CASE 3040: Application of HUMBLE for an unorthodox location and a non-standard proration unit.

CASE NO.

3040

Application,
Transcripts,
Small Exhibits
ETC.

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico

May 7, 1964

EXAMINER HEARING

IN THE MATTER OF: Application of Humble Oil & Refining Company for an unorthodox location and a dual completion, Lea County, New Mexico.	Case No. 3039
Application of Humble Oil & Refining Company for an unorthodox location and a non-standard proration unit, Lea County, New Mexico.	Case No. 3040

BEFORE: Daniel S. Nutter, Examiner

TRANSCRIPT OF HEARING

EXAMINER NUTTER: We will call Case No. 3039.

MR. DURETT: Application of Humble Oil & Refining Company for an unorthodox location and a dual completion, Lea County, New Mexico.

MR. HINKLE: Clarence Hinkle, Hinkle, Bondurant and Christy, appearing on behalf of Humble. Mr. Examiner, the Humble has two cases this morning, this case that has just been called and Case 3040. Both of them are for unorthodox locations in the Fowler Ellenburger field, and we have two witnesses. Their testimony will overlap. For that reason, I would like to move that

both cases be heard at the same time or consolidated for purposes of hearing.

MR. NUTTER: We will now call Case 3040.

MR. DURETT: Application of Humble Oil & Refining Company for an unorthodox location and a non-standard proration unit, Lea County, New Mexico.

MR. NUTTER: Is there objection to the consolidation of Cases 3039 and 3040 for the purposes of testimony?

MR. BUELL: For Pan American Petroleum Corporation, Guy Buell. I would like to concur in Mr. Hinkle's motion for consolidation.

MR. NUTTER: The cases will be consolidated for testimony. Are there any other appearances in these cases?

MR. HINKLE: We have two witnesses we would like to have sworn.

(Witnesses sworn.)

CLYDE PINE, JR.,

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

DIRECT EXAMINATION

BY MR. HINKLE:

(Whereupon Exhibit No. 1 was marked for identification.)

Q Your name is Clyde Pine?

A Yes, that's correct.

Q You are an employee of the Humble Oil and Refining Company?

A That's correct.

Q In what capacity?

A I'm employed as petroleum geologist for the Humble Oil and Refining Company.

Q Are you a graduate petroleum geologist?

A Yes, I am.

Q Where did you graduate from?

A I graduated from Tulane.

Q What year?

A In 1958, with a Bachelor of Science degree in geology.

Q Have you practiced your profession since graduation?

A Yes, I have. I've worked in the West Texas-New Mexico, Southeast New Mexico area for the last four years and nine months.

Q Have you been employed by the Humble continuously during that time?

A For the last four years and nine months, no, I have not. I have worked for another company prior to working for the Humble Oil Company.

Q Are you familiar with the Fowler Ellenburger and Fowler Blinebry pools?

A Yes, I think I am quite familiar with them. For the past

several months I have been conducting a study on the Fowler field. I have recently completed this study.

Q When did you commence your study of this area?

A In January of this year.

Q And it's continued up to the present time?

A Up until the present time, yes.

Q What has your study consisted of?

A My study has consisted of studying the Ellenburger structure primarily, examining all information available on this field, which included electric logs, sample logs, and completion well data.

Q Have you previously testified before the Oil Conservation Commission?

A No, I have not.

Q Mr. Pine, refer to Humble's Exhibit No. 1 and explain what it is and what it shows.

A Yes.

Q Before starting your explanation, are you familiar with the applications which Humble has made in these two cases, Cases No. 3039 and 3040?

A Yes, I am.

Q Now, go ahead with your explanation of Exhibit 1.

A Exhibit No. 1 is a structural map contoured on the top of the Ellenburger formation, the scale of this map being one

inch equals a thousand feet. The contour interval is one hundred feet. As we can see on this sub-surface structural map on top of the Ellenburger the Fowler field at this datum is a northwest-southwest trending anticline faulted by high angle reverse faults.

Q What are the color symbols which you've shown, for instance, the red lines first here.

A The solid red lines are showing the lines of two cross sections which I have prepared and which we will later exhibit, No. 2 and No. 3. The cross sections are A-A' and B-B'.

Q What are the wells which have been circled in orange?

A The wells circled in orange, of which there are four, are unorthodox Ellenburger locations in the field. We can see that one of these unorthodox locations, the Gulf No. 3 Lilly in Section No. 23 is 330 feet from the south and west lines of a quarter section. This is exactly the same footage of our proposed No. 2 J. A. E. Knight.

Q Now, you've indicated the proposed location on the plat on Exhibit 1?

A That's correct, our J. A. E. Knight would be located 330 feet from the south and west lines of a quarter-quarter section, exactly as is the No. 3, the Gulf No. 3 Lilly. Another unorthodox location in the field, the Pan American No. 17, which is located in Section 15, this too being an unorthodox Ellenburger location.

Our proposed No. 2 "AB" State of New Mexico located in Section 16 would be similar in the specific of this Pan American No. 17 in that the Pan American No. 17 well shares an eighty-acre allowable with another well, the Pan American No. 17 shares an eighty-acre proration unit with the Pan American No. 9 South Mattix Unit. It's proposed that our No. 2 "AB" State of New Mexico would share one eighty-acre allowable which is already granted to the No. 1 "AB" State of New Mexico.

Q What are the lavender triangles?

A The lavender triangles on the map are indicating wells that are faulted in the field. Every one of these wells has a repeated section in it indicating a high angle reverse fault is cutting that well.

Q You've examined the logs of each of those wells?

A I have examined every well, the logs of every well in this field.

Q What does the green dotted line indicate?

A The green dotted line indicates the approximate original oil-water contact in the various fault blocks of the field.

Q What evidence is there to substantiate the faults which you have shown on Humble's Exhibit No. 1?

A As I mentioned earlier, every well that has a lavender triangle around it is faulted without question by examining the logs, it's very readily seen that there is repeated section in

every one of these wells. If we would start with that fault -- I have three faults shown on this map -- if we would start with the central fault, that fault which would be very close to the Humble No. 1 State of New Mexico "AB" in Section No. 16 and extending down to the southeast, this would be the central fault of the three that I have shown there. Every well along this line that penetrated the Ellenburger has repeated section.

The Humble No. 1 State of New Mexico "AB" has a repeated Simpson section. The Pan American No. 6 South Mattix Unit likewise has a repeated section in the Simpson. The Pan American No. 2 South Mattix Unit also has a repeated Simpson section. The Pan American No. 3 South Mattix Unit has a repeated section including part of the Fusselman and part of the Montoya. The Pan American No. 5 well South Mattix Unit has a repeated Ellenburger section. The Gulf No. 1 Plains Knight has repeated Ellenburger section. The Gulf No. 2 Plains Knight has repeated Simpson section. Thus I have seven-well control for establishing this fault.

Immediately south of this fault, I have another fault extended. We see in the southeast corner of Section 16 the Pan American No. 2-D. This well has a repeated Simpson section. Jumping to the northwest quarter of Section 22, the Sinclair No. 4 well likewise has repeated Simpson section. The Pan American No. 12 South Mattix Unit in the southeast quarter of Section 22 has repeated portions of Montoya and Simpson sections. On this

fault I have three-well control. This is excellent control for faults.

The northerlymost fault I have two wells which are affected by this fault that I have shown there. The Pan American No. 9 South Mattix Unit has repeated Simpson section in it. The Pan American No. 10 South Mattix is not faulted. However, the Simpson formation exhibits extreme stretch, extreme exaggeration because of its close proximity to the fault. The Simpson formation exhibits drag because of its close proximity to this fault. The northerlymost fault I have two points of control for it. I've extended that fault parallel with the other two faults for which I have excellent control, which also coincide with the northwest-southeast trend of the Fowler Ellenburger anticline.

Q Do you consider the repeated sections as shown in these wells you've testified to as good evidence of a faulting?

A It's excellent evidence.

Q It's about the best you can get?

A It's as good as you can get, that's right.

Q Is it unusual that faulting condition should be parallel as you've shown it on the map here?

A No, I consider it not unusual at all but more likely the most logical thing.

Q It's logical, then, that you should extend the line through Pan American's No. 9 well parallel with the other faults

that you'ge shown?

A Yes.

Q Are these faults the basis of Humble's applications in these cases?

A Yes.

Q In what way, you might elaborate on that a little bit more.

A As we can see from this Ellenburger structural picture, Humble has drilled one dry hole, the No. 1 Knight; they have drilled another joint dry Ellenburger well which was a joint well with Pan American, the No. 2-D.

MR. NUTTER: Where is that dry hole, the No. 1 Knight?

A It's in Section 14 in the Southwest quarter.

MR. NUTTER: Northwest of the Southwest, is that correct?

A Northwest of the Southwest, yes. They drilled that dry hole, they drilled with Pan American. They shared fifty percent of the cost of the Pan American No. 2-D, which is located in the Southeast quarter of Section 15.

Q (by Mr. Hinkle) Both of those wells were drilled at standard locations, as far as the field rules are concerned?

A That's correct. Both of these wells are drilled at the orthodox Ellenburger locations set up by the field rules. Humble lost three hundred forty-five thousand dollars in those two wells. Humble also drilled their No. 1 "AB" State of New Mexico. It's an

Ellenburger producer. After studying this field, it's quite evident that the Humble No. 1 State of New Mexico is not producing from that portion of its eighty-acre proration unit which is up-thrown from the Humble No. 1 "AB" well. The "AB" No. 1 is located in a different Ellenburger reservoir than is the Ellenburger on the up-thrown side of that fault. Also arising from this study we see that Humble has acreage in the Southwest quarter of Section 14 that would be productive if we would have a well there.

From these two facts, that we have productive acreage in Section 15 from which we are not producing, we have productive acreage in Section 14 from which we are not producing, Humble has to drill two wells to recover their oil under their leases for themselves and for their royalty owners.

Q I believe that you stated that the green line indicated the water-oil contacts?

A Yes, I did.

Q How were these established?

A These oil-water contacts in the various fault blocks were established by drill stem test information and production data.

Q How do you account for the difference in the water-oil contacts in the three fault blocks that are shown?

A I account for this difference because I think each fault block is acting as a separate Ellenburger reservoir. Originally,

each block had different oil-water contacts. I might explain that a little bit farther. One fault block which is immediately downthrown of the northerlymost fault shown on this map extending through Sections 9, 10, 15, 14 and 23 on the down-thrown side of this fault block, the Gulf No. 5 Carr is drilled, the Pan American No. 9 South Mattix Unit, the Pan American No. 10 South Mattix Unit and the Rumble No. 1 Knight. These four wells are drilled in this fault block.

From drill stem test information I see that the Gulf No. 5 Carr located in Section 10 produced oil down to a minus 7249; on drill stem test data from the Pan American No. 10 in Section 15, I see on a drill stem test which straddled this minus 7249 figure that drill stem from minus 7218 to minus 7268 produced salt water. From the No. 5 well, I have definite evidence that it was oil productive down to minus 7249.

I therefore know that the original oil-water contact in that block was from minus 7249 somewhere between that depth and minus 7268. If we drop from that fault block into this central fault block, we see that the Pan American No. 12 B well, which is located approximately 660 from the South and this East line of Section 9, this well produced water on perforations from minus 7227 to 7237. This well produced water higher than the Gulf No. 5 Carr well produced oil.

The Pan American No. 7 South Mattix Unit approximately

660 from the North and West lines of Section 15 produced oil to a minus 7217; to tie down this oil-water contact the Pan American No. 7 produced oil to a minus 7217. The Pan American No. 12 B produced salt water at a minus 7227. This oil-water contact originally was someplace between 7217 and 7227.

If we drop to the next southerly fault block, that fault block containing the Humble No. 1 State of New Mexico 'AB', the Pan American No. 6 South Mattix Unit, the Pan American No. 2 South Mattix Unit, the Pan American No. 3 South Mattix Unit, the Pan American No. 5 South Mattix Unit, the Gulf No. 1 Plains Knight, the Gulf No. 2 Knight, also the Pan American No. 12 South Mattix Unit, the Sinclair No. 4 and the Pan American No. 2 well, this lower fault block here, the oil-water contact in that block, the Humble No. 1 'AB' produced oil from minus 7360. This is a hundred ten feet lower than the oil-water contact in this central fault block.

I have a post-dated fault in Section 22 separating the Pan American No. 3 South Mattix Unit from those wells northwest of it. The oil-water contact in this block is extremely questionable to pin down. It's felt that it was extremely close to minus 6823 from production data and drill stem test in the Pan American No. 3 South Mattix.

MR. NUTTER: You are speculating there that the water-oil contact in the Southeast half of this Southwest block would be

at a minus 6823?

A Somewhat deeper than that.

MR. NUTTER: That would be the half of it to the Southeast?

A That's correct. The Pan American No. 3 well produced oil to minus 6823. However, after producing not too much oil, after workovers, they tested on the drill stem test through that same producing interval and they found oil-water. Also, this well is located on a twenty-acre tract which was shown to be non-productive or ruled to be non-productive at one of these earlier Pan American hearings.

At one time Pan American wanted to allow the North half of the Northeast Quarter of Section 22 as an eighty-acre allowable for the drilling of their No. 15 Pan American well, located 660 from the North and East lines of 22. They wanted to give that eighty acres running East-west. At a previous hearing, the twenty acres on which the Pan American No. 3 well is located was ruled non-productive. Also, if we would follow the Humble No. 1 "AB" well produced oil from minus 7360, if we would follow a 7360 contour line down into this Southeast fault block, we would see that the Pan American No. 12 South Mattix Unit is a hundred feet higher than this. It's at 7257.

If the oil-water contact were the same as in the fault block in which the "AB" well was located that Pan American No. 12

should have been an Ellenburger producer, it's a hundred feet higher than where we produce oil. However, it produced salt water. Also, the Gulf No. 2 Plains Knight well in the same fault block has an Ellenburger top of minus 7513. This is still higher than where the Humble No. 1 well produced oil, but it never did produce oil. It produced salt water.

I know that the oil-water contact was above at least this 7257 figure. It was below 6823 from production data on the Pan American No. 3 well. Because of later tests in the Pan American No. 3 well, the fact that it watered out, I can feel rather strongly that it was in close proximity to this minus 6823 number.

Q Now, Mr. Pine, is the difference in the water-oil contacts a function of separate fault blocks on a tilted water-oil contact?

A The difference in water-oil contacts in these separate fault blocks is strictly a function of the faulting in the field. It is not a function of a tilted oil-water contact.

Q If it were tilted, what would you expect to find?

A If it were tilted, I would expect to find a gradual change from one side of the field to the other. In this particular case, I see abrupt changes in oil-water contacts which coincide with these well established faults.

Q Here you have a difference in the central fault block from the two on the side?

A That's correct. The central fault block produced water at a structurally higher level than did the Northeast block and also it produced water a hundred and ten feet higher than our AB' well produced oil. Our well potentialled for five hundred fifty barrels a day, a hundred feet lower than where they produced water.

Q Mr. Pine, you have shown on Humble's Exhibit an A-A', which I believe you stated you had prepared a cross section on. Refer to Humble's Exhibit 2.

(Whereupon Humble's Exhibit No. 2 marked for identification.)

Q Explain what Humble's Exhibit No. 2 is and what it shows.

