BEFORE THE
NEW MEXICO OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
June 30, 1971

EXAMINER HEARING

IN THE MATTER OF:	
Application of Texas Oil & Gas Corporation, for an unorthodox gas well location, Eddy County, New Mexico.	Case No. 4562

BEFORE: Elvis A. Utz, Examiner.

TRANSCRIPT OF HEARING

MR. UTZ: Case 4562.

MR. HATCH: Case 4562. Application of Texas Oil and Gas Corporation, for an unorthodox gas well location, Eddy County, New Mexico.

MR. LOSEE: A. J. Losee of Losee and Carson, Artesia, New Mexico, appearing for the applicant. I have two witnesses that I would like to be sworn at this time.

(Witnesses sworn)

MR. UTZ: Are there other appearances?

MR. LOPEZ: Owen Lopez, Montgomery, Federici, Andrews, Hannahs & Morris, Santa Fe, for the protestant Marathon Oil. Associated with us on this case is counsel for Marathon from Houston, Jack McAdams, and we have one witness.

MR. HINKLE: Clarence Hinkle, Hinkle, Bondurant, Cox & Eaton, Roswell, representing the Western States Producing Company. We will have one witness.

MR. KELLAHIN: Jason Kellahin, Kellahin & Fox, Santa Fe, appearing on behalf of Chevron Oil Company. We will not have a witness.

MR. UTZ: Are there other appearances? You may proceed.

BRENT WATSON,

a witness, having been first duly sworn according to law, upon his oath, testified as follows:

(Whereupon, Applicant's Exhibits 1 through 3 were marked

for identification.)

DIRECT EXAMINATION

BY MR. LOSEE:

Q Will you state your name, please?

A Brent Watson.

Q Where do you live, Mr. Watson?

A Midland, Texas.

Q What is your occupation?

A District Geologist for Texas Oil and Gas Corporation.

Q You have not previously testified before this oil commission?

A That's correct.

Q Do you have any college degrees and, if so, what are the degrees and where were they obtained?

A I have both Bachelor and Masters Degree from Texas Christian University in Fort Worth.

Q In what subjects?

A In -- majoring in geology, minor in math-physics.

Q When did you graduate with your masters?

A 1961.

Q Since that time what has been your occupation?

A I was employed by Sinclair Oil & Gas Corporation out of college, worked in Amarillo, Roswell and Midland. I worked for Continental Oil Company after I left Sinclair for slightly over one year and since that time I have been

with Texas Oil & Gas Corporation in Amarillo and Midland.

Q How long with Texas Oil and Gas?

A Five years.

Q Did you say what your capacity was with Texas Oil & Gas in Midland?

A District Geologist.

Q During your period since graduation, have you attended any seminars and, if so, on what subjects?

A I have attended several electrical logging skills and drill stem testing skills, coring skills, plus I have been on a three weeks clastic seminar with Continental Oil.

MR. LOSEE: Mr. Examiner, are Mr. Watson's qualifications acceptable?

MR. UTZ: Yes, sir, they are.

Q (By Mr. Losee) Are you familiar with the application of Texas Oil & Gas Corporation in this Case No. 4562?

A Yes, I am.

Q Would you relate briefly its purpose?

A The purpose of this application is to drill an unorthodox location 990 from the north and west lines of Section 22, Township 22 South, Range 23 East. The normal pool rules are 1650 feet with 640-acre spacing.

Q Now, those are the pool rules for the Upper Pennsylvanian Indian Basin Pool, are they not?

A Yes, that's correct.

Q What is the spacing for wells in the Indian Basin-Upper Pennsylvanian Pool?

A 1650 feet.

Q No, the spacing.

A 640 acres.

Q Does Texas Oil & Gas Corporation hold a farm out on this entire section?

A Yes, we do. This was a farm out from Gulf Oil Corporation under one base lease.

Q Please refer to what has been marked as Exhibit 1 and explain what is shown by this Exhibit?

A Exhibit 1 is a structure map contoured on top of the Cisco Canyon Reef using a contour interval of 50 feet, the scale being one inch equals 2,000 feet. This map will be used to support some of our theories in Section 22 that for the -- our reasoning behind the unorthodox location.

I feel that the two important things that are on this particular map are two structural noses. There is one structural nose moving -- trending and plunging southwest across Sections 15, 14 and 23. This -- there has been a new well drilled in the basin within the last two months, the Monsano No. 1 Ralph Low located in Section 23 encountered a reef-type section at minus 3509.

This is a new point that I have introduced on this map, as well as Mr. Mershon or Western States Producing

Company's well in Section 21. You will also notice there is another southwest trending nose that I have mapped, trending through Sections 16, 21 and 28. These two noses, I think, are very important to this particular case.

Also, on the south end of this particular map, I have a dark dashed black line which indicates the limits of porosity in the Cisco Canyon Reef. I will show you the basis for this particular line on Exhibit 2 which I will introduce next.

Q Now, how far away are the closest wells to your proposed location, Mr. Watson?

A The closest well to our proposed location is the Western States No. 1 Mershon Gas Com which is 1,980 feet due west of our well. This well was drilled on an unorthodox location 990 from the north and east lines of Section 21.

The next closest well would be the Gulf No. 1 Helbing Federal due north of our location from the people that we have the farm out from Gulf Oil and it is 4,400 feet due north of our proposed location.

The Standard of Texas No. 5 Bogle Flats Well is located due northwest, is located 6,100 feet northwest of our well and the Marathon Federal 1BB Gas Com is 7600 feet northeast of our proposed location.

Q Now, when was this Monsano Well in Section 23 completed?

A This well was drilled and logged on May 4, 1971. This well was subsequently plugged later on in the month.

Q When was the Western States Well completed, approximately?

A Let's see.

Q Well, we don't need an exact date.

A It's been in about a year or so now.

Q Now, you have an area on this map colored in blue in Section 22. Would you explain what that denotes?

A As I mentioned earlier, the two southeast trending noses that I have mentioned are very important in the testimony in that they form a synclinal area in Section 22. I have a closure of a minus 3400 feet intersecting the zero porosity line in the Cisco Canyon Reef.

These conditions are necessary to form the, what I feel a trapped conate water in this particular well. This well was drilled by Gulf Oil Corporation to a total depth of 7828. A sonic log was run on this well. Induction logs were run on this well in that they felt this was an inside location and should have no problem and all they needed was a log for correlation, a gamma ray sonic log.

They ran pipe, shot the well, acidized it with a thousand gallons and have made nothing but water from this well. This caused them to scratch their heads and bring great puzzlement and what I would like to introduce is a theory that I have for this particular water in this

section and this theory is that the close low at minus 3400 subsea closes against the zero contour line. The hydrodynamic forces in this particular area that would cuase this situation were that the reef would have conate water in the porosity in this particular reef as the gas migrated updip into the west, the --

Q Now, your water was there years ago?

A Right, right. The conate water is indigenous to the formation. As the gas invaded and came updip and was coming updip to the west, then the hydrodynamic forces pressed and caused a downward pushing of the water. This water in all cases -- in most cases through this field has been pushing down to a lower elevation of an approximate gas-water contact in the field proper of a minus 3750, yet at minus 3403 we have a well up here that is making water, 100 percent water in fact, and the only logical explanation that I can come up with or one logical explanation that I can come up with is the trapped conate water or sometimes called perched water in this particular section.

The trapping of the 3400 foot contour line against the zero isopach gives you a close low and in this particular area the hydrodynamic forces would be pushing down, out of Section 21, down into this low that would be pushing south from 15 into Section 22 and, also, because of

this particular nose that comes through Section 14, there would be a southwesterly push causing the water to be pushed down into this closed low and trapped.

At this particular location where Gulf drilled, they encountered this particular interstitial water and this is the basis that I have for the blue area on my map.

Q Now, Mr. Watson, what's your dashed line along the south edge of this? Explain that again.

A Okay. The dashed line on the south edge of the field is what I would consider is the two percent porosity limit. In other words, anything south of that particular line would have no porosity in the Cisco Canyon Reef greater than two percent.

I will explain this two percent cutoff on my next Exhibit when I introduce the isopach.

Q Why doesn't the water go through that line going to the southeast?

A Because it's an impermeable barrier because you go from a porous facies, porous dolomite and limestone facies, to the north into a non-porous limestone and shale facies to the south and it's an impermeable barrier with essentially no porosity or permeability, so, therefore, it forms a trapping agent for the 3400 foot close contour.

Q Now, you mentioned the gas-water contact in the field at 3750. How do you arrive at that subsea datum?

A This was derived from studies done on drill stem tests and production data in the field proper. Well, when you get any lower than minus 3750 nearly all of the reef is water productive.

In other words, this is a general. It could be 25 feet higher, 25 feet lower, but in general -- and this has been introduced in various cases before and I think several companies use this minus 3750 as an arbitrary gas-water contact for the field, based on drill stem test and production data.

Q That was the figure you testified to in the Western Mershon's Case in Section 21, is it not?

A That's correct.

Q Is one of your other Exhibits a cross section and, if so, would you point out which wells on this structure map it runs through?

A I have a cross section. If we go from west to east, the first well on my cross section would be the Western States No. 1 Mershon Gas Com. Going then to my proposed location in Section 22, then to the Gulf No. 2 Helbing Well immediately east, then northwest to the Marathon Federal 1BB Well which was encountered at a subsea of a minus 3451. This will be introduced as Exhibit No. 3.