A Exhibit No. 2 is a North-south cross section on the Northwest portion of the Fowler field. It extends through the Pan American No. 14 B well, through the Pan American No. 12 B well, through Pan American No. 7 South Mattix Unit, through the Humble 'AB' No. 1 State well. This cross section shows the formations extending from the top of the cross section to the bottom. It shows the lower Permian formations down to the granite.

On the lefthand side of this cross section, we have listed the various formation tops. We have the Abo listed; we have the Woodford, the Devonian, the Fusselman, the Montoya, the Simpson, the Ellenburger, and granite tops. If we follow with our finger along the Simpson formation, we see that from north, which is the lefthand side of the cross section, from north to

south the Simpson formation gets higher. We see that in the Pan American No. 7 well, which is the second well from the right on the cross section, we see that the Simpson in this well is encountered at minus 5991 feet. The Simpson is encountered in the Humble No. 1 State well at minus 5987.

In other words, the Simpson in the Humble No. 1 "AB" well was fifty-four feet high to the Simpson in the Pan American No. 7 well. However, the Humble No. 1 "AB" well, while drilling, drilled a repeated Simpson section, which is labelled on this cross section. It drilled a hundred thirty-eight feet of repeated Simpson. At that point, it crossed into the down-thrown side of a fault, encountered the Ellenburger on the down-thrown side of a high angle reverse fault, encountered the Ellenburger a hundred and three feet low to the Pan American well after being high on the Simpson points.

If a well were drilled on the Humble lease along this line of cross section somewhere between the "AB" well and the No. 7 well, that well would encounter the Ellenburger up-thrown in a different Ellenburger reservoir than the reservoir from which the "AB" is producing, and it would encounter the Ellenburger at least a hundred feet high to the "AB" well, That's our reason for wanting to drill this No. 2 State of New Mexico well, to share in this oil which is in a different fault block, from which we have not been producing.

Q You therefore conclude that Humble "AB" No. 1 is producing from an entirely different reservoir than the Pan American's No. 1?

A That's correct.

Q You have also indicated on Humble's Exhibit No. 1 another cross section which is B-B'. Please refer to Humble's Exhibit No. 3 and explain what that is and what it shows.

(Whereupon Humble Oil & Refining Co. Exhibit 3 marked for identification.)

A Exhibit No. 3, which is cross section B-B', again runs from north to south in the field. This section runs through the Humble No. 1 Knight well in Section 14, through the Pan American No. 8 well in Section 15, through the Gulf No. 1 Lilly well in Section 23, through the Gulf No. 3 Lilly in Section 23, through the Gulf No. 1 Plains Knight in Section 23. This is a north-south cross section.

On the cross sections I've shown here, the stratographic section from the lower Permian down through the Ellenburger. The section runs from north to south, on the lefthand side of the section is north, on the righthand side is south, on the lefthand side of this cross section the first log is the Humble "AB" Knight. We can see that the Humble "AB" Knight was drilled on the downthrown side of a high angle reverse fault. At this point, there are four hundred fifty-two feet of throw to this fault.

We can see that a well drilled south on this No. 1 Knight would encounter a different fault block, would be up-thrown to our No. 1 Knight. This is the reason for our wanting to drill the Humble No. 2 Knight. We would be drilling the No. 2 Knight in a different fault block than the fault block in which we drilled the No. 1 Knight.

Q By fault block, you mean a different reservoir?

A That's right.

Q A different pool?

A Yes. Following this cross section from north to south, the second, third, and fourth wells from the left shown on my cross section are not faulted. These wells show normal sections. The well to the right of the cross section is the Gulf No. 1 E Plains Knight. This well is faulted twice. The total Ellenburger in this well is approximately fifteen hundred feet. The normal section would be closer to five hundred feet. We can see, as I have listed here, the top of the Ellenburger formation. We can see that I have listed here the second Ellenburger, which was encountered in the down-thrown fault block. We can see a repeated low part of the Simpson marked on this well. We can also see a portion of this well that I've listed the third Ellenburger. This well actually encountered the Ellenburger on three different occasions. This well is without question faulted.

Q Now, on both Humble's Exhibits 2 and 3, the well logs

that you have shown on these exhibits are the actual well logs which have been superimposed on the exhibit, is that right?

A That's correct, superimposed and reduced to half scale for convenience.

Q What do you conclude from Exhibit No. 3?

A From Exhibit No. 3 I can see that immediately south of the Humble No. 1 'AB' some distance there's a high angle reverse fault. If a well were drilled up-thrown to this fault such as where we propose to drill a Humble No. 2 Knight, we'd encounter the Ellenburger up-thrown to our No. 1 well. It would, in all probability, be productive from the Ellenburger. Up to now, we have no well producing from these leases which I feel to be productive.

Q Have you prepared all of these Exhibits 1, 2 and 3?

A Yes, I have.

MR. HINKLE: We would like to offer in evidence Humble's Exhibits 1, 2 and 3.

MR. NUTTER: Humble's Exhibits 1 through 3 will be admitted in evidence.

(Whereupon Humble Oil & Refining Co. Exhibits 1, 2 & 3 admitted in evidence.)

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

MR. NUTTER: Anyone have any questions of the witness?

MR. BUELL: I am going to have a few, if it please the

Examiner. I believe it would save time overall if we can have a short recess, or I can start right ahead. I believe it will save time.

MR. NUTTER: We will take a five-minute recess.

(Whereupon a short recess was taken.)

MR. NUTTER: The Hearing will come to order, please. Mr. Buell, did you have any questions?

CROSS EXAMINATION

BY MR. BUELL:

Q I wish you would keep Exhibit 1 out, which I see you have before you there, Mr. Pine. Maybe in the interest of saving time, we can get off and perhaps free on a generality that geological work of the nature as reflected by your Exhibit No. 1 is highly interpretive, is that not correct?

A I think certainly any geological work is interpretive, yes.

Q Now, as I understood your testimony, I believe you said every well on which you had a fault pick, you had a lavender triangle, is my understanding correct?

A I say this: Every well on which I have a lavender triangle has repeated section and is indeed faulted.

Q Are you answering "yes" or "no"? I'm not enough of a geologist to understand. Does the lavender indicate a fault pick in a well or does it not?

A Yes, it does.

Q What other data did you have to assist you, Mr. Pine, in placing your faults where you have them?

A As I mentioned earlier, I examined every electric log in this field, every sample log, every completion ticket. After examining, every log very closely, thinking that these wells are indeed faulted, they have repeated sections, I drew a structural map of the Ellenburger formation in what appeared to be my best geologic interpretation.

Q Could I summarize your answer by saying that the logs of the wells that you have a lavender triangle around were your only data in helping you with the faults?

A No, that's not correct.

Q What's on a completion ticket that will help you place a fault?

A One thing is that there is some difference in the original oil-water contacts in these separate fault blocks. This data is obtained from completion tickets.

Q That just helps you in putting a well in a certain fault block, doesn't it?

A This is merely back-up information to confirm some of the faults which I've shown here.

Q I see.

A By electric log pick.

Q I believe I understand now, Mr. Pine.

A Fine.

Q Would you state for the record, please, the destination of any well on your Exhibit 1 that is closed in a lavender triangle that was drilled after 1954?

A You are asking here if I would go through and pick out every well on this map drilled after 1954?

Q Each well enclosed in a lavender triangle.

A On that one, I am going to have to check scout tickets.

Q We'll wait.

A All right, the Pan American No. 12 South Mattix Unit was completed in October of 1954.

Q Mr. Pine, I believe it will save time if you will just state for the record those wells that you find enclosed in a lavender triangle that were completed after 1954.

A After 1954?

Q Yes.

A I don't believe there are any. Wait just a minute, the Pan American No. 17 South Mattix Unit -- no, right, there's no well enclosed in a lavender triangle drilled after 1954.

Q In other words, these critical data which you've used have been available for, oh, some ten years now, give or take a few months?

A Yes.

Q Turn your Exhibit 1 open back again. How many separate and distinct reservoirs do you show on your Exhibit 1?

A At least three, perhaps four.

Q Let's go through and designate them so the record will reflect how many separate and distinct reservoirs we are dealing with here. Could we start on the north and call that the northwest area?

A We can call that A.

Q Would you go right through and designate them for me, please?

A The reservoir in which the Gulf No. 5 Carr, the Pan American No. 9 in Section 15, the Pan American No. 10 in Section 15, these wells are in a separate reservoir which we will call Reservoir A.

Q All right.

A Immediately south of that reservoir, between those two faults, we will call this one Reservoir B. In Reservoir B is drilled the bulk of the Ellenburger producers in the field. South of that the reservoir in which the Humble No. 1 'AB' is drilled we'll call Reservoir C. It is possible that the Pan American No. 3 is also in a different reservoir. This is questionable, but I think that it is.

Q Yes, sir.

MR. HINKLE: Do you want to call that D?

A We'll call that one D.

MR. BUELL: Mr. Examiner, in his direct this witness referred to some of the earlier unorthodox location exception cases. I think it would be proper to incorporate into this record those cases by reference. I would like to move that Case 2553, 2570, 2854, and 2901 be incorporated into this record by reference.

MR. HINKLE: Mr. Examiner, Humble did not participate in those cases. We did not have an opportunity to examine the witnesses, cross examine, or to go into the evidence that was introduced in any way, I don't believe. I think it will unduly encumber the record in this case and cause confusion to include those records here. I don't see where they'll serve any useful purpose. The evidence we will put on, including that which we have already put on, will show our complete case. I think that if he wants to rebut that that he should have the witnesses here and put them on rather than use the evidence in these other cases which we did not participate in.

MR. BUELL: Mr. Examiner, in the first place, the Humble witness introduced those cases, not I. He compared his two applications with two of the previous cases I mentioned. They brought it up; I didn't. As far as Humble not being here, they were an operator in the pool; they had notice; they had the opportunity. It was no fault of the Commission or Pan American that they were not here represented.

MR. HINKLE: They were not directly involved in the exceptions in those cases. Now, the reference that has been made to those exceptions has just been the record shows that there has been exceptions made by the Commission in connection with these field pool rules. We are not going into those cases at all.

MR. NUTTER: We will take his reference to these previous exceptions for what they are worth and deny your motion.

MR. BUELL: Thank you, Mr. Examiner.

Q (by Mr. Buell) Mr. Pine, let's get back to our three or four separate and distinct reservoirs.

A Yes.

Q Do you feel that separation as shown by your Exhibit 1 is a sealing separation such that each of these separate accumulations of oil A, B, and C, will perform and react as separate and distinct reservoirs?

A From various information that I have, I can say that from the original oil-water contact in these blocks, they are indeed separate reservoirs.

Q So here we operators and this Commission, we're not dealing with one reservoir, we're dealing with three?

A Yes.

Q What is your recommendation to this Commission as to how they prorate and regulate these three separate and distinct reservoirs?

A I'm not familiar enough with the aspects of how something like this is handled; therefore, I can't make recommendations on how they should do it. I can merely present a geologic interpretation of the structure of this field.

Q Do you think, based on your background and experience as a petroleum engineer, that conservation would be served and correlative rights protected by prorating and regulating three pools as one pool?

A I have to qualify that. I am not a petroleum engineer. I'm a petroleum geologist.

Q Yes, sir.

A Therefore, I don't have just a heck of a lot of reservoir experience.

Q All right, I certainly don't want to get you out of your field. Could I inquire at this time if Humble is going to have a reservoir engineer on the stand?

MR. HINKLE: Yes.

A Right.

Q I'll try not to ask you any more questions of that type, Mr. Pine, although I believe you agreed with me that geological work such as this is highly interpretive. I feel almost sure without even asking you this that you have every confidence in the world in this picture that you presented to the Commission here today.

A I am enough confident in it that I have convinced the Humble Oil and Refining Company to spend approximately four hundred thousand dollars. Yes, I say I have lots of confidence in it.

Q In other words, you would recommend to your management that they drill wells in the area that they're requesting these two here today?

A Yes.

Q With the utmost confidence you have in your work, why have you not recommended to your management in the area of your Knight lease that they drill a well at a regular location, at an orthodox location?

A An orthodox location would put it back in a separate reservoir, would put it down-thrown to the central fault block. An orthodox location would be approximately one hundred fifty feet from the Humble No. 1 Knight.

Q I don't believe you follow me. He's got his work map here and it's not like the one I was looking at.

MR. NUTTER: I think you are probably looking at a location to the Southeast of the Northwest, Mr. Buell.

MR. BUELL: Yes, sir, he's referring to his work map and it's not quite like the exhibit.

Q (by Mr. Buell) Can you look at the exhibit now and answer my question, Mr. Pine?

A What location are you recommending here?

Q Are you familiar with the pool rules?

A The pool rules, yes.

Q Why did you not recommend to your management that they locate an orthodox well on your Knight lease?

A Oh, okay, the best structural position for a Humble No. 2 Knight well would be as I've shown here three hundred thirty feet from the South and West lines of Section 14. As the structural map shows, this location would be four hundred feet high structurally to an orthodox location.

Q Do you feel an orthodox location would be productive?

A It could be, yes.

Q So it is your testimony to this Commission that Humble, under your interpretation, could locate an orthodox well on their Knight lease and not need the unorthodox location you are requesting here today for Knight No. 2?

A In answering that question fully, I don't have a scale here to scale the exact point of this orthodox location or perhaps proposed orthodox location. It would appear that if this dot I'm looking at would truly be an orthodox location, we could perhaps at the orthodox location make an Ellenburger completion, yes.

MR. BUELL: Let the record show that the dot he was referring to is one in pencil on the copy of Exhibit 1 he was looking at that has been placed in the center of the forty acres

to the right of the forty acres containing the unorthodox location.

Q Mr. Pine, would not a location a hundred fifty feet west of that dot you were referring to, would it not also be productive?

A Yes, it would.

Q The rules provide for a location, they give you latitude up to one hundred fifty feet out of the center?

A As you mentioned there, a well located one hundred fifty feet from an orthodox location would be productive from the Ellenburger, however, would not be structurally as high as our proposed No. 2 Knight well.

Q I don't recall anything in the rules about proving a well for being structurally high, Mr. Pine. Let me ask you this: That fault that crosses your Knight lease ...

A Yes.

Q -- can we give that fault a designation like X or something like Fault X?

A No. 1.

Q Humble's No. 1, all right. How many lavender triangles do you have on that fault trace?

A I have one.

Q Only one?

A Yes.

Q Is the path that that fault follows critical to the

amount of productive acreage that's on your Knight lease.

A I'm sorry, would you restate that.

Q I said is the path that that fault takes across your Knight lease critical to the amount of productive acreage that's on that lease?

A Yes.

Q So we only have one well with data on that fault?

A No, that is not correct.

Q All right, what other data do we have?

A We have one well which is enclosed by a lavender triangle which, as I mentioned earlier, is faulted. It has repeated section. We have another well --

Q Now, wait, wait, which well is that?

A (Indicating)

Q That's a lavender triangle well that's one that we're talking about?

A Right, we have one well which is faulted; we have another well which is the Pan American No. 10 South Mattix Unit approximately 1980 from the north of Section 15 and about 660 from the east line.

Q Why didn't you put a lavender triangle around it?

A Well, I wasn't for sure with my statement here.

Q I'm sorry, I didn't want to cut you off.

A This well is not faulted. This well exhibits drag

in the Simpson formations because of its close proximity to a high angle reverse fault being on the down-thrown side of this fault. If you compare the Simpson in this No. 10 well with a normal Simpson section, you'll find that the Simpson section is exaggerated in length. You can correlate it almost kick for kick but it's exaggerated. This is exhibiting its close proximity to a fault on the down-thrown side. It's exhibiting drag.