Q Mr. Watson, please refer to what's been marked as Exhibit 2 and explain what is shown by that Exhibit?

A Exhibit No. 2 is an isopach map of the Cisco Canyon Reef porosity greater than two percent. The two percent cutoff was used for various reasons.

No. 1, in the field rules established by Marathon in 1967, they stated that two percent appeared to be a reasonable cutoff. Also, in previous hearings before the New Mexico Conservation Commission, the two percent porosity figure has been used and testified to that porosity lower than two percent would possibly have very small, poor volume and therefore almost zero permeability, so I have used this as my cutoff.

Q Where did you obtain the data for this isopach map?

A This isopach map was derived from electric logs that have been run in the field proper, examination of those logs. Basically sonic logs. Whenever possible I used the sonic log so that the comparisons would be on the same type log.

Q Now, what is your contour through the Gulf Helbing No. 2 in Section 22?

A I have a 50 foot contour line running just north of the Gulf No. 2 Helbing Federal.

Q Now, that well did not produce gas, did it?

A This well did not produce gas and I have this -- this is not, as some people would refer to it, a net pay map. This is a porosity isopach map dealing with the porosity in the formation, irregardless of the fluid within the

formation, whether it be gas or water, and this well had 34 feet of this type porosity.

Q Now, how much porosity did you credit for the Western States Well?

A I gave the Western States Well 25 feet of porosity greater than two percent.

Q Now, this recently completed Monsano Well in Section 23, how much porosity did you give it?

A I assigned it 3 feet. It had two foot in one zone and another foot in another zone. The zone becomes rather shallow in this area and I also used the gamma ray cutoof as well as the porosity cutoff.

I used, I believe, 50 API gamma ray units as the cutoff on this thing. Anything cleaner than five units from the left-hand side of the log I considered as possibly clean enough carbonate to be productive and then greater than two percent and it had three feet. The zone correlates very well with the reef pay in the field.

Q Mr. Watson, in your opinion, does this isopach fairly represent porosity in the Cisco Canyon Reef?

A Yes, I think it does. I have tried to use a constant thickening interval in this across the field and the rate of thickening across the field, as far as porosity build-up, appears to be between 200 and 250 feet, using a constant rate of porosity build-up and decline and I have

shown a thickening area pushing through Section 22 and I feel this map is representative of the reef.

Q All right. Now, have you polemitered the area below your two percent porosity line in Section 22?

A Yes, I have.

Q How many acres were in that area?

A I show 61 acres with less than two percent porosity.

Q So this 579 acres would be above the two percent porosity line in Section 22?

A That's correct.

Q Now, let me ask you to refer back to your Exhibit 1 and ask if you have polemitered the area in the trapped water section colored in blue located in Section 22?

A Yes, I have. There is one -- there are 139 acres within the perched water column.

Q That still has the 61 acres below the zero line, is that correct?

A That does not include the 61 acres. The total of the two would be 200 acres. That would be the total of the perched water plus the 61 non-porous acres.

Q So that in Section 22, referring to your Exhibit 1, excluding that porosity less than two percent in the reef and excluding the perched water, trapped water area, there's 440 acres, is that correct?

A That is correct.

Q Please refer to what has been marked as Exhibit 3 and explain what is shown by this cross section?

A Exhibit 3, as I mentioned earlier, is an east-west cross section across the field. The purpose of this cross section is to show that wells both updip and downdip from the Gulf No. 2 Helbing Federal are gas productive from the Cisco Canyon Reef.

The Southwestern or now Western States Mershon Gas No. 1 Gas Com was potentialed for an IPCAOF of 7,400,000 cubic feet of gas per day with a gas-liquid ratio of 197,200 to 1. This well, according to my structure map, will be updip to the proposed location.

Then, coming through our proposed location downdip we see the Gulf No. 2 Helbing Federal Well which I stated earlier had been perforated in the Cisco Canyon Reef and swabbed 115 barrels of water in 6 hours.

Then, coming downdip, the Gulf Helbing Well is at a subsea of a minus 3403. At a subsea of a minus 3451 due northeast of that in this would be the last well on my cross section, the Marathon Oil Company Federal 1BB Com, was completed for an IPCAOF of 15,187,000 cubic feet of gas from a lower interval in the Cisco Canyon, perforations being from 7543 to 7564.

Again, this again shows the anomalous condition present in Section 22. We have updip gas, we have downdip

gas and in this particular area in Section 22 we have water. This well is definitely anomalous.

Q In your Western States, what was your subsea datum on that?

A It was a minus 3197, 205 feet.

Q Low to the Gulf Helbing No. 2?

A Right, it was high to the Gulf Helbing No. 2.

Q Yes, high. Then, further up the Marathon dip your subsea was 3451?

A That's correct.

Q And so it was downdip from the Helbing about 50 feet?

A That is correct.

Q Were Exhibits 1 through 3 prepared by you or under your supervision?

A Yes, they were.

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

MR. UTZ: Without objection, Exhibits 1 through 3 will be entered in the record of this case. Are there any questions of the witness?

CROSS EXAMINATION

BY MR. RAMEY:

Q Is this Western States Well, the one that you referred to as Western States, the one you have labeled Southwestern Natural Gas?

A Yes, that's correct. It was drilled as Southwestern Natural Gas.

Q But, it's the well in Section 21?

A Yes, that's correct.

CROSS EXAMINATION

BY MR. McADAMS:

Q Jack McAdams of Marathon. Could you explain again to me these noses that you say create this perched water table?

A The Marathon No. 1 Federal 1BB located in Section 14 has a subsea of a minus 3451. The Monsano No. 1 Low located in Section 23, almost two miles south, has a subsea of minus 3509.

There's 50 feet of dip between those two wells and I defy anyone to show me anywhere where the rate changes to 50 feet in a mile there. In other words, you would have one contour between those 2 wells.

Also, in Section 15 you have a very high well coming in at a subsea. This is the Gulf No. 2 or No. 1 Helbing Federal comes in at a subsea of minus 3099, an extremely high point, which gives us the high nose starting from up here and I feel that the nose has to pull between these two flat wells.

I have a high point here, two essentially flat points here and I pull the nose through this particular area.

MR. LOSEE: You will have to explain to Mr. Utz.

THE WITNESS: Okay. I have the nose pulling from a minus 3100 at the Gulf No. 1 Helbing Federal down to -- in order to keep my contour interval that I have shown throughout the map, I have to pull this nose down through Sections 14, the south half of Sections 14 and the north half of Sections 23.

I feel that this is a legitimate sub-surface interpretation.

Q (By Mr. McAdams) This is closing against a porosity barrier here?

A Yes, the minus 3400 foot contour here, you see, intersects the porosity barrier, it intersects the porosity barrier here.

Q This is your two percent porosity cutoff?

A Right.

Q How do you determine the western extremities of this perched water table?

A The western extremities? Again, this is a sub-surface interpretation. The Southwestern well located in the northeast quarter of Section 21 came in at a subsea of minus 3197.

Using a constant rate of dip from 3200 to 3400, you are coming from high here to a low in here, and using a constant rate of dip that's -- I have to come up with this interpretation here. You are coming from high down into

a low; you are coming from high down into a low.

MR. LOSEE: What you are referring to is you are coming from a high in Western States Well down to the Helbing and coming from a low up here in the Marathon -- or a high?

THE WITNESS: High up here, right, down to a low here.

MR. LOSEE: High in the Gulf Federal Helbing No. 1.

Q (By Mr. McAdams) You have here a circle in Section 22 and at the proposed unorthodox location, is that right?

A That's correct.

Q This arrow pointing to it on Exhibit 1?

A That's correct.

Q What does this other little penciled in circle represent?

A This is the orthodox location, 1650.

Q Why do you need an unorthodox location if you are sure this perched water is over that far?

A Again you will notice that the structural advantage is very negligible coming from 1650 up to here. The reason we need an unorthodox location is because of correlative rights.

In this particular area, we have a well 990 off this lease line which certainly we feel like we need correlative rights to produce at least the same distance from the western-most lease line as Western States. In other words, they have a drainage advantage over us.

Q Won't a well placed there protect you as much as one here?

A I would think that a well 990 is going to protect its drainage rights certainly better than a normal location at 1650 with a well that's unorthodox offsetting the lease line.

In other words, if this is unorthodox, 990, and again you can argue the drainage patterns backwards and forwards, but if there's a well 990 off your lease line, you cannot protect your rights. We are not interfering with any of the wells to the north. That's not the problem because they are all quite a ways from this particular lease, but the well that we are interested in is the well that's 990 off the particular Gulf farm out that we have and we feel that we have to protect our correlative rights by staying 990 off of this particular lease line.

Q Don't you interfere with other people's correlative rights?

A Well, in this particular case --

MR. LOSEE: Whose correlative rights?

THE WITNESS: I am 6100 feet from Standard of Texas and 7,600 feet from Marathon.

Q (By Mr. McAdams) That's right.

A I am certainly not taking your gas, I don't think. I may be.

Q You said you weren't familiar with the drainage patterns?

A Right. It may drain two miles.

Q This well here doesn't have a 990 location protecting it, does it?

A That's correct.

MR. UTZ: Which well is that?

MR. McADAMS: The Bogle Flats in Section 16.