Q It tells you close proximity, Mr. Fine, but it doesn't tell you how close, does it?

A That's correct.

Q So it wouldn't be inconceivable, would it, not based on the control you have on Humble's fault No. 1 that the actions of that fault might truly be in a more north and south direction rather than a northwest and southeast direction, as you show it here?

Q From other evidence in the field, if we drop down to the central fault that I've shown here, we see that the Gulf No. 3 Lilly well 330 from the west line and 1980 from the north line of Section 23 is rather close to this fault. This well exhibits absolutely no deformations of any sort in the section. So I see here a well which is real close by well controlled fault data and yet it exhibits no deformation. I can only conclude that a fault that does show deformation in the Simpson section is extremely close. It's closer to the fault than it is to the No. 3 Gulf

Lucky well.

If we rotate the axis of Humble's fault No. 1 to the west or to an easterly direction and towards a more south production, what happens to the productive acreage on your Knight lease?

A It would cut quite a bit of that acreage off and it would show that acreage to be non-productive perhaps.

Q Let's go now over to your State "AB" area. I believe if I understood the designation of our reservoirs correctly, A, B and C, Humble's State "AB" 1 is in C reservoir?

A Yes.

Q And your proposed unorthodox location State "AB" No. 2 would be in the B reservoir?

A Yes.

Q And as I understood your recommendation, you were recommending that those two wells share an eighty-acre allowable?

A Yes, just as the Pan American No. 17 South Mattix Unit, which is in the same fault block as our No. 2 "AB" would be, is sharing an allowable with the No. 9 South Mattix Unit which is in Reservoir A.

Q I don't want to get you out of your field and if you think I am, just say so, but you made this recommendation. Now, from the standpoint of conservation and the protection of correlative rights, can you make such a recommendation?

A The Humble Oil and Refining Company has leases in Section 15. We have not produced any oil from this reservoir. Other people in the field have received unorthodox locations. We have drilled wells at orthodox locations, made dry holes. At this point we initiated a study to see if we too couldn't recover Humble's oil for Humble and for their royalty owners under Humble's leases.

Q In other words, you think it's all right?

A I think it's perfectly all right for Humble to drill a well on their lease to recover their oil.

Q Oh, yes, no one would argue that point with you, but the point I was trying to make is whether in your opinion it's right for two wells in two separate reservoirs to share an allowable out of one pool? I don't care whether it's Humble, Pan American, Gulf, or who it is.

A On this request, I'm afraid I would have to refer that to our engineer.

Q Let me ask you this, and then we will get back to your type work. State whether or not, for the record, a well in the center of the northeast quarter-quarter in Section 15 as shown by your Exhibit No. would be productive or not productive.

A It would be productive, structurally lower than our proposed No. 2 "AB" well.

Q Do you have enough confidence in your geologic work

to recommend to your management that a well be drilled in the center of that forty?

A Geologically, I can say yes.

Q Then if you did that, I notice in your direct testimony you had to say that this request of Humble's, talking about the State "AB" 2, --

A Yes.

Q -- was only similar to another request, whereas when you compared the Knight 2 with the Gulf 3, you said it was identical.

A In footage location?

Q Yes.

A Yes.

Q If you moved the State "AB" No. 2 to the center of the north forty, then disregarding the effect of separate reservoirs, it would be identical to Pan American's request, would it not?

A Yes.

MR. BUELL: That's all I have, Mr. Examiner.

MR. NUTTER: Any other questions of the witness?

MR. HINKLE: I have two or three questions.

REDIRECT EXAMINATION

BY MR. HINKLE:

Q Mr. Buell, in his cross examination, referred to a

probable location which would fall in the Southeast of the Southwest Quarter of Section 14 as a normal standard location?

A Yes.

Q Where would that well be located with reference to your fault line No. 1 that you've referred to?

A Well, again in answering Mr. Buell's question, I think I qualified there that I'm only picking an eyesight point in an estimated location here. I don't have a scale, I don't have the exact point.

Q It might fall approximately on your projected fault line there?

A Approximately, yes.

Q Where would that location leave you with respect to the protection of correlative rights, keeping in mind that the Gulf No. 2 and No. 3 wells to the south are on 330 locations?

A I think it would violate these correlative rights.

Q And you've already testified that these were exceptions to the field rules that were permitted for Gulf?

A Yes.

MR. BUELL: May it please the Examiner, this witness, in answer to my questions, stated he was not a reservoir engineer, he knew nothing about protection and correlative rights on direct. He's answering questions from his counsel that go into the protection and correlative rights. He can't turn it off and on like a

hydrant.

A Perhaps I can answer this question a different way, then, just as a geologist here. If Humble drilled a well in an orthodox location, we would be approximately four hundred feet lower than our proposed No. 2 location. Not having had lots of reservoir experience, I think I can still say that a well that is producing four hundred feet higher than another one would probably make more oil out of this reservoir.

Q Mr. Pine, the fact that exceptions have been made in connection with the Gulf's applications well No. 2 and 3 and also in connection with Pan American's Well No. 17, and as I understand those have all been made within the last year or approximately so, were these exceptions the reason that this new study was made by Humble of the whole pool area?

A That's right, after the unorthodox location was proved for the Ellenburger completion of the Gulf No. 3 Lilly, Humble initiated a study of the Fowler field. The results of this study are what you see before you here. It appears that we have acreage which would be productive would we be allowed to drill these wells.

Q Prior to the time of granting these extensions, I believe you've already pointed out that Humble drilled some wells and they drilled it on the standard locations and they did not ask for exception.

A That's exactly right.

Q Did Humble object to the Gulf's exception or Pan American's exception?

A It's my understanding that they did not.

Q In connection with your testimony on cross examination, you referred to Well No. 10 Pan American's Well No. 10 in Section 15 as indicating that it showed some drag in the Simpson formation, I believe?

A Yes.

Q Can you explain that a little bit further as to what you mean by "drag" there?

A When a high angle reverse fault occurs such as occurred here; normally the Ellenburger was like this. The faults, the central fault block is pushed up relative to this one, it goes like this. In this case it projected over the down-thrown block. The beds in the down-thrown block, when they're pushed against fault, this is done. This well, the No. 10 rather than drilling a Simpson section like this drilled this such that each bed was exaggerated in thickness. This is clear evidence of being real close to this fault.

Q This is one of the reasons why you approached the No. 1 fault line from Well No. 9 through Well No. 10?

A That's correct.

Q Mr. Buell indicated that you might as well have curved

the No. 1 fault line. Would you have had control at all to curve it?

A I had no control to curve it and in fact, it seems only logical if you have a northwest-southeast trending anti-cline, you have two wells controlled faults which parallel the axis of the anti-cline. You have a third fault on which you can pick it in one well. You know that it's very close to another. It's only logical for me to extend this fault parallel to the other two faults for which I have complete control, which is again parallel to the axis of the major feature here.

Q Would you say that it's a more normal condition where you have faulting in an area like this that the faults are parallel than the curve?

A Yes.

Q This is the usual condition that you find in a faulted area?

A Yes.

Q You have parallel faults?

A Yes.

MR. HINKLE: I believe that's all on redirect examination.

MR. BUELL: Mr. Examiner, I would like to get this cleared up at this time. Does anyone in the room have a scale, and I would like for a spot to be marked on the official exhibit

one hundred fifty feet west of the forty acres to the east of the unorthodox location showing that according to Mr. Pine's interpretation such a location would be orthodox and productive. Does anyone have a scale?

MR. HINKLE: In view of that, I would like to ask one more question.

MR. NUTTER: All right.

Q (by Mr. Hinkle) Assuming that Humble located a well at the location suggested by Mr. Buell in connection with the Knight least in the Southeast Quarter of the Southwest Quarter of Section 14, in your opinion would such a well ever pay out?

A Again, I think I'd have to refer this perhaps to an engineer.

MR. HINKLE: We'll cover that.

MR. NUTTER: I'll get a scale.

MR. DURETT: Here's the official exhibit, Mr. Buell.

MR. DAVIS: You are talking about a field rule location, not an orthodox location? You are talking about a location under the Fowler rules, not a full eighty-acre location?

MR. BUELL: Yes.

A If it's all right, let me just mark it on here to get it straight before I mark it on there.

MR. BUELL: Yes.

A Again, let me examine this one here as I have done that

one.

MR. BUELL: Do it real light so that the red will show up. Mr. Examiner, could I make a phone call while he's doing this?

A All set.

MR. BUELL: Mr. Examiner, what Mr. Pine has done, he has drawn a red circle exactly in the center of that forty-acre tract. I would like him to draw a circle one hundred fifty feet west or south and west, just make it due west of that circle in the center.

MR. NUTTER: Do you have a dot in the center of that forty, do you?

A Yes.

MR. NUTTER: Can you make a one hundred fifty foot radius circle? What is the pool rule, one hundred fifty feet from the center? So a one hundred foot radius circle around that, do it.

A I think I may have a protractor here. I can put a lot of dots in freehand in a circle. This doesn't happen to have a one hundred fifty foot radius on it.

MR. NUTTER: Make a circle of three hundred feet diameter around that dot.

A All right, it's not very pretty but it's approximate.

MR. BUELL: That will do.

RECROSS EXAMINATION

BY MR. BUELL:

Q Now, let's go back to Humble fault No. 1, the northernmost fault.

A Yes.

Q With regard to that fault, the tract that you have, let me ask you this: How many points do you as a geologist need to find the plane of a fault?

A Certainly the more the better.

Q Six?

A I say certainly the more the better, as I had down here in this middle fault.

Q Is there any, a generalized number in your trade that you need, the number of points that you need to ascertain the plane of the fault?

A To absolutely tie it down?

Q Yes, sir.

A Two faults, two fault picks could tie down the plane of a fault.

Q Two points could?

A Yes.

Q I'd always heard it was three. I'm glad to know it's only two. How many do you have here?

A I have one fault pick.

MR. BUELL: Thank you, Mr. Pine.

MR. NUTTER: Go ahead, Mr. Hinkle.

MR. HINKLE: Are you talking about the strike of the fault or the fault plane?

A As Mr. Buell asked the question, the fault plane, two picks, one in each well, one here and one here, if I can pick a fault here in one well and a fault here in another well, I can establish the fault plane, which was Mr. Buell's question.

MR. NUTTER: In other words, if you have two points, you can draw a line between the points, assume that it's a straight line?

A I'm not establishing the strike of this fault by two points, but I can by two points, as Mr. Buell asked can I establish the fault plane.

MR. NUTTER: By the plane, do you mean the face of the fault?

A Yes.

MR. NUTTER: In a vertical direction?

A Yes, I can establish this.

MR. NUTTER: Are there any other questions of Mr. Pine?

MR. HINKLE: That's all.

MR. NUTTER: He may be excused and we'll take a fifteen-minute recess.

(Whereupon a recess was taken.)

MR. HINKLE: Ready to proceed?

MR. NUTTER: Yes.

WILLIAM DUTTO,

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

DIRECT EXAMINATION

BY MR. HINKLE:

Q Your name is William Dutton?

A Yes.

Q You are employed by the Humble Oil and Refining Company?

A Yes, sir.

Q What capacity?

A I'm a petroleum engineer in the Midland area reservoir section.

Q Does that cover Southeast New Mexico too?

A Yes, sir, West Texas and Southeast New Mexico.

Q Have you previously testified before the Oil Conservation Commission?

A Yes, sir.

Q Your qualifications as a petroleum engineer are a matter of record?

A Yes, sir.

MR. HINKLE: Qualifications acceptable?

MR. NUTTER: Yes, sir.

Q (by Mr. Hinkle) Have you made a study of the Fowler Ellenburger pool?

A Yes, sir.

Q Have you prepared any graphs and maps or exhibits in connection with your study?

A Yes, sir, I have prepared Exhibit No. 4.

(Whereupon Humble Oil & Refining Co. Exhibit No. 4 marked for identification.)

Q Now, Mr. Dutton, refer to Exhibit No. 4 and explain what it is and what it shows.

A Exhibit No. 4 is a performance curve for the Fowler Ellenburger pool. It shows the produced gas-oil ratio as outlined in red. The dashed line along the gas-oil ratio curve is the original solution gas-oil ratio of one thousand twenty cubic feet per barrel. The curve with the circle points is the arithmetic average bottomhole pressure. The dashed line along that curve shows the saturation pressure of 2467 psig. The curve outlined in green is the daily oil production. The curve outlined in red is the daily water production, and the number of producing wells is also shown on this curve.

Q I note in connection with the daily oil production that the curve goes up very abruptly and about February, 1964. What caused that?

A There was actually an increase shown in the last four

months that's a function of the performance of the Pan American of the South Hattix Unit 16 and 17.

Q What do you conclude from the performance curve shown on Exhibit No. 4?

A The pertinent point to me on this curve is that gas-oil ratio performance of this field does not substantiate the bottomhole pressure performance of the field. You notice back in late '54 or early '55 the saturation pressure was reached based on the pressure curve. You would normally expect if the saturation pressure had been reached at that point, you would expect an increase in the gas-oil ratio with a continuing increase from there on in the gas-oil ratio performance, and it has not done that. This to me casts a little doubt on the pressure data. Likewise the -- but making the assumption that the pressure performance is right, it is the only available data, you notice an appreciable flattening of the pressures, although out at the later years there are very few pressure points.

These represent maybe one or two wells on pressure maintenance with the majority of the wells being on the pump, that it can be the function of lack of data. But it does indicate a very flattening of the pressure, which can possibly be indicating some pressure maintenance by water influx and it appears the gas-oil ratio indicates the average pool pressure is still above the saturation pressure.

The curve also shows, although the water production is very erratic, which is probably a function the way water production is reported based on prorated. It does show a general increasing in water production. To me this performance curve indicates that there is some water drive acting in this field. This curve plus the watering out and plug-backs of Ellenburger wells, as the exploration witness testified to, indicates to me that potential of some water drive in this field.

Q Would you conclude, then, that the Fowler Ellenburger pool is being produced primarily by strong water drive?

A I cannot say that it's been produced primarily by a water drive. I imagine that it is being produced by a combination of solution gas and water drive. The relative magnitudes of either type have not been determined, but I think this curve indicates that there is some pressure maintenance through water encroachment.

MR. NUTTER: I might ask you these gas-oil ratios are the calculated ratios on the amount of oil produced in the field and the oil produced in the field?

A Yes.

MR. NUTTER: They are not test ratios?

A No, all the data on the graph came from New Mexico Engineering Committee reports.

Q (by Mr. Hinkle) Exhibit No. 4 was prepared by you or

under your direction, was it not?

A Yes.

(Whereupon Humble Oil & Refining Co. Exhibit 5 marked for identification)

Q Refer to Humble's Exhibit 5 and explain what that is and what it shows.

A Exhibit No. 5 is a plat showing the known proration units as the Commission records reflect them. They also -- the red outline shows Humble's proposed proration unit and the red circles show Humble's proposed unorthodox locations. The green circled wells are the Ellenburger wells, and the green dashed area are the Ellenburger proration units as reported. The orange circled wells are the Blinebry wells, and the orange dashed area are the Blinebry proration units.

Q Have any of the Ellenburger wells in the pool been drilled at unorthodox locations?

A Yes, sir, Gulf's Lilly No. 1 was drilled three hundred thirty feet.

Q That's in Section 23?

A Yes, the Northwest Quarter of the Northwest Quarter of Section 23. That's drilled three hundred thirty from the lease line, and it has eighty-acre proration unit assigned to it. Gulf's Lilly No. 3 in the Southwest of the Northwest of 23 was drilled three thirty from the West and South lease lines, and this well

was your forty acres assigned to it. It was originally requested--at the time they proposed this location, they requested eighty acres, were denied, came back later and requested forty acres and were approved.

Pan American South Mattix Unit No. 15 in the Northeast Quarter of the Northeast Quarter of 22 is an unorthodox location in that it is located in the wrong quarter-quarter section. The field rules require development in the Northwest and Southwest Quarter-quarter section. This well, Pan American originally requested an eighty-acre allowable for it at the time their No. 3 was watered out, and as a result of hearing, they got a sixty-acre allowable for this well.

Q These are all of the exceptions that have been made?

A No, sir, there's one more.

Q Okay.

A Could I back up a minute? That lease location of Gulf's Lilly No. 2 and Gulf's Lilly No. 3 are the precedent for Humble's request for three hundred thirty foot location from the lease line.

Q On their J. A. E. Knight No. 2 you are talking about?

A On our J. A. E. Knight.

Q On Humble's

A These two wells establish a precedent of Ellenburger wells three hundred thirty foot from the lease line and both of

our applications are for three hundred thirty foot from the lease line. The next one is in the Northeast Quarter of Section 15. Originally Pan American had the South half of the Northeast Quarter dedicated to Well No. 10, and I don't know what acreage they had dedicated to their No. 10.

Well No. 10 South Mattix Unit No. 10 watered out and Pan American requested permission to drill South Mattix Unit No. 17 at an unorthodox location and share in an eighty proration unit with South Mattix Unit No. 10. This request was approved and this is the precedent for our request for a shared proration unit for our New Mexico State "AB" wells 1 and 2.

Q You have designated Humble's proposed unorthodox location by a red circle, is that right?

A Yes, sir.

Q One in Section 16 and one in the Southwest-Southwest of 14?

A Yes, sir.

Q What acreage does Humble propose to dedicate to its State "AB" No. 2 in the East half of the Northeast Quarter of Section 16?

A We propose to dedicate the same acreage to this well that is currently dedicated to ur State "AB" No. 1 and these two wells to share the proration unit and the two wells combined not to be allowed to produce more than one top pool allowable.

Q You intend, then, to continue to produce State "AB" No. 1 in the event you are permitted to drill the J. A. E. 2?

A Yes, sir, we would continue to produce the "AB" No. 1 down to its economic limit because we don't feel that the down-thrown side of that fault would be drained by our No. 2 well, and we would desire to produce both wells in order to have competitive operations in both sides of the fault block.

Q In your opinion, is the exception which was made in connection with Pan American No. 17 well a precedent for this exception Humble is requesting?

A For the shared proration unit, yes, it is.

Q What acreage does Humble propose to dedicate to its J. A. E. Knight No. 2 well?

A We propose to dedicate the sixty-two acres shown as outlined in red on this plat, which is the area that lies in the Southwest Quarter of the Southeast Quarter and in the Southeast quarter, approximately twenty-two acres in the Southeast Quarter of the Southwest Quarter, which lies on the up-thrown side of the fault transversing that lease.

Q In your opinion, is the acreage which you propose to dedicate to these two wells reasonably proved to be productive?

A Yes, sir, it is.

Q Is Humble's justification of the investments associated with the drilling and the equipping of these two proposed wells

based on the presence of a water drive.

A Yes, it is. Our justification of the $133,000 expenditure for each one of the Ellenburger completions, which includes pumping equipment and related facilities or a combined expenditure of $334,000, is based on the presence of a water drive. I might add also that we have spent $300,000 for the one and half dry hole, that the exploration witness testified to.

Q What do you mean by one and a half dry holes?

A We drilled the Pan American 2-D on a fifty-fifty deal with Pan American.

Q In your opinion, are the unorthodox locations which are being requested necessary to protect correlative rights?

A Yes, sir, these locations as requested are based on structural advantage which we consider is necessary to protect the correlative rights of Humble and our royalty owners in view of some water drive in this field.

Q Have you determined the amount of oil that would be lost to Humble by moving the proposed locations back to the center of the respective forty-acre legal subdivisions?

A Yes, sir, we would lose on the 'AB' lease, if we would move the No. 2 location back to the center of the Northeast Quarter, we would lose twenty-three and a half percent of the original oil in place under that tract. If we would move the Knight 2 location back to the center of the forty-acre proration unit on

which it is located, we would lose seventeen percent of the original oil in place on the Hinkle lease.

MR. NUTTER: If you moved it where?

A If we would move it to the center of the Southwest of the Southwest of 14.

MR. NUTTER: In other words, in the same forty-acre tract but in the center of it?

A Yes, sir.

MR. NUTTER: You estimate you would lose seventeen and a half percent?

A Of the original oil in place.

Q (by Mr. Hinkle) Mr. Dutton, assuming for the purpose of this question only that the Fowler Ellenburger pool is a solution gas drive pool, if that is the case, would the structural advantage violate the correlative rights of the up-structure lease owners?

A No, sir, if this field is producing by solution gas drive and in view of the good communication that it has and the fact that allowables have generally been tied to productive acres, this won't violate correlative rights.

Q In your opinion, will the proposed wells of Humble's increase the total ultimate recovery from the pool?

A No, sir, they will not increase ultimate recovery from the pool, but they will definitely allow Humble and the royalty owners to recover our remaining recoverable oil underlying our

leases.

Q Referring to Humble's State "AB" No. 1 in Section 1, in your opinion, is [illegible] at the present time dedicated to the acreage which have been dedicated to the well?

A The "AB" No. 1.

Q All No. 1, yes.

A No, sir, it is not.

Q On what do you base your opinion?

A Based on the structural interpretation and the difference in the water-oil contacts and subsequent water production performance of wells in the field, I don't believe there's communication through the oil column. Pressure data indicates communication, but I believe this pressure communication is through the aquifer, which is very reasonable in that there are numerous cases in literature and various field studies that indicate communication of pools over great distances through aquifers and this would be in effect communication between fault blocks, pressure communication between the fault blocks through the water aquifers.

MR. HINKLE: Mr. Examiner, in connection with Case No. 3039, Humble also seeks the approval of the dual completion of its State "AB" No. 2 in the event it is drilled, so that if the proper zone is encountered, that it can also complete in the Fowler Blinebry pool. There's a precedent for this in that the Oil Conservation Commission can approve this administratively in

that they have already approved a well for this purpose. However, since we had to file this case for an unorthodox location, we have included in this application and in that connection, we have filed with the Commission the regular form which is the application for multiple completion and which I would like to have identified as Humble's Exhibit No. 6.

(Whereupon Humble Oil & Refining Co. Exhibit No. 6 marked for identification.)

Q Now, Mr. Dutton, refer to Exhibit No. 6 and explain what it shows.

A Exhibit No. 6 is a standard Commission application for a multiple completion together with a schematic diagram, a plat of the lease and the well, and a letter of notification to the offset operators.

Q Referring to your diagram, will you explain how you propose to dually complete this well?

A We propose to complete this well as a combination or non-consent dual completion with a 4 1/2" casing set to 10,600 feet for the Ellenburger and 2 7/8 casing set to 6200 feet for the Blinebry. We propose to set three hundred feet of 13 3/8 casing and circulate the cement; 4,450 foot of 9 5/8 intermediate casing will be set into the San Andres and the cement will be circulated back into the base of the salt. We will run 4 1/2 production casing for the Ellenburger to 10,600 foot and 2 7/8

inch casing to the Blinebry at 6200 foot. We will cement the volumes to be determined on the basis of a caliper, but we will centralize through the pay zones and cement in two stages, the first stage being down the long string, while we are maintaining the circulation out the small string to dress off the string and dress off the short string and tie back into the intermediate. The Ellenburger perforations are 10,150 and 10,530 foot and the proposed Blinebry are from 5400 foot to 5750.

Q In your opinion, will this method of dual completion definitely prevent communication between the two zones?

A Yes, sir.

Q Referring to Humble's State "AB" No. 1 on Exhibit 5, do you know why the Humble did not attempt to dually complete that in the Blinebry formation?

A Maybe I should, we should back up a minute. We are proposing this 'AB' 2 as a dual. In the event that we, the logs indicate a sufficient Blinebry section, we'll set the pipe on it. There's a good possibility we will not set the Blinebry pipe, but we do not want to dual the 'AB' No. 1 because it has five and a half inch casing in it, and if we would conventionally dual that well, we would have to pull the 2 1/2 inch tubing in it, that's currently in it, and replace with two strings of 1/16" tubing, which would reduce the Ellenburger lift capacity by approximately forty percent. Reduction in lift capacity would

result in earlier abandonment at a higher economical limit than it would with continuous use of the large capacity pumping unit. We want to maintain that zone as long as we possibly can.

MR. HINKLE: That's all on direct examination.

CROSS EXAMINATION

BY MR. NUTTER:

Q Mr. Dutton, what's the current producing capacity of your "AB" No. 1 in the Ellenburger?

A February's production was sixty-four barrels of oil per day, forty-five barrels of water per day.

Q How much oil has that well produced?

A Cumulatively to the first of March, that well had produced 530,616 barrels.

Q That's 3-2-1964, correct?

A Correct.

Q What have you based your estimates of a loss of twenty-three and a half percent of the original oil in place on a standard location there, not a standard location but on a 660-660 location for your No. 2 well and your seventeen and a half percent loss on your proposed No. 2 Knight well on 660?

A That is based on the gross acre feet in place underlying both of those tracts above the original water-oil contact, and it's a comparison of the total that was originally there compared to what it would be if you cut it off, based on the structurally

lower position.

Q You are basing that, in other words, on the encroachment of the water into the lower position structurally?

A Yes, sir.

MR. NUTTER: Any other questions of Mr. Dutton?

CROSS EXAMINATION

BY MR. BUELL:

Q Let's clear out all the underbrush right at the outset here. Are you in agreement with the structural interpretation that Mr. Pine presented for Humble?

A Yes, sir.

Q Do you base your agreement on simply your confidence in him and his ability as a geologist, or have you made a study of your own which confirms and verifies his interpretation?

A I have reviewed his case; I have not made an independent geologic study. His explanations of what has transpired in this field are reasonable explanations, where in numerous cases some of these other explanations for it have been written off as being freaks, and his explanation explains these freaks more reasonably to me and they have a good sound engineering or technical basis to them. I have accepted them on that basis.

Q And you agree with him that actually what we're looking at here is four separate and distinct Ellenburger reservoirs?

A From the standpoint of communication through the oil

column, yes, from a standpoint of pressure communication, no. They are in pressure communication.

Q Why don't we go into that just a little here, Mr. Dutton. I want to be sure I understand you. Do these sealing faults of Mr. Pine's stop at the water-oil contact?

A I would have to say I don't know to that point. I would -- my estimation would be that they probably go on to the granite and feather out down in there, but it --

Q You have not made a study of that?

A No, I haven't, but my explanation of where this communication could come from is that these faults were feathered out horizontally eventually and the communication is probably through it, like an end run or something.

Q You have no data on that, that's just a hunch of yours?

A That's a hypothesis, that's right.

Q Actually, Mr. Dutton, is it not a common occurrence for engineers to use factual data to confirm or deny a structural interpretation of a geologist?

A Yes, sir, it is if these data are available.

Q What data would you need, would production performance, would that be a good tool?

A It is a good tool.

Q Would pressure be a good tool?

A It is another tool, yes, sir.

Q Well, have you made such a study -- of actual data --

A Of production data?

Q -- to confirm or deny the structural interpretation of Mr. Pine's, which he honestly admits is highly interpretive?

A That is the basis of my concurrence with his review, is mainly production data.

Q Actually, as a matter of fact, Mr. Dutton, isn't just the contrary true and all of your indices of performance indicate that his structural interpretation is wrong instead of right?

A No, sir, I think that his structural interpretation is the only way you can account for the water production that has transpired in this pool.

Q In view of that, I wonder then why this Exhibit 1 was pressure performance on only one reservoir? Why didn't you have four?

A If you had the time and the desire to go into a material balance type calculation, which we have not done --

Q That's important. Let's remember that, Mr. Dutton, in connection with something else.

A -- which we have not done --

Q Go ahead.

A To do this right, you would have to split all the data into four separate formations, that's correct.

Q Isn't that what you as an engineer would do if you were

dealing with four separate and distinct reservoirs?

A To get the final correct answer, if you want to know just how much, what each separate reservoir is doing, yes, but on a basis of trying to pin down the predominant type of drive, I don't believe it's necessary.

Q Excuse me. I didn't mean to interrupt. I don't ever want to interrupt you.

A Just from my own experience, material type balance calculations are real wonderful to have, but I can't afford to make them in a whole lot of cases. We normally don't go to that trouble which is time consuming to just one location. The data that we have put together is sufficient to justify to our management which they have bought an expenditure of approximately $384,000. We just go far enough to give our management concurrence and move on to something else. That's why material balance calculation has not been made.

Q Do you mean to infer by your Exhibit 1 that you as a reservoir engineer feel that these separate and distinct reservoirs are actually performing as one?

A Pressure-wise they are.

Q Would that not indicate to you, then, Mr. Dutton, the possibility that this structural interpretation of Mr. Pine's is wrong?

A Based on the evaluation of it as one reservoir, you

cannot explain the water production except by the basis of it being, freak, and I believe there's usually a technical explanation for most freaks.

Q Freaks, now you couldn't be talking about SMU No. 3, could you?

A Yes, sir.

Q Mr. Dutton, I can see right now that that is one thing, in which Pan American concurs with you. We also think SMU No. 3 is a freak. Let's see how Mr. Pine's interpretation explains away that freak. That seemed to be critical to your presence here. As I recall, SMU No. 3 was in reservoir D, his fourth reservoir?

A Yes, sir, and he also based on the performance of that well -- gave me a copy of the structure.

Q Just answer my question. My question was, Mr. Dutton, wasn't the SMU No. 3 in reservoir D, Mr. Pine's fourth reservoir?

MR. HINKLE: Let me correct that for the record. I don't believe that Mr. Pine testified definitely that there was a fourth reservoir. He indicated that there might possibly be, and for the purposes here, it would be identified as Exhibit D.

Q (by Mr. Buell) Let's talk about this possible might-be reservoir D and how his interpretation of that possible reservoir D explains the freakish performance of SMU No. 3. You are looking at your Exhibit No. 1, now, Mr. Dutton?

A Yes, sir.

Q How many other producing, [illegible] wells are in reservoir D? Mr. Dutton, are you counting wells in reservoir D or reservoir C?

A I'm just making myself a few little notes right now.

Q I'm sorry, take your time. I believe you'll find there's just one and that's SMU No. 3.

A Did we call the northern portion of this C, for my information?

A Yes, he labelled that C.

A And this one here is D. There is one, then.

Q That is SMU No. 3?

A Yes.

Q Let's review the performance for that well. Are you familiar with that?

A Only to the extent that it watered out very early.

Q Let's review it. Since you are not familiar, you can't disagree with me and the Commission records will back my statements up. As a matter of fact, Mr. Dutton, assume for the purpose of this question that I am correct, that that well was completed initially as a flowing water free top allowable well.