CROSS EXAMINATION

BY MR. LOPEZ:

Q Along these same lines, Mr. Watson, why do you suppose the Mershon Well in Section 21 was granted an unorthodox location and why was it necessarily applied for?

MR. LOSEE: I don't think the witness is capable of answering.

THE WITNESS: I was not present at the hearing, so I --

Q (By Mr. Lopez) Referring to your strong dotted line at the bottom, which you have indicated is limits of porosity, what control factors did you use in bringing that line so far south under Section 22?

A The Gulf No. 1 Helbing Federal Well located immediately north of our well has 187 feet of porosity greater than two percent which is an anomalously thick area pulling out in through here.

Using a normal rate of dip on my 25 foot contour

interval coming down, I feel like that there is a definite thick trending in this direction. This, again, is subject to interpretation. Someone might want to fiddle with the contours and pull the zero line up a little higher. Again, this is an interpretation based on an extremely thick well due north of us.

In Section 16 the Standard of Texas No. 5 Bogle Flats has 96 feet of porosity greater than two percent. As we move one mile to the east to the Gulf No. 1 Helbing Well, we have an increase up to 187 feet of porosity greater than two percent.

Then, when we move due east of this well to the Marathon No. 1 Federal BB, we again drop back to 75 per cent. I feel like that there's a thick area setting up, running down through Sections 15 and into Section 22 based on sub-surface interpretation.

Q Could you refresh my recollection and tell me how many feet of porosity you found in that watered out well in Section 22?

A 34 feet.

Q How did this justify your finding a thickness running down through this area?

A Any time I get two low points and I have a high point trending with it, I put the high point through this thing. That's the way a good sub-surface geologist finds

oil is coming between two low areas trending it with a high well and that's what I have done in this particular area. I feel like that this is the interpretation that best justifies this Section 22 and I feel like that we are going to find it thick in this location.

We will not know until we drill it, but --

CROSS EXAMINATION

BY MR. KELLAHIN:

Q Along the same line, how much of that thickness did you find in -- my map shows the Mershon Well in Section 21. I believe you referred to it as Western States.

A That's right, the name has been changed.

Q What's the thickness there?

A I give 25 feet of porosity greater than two percent.

Q Then you come straight across and get 34 feet of porosity?

A That's correct.

Q Wouldn't it be just as logical to smooth out that line and say the whole area was between 25 and 34 as to develop that nose?

A If I pull my 25 contour through here, then I have to change and make an anomalous condition on my rate of thickening in this area. In other words, I would go from 187 to 25 in this space whereas all the rest of the area I have been able to contour this very well with the 25 foot contour interval rate of dip of almost 200 feet per

mile.

Q That would not be unusual to approach the end of the field, would it?

A Again, we go from 182 -- we have some --

MR. LOSEE: Which wells, again?

THE WITNESS: The Pan American No. 1 USA Smith Gas Unit has 203 feet of pay greater than two percent in Section 12. We move immediately south in Section 13 and we have 18 feet. But, again, the rate of dip I have used is approximately -- that's the 200 to 250 feet of per mile of thickening in the porosity.

Q (By Mr. Kellahin) You said you were concerned about the drainage from the Western States Well in Section 21.

A Yes.

Q Do you know what acreage is dedicated to that well?

A Yes. I believe that they received -- they can produce with 56 and a quarter percent of their allowable. I believe that's what they produce.

Q Weren't they given 320 acres?

A I believe they received 360.

Q What would you propose for your well in Section 22?

A Based on the perched water idea, 440 acres.

Q Is all that acreage productive in your opinion?

A I feel like that everything above minus 3375 above the perched water has not been proven non-productive and I

can say that it could just as easily be productive as non-productive and the isopach in here would show the same thing. Again, this is highly interpretive and this is my interpretation and I give the Southwestern Well approximately what their penalty was, was about what it comes up.

MR. KELLAHIN: Thank you.

CROSS EXAMINATION

BY MR. GIST:

Q What is your basis again for the closure there in the southeast quarter of Section 21?

A The southeast quarter?

Q I think that interpretation is as critical as anything to this.

A Monty, we have a point on the Ralph Low Marathon Federal at minus 3322. We have a point in the Hannigan No. 1 Indian Federal in Section 21 of minus 3050, as well as the Western States Well at 3197.

If we go ahead and close this 3100 foot off and close the 3200 foot off, I can't get down to the 3322 well without changing my rate of dip, so I have to pull some sort of anomalous nose or pull-out in this area. In other words, using my rate of dip, I would go 31, 32, 33, 34, I should encounter this well at minus 3400, 3450 and I encountered it at minus 3322.

Q The structural interpretation is interpretive in this case?

A It certainly is. This is my personal interpretation, that's correct.

MR. UTZ: Are there other questions?

REDIRECT EXAMINATION

BY MR. LOSEE:

Q Now, I thought I asked you on direct examination as to you polemitered above the perched water and above the 2 percent line, total of 440 acres, and I thought I obtained your opinion as to whether it was probable that all that area was productive of gas in the Upper Pennsylvanian.

A Yes.

Q Is that your opinion?

A This is my opinion that 440 acres, excluding the 61 acres below 2 percent and the 139 acres within the perched water, would be gas productive.

Q And that's in Section 22?

A Section 22.

MR. LOSEE: I have no further questions.

MR. LOPEZ: Mr. Examiner, just one question. Do you think you should be penalized for the unorthodox location?

THE WITNESS: Certainly if this particular theory of the perched water is accepted, deducting these two particular

footages, we certainly would have to be penalized for that amount of acreage that's not productive.

MR. LOPEZ: You said you had 440 productive acres in your opinion. Do you think that you should have an additional penalty for the unorthodox location above the 440 and, if so, what would you recommend?

MR. LOSEE: I don't know, Mr. Examiner, that Mr. Watson is capable really of answering the question.

THE WITNESS: I am not familiar, being the first time I have testified at the hearing, as to what kind of penalties are normally assessed in these type hearings.

RECROSS EXAMINATION

BY MR. McADAMS:

Q Mr. Watson, you wouldn't contend that you would be entitled to an allowable greater than the Mershon Well, would you?

A In this particular case, I think that we should receive an allowable slightly more than the Mershon Well. I show that we have more productive acreage than they do, slightly.

Q That's based on your interpretation?

A Yes, and the perched water table less the non-productive; I show we have slightly more acreage. I think they received 360 acres and I feel like we have at least 80 acres more, based on this interpretation, than they.

Q Are you familiar with the history of the Hannigan Well that was located, dry hole over in Section 21?

A Yes. I looked at that log and this well, of course, was drilled before this other, before the Western States Well was drilled, and again this was a point of contention evidently in this hearing, which I am not familiar with all the testimony, but evidently this well was a point of contention and even though it was plugged -- if you want to, I could take -- we could take that out but that would hurt Western States even more.

Q How many feet of pay did you give that well?

A I gave this well 23 feet of porosity greater than 2 per cent. I really don't understand that well, I really don't.

MR. UTZ: You don't understand which well?

THE WITNESS: The Hannigan Well, with 23 feet, why it was not productive, but that's not in our hearing, I don't think. I think that's already been battled out in this other hearing.

MR. UTZ: There was a little contention between that well and the Mershon Well.

THE WITNESS: I see.

Q (By Mr. McAdams) That Hannigan Well is located well above your zero porosity cutoff, isn't it?

A Yes, it certainly is. 23 feet of porosity, that's correct.

MR. HATCH: How many productive acres have you attributed to the Mershon Well?

THE WITNESS: Using a rough polemiter method on their particular tract in there, I feel like they probably had at least 400 productive acres based on this interpretation.

MR. UTZ: Your estimate is 400?

THE WITNESS: At 400, that's correct.

MR. UTZ: Are there other questions? The witness may be excused.

THE WITNESS: Thank you.

GEORGE SUTPHEN,

a witness, having been first duly sworn according to law, upon his oath, testified as follows:

(Whereupon, Applicant's Exhibit 4 was marked for identification.)

DIRECT EXAMINATION

BY MR. LOSEE:

Q Would you state your name, please?

A George Sutphen, S-u-t-p-h-e-n.

Q Where do you live?

A Midland, Texas.

MR. UTZ: Would you spell that again?

MR. LOSEE: S-u-t-p-h-e-n. That's Dutch.

MR. UTZ: I gathered it might be.

Q (By Mr. Losee) What's your occupation?

A I am a Petroleum Engineer.

Q Employed by Texas Oil --

A Texas Oil and Gas Corporation.

Q Have you previously testified before this commission?

A No, sir, I have not.

Q Do you have any degrees and, if so, what are they and from what schools were they obtained?

A Yes, sir, I have a degree in petroleum engineering, a Bachelor of Science from Texas A & M University.

Q When did you obtain this degree?

A 1958.

Q Since that time, have you been employed as a petroleum engineer?

A Yes, I have.

Q For what companies?

A For approximately ten years I was employed by Pan American Petroleum Corporation as a petroleum engineer. About half that time I spent in engineering assignments involving drilling, production and evaluation of drilling prospects. The other half of that ten-year span was spent in various assignments in reservoir engineering. About two years of that was in the supervisory capacity.

Q At what general areas during this ten-year period were you --

A I was employed during that entire period in the Permian

Basin and Delaware Basin areas, Levelland, Monahans and Midland.

Q After you left Pan American, by whom were you employed?

A I was -- I have been employed for approximately the last year and a half by Texas Oil & Gas as the Midland District Engineer.