A Yes.

Q The well produced, if my memory is correct, for about three months when it was shut in for an interference test that

was held, run in conjunction with an application for field rules that was pending before the Commission. At that time, that one well in this separate reservoir with no other producers was still producing to that allowable flowing water free. At the end of that shut-in period and after incidental observations on Well No. 3 showed complete communication and drainage, it was attempted to return to production and it was then one hundred percent salt water producing well. I want you to explain for the Examiner how Mr. Pine's geological interpretation helps explain that freak. You have a one-well reservoir it was shut in and nothing else was producing and it went to one hundred percent water.

A This transverse fault that was postulated in the exploration testimony, this was thrown in in an attempt to explain the difference in the water-oil contact in the, say, the combined fault block of C and D. This fault is at a different orientation than the other two faults, if it is there at all. I don't know how it could have come about if it was there, but I think it would be possible for it to have been a secondary fault in comparison to the three other faults for discussion purposes call those primary fault, and in the process we have no data on that fault. It's a postulation if it is there. It could be very possible that that fault had communication through the oil column and the production up in the C fault block could have allowed, pulled the

pressure down and voided part of the reservoir down there and allowed the water to encroach.

Q Would it be a fair summary of your opinions, Mr. Dutton, to say that in your opinion his structural interpretation does not explain the freakish nature of SMU No. 3?

A No, sir, I think it comes closer to explaining what could have possibly happened than just calling it a freak, I certainly do. I can't say what I have just said is the truth. It is a possibility and without being able to pin down that fault there, if it is there, or not, you'll notice it's marked with a question mark. We are not trying to say it is there or it isn't there. It's a possibility, and if such a thing is there, it is a possible explanation for what has happened to SMU No. 3.

Q The reason I made my summary I did because in Mr. Pine's opinion it's a sealing fault; for you to explain that freakish nature of the performance of No. 3, you had to make it a non-sealing fault?

A This secondary type fault, yes, sir.

Q You said you examined performance data which confirmed Mr. Pine's interpretation. Relate for the record these performance data.

A The performance data consisted primarily of the water cuts in connection with plug-backs of various wells through the reservoir. For example, Well No. 7, I don't have the actual data

with me but it started making, approximately ten percent water.

Q Which well is No. 7?

A SMU No. 7, which is in the Northwest of the Northwest of 15, and it was plugged back to get away from water production. Our New Mexico State "AB" No. 1 has quite a history of workovers. In two instances of communication, in the process of plugging back and maintaining the water production that we had in the lower zone as we come back up the hole, there are several instances of this. If you want specifications, I mean Mr. Pine can give you the specifications on these workovers and water cuts better than I can.

Q Mr. Pine doesn't know anything about performance or reservoir engineering?

A He knows about the well workovers and he has the data on the tests prior and before and I reviewed, as I said, I have reviewed his study and I have concurred with it from that standpoint.

Q I believe you said Gulf Lilly No. 1 was an example of an unorthodox location?

A Yes, sir.

Q Of course, you are aware of the fact that that well was drilled prior to the adoption of the Fowler Ellenburger pool rules, are you not?

A It was drilling at the time of the hearing.

Q It was a regular at the time it was drilled?

A It was regular on statewide rule.

Q So actually there is only one 330 unorthodox location in the field at this time that was completed after the adoption of rules?

A One 330 location?

Q Yes, sir.

A That is correct.

Q What well is that, I've forgotten.

A Gulf Lilly No. 3.

Q Are you aware of the fact that a well was already in existence at that location down to the Fusselman and that Gulf merely deepened an existing well down to the Ellenburger?

A Yes, sir.

Q So actually from the standpoint of the unorthodox completions which have been granted after the rules, we have only one and that's the Gulf well that we have just been discussing?

A As far as 330 locations, yes, sir.

Q Mr. Dutton, the absence or existence of a water drive in this reservoir or these reservoirs is very critical to your case, isn't it?

A Yes, sir, our belief in the water drive is what necessitates the up-structure locations, that's right.

Q If in truth and in fact a water drive does not exist,

then there would be no justification on your part for locating these wells as 330 locations structurally higher, would there?

A No, sir.

Q And if in truth and in fact a water drive does not exist, these wells could be located regularly or more regularly as I suggested in my cross examination of Mr. Pine?

A Well -- all right, sir. I don't understand your regular location. If you are talking about in the center of the other quarter, yes.

Q I said with relation to your State "AB" you are exactly right, that's why I said more regular. Of course you can locate an orthodox location on your Knight lease.

A It would be a high risk well.

Q But strictly under Mr. Pine's interpretation with which you agree, right?

A Right.

Q So the absence of a water drive becomes critical, does it not?

A , sir.

Q Where is the first exhibit you introduced, the performance curve? While we're looking at that performance curve and with particular reference to the pressure performance, Mr. Dutton, I wish you would describe for me a typical performance curve of pressure on a solution gas drive reservoir such as you've looked

at in your engineering books in school.

A Normally at the time the reservoir pressure hits saturation pressure or very soon thereafter, you would anticipate an increase in the gas-oil ratio.

Q I said pressure performance, Mr. Dutton.

A Pressure performance?

Q You can elaborate on redirect. Mr. Hinkle wouldn't miss a point.

A Excuse me, I apologize.

Q Describe to the Examiner the typical performance pressure curve of a solution gas drive field such as you looked at in school.

A Typical of oil-gas curve, youwould start at original pressure and decline at some slope to a saturation pressure, at which point you would get a break in the curve and with continued production the bottomhole pressure,you would have a straight line portion for a while, but with continued decline your pressure would curve and drop off.

Q For the stage of depletion that the Ellenburger reservoir in the Fowler area is in, if we had been looking at your exhibit we would have thought that you were describing that pressure performance curve, wouldn't we, Mr. Dutton? Isn't that what's happened here?

A You picked up a break at the saturation pressure, that

is correct, but again these are, as I pointed out when I discussed it previously, these are one and two well points representing a field and everything. The pressure is remaining fairly constant at an extremely high level in view of the difference in a half million barrels of oil that had been produced since the saturation pressure, and I would not normally expect it to remain that high and as I pointed out previously, the solution ratio does not substantiate pressure performance.

Q You jumped back to gas-oil ratio on me, didn't you?

A Yes, sir.

Q What are some of the tools that an engineer has at his disposal that he can use to ascertain and pin down whether or not there's an effective or tight water drive when some of the data perhaps may conflict, what are some of the tools you reservoir engineers have?

A As I mentioned previously, the only correct way to do is material balance, and I explained why we have not pursued it in this case.

Q Don't you feel the exceptions that you are asking for here today are of such a nature that it would have been worthwhile to have satisfied in your own mind whether or not we had a tight and effective water drive here?

A No, sir, as I have stated, a performance curve of this type we conflict between the pressure and the gas-oil ratio

performance and the increasing water production to me is sufficient evidence that we have more than a limit of water drive. We at least have a combination drive with a fairly significant portion of it being attributable to water. This fact plus the water cut performance of these wells in the field and the continual plug-back of many of these wells for watering out of your No. 10 the watering out of your No. 2, to me that is adequate water that you have coming at you and you had better get high.

Q Maybe it would help me understand, Mr. Dutton, what do we have to have in existence to have an active and effective water drive where your water drive would be your primary producing mechanism, or I believe you have about decided here it's fifty percent water drive, fifty percent solution gas drive?

A As I stated before, I cannot put any relative numbers on one or the other.

Q Then you couldn't argue with me if I said it's ninety percent solution gas and ten percent water drive?

A No, I could not refute it.

Q What do you have to have in existence to have an active effective water drive?

A You have to be in connection with a water acquifer.

Q Is there anything about the acquifer other than being in communication with the oil important?

A The degree of communication and the size of the acquifer

determines how strong your water drive is.

Q Since you haven't made any study to ascertain first whether we have communication with the acquifer or not, could I safely assume that you haven't made a study to ascertain the relative size of the acquifer?

A I think our water encroachment that has been exhibited through well workovers indicates there is communication with the acquifer itself.

Q You have not made a specific study, you are basing that opinion, or as you said earlier, I believe you said it was just a hunch you had?

A To me this is based on data, that part of it.

Q Have you got any hunch on the size of the acquifer?

A I have no idea.

Q Would it surprise you, Mr. Dutton, to hear that in the pool rule hearing on this very pool, that data were introduced in the hearing that an extensive geological study -- now this is ten years ago -- was made and that the acquifer was not of sufficient size to afford any effective mechanism help?

A It would surprise me and I don't believe it is there.

Q Would it surprise you that Humble was there and concurred with that presentation?

A Humble concurred with the field rules but there was no mention of communication with the acquifer. This is going to be

a matter of record anyway.

Q Yes, the Commission has it in their record.

A But the witness testified to it being a solution gas drive field and as I recall, there's no reference to an acquifer in that hearing.

Q Well, you are going to make me take time to find it.

MR. BUELL: Off the record.

(Whereupon a discussion was held off the record.)

MR. BUELL: Mr.Examiner, in the interest of saving time and if Mr. Hinkle would agree, could we have a right to find that or not, find it in the transcript and point it out for the record further on?

MR. NUTTER: How much further do you have to go on this?

MR. BUELL: I think I'm through right now if I can get my colleagues to agree. We're through, Mr. Examiner.

MR. NUTTER: Are there any other questions of Mr. Dutton? Mr. Buell, you are planning a direct case of your own?

MR. BUELL: Yes, sir.

MR. NUTTER: I suppose you can make reference to this portion of this transcript in that case.

MR. BUELL: Fine.

REDIRECT EXAMINATION

BY MR. HINKLE:

Q Mr. Dutton, referring again to Humble's Exhibit No. 4

and in particular to your curve showing the gas-oil ratio, if you had a typical gas solution drive, would that curve be as it is as shown there?

A No, sir, very soon after the saturation pressure was reached, this is making the assumption that the pressure data is correct, very soon after the saturation pressure is reached, you would start to have a continuing increase in gas-oil ratio until very late in the life of the field, at which time it would hump over just very slightly. But as you can see, we have quite a bit of life left in this field and we have quite a bit of production history behind us, and for better than ten years or approximately that, that ratio has remained at solution ratio.

Q Isn't it a fact that all the production data as shown on the performance curve here were obtained after the field rule hearing --

A Yes, sir.

Q -- that Mr. Buell has referred to?

A Yes, sir, that hearing was held in '54, as I recall, and at that time they might have been just approaching the saturation pressure. Since that time, this flattening of the pressure performance and maintaining a flat performance and the continual gas-oil ratio at the solution ratio is all field performance obtained at that original hearing, at which they said it was a solution gas drive field.

Q Can you state whether or not Ellenburger fields as a rule are gas solution or water drive mechanism?

A They're normally -- again, the degree varies, but they're generally always a partial water drive associated with an Ellenburger field. Ellenburger acquifer is quite sensitive. It's usually some degree of water drive in the majority Ellenburger fields.

Q If geologic study had been made in connection with the field rule hearing, it would have been made before all of the production data shown on Exhibit 4 were available, is that right?

A It would have been made at about the time one-third of the production data was available, yes, sir.

Q I may have covered this on direct, but again what do you conclude by the gas-oil ratio curve as related to your pressure curve?

A Well, I conclude that there is a discrepancy between the two of them and I put more faith in the produced gas-oil ratio measurement because it is a continual measurement of all wells as opposed to a periodic measurement on a few selected wells, with the number of wells measured continuing to decrease down to 1954 when that represented just a one-well measurement.

MR. NUTTER: 1964, you mean, don't you?

A 1964, yes, sir.

Q (by Mr. Hinkle) Your production data also shows that

there has been an appreciable amount of water produced with the oil in the field?

A Water production shows a continual increase and if these workovers had not been performed, it would have been substantially more than that, but through controlled workover to plug off water it has been maintained at a fairly low level but it does show an increasing trend.

Q Is that all indicative of some type of water drive mechanism?

A Yes, sir, it is.

MR. HINKLE: That's all, Mr. Dutton.

RECROSS EXAMINATION

BY MR. HUTTER:

Q Mr. Dutton, with the majority of the life of the pool there were approximately twelve wells producing in there. How many of those wells has it been necessary to work over during the life of the pool, do you know, and how many of them have been plugged back to cut the water production?

A We have worked over through six different workovers on our "AB" 1. We have plugged back. The Pan American South Mattix Unit No. 2 was worked over and plugged back; South Mattix Unit No. 3 was abandoned, was not worked over due to water production; No. 4 was plugged back; No. 5 was not.

Q No. 5 has never been worked over?

A No, sir, No. 9 has been plugged back, it looks by the schematic, several times. No. 7 has been plugged back. These are all South Mattix unit wells. No. 8 has been plugged back. No. 9 has not. No. 10 has been and watered out.

Q It watered out and was abandoned?

A Right, that looks to be all of it.

Q How about Gulf's Lilly No. 1?

A It opened a higher section, but I don't believe they squeezed the lower section; it was worked over but it was not plugged. They did not plug back the original completions.

Q Do you know if that well makes water or not?

A Lilly No. 3?

Q No, it's the Lilly No. 1, I believe, the old one.

A The Lilly No. 1 based on February was cutting twelve percent water. If you would like the current wells cutting water, Carr 5, Lilly 1, Humble 'AB', South Mattix Unit 2, are the wells currently cutting water.

Q How about Gulf's Carr No. 5, has it ever been plugged back to reduce the water cut?

A It was completed right in the top of the section to start with. As I mentioned, the SMU No. 9, which has not been worked over, it is completed in the top of the section also.

MR. NUTTER: Are there any other questions?

MR. BUELL: Two more, Mr. Examiner.

RECROSS EXAMINATION

BY MR. BUELL:

Q Mr. Dutton, you are well aware of the fact that there are many reservoirs where admittedly no active water drive exists wherein wells produce water?

A Yes, sir.

Q Maybe I misunderstood, but it seemed to me when you were going over the workovers, I believe it was SMU No. 2, it wasn't plugged back, it was plugged down and eliminated water production. Is that normal procedure in a water drive reservoir?

A While we're checking the data, it is possible if there's stratigraphy or lenticularity of any type, it is possible to water out something above and be able to get pipeline oil below.

Q That water was completed lower and cut down on its water production, didn't it?

A We're going to check it in just a minute.

Q It came up and didn't do any good and went back down and helped?

A Originally on 4/10/50 South Mattix Unit No. 2 was completed in open hole from 10,250 to 10,305. It is currently producing from perforations at 9958 to 10,099. This is by our scout tickets and making twelve per cent water.

MR. NUTTER: Are there any other questions of Mr. Dutton? He may be excused. We will recess the Hearing until 1:30.

MR. NUTTER: The Hearing will come to order, please. Mr. Hinkle, do you have anything further on your direct case?

MR. HINKLE: I would like to offer in evidence Exhibits 4, 5, and 6 in connection with Mr. Dutton's testimony.

MR. NUTTER: Humble Exhibits 4, 5 and 6 will be entered into evidence.

(Whereupon Humble Oil & Refining Co. Exhibits 4, 5 & 6 admitted in evidence.)

MR. HINKLE: That's all we have.

MR. NUTTER: Mr. Buell, do you have anything to show in this case?

MR. BUELL: Yes, sir, we have some testimony. We have one witness, Mr. Rodgers, who has not been sworn.

(Witness sworn.)