Q Since your graduation from school, have you attended any seminars?

A Yes, I have. I attended two Pan American seminars.

Q On what subjects?

A I attended approximately a six weeks seminar in gasoline plant engineering and another six week seminar in reservoir engineering in the company's general office in Tulsa.

I also have attended numerous industry seminars in logging, core analysis, drill stem testing and so forth.

MR. LOSEE: Are Mr. Sutphen's qualifications acceptable?

MR. UTS: Yes, they are.

Q (By Mr. Losee) You have heard the discussion about the Gulf Helbing Federal No. 2 located in Section 22. Would you give a brief resume of the completion efforts made by Gulf in drilling this well?

A Yes, I will. Gulf drilled the Helbing Federal No. 2 to a depth of 7823. At that point they ran a gamma ray sonic

log. At this point I have discussed with Gulf personnel the fact that all indicators were favorable; drilling time, sample analysis, log analysis, structure position, everything was favorable.

At that point Gulf went ahead and ran pipe without further testing. Now, other than the use of centralizers and scratchers on the casing, I find no record that Gulf took any special precautions to insure that they had a good cement bond either between the cement and the formation or the cement and the pipe.

Q Would you, in a similar reef reservoir, take any precautions to insure a good cement job?

A Yes, sir, I would. I would take several extra precautions, especially in any Pennsylvanian type formation.

Q What would those precautions be?

A First of all, we commonly use rusty or stripped pipe, pipe that has the mill lacquer removed. We also quite commonly use an abrasive type slurry to precede our main cement slurry.

Q After they ran this pipe and cemented it, what did Gulf do in their completion efforts?

A Gulf shot 12 holes over 6 different intervals in the reef from 7684 to 7573 on a subsea basis. This is minus 3409 to a minus 3520. Now, this 3520 is 230 feet above the water-oil contact in this general vicinity.

Q Which is at 3750?

A Yes, sir, at minus 3750.

Q Then, what happened in their --

A Then Gulf swabbed the well dry, natural, with no show; swabbed clear to the seeding nipple. They then acidized with a thousand gallons of acid and subsequently the well made 100 percent water.

Q Please refer to what has been marked as Exhibit 4 and explain what is shown by this Exhibit?

A As I said, the fact that the well made 100 percent water, although all other indications had been favorable, caused Gulf to run a radioactive tracer survey.

Now, before we get into the results and interpretation of this survey, let me make a few brief statements about how this survey is run. First of all, the well is placed on injection, since normally it's difficult to establish a producing rate, especially in this case with the well having to be swabbed to produce anything.

They turned it around and put it on injection at the rate of one barrel a minute on a vacuum. Then, the tracer type survey is run in this manner. The tool is raised above the zone of investigation and a small slug of liquid radioactive material is ejected and naturally it's forced down by the injecting fluid. The tool is then lowered and logged back up through this downward moving radioactive

slug.

The second type of tracer is run with the tool in a stationary position. The tool is composed of the ejection ports at the top of the tool and generally one or two detectors located near the bottom of the tool. Now, these distances between the port and the radiation detectors are, of course, known distances, so with the tool hung stationary, the time required for the radioactive slug to reach the radiation detectors can be measured.

Let's go now to the Gulf survey. The first time on the tracer no. 1 the radiation tool --

Q Let me stop you here. Explain the log.

A Excuse me. Yes, let me explain this display. This is a comparison of the sonic log of the Gulf Helbing Federal No. 2 on the left and the results of the tracer survey hung on depth scale on the right.

Now, the points A, B and C denote different places where the radioactive material was ejected. The arrows with small o's are the perforations. Now, tracer no. 1 was run with the injection -- pardon me, with the tracer tool hung at a depth of 7520 which is point A. As you can see, this is above all the perforations in the well.

At that time, the log was -- the tool was lowered and logged back up through the moving slug. As you can see on run no. two, which is run a minute -- almost two

minutes after ejection, we already have some indication of channeling, that is radiation 20 feet below the main slug. As time progressed, additional channeling was indicated with radiation being detected clear down to a depth of 7730 --

Q Below the lower most perforations?

A -- which is approximately 46 feet below the lowest perforation in the well. On tracer no. -- pardon me, the tracer no. 1 was not too definitive for this reason, by the time the tool got to the slug on the first run, it had already moved past the first perforation so we couldn't tell -- as result of this, we couldn't tell whether there was any fluid going in the first perforation.

They then ran tracer no. 2. Now, because they got down a little faster, this tracer run is a little more definitive and defines in the first 7 runs that approximately -- in fact, virtually all, 100 percent of the water is going into perforations no. 2, 3 and 4. Now, this interpretation is made by polemitering the size of these radioactive kicks after they passed certain perforations.

In any event, the liquid was entering the perforations no. 2, 3 and 4, very little fluid entering perforation no. 1. The significant point in this survey, however, is that again we have detected radiation, interpreted as

channeling, already below the main slug before it has passed perforation no. 4.

As time progressed, and the tool was run lower, logging back up through the radioactive slugs, we see additional indications of channeling. By run no. 11, which is 17 minutes after ejection, we see definite indications of channeling, large radiation down to 7700 and by run no. 17, we can follow this diminishing radiation indicating channeling down this time to 7710.

So, on two separate tracer runs and on separate tracer surveys and on numerous runs, we have positive indication of channeling as low as 7730, which is 40 feet below our lowest perforation and at least 20 feet below the base of the reef.

Now, we know this is channeling because of tracer no. 3. Tracer no. 3 was run with the tool stationary and hung at a depth where the ejection was just above perforation no. 5, right here at 7663 and a half. Now, that perforation is at 64, 7664. With the tool hung there and the detectors, of course, below that perforation as shown on this Exhibit, 7668, and the detector no. 2 at 7673, no radiation was detected, indicating that no fluid was moving inside the pipe below perforation no. 5. Consequently, any radiation detected at that point or below has to be outside the pipe.

Tracer no. 4 was run with the tool hung at a depth of 7500 and was merely a packer check. We had tubing in the hole with the packer set at about 7510. As you can see, with the detectors hung inside the tubing, the birch naturally passed the detectors and was never picked up as a channel behind the pipe at the packer.

Q Now, Mr. Sutphen, do you have an opinion as to what caused the water in the well bore and the Gulf Helbing Federal No. 2 well?

A Yes, sir, I sure do. Obviously, we do not -- we cannot tell exactly or precisely where the water came from. This survey, which is run by the operator under the same conditions, mechanical conditions that the well was in when they slugged 100 percent water, indicated that a channel did exist. They tell us that at least some of the fluid that was produced on the swab test probably came from a depth as low as and probably below 7730.

Now, since only one fluid was produced, the well made 100 percent water, I would assume that all of the water production came up this channel.

Q That's below the gas-water contact in this field, that 77 --

A No, sir. The water-oil contact would be below 7730, somewhere down there.

Q Yes, but it was below their lowest most perforation?

A Yes, sir, and below the base of the Pennsylvanian.

Q Was Exhibit 4 prepared by you?

A Yes, sir, it was.

MR. LOSEE: We move its introduction.

MR. UTZ: Without objection, Exhibit 4 will be introduced into the record.

Q (By Mr. Losee) Now, Mr. Sutphen, you heard the testimony about the unorthodox location at 990 feet out of the north and west corner and if I were to advise you that the rules of the Oil Conservation Commission provide that if an operator is given an unorthodox location, the Commission can make an adjustment to offset the advantage obtained, do you have a recommendation to the Commission in this connection?

A Yes, sir, I sure do. On the theory and I think a justified theory that the water production on the Gulf Helbing Federal No. 2 came from a zone unknown, other than the Pennsylvanian, this well does not condemn Section 22. On that basis, all the acreage that we adjudge to be above the two percent porosity cutoff would be net pay.

This amounts to 579 net acres. On the other hand, since I admit that we are not certain that all the water produced in the Gulf Well came from a zone other than the reef, although we have no evidence on this log that any of the fluid was going into or coming out of the reef, we feel

that there is a possibility that the perched water concept applies which would give us 440 net acres above the two percent cutoff and outside the perched water zone. I feel that a reasonable compromise between the 440 net acres and 579 net acres or a net acre assignment of 509 acres would be fair in this case.

MR. LOSEE: Mr. Examiner, I would move that you take administrative notice of the evidence in the examiner and de novo hearing, Case No. 4089 being the application of Paul Mershon for the unorthodox location in Section 21.

MR. UTZ: Without objection, the examiner will take administrative notice of the case and Order R-4089.

MR. LOSEE: That's case number, not order.

MR. UTZ: The case?

MR. LOSEE: Yes. I don't have the order. That's all the direct examination of Mr. Sutphen that I have.

MR. UTZ: Mr. Losee, as far as Case 4089 is concerned with this case would be as it relates to Section 22.

MR. LOSEE: Yes, surely.

MR. UTZ: Okay. Questions of the witness?

CROSS EXAMINATION

BY MR. HINKLE:

Q I have one question. Referring to your Exhibit 4 and these tracer surveys --

A And these what, sir?

Q The tracer surveys that were made, shown by your Exhibit No. 4, do they in any way indicate that there was any gas in the formation, producing formation?

A There is no way that I know of that they can. This tool is not a gas detection tool.

Q So far as you know, there was no evidence of any gas whatsoever in the original test of the well?

A That's correct.

MR. HINKLE: That's all.

MR. UTZ: Are there other questions?

CROSS EXAMINATION

BY MR. GIST:

Q I have a question. In your survey there, your base perforation is 77?

A It's 84.

Q 7684?

A 7684, yes.

Q Your tracer surveys, you say, indicate that your slug goes down to a depth of 77 --

A 7730 was the lowest channel radiation indicated.

Q Could they not run their tool any lower than that?

A I tried -- no, they could run it lower and I wish to goodness they had and I tried to contact the employee of the tracer company that ran this and I was unable to do so, but I don't know why they didn't run it any lower.

Q Indications are that your tracer tells you that you are perhaps losing some or having some channeling down into a shale section that comes in at approximately 7710?

A This doesn't indicate that the fluid is entering the shale section. It merely indicates that the radioactive material was opposite the shale section at the lowest point that they ran the tool.

Q But, it does die out down in the shale section?

A No, sir, we don't see it die out on that particular run at 7730. It is still a quite strong indication.

Q Point that out to me, if you will.

A At 7730 you can see we are still recording some radiation to the right of the base line. This is the base line, this dashed line.

Q But, your big slug is right here below your basal perforation.

A The big kick is. Now, several things govern the magnitude of that kick. One of them is dilution in the fluid you are injecting, hole size, several different things, so it's not completely interpretive.

The one thing it does prove is that there is channeling.

Q At what rate were you injecting water?

A One barrel per minute.

Q On this survey over here, do you get an indication below

7710?

A No, that's as low as we get, but as you can see, the depth of the channel is increasing on these successive surveys, so it's safe to assume, I think, that we would continue to see it move down if it didn't become completely diluted.

Q What's the subsea TD of this well?

A I don't know.

Q Would it be 3659?

A That's correct.

Q Other than the perched water table that you carry at 3377, the top of the gas-water --

A I would have to look at the Exhibit. Yes, I believe that's correct.

Q Your perched water level is at 3377 and for the majority of the field the water level is at minus 3750?

A Right.

Q TD of this well is at minus 3659?

A Right.

MR. UTZ: Are you through?

MR. GIST: Yes.

MR. UTZ: Mr. Kellahin.

CROSS EXAMINATION

BY MR. KELLAHIN:

Q The Exhibit you presented in no way indicates where the water would be coming from in that well, would it?

A Unfortunately no, not a specific point.
Q Now, the perforations that were in that well bore would have been within the gas zone had there been any gas there, would they not?
A Yes, sir, the well was perforated in the gas zone.
Q Did it make any gas at all?
A No, sir.
Q If it had been perforated in the gas zone and was completed below the water-gas contact, why wouldn't you have a two phase flow,both gas and water?
A If fluid was coming out of the formation you probably would have.
Q But, it didn't in this case?
A That's right.
Q That would indicate there's no gas there?
A No, sir, it just indicates the fluid was coming up the channel.
Q Wouldn't the gas come out of the formation in a well of that kind?
A It would not be improbable that no fluid would be produced out of the formation if a bad enough channel existed.
Q Does this indicate that a bad enough channel did exist?
A It only indicates that a channel did exist. We would have to have more tests run to determine how bad the channel was, but the well was injecting 1440 barrels a day on a

vacuum and if it was all going down that channel it was a pretty bad channel, yes, sir.

Q So any gas would not come out of the formation in that case, is that your testimony?

A No, sir. I don't know why no gas was coming out of the formation. I feel it should have.

Q But, it didn't?

A No, sir.

CROSS EXAMINATION

BY MR. LOPEZ:

Q Mr. Sutphen, along these same lines, if Gulf had agreed with your interpretation, don't you believe they would have squeezed off the well and reperforated it?

A Yes, I am confident they would have.

Q Do you know why they did not?

A Yes, I did. I inquired of Gulf why they did not and on the original interpretation the fellow that ran it I feel misinterpreted the data and apparently the matter was not delved into any deeper.

Q It's just as likely, though, he was convinced by the questioning Mr. Kellahin brought out, since it was making no gas there was probably no gas there?

A Yes, that's true.

MR. UTZ: It's your opinion, then, that Gulf was in error?

THE WITNESS: Yes, sir.

MR. UTZ: Are there other questions of the witness?

MR. LOSEE: I have no further questions.

MR. UTZ: The witness may be excused. Who wishes to go next?

MR. HINKLE: We have one witness to be sworn, Monty Gist.

(Witness sworn)

MONTY GIST,

a witness, having been first duly sworn according to law, upon his oath, testified as follows:

(Whereupon, Applicant's Exhibits 1 through 3 were marked for identification.)

DIRECT EXAMINATION

BY MR. HINKLE:

Q State your name and your residence.

A I am Monty Gist. I represent Western States Producing Company.

Q Reside at Midland?

A Reside at Midland, Texas.

Q Have you previously testified before the Oil Conservation Commission --

A Yes, I have.

Q -- and qualified as a petroleum geologist?

A Yes.

Q Your qualifications as geologist are a matter of record with the Commission?

A They are.

MR. HINKLE: Qualifications sufficient?

MR. UTZ: Yes, sir.

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

A Yes, sir.

Q Refer to Exhibit No. 1 and explain what this is and what it shows?

A Exhibit No. 1 is a structure map contoured on top of the Pennsylvanian Reef. It is also showing an isopach of the gross dolomite producing zone and the dashed contoured line --

Q The isopach is shown by the dotted line?

A That is correct. There is a cross section index colored in red labeled "A" to "B". Section 21 showing the location of the Western State Producing Company No. 1 Mershon Gas Com.

It is also showing the 360 acres dedicated to the gas well.

Q That is to your gas well?

A That is to Western States Producing Company's gas well. It shows the proposed location of Texas Oil & Gas Well at

a 990 location.

Q That's in Section 22?

A Section 22. It shows the estimated gas-water contact in the Gulf No. 2 Helbing in Section 22 and the minus 3750 gas-water contact that's carried for the remainder of the field.

Q What acreage does Western States own and operate?

A Western States owns and operates most of the acreage in Section 21 and all of the entire 360 acres is dedicated to the well.

Q Have you made a study of the wells that have been drilled in this area?

A Yes, sir, I have.

Q And of the Gulf Helbing Well and the way it was completed?

A Yes, sir, I have.

Q Do you agree with the testimony that has been given here as to the manner in which it was completed?

A I agree that the well was perforated in the Pennsylvanian Reef and acidized and swabbed water at the rate of 115 barrels in six hours.

Q And so far as you have been able to obtain, there is no evidence of gas in the formation whatsoever?

A There is no reported trace.

Q At the time your well was drilled, did you have this same structural map or substantially so?

A Yes. The contours had to be revised. Our well came in approximately 140 feet lower than we had originally anticipated, thus drawing the southeast flank of this structure in tighter to our well.

Q Now, based upon the contours and your isopach indication here which is the dotted lines, the dotted line across Section 21, the north of that represents the 360 acres that's dedicated to your well?

A Yes, sir.

Q Now, have you made a study to determine the probable productive acres in Section 22?

A Yes, sir, I have.

Q Now, before getting into that, refer to Exhibit 2 and explain what this is and what it shows?

A Exhibit 2 is a cross section that extends from Section 16, the Standard of Texas No. 5 Bogle Flats unit, south to the Hannigan No. 1 Indian Federal in 21, northeast to the Western States No. 1 Mershon Gas Com, southeast to the Gulf No. 2 Helbing Federal, northwest to the Gulf No. 1 Helbing Federal, then east to the Marathon No. 1BB Federal.

Q Does this show the structural position of these wells you have mentioned?

A The cross section shows the top of the reef and the base of the reef. It's hung on sea level, so you get relative position here with respect to the gas-water contact at

which I am carrying in the well at 3401. It shows the Gulf Well, the entire section of the Pennsylvanian Reef to be below the gas-water contact.

Of course, the gas-water contact was based on this. The entire producing section of the Western States Well is above the top of the reef in the Gulf No. 2 Helbing.

Q What do you conclude by this Exhibit, if anything?

A I feel that the Gulf Well definitely tested formation water. I agree with Mr. Watson's statement that we probably are in a perched water table. However, I do not think you can produce or swab water at the rate of about 19 barrels an hour from a conate situation.

In other words, I don't think this is conate water.

Q Do you think that could have been caused by channeling as indicated by these tracer surveys?

A I do not suspect that.

Q Do you have any further comment with respect to Exhibit No. 2?

A No, sir.

Q Refer to Exhibit 3 and explain what it is and what it shows?

A Now, Exhibit 3 is just a copy of Exhibit 1 with the exception of my estimated productive acres.

Q Now, how did you go about making this estimate?

A I made the estimate on the basis of a ten-acre grid pattern.

Q This would indicate that all below the 360 acre line in Section 21 is non-productive, would it not, considered non-productive?

A Yes.

Q Have you extended that line, then, east?

A This map shows the southern limit of the Western States productive acres as determined by the Oil Conservation Commission.

The Conservation Commission drew the southern boundary of our proration unit. Therefore, if the southern portion of Section 21 was non-productive, I felt that the southern half of Section 22 would also be non-productive.

That portion below the water table definitely and because of water production in the portion above the water table tied an impermeable --

Q Would be non-productive?

A -- would be non-productive.

Q That leaves outlined in red or orange there how many acres?