JIMMIE RODGERS,

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

DIRECT EXAMINATION

BY MR. BUELL:

Q Mr. Rodgers, would you state your complete name, by whom you are employed, what capacity, and at what location?

A James Turner Rodgers, employed by Pan American, Lubbock district office, as petroleum engineer in the reservoir section.

Q Mr. Rodgers, you've testified at prior Commission

hearings, have you not, including hearings relating to the Fowler Ellenburger oil pool and your qualifications as a petroleum engineer are a matter of public record?

A Yes, sir.

(Whereupon Pan American's Exhibit No. 1 marked for identification.)

A Mr. Rodgers, would you look now, please at what has been marked as Pan American's Exhibit 1 and state for the record what that exhibit reflects?

A Exhibit 1 is a structure map contoured on the Ellenburger in the Fowler area indicating that the structure is an anticline.

Q Is that a similar exhibit that has been introduced in Fowler pool hearings from 1954 to date?

A Yes, sir, it's very similar. We have had one slight change on it since it was last presented in drilling the South Mattix Unit Well No. 17, which is located in the Southwest Quarter of the Northeast Quarter of Section 15; that well came in roughly one hundred feet higher than it would have on the old map, and we've taken the center contours and recontoured three or four of them slightly. Essentially, it's the same map.

Q Who originally prepared and did the work on the basic data which are reflected by this exhibit?

A This map was prepared in the old Pan American Roswell

district office back in 1954 by a Mr. Tom Ingram, then a staff geologist, working under his supervisor.

Q Actually, could you say with respect to the determination of the boundary of the Fowler Ellenburger pool, as reflected on this exhibit, that it was actually done by a team of geologists working together back in 1954 or prior to 1954?

A That's right.

Q Did they go into a tremendous amount of detail and study in preparing this basic structure?

A Yes, sir, they did. If I'm not mistaken, this was the first field in the state of New Mexico to be granted eighty-acre spacing, and we spent a great deal of -- or Pan American spent a great deal of time and money to define the structure. They actually built a ten-foot long model of this reservoir to depict this faulting condition.

Q Now, I believe you've already testified that the boundaries, the field limits as depicted by this exhibit, have not changed one iota since 1954?

A No, sir, they haven't.

Q With the exception of the minor variations which you mentioned in connection with SMU No. 17, of all the subsequently acquired data that have been acquired since the exhibit was prepared, has it confirmed this structural interpretation as reflected by our Exhibit No. 1?

A Yes, sir, it was.

Q In the interest of brevity, would it be fair to say that our interpretation of structure is reflected by Exhibit 1 as compared with Humble's interpretation of structure as reflected by their Exhibit No. 1 are almost completely dissimilar?

A Yes, sir, they are dissimilar.

Q Have you spotted on this map the two unorthodox locations that Humble is requesting here today?

A Yes, sir, they're shown by the red dots and the red No. 2 indicating the section well on the respective leases.

Q With respect to the Knight No. 2, the unorthodox location on the eastern portion of the field, what does this structural interpretation show with respect to the productive acreage on that tract?

A This Exhibit 1, or this structure, shows that the productive acreage on this tract including -- now, by tract I'm referring to the entire Knight lease as it is productive from the Ellenburger, contains approximately forty productive acres. That would be taking some of the productive acreage in the Northwest Quarter of Southwest Quarter of Section 14, which is going north rather than east from the well to actually pick up acreage.

Q The productive acreage figure that you gave is for the entire Knight lease in the Fowler Ellenburger oil pool?

A Yes, sir.

Q Actually, Mr. Rodgers, just looking at your exhibit there, it would seem to me that possibly your interpretation of structure, or this interpretation of structure, would most nearly justify crowding in close to the line than the Humble interpretation, which showed all that productive acreage even back out to a regular location?

A Yes, sir.

Q I want you to look next and --

MR. BUELL: -- and Mr. Examiner, I would like to ask your forbearance here. Certainly we did not anticipate the Hearing taking the turn it did, and Humble's structural interpretation. I have only one copy of what I propose to be our next exhibit. It is our file copy of an exhibit that we introduced in Case 2854. That's one of the cases that I asked to include by reference. If I might have your permission and Mr. Hinkle's concurrence to submit this, then get it back and re-submit copies for the record and a copy I'll furnish Mr. Hinkle for Humble, if that's satisfactory with the Examiner.

MR. NUTTER: This is satisfactory with the Commission.

MR. HINKLE: We would like to have two or three copies.

MR. BUELL: Exhibit 4 in Case 2854.

MR. DAVIS: Yes, we would have no objection to that.

MR. BUELL: Then I won't have her mark this, just understanding that the exhibit we are referring to --

MR. NUTTER: I think it would be better to identify it, then we know when we get the photostatic copies on it.

(Thereupon Pan American's Exhibit No. 2 marked for identification.)

Q Now, Mr. Rodgers, before I direct your attention to what the reporter has identified and marked as our Exhibit No. 2, I will ask you if you were in the hearing room during Mr. Pine's testimony for Humble.

A Yes, I was.

Q Do you recall his statement to the effect that his placing of the faults and his structural interpretation was confirmed by varying water-oil contact.

A Yes, sir, I do.

Q Let's get one thing straight right now, Mr. Rodgers. Can you as an engineer, or can any reservoir engineer precisely say at a certain datum one foot below it you'll have one hundred percent water and one foot above it you will have one hundred percent oil?

A No, sir, you can't. We know that we always have a transition zone that's going to vary throughout a reservoir, varying primarily with permeability. The differences he has shown in water-oil contacts is actually very small within practical reason, with the exception of what we finally called Reservoir D, the probable reservoir, and there he had no pick on the water-oil

contact so that easily his water-oil contacts are all within reason in the various segments of his map and also agree with our estimated or picked or reported water-oil contact of 7250.

Q So when you engineers refer to water-oil contact at a precise datum, you are just doing that for practical purposes of expressing yourself, and it's always made with the understanding, that it is not capable of precise determination?

A That's right.

Q Would a fair summary of your testimony with respect to the differing water-oil contacts as he shows on his Exhibit 1, is that the difference in the levels of the water-oil contact are so small as to remove these water-oil contacts as a confirming factor of his structure?

A Yes, sir, I think so.

Q Now, would you look at what I have asked the reporter to mark as our Exhibit No. 2 and in order that the Examiner can look at this with you, would you mind going up and standing by him?

MR. BUELL: I am sorry; we just happened to have that copy in our files with us.

MR. HINKLE: That's all right.

MR. NUTTER: I think you can put it on the board and refer to it.

MR. BUELL: Actually, Mr. Examiner, with the exception

of the difference in the scale, it generally is a pressure performance curve of the reservoir as depicted on one of the Humble's exhibits.

Q (by Mr. Buell) Mr. Rodgers, do you feel that structural work, geological work such as we've seen here today, is as highly interpretive as Mr. Pine feels that it is?

A I'm sorry, Mr. Buell, would you restate that one? I lost you.

Q I was laying a little predicate for Exhibit No. 2.

A Okay.

Q I asked you if you agreed with Mr. Pine that strict geological work is highly interpretive?

A Yes, it is.

Q Such as the type he did on Exhibit 1, and such --

MR. HINKLE: Is he testifying as a geologist? He's a petroleum engineer.

MR. BUELL: He's testifying as everything. You can ask him a question on anything. For the benefit of the record, that all our engineers do production geological work. They handle our production geology, so, therefore, he testifies as to our production geology, and you feel free to ask him anything you like.

Q Mr. Rodgers, do you now, as a reservoir engineer, agree that production performance and statistics, data which are factual, are quite often helpful in confirming or proving wrong a highly interpretative geological interpretation?

A Yes, sir.

Q With that background in the record, briefly state what Exhibit 2 reflects.

A Exhibit 2 is the bottomhole pressure history of the Fowler Ellenburger Pool as a function of time. Also shown on the exhibit, in addition to the average survey or average fieldwide pressures, are the initial well pressures, bottomhole bomb pressures determined upon initial completion of the first eight SM Unit wells in the field. These data were presented back in earlier cases to show the excellent communication within this reservoir.

Q How are the initial pressures of newly completed wells distinguished on that exhibit, Mr. Rodgers?

A They are shown by the small circles with the wells numbered to the upper right-hand side of the circle.

Q Would you very quickly put a copy of Humble's Exhibit No. 1 up on the board adjacent to our Exhibit No. 2?

A That's the map?

Q Yes, sir, the structure map. Now, you are familiar with Mr. Pine's designation for practical purposes, Reservoirs A, B, C and D?

A Yes, sir.

Q I think you can forget about D if you want to. Let me ask you this, would you use the data reflected on exhibit, Pan American Exhibit No. 2, compare it with the individual well locations and Reservoir A, B or C classifications on Humble's Exhibit No. 1, and let's see what these production data, performance data show with regard to whether or not we might have a sealing fault between A, B and C?

A All right. As I stated, we've shown the first eight completions, and starting with -- well, in Reservoir A none of these eight wells are actually in that portion of the field, so going to Reservoir B we have Wells No. 7, 4, 1 and 5 which would be 7, 4, 1 and 5. Actually that pretty much covers it.

Q Was No. 1 the discovery well of this pool?

A Yes, sir, it was.

Q What was the next well completed in Reservoir B?

A After No. 1, the next well completed in that portion would be Well No. 4. It had an initial pressure of some, oh, 200 pounds approximately below No. 1.

Q The initial pressure on Well No. 4 came in with a pressure 200 pounds below No. 1?

A Yes, sir.

Q Was it in the same reservoir?

A Yes, sir.

Q What I would like for you to do is to make a comparison pick, an initial completion, the first completion in one of the other reservoirs, and let's compare them to see if the pressure has been drawn down, that's what I would like you to do.

A Well No. 2 would be in the segment here identified as C. Actually 2 was completed shortly after 1, and their pressures were essentially the same, so we have no indication on that. The next one completed in this C would be Well No. 6. Well No. 6 had an initial bottomhole pressure of approximately 3870 pounds as compared to an original reservoir pressure of 4,330.

Q Let me ask you this as a general question, Mr. Rodgers. By looking at our Exhibit 2 can you see that the initial pressures

of all of these wells, regardless of whether they were in Reservoirs B or C, came in at what was then about the average of what we were calling the Fowler Ellenburger Oil Pool?

A That's right.

Q What would that indicate to you as a reservoir engineer?

A That we had communication throughout the reservoir and that essentially it was one common source of hydrocarbon.

Q Would it not be fortuitous that you would have separate and distinct reservoirs and the pressure at any simultaneous point or group of simultaneous points be the same in both?

A Yes, sir, it would be.

Q Were formal interference tests run to show communication throughout the reservoir?

A Yes, sir, they were shown by the small blue dots on the Exhibit 2. These are the interference tests pressure measured in SMU Well No. 3. This was the well we shut in for some three years and the pressures are shown here for that well from 1951 through 1954 and follow right on the trend.

Q That well is in Reservoir D?

A Yes, sir, it is.

Q What happened to the pressures on Well No. 3 when it was shut in?

A They declined almost perfectly in line with the field

pressure.

Q If it was in a separate little reservoir all its own, isolated from the world and producing interval in any other well bore, what would have happened to its pressure?

A In my opinion it would have stayed constant.

Q Instead it followed and declined on exactly the same path as the other wells in the Fowler Ellenburger Oil Pool?

A Yes, it declined almost 2,000 pounds, 1900 pounds.

Q Do you have any other comments you would like to make at this time on Exhibit 2?

A No, sir.

Q I believe, Mr. Rodgers, would you agree with me that the fault which Mr. Pine designated as Humble Fault No. 1, would you agree with me that the trace of that fault, the attitude of that fault is extremely critical with regard to the productive acreage on the Humble Knight lease?

A Yes, sir.

Q If that fault trace on his Exhibit 1, which we're all looking at is pivoted to my right, what happens to the productive acreage on the Knight lease?

A It's decreased, that's clockwise.

Q Yes. Clockwise, and to my right?

A Okay.

Q Would you have to pivot that a very large amount of surface area there to significantly reduce the productive acreage?

A No, sir, you wouldn't.

Q Do you recall Mr. Pine referring to a well down there that he said was close to a fault and didn't have any drag in it?

A Yes, sir, if I'm not mistaken he referred to the Lilly No. 3 down here.

Q If you pivoted that Fault No. 1 to the right within the interval between that Gulf well and that other fault, would that significantly affect the productive acreage on the Knight lease?

A Yes, sir, it would. It would cut it in less than half.

Q Sir?

A It would decrease it by more than fifty percent.

Q Let me ask you this, have you critically examined the performance of the wells that would be in Reservoir A on Mr. Pine's exhibit?

A Yes, sir, I have.

Q What wells are they?

A The Gulf Carr No. 5, South Mattix Wells No. 9 and 10.

Q What do you find when you critically examine the performance data of those three wells? Would they appear to you to be all in the same reservoir? You need to come back to your notes?

A I sure do.

Q Okay. All right, Mr. Rodgers, go right ahead.

A These three wells appear to be in the same reservoir but not in a reservoir as depicted by their Exhibit 1, in my opinion. If they were in an isolated reservoir shown as Reservoir A, then I would have expected our No. 9 well under water drive to have been the best well in that reservoir.

Q Mr. Rodgers, would you work from the other side?

A There is, as Humble has put forth, would be that these three wells are in a common reservoir, Reservoir A, and that we have here water drive mechanism, so that under that circumstance in this Well No. 9 I would think would have been the best well.

The communicative recoveries on these three wells as of March 1st, 1964, Gulf recovered 45,752 barrels. The South Mattix has recovered 172,800. The South Mattix No. 10 was abandoned after recovering only 26,000.

Q If you were trying to find an isolated reservoir up there, just based on the producing characteristics which you have just recited, which well would you take out of Reservoir A?

A Well, I'm going to have to assume that if I would do anything with it I would take No. 5 out, which would force me to depict the fault clockwise.

Q Which would reduce the productive acreage on the Humble Knight lease?

A Yes.

Q Were you in the room when Mr. Pine and I were discussing the fault picks that he had for Fault No. 1?

A Yes, sir, I was.

Q I believe we ended up in substantial agreement that the only well he had any data on, amplificative data, a fault pick, was that well with the lavender triangle, Well -- what is that, our Well No. 9?

A Yes, sir.

Q I asked him, and I'll now ask you, how many points would you need to ascertain the plane of a fault?

A To define the plane of a fault you would have to have three points.

Q Could you define the plane of a fault with no more data than are available on Humble's Fault No. 1?

A No, sir.

Q Is it or is it not just flatly mathematically or geometrically impossible?

A Yes, sir, it is. It takes three points to define a plane surface. In order to extrapolate a fault and determine the trace or intersection of that fault plane with the top of the formation, you have to establish the dip and strike of the fault, which in effect, is establishing a plane which you have to have

three points.

Q So, from the standpoint of locating the fault encountered in Well No. 9, the picture presented on Humble's Exhibit 1 is just one of many different interpretations you could apply to that?

A Yes, sir.

Q From the standpoint of ascertaining productive acreage is the plane of the fault critical?

A Yes, sir, it is.

Q In what way? I think I understand, Mr. Rodgers, but I want to be sure I do. In what way is ascertaining the plane critical from the standpoint of determining productive acreage?

A Again, it's critical in that you have to extrapolate from some picks in a well down in the formation, you have to extrapolate your fault plane up to the point where it intersects with the top of the formation, which is essentially what this trace is. In order to extrapolate it you have to know the dip of it and establish the attitude of that plane in the extrapolation.

Q Simply, the data obtainable from Well No. 9 is not sufficient to enable you to establish the dip?

A No, sir.

Q What other field performance data have you analyzed to see whether performance data confirm or prove wrong the Humble interpretation on their Exhibit No. 1? Have you looked at any

fieldwide pressure surveys?

A Yes, sir.

Q Do you have those handy?

A Yes.

Q What are you looking at now?

A I am looking at the annual report of New Mexico Oil & Gas Engineering Committee.

Q What does it show with regard to performance data in this particular pool?

A With the data I have here just in this one volume, which is 1959, the most pressures reported in any year shown here, and this just goes back to '56, was in May of 1956 when there were seven wells or bottomhole pressure was measured on seven wells in the field.

Q Isn't that a fairly representative number, assuming there were fourteen producing then, probably not fourteen is there now?

A Probably not fourteen.

Q So a fairly high percentage of the total wells in the pool?

A Yes.

Q What do the pressures reveal, were they all taken about the same time?

A Yes, sir. And these seven pressures range from a low of 2362 psi to a high of 2398 psi. They have a range of 36 pounds per square inch for the full seven pressures.

Q What is the distribution of those wells with regard to Reservoirs A, B and C on Humble's Exhibit 1?

A The seven wells that are reported here, the Gulf Carr 5, the Gulf Knight 1 --

Q That's Reservoir A?

A Gulf Carr 5 is in Reservoir A, Gulf Knight 1 is in B, the Lilly No. 1 is in B, South Mattix No. 1 is in B, South Mattix No. 4 is in B, South Mattix No. 6 is in C, South Mattix No. 7 is in B.

Q So we have some pressures in all three of the Humble Reservoirs A, B and C?

A Yes, sir.

Q What was the range again or the variance, the spread between the highest and the lowest?

A From 2362 is the lowest pressure which was in South Mattix Unit No. 6 to 2398 in South Mattix No. 1.

Q Would it not be extremely fortuitous, Mr. Rodgers, that three separate reservoirs would perform so identically?

A Yes, sir. I just can't conceive how they could do it.

Q In summation, would you say that performance data, factua

data support the Humble interpretation as presented by their Exhibit 1, or the Pan American interpretation as presented by our Exhibit No. 1 here today?

A Well, in my opinion the production data confirm the fact that this is one continuous reservoir which will certainly fit our Exhibit 1.

Q Mr. Rodgers, do you agree with Mr. Dutton of Humble that in all probability if we had a sealing fault in the Ellenburger it would go on down to granite and seal everything below the Ellenburger?

A Yes, sir.

Q Did you hear him, he admitted he didn't have any data to support it, but he was offering it as a possibility, that in order to sustain a water drive in all three of the Humble reservoirs, that this water made an end run around the faults, is that the way you understood it?

A That's what I understood he said, yes, sir.

Q In your opinion would that be a very good possibility in the reservoir that we're looking at here?

A I don't think it's very probable.

Q What, in your opinion, what data do we have now to show that such an occurrence is not happening?

A Well, we have, if we look at their Exhibit 1, and assum-

ing that, as they have stated, that it's a water drive reservoir, that entering in Reservoir B the water influx would have to come in or be confined just to that southeast and northwest portion between the No. 1 and No. 2 faults. If this we know, then the wells producing on the edges in those areas would be expected to be, indicating from their production history, some water influx. We presented -- do you want to go into that cross section exhibit?

Q Go right ahead.

MR. BUELL: Mr. Examiner, he's going to refer now to a previous Pan American exhibit. We are in the same position on this.

Q Do you feel it's necessary to put this in or can you recite from it?

A I can recite from it.

Q Go ahead and identify the material you are reading from and give the information for the record and we won't have to be submitting too many exhibits after the record is closed.

A Essentially all I am using the cross section for is to get the completed intervals in the two southernmost wells, or two of the southernmost wells in that B reservoir there, the Gulf Plains Knight No. 1-E and the South Mattix Unit No. 5.

Q Go ahead and fully identify this exhibit so Mr. Hinkle might find it later if he wants to.

A This is Exhibit 2 in Case 2854.

Q Pan American Exhibit 2 in Case 2854.

MR. DAVIS: What were the wells?

A Gulf Plains Knight No. 1 and South Mattix No. 5.

Q (By Mr. Buell) What data do you wish to read from that exhibit?

A All I'm interested in is the bottom subsea information on these two wells. The Gulf Knight No. 1 is perforated in about 500 feet of Ellenburger section, perforated up and down top to bottom. The lowermost perforations are at a subsea depth of approximately minus 7100 feet, which is only 150 feet above the original water table. This well is still producing flowing top allowable water-free. The next one, the South Mattix Unit No. 5 is perforated again below 7,000 feet at approximately minus 7,040. This well is a pumping water-free producer.

Q In other words, you would expect, if this water was making the end run, it would have been shown up in these two wells by now?

A Yes, sir.

Q Did you give their communicative production to that date for the record?

A I have it, the Plains Knight No. 1 was producing 686,000 barrels. Again, this is March 1st, 1964 production. The

South Mattix Unit 5 has produced 819,000 barrels.

Q Assume for the purpose of this question, or I'll just ask you, in your opinion as a reservoir engineer who has intimately studied this reservoir, what, in your opinion, is the controlling producing mechanism?

A The controlling producing mechanism in my opinion is solution gas drive.

Q With a solution gas drive producing mechanism, and assuming for the purpose of this question that the Humble structural interpretation is correct, does Humble actually need either one of these 330-foot locations they've asked for?

A No, sir.

Q Structure location can become critical, though, if there is a water drive, can't it?

A Yes, sir, it can.

Q Is it a good thing in a water drive field to have each and every well located at the highest structural point on its particular proration unit regardless of spacing?

A Will you give me that one again, please?

Q In a water drive field can you see any particular benefit to having each and every well in that reservoir at the highest structural point on its proration unit and just disregard completely spacing?

A I'm not sure I follow you. Each and every well, sir, I don't think it's necessary to have each and every well at the highest possible structural position. I don't think you could develop a well in that manner.

Q Is each and every well that has been drilled in the Fowler Ellenburger Pool at what would be the highest structural position on its proration unit?

A No, it isn't.

Q If, in effect, there is a water drive, Humble, by crowding structure and creeping up higher on structure, is getting an advantage over all the operators who have faithfully adhered to the field rules?

A Yes, sir.

Q In the event there isn't any water drive as you think to be the case, Humble doesn't need these locations that have crowded structure?

A That's right.

Q Do you agree with Mr. Dutton when he testified that material balance would determine whether or not an effective water drive existed?

A Yes, sir. That would be the best tool to use.

Q You agree with him?

A Yes, sir, I agree with him.

Q Have you made a material balance calculation of this reservoir, Mr. Rodgers?

A Yes, sir, I have.

Q What did that material balance calculation reveal with respect as to whether or not an effective water drive exists?

A The calculation revealed conclusively that this field is not now producing under an active water drive, or any water drive as far as that's concerned. Back in the very early life of the field, personally I feel that there was water influx and there was a water drive. We think that the aquifer limited, as soon as we got over the rapid pressure decline stage, and the pressure transients had essentially reached the boundary of the aquifer, we no longer had an aquifer of sufficient size, of sufficient driving force to maintain the water drive. These pressure points, as shown on our Exhibit No. 2, are declining at a rate exactly consistent to solution gas drive performance.

Q Mr. Rodgers, perhaps sometimes we laymen, so-to-speak, do not realize the tremendous aquifer area which is necessary for an effective drive. Actually, all through school I had always heard that water was not compressible. Apparently it is or we could never have a water drive. How much of this noncompressible water do we have to have compressed so that when it expands we have a water drive?

A I don't know. You have to have an awful lot.

Q Does it have to be a tremendous amount of water?

A Relatively speaking, yes, sir.

Q Accept for the minute the structural interpretation of Humble, can you see how any large volumes of aquifer water could be in contact with the three reservoirs they show on that exhibit?

A As stated in our past hearings, we have no evidence of a large general aquifer in this area. That's all I can base my answer on.

MR. BUELL: I will ask the reporter to mark this as our Exhibit No. 3.

(Whereupon, Pan American's Exhibit No. 3 was marked for identification.)

Q Briefly, what is that exhibit?

A Exhibit 3 is a summary of the unorthodox locations that have been permitted and drilled and completed in the Fowler Ellenburger Pool.

Q Let's briefly analyze each one of those. I believe the only unorthodox location, which is only 330 feet from a line, which has been granted by this Commission is Gulf's Lilly No. 3, is that observation correct?

A Yes, sir, that's right. It's shown on this exhibit by the blue circle.

Q What were the circumstances of that well, was the well already in existence at that location?

A Yes, sir. It was drilled as a Fusselman completion.

Q Were you present at the two hearings, rather the first hearing of Gulf where they put on testimony as to the economics of utilizing that existing well?

A Yes, sir, I was.

Q Did they show the Commission that economic waste could be prevented by using that existing hole?

A Yes, sir, they did.

Q Was there any controversy at that hearing between any of the parties as to the productivity of the 40 acres in which their Well No. 3 is located?

A There was no controversy over the 40 acres, no, sir.

Q So, actually when we look at the facts, Humble's proposed J. E. Knight No. 2 is not identical to the Gulf application, is it?

A No, sir, it's not.

Q I believe you would say that you disagree with the productive acreage that Humble thinks they have on their Knight lease, would you not?

A Yes, sir.

Q Also there is no existing well at that 330-foot location, is there?

A No, sir, there's not.

Q All right, now, after the Gulf application what was the next application?

A The next one was Pan American South Mattix Unit No. 15 which was located in the Northeastern Quarter Quarter of Section 22.

Q Is that well as close as 330 feet to any of its unit lines?

A No, sir, it's drilled in the center of the 40-acre unit.

Q So neither of the Humble's applications are identical with it, are they?

A No, sir.

Q What was the next request of the Commission with regard to an unorthodox location?

A The South Mattix Unit No. 17 in the Southwest of the Northeast of Section 15.

Q How is that request, or how is that location different from either of the two Humble requests?

A This request was for a companion well with the No. 17 to share an allowable with the existing South Mattix Unit No. 9. The well was drilled in the center of the 40-acre unit south of the No. 9 well.

Q So it is somewhat similar to Humble's request for their

State "AB" No. 2 in that they are following there the companion well principle?

A Yes, sir.

Q They are asking for a companion well, but it is different in that they're crowding it in 330 feet from a line and also putting it in the same 40 with the existing well?

A That's right.

Q With respect to Pan American SMU No. 17 and No. 15, could those wells have been moved upstructure if they had been located 330 feet from a line?

A Yes, sir, they could have.

Q But even in the face of that they were located precisely in the center of the alternate 40-acre tract?

A Yes, sir, they were.

Q Mr. Rodgers, as a reservoir engineer would you ever recommend to the Commission that where we have three separate reservoirs, as reflected by Humble's Exhibit 1, that all three of those reservoirs be prorated and regulated as if they were one reservoir?

A If they were not in communication and were separate and distinct reservoirs, then they would have to be handled separately.

Q Can you, as a reservoir engineer, see easily how waste

could occur, conservation would not be served and correlative rights violated by trying to regulate three pools as if they were just one?

A Yes, sir, I can.

Q Do you have anything else you would care to add at this time, Mr. Rodgers?

A No, sir, I don't.

MR. BUELL: That's all we have by way of direct, Mr. Examiner, and I might formally offer our Exhibits 1, 2 and 3 inclusive, of course, with the understanding that we will submit Exhibit 2 direct to the Examiner and also a copy to Mr. Hinkle.

MR. HINKLE: Mr. Examiner, before passing on the introduction of Pan American's Exhibit 1, I would like to withhold that until after cross examination.

MR. NUTTER: You are agreeable to the admission of 2 and 3 at this time?

MR. HINKLE: The others, yes.

MR. NUTTER: Pan American's Exhibits 2 and 3 will be admitted in evidence, and you will furnish us three copies of No. 2.

(Whereupon, Pan American's Exhibits 2 and 3 were admitted in evidence.

MR. HINKLE: Mr. Examiner, I think in the interest of

time if we had a recess that we can save time.

MR. NUTTER: We might momentarily put this case in abeyance and take some of the shorter cases if you would like ten or fifteen minutes.

(Whereupon, a recess was taken.)

MR. NUTTER: We will reopen Case 3039 and 3040.

MR. BUELL: Mr. Rodgers is available for cross examination.

MR. NUTTER: Proceed, Mr. Hinkle.

CROSS EXAMINATION

BY MR. HINKLE:

Q Mr. Rodgers, refer to your Exhibit No. 1.

A Yes, sir.

Q Have you examined all of the wells, logs of the wells that are portrayed on this exhibit?

A Yes, sir, I have.

Q Have you determined what wells show a faulting condition in the area?

A Only insofar as the Ellenburger formation is concerned. In other words, where the fault planes have actually intersected the well bore in the Ellenburger. I think I should modify my first answer, I have reviewed all of them insofar as the performance in this field as to the formation, but as far as the fault

picks, I haven't reviewed them. I haven't reviewed the logs in detail.

Q Can you indicate on Exhibit 1 the wells that you have examined that show a faulting condition?

A In the Ellenburger, yes, sir.

Q If you will mark those with a triangle.

MR. BUELL: You want it on the official--

MR. NUTTER: If you call them off we can all mark them on all of our exhibits.

A South Mattix No. 5 in the Southeast of the Northeast of Section 22.

Q (By Mr. Hinkle) Of 22?

A Yes, sir.

Q That would be this one right here?

A Yes. The Gulf Plains Knight No. 1 in Section 23, it's diagonal, southeast of the No. 5 there, the one that has the 6398 for the top. Then come on diagonal to the next well, the dry hole No. 2 well. Actually in that one the fault was not in the Ellenburger but it was picked in that well. The Northeastern Quarter of Section 15, the No. 9. That's all.

Q You didn't find a faulting condition in the South Mattix No. 6 or No. 2?

A Yes, sir. When this map was presented -- as I said, I

restricted those picks I gave you to the Ellenburger formation. When this map was presented there were some three or four cross sections running throughout the field showing the occurrence of the faults in the formations above the Ellenburger. I don't have the information here exactly which wells they were picked in, there were quite a few picks.

Q Was there any testimony in previous hearings where this exhibit was used to show a faulting condition in connection with the Mattix 6, 2 and 3?

A Again, I don't have that information. From what I remember it was in a number of these wells in the upper pays, yes, sir.

Q Do you recall the testimony of Tom Ingram in connection with Case 391 in regard to faulting condition in wells 3, 5 and 6, that's the South Mattix wells?

A Not -- I've read it, yes, sir. I don't know specifically what you are referring to.

Q You don't recall his testimony that there was a faulting condition in Well No. 3?

A In what formation?

Q I'm not sure.

A As I said, I am limited here to the Ellenburger.

MR. DAVIS: As it affects the Ellenburger?

A It would affect the Ellenburger at some other location as it gets to it. To my knowledge it was not in the Ellenburger, it was probably above the Ellenburger.

Q Do you know why this fault was not portrayed on this exhibit in connection with the Wells 5 and 1 which you have referred to, that's 5, the SMU Unit and 1 of the Plains Knight Gulf and No. 2 of the Plains Knight Gulf?