A That leaves approximately 257 acres. Now, I will point out that I did not have on this map the control of the well in Section 23, the subsea value of which was 3509.

Now, in recontouring that and swinging the contour lines around to meet that well, I can possibly give about ten more productive acres to this.

Q So, possibly increase it to 267?
A Yes.
Q Now, if the Texas Oil & Gas Corporation drilled their proposed well in Section 22, is it your recommendation that the acreage to be dedicated to it not exceed 267 acres?
A That is correct.
Q Do you have any other recommendations to the Commission?
A No, sir, no other recommendations. I do feel that they are very familiar with the proceedings relative to the Mershon Case, 4088. Basically, we are dealing with the identical situation here.

They have been through a preponderence amount of information. From that they arrived at a southern limit of productive acreage in Section 21 and I feel nothing has been offered to make them alter their decision as far as 22 is concerned.

Q Do you have any comments to make with respect to the Exhibits that were introduced by the applicant in this case?
A No, sir.

MR. HINKLE: We offer in evidence Exhibits 1, 2 and 3.

MR. UTZ: Without objection, Exhibits 1, 2 and 3 will be entered into the record of this case.

MR. HINKLE: That's all of our --

MR. UTZ: Mr. Gist, I will have to admit that I have determined in my own mind that through these cases and my experience with the other case that geology is not an exact science.

Are there questions of the witness?

MR. LOSEE: Yes, I have questions.

CROSS EXAMINATION

BY MR. LOSEE:

Q Mr. Gist, your Exhibit 1 does not show the Monsano Well in Section 23, does it?

A No, sir, it does not.

Q That location is 1680 from the south and east lines of the section, is that correct?

A That is correct.

Q And if the reef came in in that well at a subsea datum of 3559, what would that do to your structure on the Upper Pennsylvanian Reef? What do you show it at that point?

A At that point your 3500 foot contour would have to come around to your location. It would be on the northwest side of your location. You contour that out and bring your minus 3400 where I carry the gas-water contact, you swing that around more to the east, thereby picking up as I mentioned in my testimony roughly probably ten more acre feet, productive acres.

Q Let me ask you to spot that location on your map, would you,

and see where it comes in at 3559. Let me ask you to do it on the one that's being introduced, I'm sorry.

What contour line are you closest to on your Exhibit? This was 3559.

A Let me get that top again. What was your top?

Q 3559.

MR. RAMEY: This Exhibit says 3509.

MR. UTZ: Your Exhibit says 09.

MR. WATSON: Let me calculate it. It's actually minus 3559 is correct. That must be a drafting mistake.

MR. UTZ: Are you sure about that?

MR. WATSON: Let me check it. 59.

MR. UTZ: 3559?

MR. WATSON: Yes.

Q (By Mr. Losee) So, Mr. Gist, the contours around that well, you have it coming in at 36, a little less than 50, and those contours would have to move 100 feet to the south and east, would they not?

A Yes, sir, to pick up that point, but you can't ignore the 3401 in the Gulf Helbing.

Q At least at the point of the Monsano Well they would have to be 100 feet to the south and east as to what you have them depicted on this Exhibit, would they not?

A Yes, sir, they would.

MR. UTZ: Excuse me just a minute, Jerry. Would you

draw your 3500 foot contour on that Exhibit and take into account the Helbing Well at 3559?

MR. LOSEE: Monsano Well.

MR. UTZ: Monsano Well and swing back up to the Gulf Helbing Well where you think it ought to be.

Q (By Mr. Losee) Now, Mr. Gist, with those redrafted contours reflecting the Monsano Well, does that not give credence to applicant's Exhibit 1 showing a nosing area to the south and east through Sections 15 and 23?

A It bears a slight resemblance. It is not as prominent as your Exhibit.

Q It does nose down that way, doesn't it?

A Yes.

Q Now, tell me what the zero line on your Exhibit 1 depicts?

A That is the interpretive limits of the isopach of the dolomite producing zone.

Q Now, by the limits of dolomite, are you talking about the two percent porosity in the reef? Is that your interpretation of where the two percent porosity line is in the reef?

A That's very similar, yes, because your porosity in most cases is related to the dolomite position in your reservoir.

Q Now, you prepared this map after you completed your Mershon Well in Section 21, did you not?

A Repeat that.

Q You prepared this map showing that zero line after your completion of the Mershon No. 1 Well in Section 21, did you not, using the data from that well, I suppose?

A Yes, sir.

Q So that after you have drilled that well and set your zero line in Section 21, everything above it, I suppose, you would interpret would be productive of gas in the Pennsylvanian Reef?

A It could be gas saturated.

Q Well, do you interpret that it is productive above that zero line?

A That's a good question. It possibly could be.

Q In other words, all of Section 22 is above your zero line, is it not?

A Yes, it is.

Q So on that basis, absent the water in that section wherever it may be and wherever it may be coming from, it would all be productive, would it not?

A Well, we can get off on this gross map. Contours are not as meaningful productive-wise as is the net pay that you have in this dolomite section. I don't have a net pay map, as far as our net porosity map.

Q Actually, though, your map shows on its face that this dotted line is the isopach of the gross dolomite producing zone, doesn't it?

A Yes, it does.

Q Wouldn't it be a logical interpretation that everything above zero, in preparing it, you would have interpreted to be productive?

A It could be productive. The quality of the production would be something else.

Q Do you like the term perched or trapped water? Which one of those two terms do you like best?

A I prefer to just call this an abnormal water table, an anomalous water table.

Q Why do you pick the cutoff of this water along the eastern boundary of Section 22?

A Because I am not certain how far the eastern limits of that water table is, as I have tried to indicate it there by the hashered marks.

Q Let me ask you this. Are you aware of the fact that the Monsano dry hole in Section 23 didn't have any water?

A It didn't have any porosity.

Q I think it had 3 feet, but I am asking you about water is my question, that there was no water in the well.

A I will take your word for it.

Q So that we can assume that at least there's no water in the eastern one-third of Section 23 based upon that well, can we not?

A Yes, sir.

Q And when we go to the west, the first point at which we get water is in this Helbing No. 2 to have any control, is that correct?

A Going west from the Monsano? That's correct.

Q So, actually, your hashered marks could just as well have been made directly east of the Helbing No. 2 Well as where they are located on your map?

MR. UTZ: Indicating the end of the water?

MR. LOSEE: Yes. You could have put them right next to the Helbing Well, could you not?

THE WITNESS: I could have.

Q (By Mr. Losee) Have you calculated the number of acres in Section 22 with your redrafted contours above the zero line?

A Above --

Q Your zero producing zone line.

A Yes, sir, I have. That would be approximately 348 feet.

Q 48 acres?

A I mean acres, pardon me.

Q Have you accounted for the change in the contours that you now interpret with the Monsano Well?

A Yes, sir.

Q And in making that calculation, you don't account for the fact that the conate water might be directly east of the Helbing Well, do you, rather than at the end of the section

as you give it?

A No, sir, because it's unlikely that it is.

Q You don't really know where the point is east of Helbing except it's not in the Monsano, do you?

A That's correct, but by the same token we don't know how far over the gas goes westward because there's no gas in the Monsano Well.

MR. UTZ: What was your figure that you just gave, 342 or 48?

MR. LOSEE: 347.

THE WITNESS: 348, approximately.

MR. LOSEE: 348.

Q (By Mr. Losee) Now, do you have any evidence to support your opinion that the channel didn't provide water in the Helbing No. 2 Well?

A No, no concrete evidence.

Q Well, do you disagree with Mr. Sutphen's interpretation of these tracer surveys?

A I think it's interpreted -- just as interpretive as the geology in some of the areas here that we are looking at.

Q Have you had any special training in tracer survey work?

A I am not an expert at it, no, sir.

Q So that if Mr. Sutphen's theory of channeling water from below the perforations in the Gulf Helbing Well is correct, isn't it true that if the well bore were filled with

water from the channel that you could not produce any gas through that loaded well bore?

A No. I don't think that if you are in a reservoir here with supposedly 34 feet of porosity and you perforate it and acidize it and swab it at the rate that they did, I do not think that you would overlook gas in some form or the other. This is my opinion.

Q Western States doesn't have any objection to the location of our proposed well at 990 out of the corner to protect our correlative rights, does it?

A No, sir.

MR. LOSEE: That's all the questions I have.

MR. HINKLE: I would like to ask, unless you have some questions.

MR. UTZ: No, we don't have any questions at this point.

REDIRECT EXAMINATION

BY MR. HINKLE:

Q Mr. Losee's cross examination referred to the water which was encountered in the Gulf Helbing Well in Section 22 as conate water. With the amount of water that was swabbed there, does that indicate it was conate water or quite a volume of water?

A It indicates it's quite a volume of water.

Q And, ordinarily, you wouldn't have that volume if it was

just conate water, would you?

A No, sir. That would be highly unprobable.

MR. HINKLE: That's all.

MR. LOSEE: One other question. Would the high volumes of water which you say can't be entirely conate indicate channeling?

THE WITNESS: Yes, it would not indicate channeling, but you could produce or swab water at that rate from a channel providing you have an aquifer that will furnish the water.

MR. LOSEE: That's all.

MR. UTZ: Mr. Gist, I am sure you are familiar with Mr. Mershon's testimony in the previous two cases, I believe it was, are you not?

THE WITNESS: Yes, sir.

MR. UTZ: Now, to the bitter end, he contended that this area over here had a present water table. Are you disagreeing with him?

THE WITNESS: No, sir.

MR. UTZ: Other questions of the witness? The witness may be excused. You just had one witness?

MR. HINKLE: That's all.

MR. McADAMS: Mr. Examiner, we have hopefully a short witness, real short. In the interest of brevity we are going to cut it down.

(Witness sworn.)

CLYDE ALTON,

a witness, having been first duly sworn according to law, upon his oath, testified as follows:

(Whereupon, Marathon's Exhibit 1 was marked for identification.)

MR. McADAMS: I am Jack McAdams representing the protestant, Marathon Oil Company. I have one witness.

DIRECT EXAMINATION

BY MR. McADAMS:

Q Would you please state your name?

A My name is Clyde Alton.

Q By whom are you employed?

A I am employed by Marathon Oil Company.

Q What capacity?

A In the capacity of Senior Petroleum Engineer of the Division Engineer in Houston, Texas.

Q Have you testified before this commission before?

A I have.

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

MR. UTZ: Yes, they are, if you will spell your name again.

THE WITNESS: A-l-t-o-n.

Q (By Mr. McAdams) Mr. Alton, are you familiar with the

Indian Hills-Upper Pennsylvanian Pool?

A I am familiar with the Indian Basin-Upper Pennsylvanian Pool, yes.

Q And with the Commission's special pool rules?

A Yes, sir.

Q Are you familiar with the application that's been filed in this case?

A Yes, sir, I am.

Q What have you studied and reviewed in connection with preparation for this case?

A I have studied many logs of the completed wells in the area; also the core records of those wells that were cored in the area.

Q Have you prepared an Exhibit for use in this case?

A Yes, sir, I have.

Q This has been identified as Marathon's Exhibit No. 1. Would you explain what that Exhibit is and what it purports to show?

A This is an isopach of net gas pay within this area of interest, is contoured on a 20 foot interval. I have shown in large numbers beside each of the wells in the various sections the net feet of pay that I have given these wells.

I have also shown two locations in Section 22, 22 south, 23 east on the applicant's proposed unorthodox

location being 990 out of the north and west and another location, a standard location, being 1650 out of the north and west.

Q I notice on your Exhibit No. 1 that you have your zero contour in Section 22 cutting through the Gulf Helbing Well No. 2.

A This is true. We have no indication that there was any gas ever produced from this well. Therefore, we have no net pay in this well. It's a fact that we know that no gas is at this location.

I might have moved my zero line a little bit north but I don't know just how far north I could logically move it, so I ran it right through the No. 2 Well.

Q You have heard the testimony here today from the applicant's witness regarding the possibility of the water getting into the well bore in this No. 2 Helbing by a channeling process below the perforations in the reef zone?

A Yes, I have.

Q Do you have any opinion as to the validity of that?

A I am certainly not an expert on this type of tracer survey, but I would think the people who ran it are experts and I think I would have to take their opinion.

Q Apparently Gulf's opinion is the one that would be the most valid in your point of view?

A Apparently this is true because Gulf didn't try to squeeze

and reperforate and complete the well as a gas well.

Q In your preparation of this net pay isopach, did you study well logs of the Mershon Well in Section 21?

A Yes, I did and the Exhibit I presented at the previous hearing concerning the Mershon Well, prior to the drilling of that well, I gave the Mershon Well 40 net feet of pay. After examining the logs I shorted him five feet, so I have to move that 40 foot contour line down just below the Mershon Well.

Q Mr. Alton, based on your studies and your information, how many acres in Section 22 would you consider to be productive acreage from the Upper Pennsylvanian Pool?

A The acreage in Section 22 above my zero line is 260 acres.

Q So that you would say there's 260 net productive acres in Section 22?

A That's correct.

Q Assuming that well was drilled at a standard location on Section 22, what allowable would you recommend to the commission, based solely on that productive acreage?

A I would recommend 260 acre allowable.

Q Now, on your Exhibit you have set out the unorthodox location requested by the applicant in this case and you have also set out what would be a standard location for this well?

A Correct.

Q What advantages will the applicant in this case obtain by the unorthodox location?
A Well, from my Exhibit, it appears that he will go from approximately 30 feet of net pay to between 50 and 55 feet of net pay. He will also be moving away from the Gulf Helbing Federal No. 2 an additional distance of 741 feet over the standard location distance.
Q Do you feel that some adjustment in the allowable should be made for these obvious advantages in addition to the net productive acreage that you found?
A Yes, I do.
Q You wouldn't have any recommendation on that, though, would you?
A I would rather leave that up to the discretion of the commission.
Q Do you feel that the correlative rights of the other operators in this field will be impaired if this well drilled at this unorthodox location is granted an allowable based on more than 260 net productive acres?
A That is correct. If the unorthodox location is granted and the well is assigned more than 260 acres, I think correlative rights will be impaired.

MR. McADAMS: That's all we have.

MR. UTZ: Are there questions of the witness?

Mr. Losee, I don't suppose you have any?

MR. LOSEE: Yes, I do.

CROSS EXAMINATION

BY MR. LOSEE:

Q Mr. Alton, this net gas pay map is the same map that was introduced in the Mershon Case in 4089?

A It's identical with the exception I have noted by moving the 40, 20 and zero lines slightly further south to give Mr. Mershon's wells an additional five feet of net pay.

Q Well, in that hearing you, I think, preferred to call this the net porosity map rather than net gas pay?

A That is correct, but in this hearing I would prefer to stick to net pay.

Q What makes you wish to change your nomenclature of the map?

A I think it was the long hassel we got into, Mr. Losee.

MR. UTZ: You don't want to have to explain that permeability any more, do you?

THE WITNESS: Right. Our main interest in it is in pay and granted, the Gulf Well certainly has porosity.

Q (By Mr. Losee) Well, you say you examined logs in the preparation of this. Have you looked at this Monsano log that was drilled in Section 23?

A No, sir, I have not looked at that log. I spotted the well on the map, but I didn't have a copy of the log.

Q If I were to tell you that it had 3 feet of reef porosity in it, would that do something to your contours on this map?

A Wouldn't do a thing to them because it was non-productive and I am talking about net pay.

Q Well, the Hannigan Well was non-productive and you have it 17 feet in.

A That's correct.

Q I mean 20 feet in.

A 17 is correct.

Q You show 17 feet of net pay?

A Right.

Q Well, if you show it in there as being non-productive and yet above your zero line, wouldn't it be logical that if the Monsano Well has 3 feet your zero line would be somewhat below the 3 foot porosity line?

A Well, we have to remember that there was gas produced from the Hannigan Well and I gave it 17 feet of net pay. It had pay because gas was produced but they couldn't sustain a rate on the well due to the lack of permeability.

Q I think in the Mershon hearing you defined the limit of recoverable reserves at the 20 foot line --

A I believe that's correct.

Q -- which supported your theory that the Hannigan Well was not commercially productive?

A I believe that's correct.
Q Again I want to call your attention to the Monsano Well that you haven't looked at the log and ask you whether or not your zero line should not swing down to accommodate the information gathered from that well?
A Not when I consider net pay because this was a dry hole.
Q Well --
MR. UTZ: It produced no gas whatsoever?
THE WITNESS: I haven't heard. I don't believe the well produced any gas. Now, I couldn't swear to that. Did they test gas in the well?
MR. WATSON: They had a weak blow to surface but it was an insignificant show, but it was --
THE WITNESS: Okay.
MR. UTZ: Sorry for the interruption, Mr. Losee.
MR. LOSEE: That's all right.
Q (By Mr. Losee) Has there been any additional knowledge obtained on the use of these tracer surveys since 1966?
A I am not an expert in tracer surveys and I am not qualified to answer that question.
Q You don't know whether there has or hasn't?
A No, sir.
Q You disagree with Mr. Sutphen's interpretation of these tracer surveys as to the channeling?
A I would have to go along with the expert on them, myself

not having a lot of knowledge on these surveys. Schlumberger certainly should, they're the people who run them.

Q Did you talk to Schlumberger?

A No, sir.

Q Would you explain to me from looking at this survey why it does not indicate channeling?

A Well, as I said, I am not familiar with this survey and I can't comment on that.

Q You don't really know what the Schlumberger interpretation of the survey was at the time it was run, do you?

A No, I do not, although I do know your witness disagreed with his interpretation.

Q You don't know what the interpretation of present experts reviewing this is, do you?

A Certainly not.

MR. LOSEE: Okay. I think that's all.

MR. UTZ: Are there other questions?

MR. STAMETS: R. L. Stamets.

CROSS EXAMINATION

BY MR. STAMETS:

Q Mr. Alton, in preparing this isopach of net gas pay, the only thing that you are interested in is gas production, right?

A Gas porosity in the gas zone, gas production.

Q So, if a well is wholly productive of water or wholly productive of oil or any other fluid with the exception of gas, you would assign it a zero on this map, is that right?

A Well, now, you threw me on that oil. Oil is pay as far as I am concerned and I certainly wouldn't assign a well that could produce oil in commercial quantities zero pay.

Q But, this is net gas pay, this is not a net pay map, this is net gas pay.

A True, but oil wells do produce casinghead gas.

Q Anyhow, a well totally productive of water would show zero net gas pay?

A That's true, as the Gulf Helbing Federal.

Q Do the various contours and wanderings of the formation have anything to do with the way you draw this line, this zero line?

A Actually, I feel like, in drawing a zero net pay line, the Gulf Helbing Federal gives me a very good point. I have two dry holes, one in Section 23 --

Q Would you repeat the start of your explanation, I missed something there?

A This being a map of net gas pay --

Q Yes.

A -- I had a perfect point to draw a zero line through in the Gulf No. 2 Helbing Federal. To my knowledge, this

well produced no gas whatsoever.

Q Do you have a copy of applicant's Exhibit No. 1 handy there somewhere?

A No, I do not.

Q I am sure the applicant can furnish you one with great speed. Referring now to the applicant's interpretation that this is a perched water table and assuming that his contours are precise, accurate and correct, would you then possibly redraw your contour of the zero porosity line as you have shown it on your net gas pay map?

I am not asking you to accept this, but only that if you did, would you redraw your line.

A Would I redraw what line?

Q Your zero net gas pay line.

A Okay. I don't feel like I could redraw it since the well did never produce any gas.

MR. STAMETS: That's all the questions.

MR. UTZ: Your zero gas net pay swings to the west through section 13 and then south down through section 14 and south?

THE WITNESS: Yes, sir.

MR. UTZ: What is the reason for making that swing to the north from the eastern edge of your map? In other words, what control did you have there?

THE WITNESS: Let me see if I understand your

question, Mr. Utz. You say my zero net pay line does what, now?

MR. UTZ: Well, from the eastern edge of your map where you enter the area of the map --

THE WITNESS: Yes, sir.

MR. UTZ: -- it swings west and then swings south down to the Helbing Well in question.

THE WITNESS: Okay.

MR. UTZ: I am just wondering what control you had to swing to the north there instead of just cutting straight across to the well.

THE WITNESS: Well, the only control that I had there is the spacing of the net pay contours.

MR. UTZ: I see. Are there other questions? The witness may be excused.

MR. LOSEE: One other question I had. You indicated you wouldn't change your zero line if you were to accept the perched water theory of conate water. Would you change it if you accepted the channeling theory, so that your zero line would then accommodate the Gulf Helbing Well?

THE WITNESS: I do not accept the channeling theory.

MR. LOSEE: I realize you don't, but assuming you do, would you then change your contour?

THE WITNESS: If I accept the channeling theory, I still contend there would have been some gas produced along with

this water and I would not move my zero line at all.

MR. LOSEE: Well, that's based upon your assumption that there would be some gas produced. Let me ask you to assume not only the channeling theory but, too, that the water in the well bore prevented the production of gas. Would you then move your zero line to accommodate it?

THE WITNESS: Would you repeat the question?

MR. LOSEE: I want you to assume two things that you have already testified to that you don't believe are correct. One is that channeling existed in the Gulf Helbing Well and two, that that channeling prohibited, by filling up the well bore with water, the production of gas.

Now, assuming those two facts to be true, would you then move your line to accommodate for the 34 feet of reef that the log showed in that well?

THE WITNESS: I would have to assume, then, that there was gas in this well.

MR. LOSEE: Well, if you wish to to accommodate for the name of your map, net gas pay over its prior name, net porosity, yes.

THE WITNESS: If I make the assumption there is gas in this well bore, then I would certainly have to do that.

MR. LOSEE: Okay, fine.

MR. UTZ: I think that's a good hypothetical answer to a hypothetical question. Are there other questions? The

witness may be excused.

GEORGE SUTPHEN,

a witness, having been recalled, testified as follows:

(Whereupon, Applicant's Exhibits 5 & 6 were marked for identification.)

REDIRECT EXAMINATION

BY MR. LOSEE:

Q You are the same Mr. Sutphen that testified on direct examination, are you not?

A Yes, sir, I am.

Q I hand you what has been marked as Applicant's Exhibit 5 and ask you to state what that is.

A Yes, sir. That's a bore hole compensated acoustic log on the Monsano Ralph Low Estate No. 1 in Section 23, Township 22 South, Range 23 East.

Q That was recently drilled and plugged and abandoned?

A Yes, sir, in May of this year.

Q Has your company made an interpretation of how much reef was present in this well --

A Yes, sir.

Q -- Upper Cisco Reef?

A Yes, sir, we have.

Q How much did you calculate?

A We find 3 feet of reef porosity greater than two percent.

Q Did the well test any gas?

A The well drill stem tested and had a weak blow. However, they had considerable trouble with the drill stem test and were not able to get initial pressures and had considerable indications that the tool plugged on the drill stem test.

Q Another question. Have you consulted with any experts with respect to the interpretation of channeling on these tracer surveys?

A Yes, sir, I have. Within the past two weeks I consulted with three Western Company experts and let me correct the record that Western Company ran the tracer survey.

Q And, what opinion did they have with respect to this tracer survey?

A They unanimously agree with my interpretation that we have channeling at least as low as 7730.

Q I hand you what's been marked as Applicant's Exhibit 6, being the Marathon Oil Company Exhibit 1, which shows in pencil some new contours --

MR. McADAMS: Wait a minute, I object to him marking that as an Exhibit. Are you planning on introducing this as your Exhibit?

MR. LOSEE: Yes.

MR. McADAMS: We will waive the objection.

Q (By Mr. Losee) In doing so, have you accommodated for the 3 feet of pay in the Monsano Well?

A Yes, sir, we have.

MR. LOSEE: We move the introduction of Exhibits 5 and 6.

MR. UTZ: Is there an objection to the entering into the record of Exhibits 5 and 6?

MR. LOPEZ: There is an objection, I think.

MR. UTZ: I hadn't heard it.

MR. LOPEZ: Now the objection is made.

MR. UTZ: Are you making the objection?

MR. LOPEZ: On behalf of Marathon, right.

MR. McADAMS: I think the Exhibit should be introduced for what it is, what it stands for, his Exhibit, he is adopting it.

MR. UTZ: I am inclined to agree with you. The Exhibit was entered as a Marathon Exhibit. If he wants to adopt it as his Exhibit, I think he is entitled to.

MR. McADAMS: I think in answer, he should communicate these facts in the interest of good feelings, mutual relationship; kind of surprising.

Can I ask a question, please?

MR. UTZ: Yes.

CROSS EXAMINATION

BY MR. McADAMS:

Q Was this gas that was produced from the Monsano Well combustible?

A I have no record of that.

Q Then, it could have been air?
A Yes, sir.
Q What pressures did the well produce from?
A I don't have the pressures on hand, but as I say again, they had considerable evidence that the tool plugged.
Q Who had this evidence? You didn't have personal knowledge of it, though?
A No, sir.
Q You are talking about what somebody else says and told you?
A No, sir, I am speaking from my recollection of the scout ticket in the commission records.
Q So, you don't know whether this was gas, air, nitrogen or what that came out of the well?
A That's right.
Q Well, this wouldn't affect Mr. Alton's drawing of this line in any way, then, would it, the information you furnished here?
A Of course, it would.
Q Not in his opinion.
A I can't speak for his opinion.

MR. McADAMS: Pass the witness.

MR. ALTON: If it were not gas, it would not affect my drawing whatsoever, would it not?

THE WITNESS: If it were not a representative test

it sure would.

MR. LOSEE: Will you admit them now? I have no further questions.

MR. UTZ: Exhibits 5 and 6 will be entered into the record. Do we have statements in the case? Do you have a statement, Mr. Hinkle?

MR. HINKLE: No, I have nothing more.

MR. UTZ: Does Marathon have a statement?

MR. LOPEZ: No, sir.

MR. McADAMS: No.

MR. UTZ: Mr. Kellahin.

MR. KELLAHIN: Since testimony in Case No. 4089 has been introduced, I would like to call the attention of the examiner to the testimony of John Cameron in that case in regard to the perched water theory and his Exhibit showing some 14 anomalies in this pool and the testimony of Hugh Hannigan in connection with the tests that were actually made on his well.

As I recall, there were two separate hearings in this case but still the same case no., so I assume Mr. Losee has introduced the entire record.

MR. LOSEE: Yes, sir, both of them.

MR. KELLAHIN: On behalf of Chevron Oil Company we support the position of Marathon Oil Company and advocate that not more than 260 acres be allocated to this well.

MR. UTZ: Mr. Losee.

MR. LOSEE: I guess referring to Mr. Cameron's testimony, which I have reviewed this morning, I would point out that in his testimony to explain the tilted table in some 14 of his wells that were serving as points, the wells were originally drilled to a certain point and actually he had no real water top in a number of wells.

I think the applicant in filing its application for the unorthodox location recognizes that the commission should offset the advantage obtained by this location by an adjustment in the allowable for the well. We think the location is justified particularly in this case where its offset is a 990 location.

Our testimony on the perched water, removing it from the section shows 440 acres. If the channeling theory is accepted as the reason for the water in the well bore in the Gulf Helbing, it's 579, and, as result, our recommendation is half way in between the two is the reasonable provable reserves under Section 22 and we ask that the allowable be reduced to 509, 6 40's.

I think that's all.

MR. UTZ: Any other statements? The case will be taken under advisement. The hearing is adjourned.

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CLYDE ALTON

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STATE OF NEW MEXICO)
)
COUNTY OF BERNALILLO)

I, GLENDA BURKS, 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.

Glenda Burks
Court Reporter

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 4562 heard by me on June 30 1971.

New Mexico Oil Conservation Commission