A The faults that were picked in the pays above the Ellenburger are portrayed on here in that they are the same faults that we have traced. In other words, Mr. Ingram presented this fault as having a general southwestern dip and it appeared in these wells in upper pays and when it intersected the top of the Ellenburger, that's your trace on the west side of the map. So they are shown, but, well, that data is included in this structural interpretation.

Q This is supposed to be contoured on top of the Ellenburger?

A That's right.

Q Explain again why your fault was not shown in these three wells that I've mentioned.

A It is shown in these wells. The fault was picked in these wells and the trace on the map is the intersection of the fault plane with the top of the Ellenburger formation, so the picks

that I am giving you are the wells in which the fault was located, and it was extrapolated as a plane and traced with its intersection with the Ellenburger.

Q Does your cross section show the Plains Knight Gulf No. 1 to be upthrown in the Ellenburger?

A It's on the upthrown side of that eastern fault. There are two faults on that end of the field portrayed by Mr. Ingram. There's a lower fault which is not traced on here, and it did not affect the structure since the upper structure caught the fault first. He actually had three. The third one was immaterial in that the second one cut the productive limit before the third one, so the third one wasn't portrayed, so I'm not sure looking at both faults exactly.

Q What control did you have for the fault which is portrayed on Exhibit No. 1 and which goes through SMU Unit No. 9?

A That would be the same control that was picked in that well.

Q Is that well the only control that you have to that fault?

A No, sir, that's the same fault. This is one continuous trace.

Q Well, the same fault with what?

A With the South Mattix 5.

Q How did you draw this faulting line with that one well?

A We used that well, South Mattix 5, Plains Knight 1 and Plains Knight 2. There are four wells. That trace is the extrapolation of that fault to its intersection with the Ellenburger formation.

Q I don't know that I understand you. You testified that you'd have to have at least three points--

A Yes, sir.

Q -- before, that you could interpret where the existence of the fault is?

A Yes, sir, that's right.

Q Now, you have drawn a fault line, if I read it correctly, on the side of this plat which makes a decided curve here and curves inside of your Plains Knight Gulf No. 2?

A Yes, sir.

Q What control do you have over the routing of that fault line making a curve of that kind?

A Mr. Ingram's interpretation. I gave that.

MR. BUELL: Give them once more and a little slower. I don't believe Mr. Hinkle is understanding you.

A They have interpreted the fault in No. 9, South Mattix No. 9, South Mattix Unit No. 5, Plains Knight No. 1 and Plains Knight No. 2 to be the same fault, so there are four picks on that

fault, and then by defining the fault with those picks and extrapolating out to its intersection, the trace was determined. I think what we are looking at here is the trace of the fault and its intersection.

MR. NUTTER: In other words, Mr. Rodgers, are you saying this is the point at which the fault crosses the top of the Ellenburger but the plane of the fault in the Ellenburger would be back towards the west of that?

A That's right.

MR. NUTTER: Of that trace?

A That's right. In other words, it was picked back in the wells.

MR. NUTTER: In other words, you have to have a third dimension to see that plane?

A That's the difficulty. That's the reason they built the model, designed it, it helps you, it's a lot easier then.

Q (By Mr. Hinkle) Does it seem logical to you that we should draw the fault line the way they did through SMU No. 9 and then curve it around so that it goes east of the Plains Knight Gulf No. 2 and intersects a line there of wells which are faulting, which you admit fault, which is the Plains Knight Gulf No. 1 and the SMU 5, and under Ingram's testimony No. 3?

A Yes, sir. It's reasonable because those faults now in

some of these other wells are in different forms. As you get up in your upper formations these faults that he was referring to pick in his other wells, this was actually the fault shown on the east side, and it's sloping back that way, so they occur in the higher formation in that area.

Q Are you aware that the Humble State "AB" No. 1 well had the most water-free oil at minus 7360?

A Yes, sir, I am sure I have. I have completion data on that well. I had minus 7360.

Q You did have minus 7360?

A It could be difference in the elevations.

Q That shows a difference of about 110 feet, doesn't it?

A Yes, sir, it does.

Q That's not a small discrepancy, is it, and one that you would normally expect?

A Over a large area and where we have a thousand feet of relief I think it's reasonable. It was completed in 1952, and in 1953, in February, they squeezed it off after five months or something. It was close. Again, it's going to vary with permeability and all. I think it's a reasonable difference, I wasn't surprised. By the same token of minus 7250 in our Meyers B-12 up here we made water.

Q Now, referring to the Cortland Meyers Pan American B

No. 12, which is in the Southeast, Southeast of Section 9, that shows the top there of minus 7244, but actually shows a water-oil contact pointed higher than 7244, does it not?

A Yes, sir.

Q How do you account for that?

A I can. This map, when it was initially presented back in '54, the Meyers B-12 had not been drilled. When we came back a year or so ago in the Gulf hearing we presented the map and added the No. 12, Meyers B No. 12 and the South Mattix Unit No. 12, which is down at the Southeast of 22. At the time we added those wells on in red to show they were additional wells. As we've used this thing from time to time they have now turned blue and we did not alter the map for those wells, so the map, as you see it contoured, is the way it was initially presented when the B-12 was drilled. Later we left it unchanged to show how accurate the map was, and that this well confirmed Mr. Ingram's contouring because it's only some six or so feet off, or maybe ten, or something like that. So that's the reason that doesn't fall right on the contours, and strictly speaking the contours should be shifted slightly to the outside of that well.

Q Now, Mr. Rodgers, isn't it a fact that the Oil Conservation Commission has included the Northeast Quarter of the Northwest Quarter of Section 23 in a proration unit in connection

with the Gulf Lilly "M" Knight No. 1?

A Yes, sir, that's my understanding.

Q And in so doing they have considered that acreage as being productive?

A Well, that well was drilled as a standard location, so it automatically earns the field spacing pattern.

Q Isn't it a fact that that acreage is contiguous to the part of the acreage which Humble seeks to have included in its proration unit dedicated to the J. E. Knight No. 2 well?

A Yes, sir.

Q As I understand it, Mr. Rodgers, you did not prepare this Exhibit No. 1?

A No, sir, I did not.

Q Are you prepared to testify that from your own information, your own work, that it is correct?

A Yes, sir. From all the work I've done I've had no reason to change it. It's a reasonable interpretation. As a reservoir engineer I looked at it in more ways than just looking at well logs. In running the material balance work I came up with oil in place in this reservoir that was within approximately five or six percent of the oil in place determined by pore volume methods by plenimetering this map. As an engineer, that's the way I would confirm it. By performance, the material balance indicates we have

a certain volume of oil, and the map indicates we have a certain volume of oil. We are back to my opinion that it's a common reservoir.

Q You haven't actually tried to confirm or disaffirm this plat by the study of the different wells and to see if the fault lines were correct and so forth?

A I reviewed Mr. Ingram's cross sections and his extrapolations of the faults as occurring on the cross sections.

Q When did you do that?

A Oh, the first time two years ago, approximately.

Q Was that before the hearings that were had in connection with these exceptions?

A Yes, sir, the first work I did in this field was just prior to the initial Gulf hearing.

Q Mr. Rodgers, in a solution gas reservoir, do you not normally try to complete through the entire section if there is no water influx?

A On initial -- you mean not perforate but actually drill through?

Q Yes, actually drill through it.

A Well, if we have a water table present that we know is there we don't like to drill to it regardless of whether it's water drive or not. It's just common practice to stay away from

water.

Q If you have a water drive, do you not try to complete the wells in the upper portion of the formation?

A In a known water drive, yes, sir.

Q How many times in this field has Pan American tried to complete in the upper part of the reservoir?

A It will take me a few minutes.

Q Okay.

A I'll take them as I come to them. South Mattix Unit No. 9 is perforated in the top and also on down some 150, 160 feet into the Ellenburger. South Mattix No. 10 was completed over the entire interval, including the top, which was roughly 100, probably 150 feet. I am estimating these numbers, but they'll be close. South Mattix Unit No. 7 was initially perforated some 200 feet or so down in the Ellenburger. We recompleted in the top.

Q Recompleted?

A Well, we squeeze off the -- we didn't squeeze them. Yes, we squeeze off the lower perforation and perforated in the top.

Q Why did you do that?

A That well, the initial perforations were some 30 feet above the water-oil contact. The water was making ten percent water, it was still top allowable, but we either had to come up higher and get further away from the water or we had to put the

well on pump. It was a matter of economics, of keeping it flowing or having to go to artificial lift, it was not watered, but was still a good well.

Q Have you worked over the No. 9 or 10 that you testified to?

A Only insofar as stimulation, not perforations. On No. 10 we did a lot of things.

Q No. 9, is it completed in the very top of the Ellenburger?

A It's completed in the top, and also four different intervals all the way down to 10,222 feet is the lower perforation, and the top is at 10,052, roughly some 200 feet.

Q Did you determine the water-oil contact?

A No, sir, the T.D. on that well was above the original water-oil contact. It was cut by fault and had a repeat Simpson section in it and pretty hard to interpret as far as the production of it. South Mattix Unit No. 4 was initially completed open hole. The open hole section I don't have a subsea, it's about 7,000.

The well was, a bridge plug was put in and came back and perforated at a 65-foot interval that starts about 50 feet from the top, so it runs from 50 feet from the top down to 115 feet.

Q Why did you plug back in that case?

A The well ceased flowing, was producing approximately 30 percent water, was still top allowable. Again, rather than put

it on artificial lift we plugged it back.

Q But it was principally because of the water encroachment?

A Yes, sir. These plug backs were back in 1958, '59, along in there. As I stated earlier, we think there's definite evidence of water encroachment in the early life of this field due to the limited extent of it.

Q But it stopped then, did it?

A Yes, sir.

Q It hasn't continued? You mean there was water encroachment early in the life of the field but it hasn't continued?

A For all practical purposes it has stopped.

Q How do you account for that?

A The difference in the rate of decline of your pressure, and you have received the aquifer, the pressure in the aquifer is less so you don't have your driving force.

Q It hasn't gone down very much, has it?

A The difference in slope or rate of pressure decline has changed considerably, yes.

Q Go ahead with your wells.

A South Mattix Unit No. 1 is an open hole interval of casing set at the top of the Ellenburger and the open hole interval runs 150 or so feet on down into it.

Q Has that been recompleted?

A No, sir, it's open hole.

Q Would you consider that completed in the top of the Ellenburger?

A Yes, it is. It's a discovery well. It cut 150 feet of Ellenburger and I imagine they were glad to see that much in a discovery well. The South Mattix Unit No. 8 is completed near the top, starts about ten feet from the top and runs down 20, 30 feet from it.

Q Has that well been plugged back?

A Yes, sir, it has.

Q What was the reason for that?

A In the end of '58,the first part of '59, we set a bridge plug and perforated up higher. The well was pumping 99 barrels of oil and 71 barrels of water prior to plug back, after the plug back, 103 barrels of oil and no water.

Q It was plugged back because of water?

A It was plugged back because of water, yes, sir.

Q Did that well, that is the No. 8, initially make water?

A No, sir, it did not.

Q So the water has increased during the life of the production?

A In the early life it did, yes, sir. It made no water since we plugged it back. South Mattix Unit No. 6 is now perforated

in the top. Initially it was perforated down below the center. It also was plugged back and replaced on flowing status. We didn't make this plug back until, oh, 1962.

Q Has there been more than one plug back in that well?

A In No. 6?

Q Yes.

A According to my information it has just been one.

Q It was plugged back because of water encroachment?

A Yes, and returned from pumping to flowing status. It was another circumstance such as that. Pan American South Mattix Unit No. 2 now perforated at four intervals starting about 10 feet from the top and running on down over 150 feet from the top.

Q Was it plugged back?

A Yes, sir. This well has a real interesting history. I've got the official Commission file on it somewhere. I'll have to refer to it. We plugged it back from an open hole section. Also this is a diagonal well to No. 3, which we're back to our freak area, but this one is not a freak I don't think. We plugged this well back and perforated, oh, about a hundred-foot interval up in the top. We did some good, it was still making water. It made water in the initial perforation.

We went along for a couple of years making, oh, 30 to 100 barrels of water on and off. We then squeezed the perforations at

the top and sand drilled three intervals at the top; went along again essentially the same, running less than 100 barrels of oil a day and 31 to 40 barrels of water.

If you will let me refer to the Commission's well file on it. We perforated in the top with these sand-drilled intervals and we came in in July of 1963 and deepened the well from a plug back depth of 9900 on down to 10,105, and perforated an interval from 10,079 to 10,099, a 20-foot interval approximately a hundred feet below the existing perforation.

Prior to that work the well pumped 83 barrels of oil and 30 barrels of water. After that workover it pumped 92 barrels of oil and 58 barrels of water. So we had an increase in oil of some nine barrels, an increase in water of about 28. However, that increase of water as we now think, perhaps was some unaccounted for load or something because on later tests the water dropped back off, so we were encouraged that this well was not, or that water had not encroached on this well, and since we had come down this far.

So here recently on January 21, 1964 we acidized the perforations with 5,000 gallons of acid and the well was pumping 36 barrels of oil and 19 barrels of water, so that the water had dropped from five something down to 19. By that time after the acid job the well pumped 162 barrels of oil and 24 barrels of

water, so that in this particular case we came back down over a hundred feet and almost made a top allowable well out of it.

Q Did that well originally make water when it was completed?

A Let's see, on initial completion it didn't. However, in 1957 we went there and acidized the thing and that's when we first made water, so we apparently communicated with water on it.

Q You said that was an unusual well. Is that another freak well like No. 3?

A No, sir, it's not freak.

Q Is that a faulted well?

A No, sir, not in the Ellenburger.

Q You are sure of that?

A Yes, sir.

Q You say the fault is not in the Ellenburger, where is the fault?

A I don't know. That western fault should cut it somewhere in the upper pays.

Q Is it conceivable that faulting condition could affect that well?

A Not as it produces from the Ellenburger.

Q Go ahead with your other wells.

A The No. 3 is abandoned. South Mattix Unit No. 5, one

of them that I discussed previously, this is our Pan American lowest subsea completed well. It's completed down below minus 7,000 feet, some 550 feet below the top of the Ellenburger to the top of the perforation, and it's a water-free top allowable well. The Gulf Plains -- you want everybody else?

Q No, I want the ones that Pan American have completed.

A Okay.

Q Is that all of the Pan American completions?

A No, sir. We have the two new ones, 15 and 17, which were completed after I did these cross sections.

Q Where were they completed?

A Let me see if I have it. The No. 17 is perforated from 9883 to 9901 and 9910 to 21, with the top of the Ellenburger, well, that would be on Exhibit 1, it's minus 6433.

MR. BUELL: 6433.

A Let's see what the elevation is. The elevation is 3254. It's perforated about 200 feet down from the top, somewhere along in there.

Q Why did that well make water so high?

A No. 17?

Q No. 15, excuse me.

MR. BUELL: He's discussing 17.

A I'm on 17 now.

MR. BUELL: Coming up on 15.

A No. 2 was the water-free, we perforated down on it. No. 15, we apparently perforated 15 twice. We perforated once and it made water and we squeezed it off and reperforated.

Q Where was that?

A At the T. D. of the well.

Q Was that above or below your completion in 17?

A What was that top on that? They're going to be pretty close. It was at 5650 subsea depth.

Q According to your information you got water above your completion in your No. 17, is that right?

A I'll have to sit down here. I can figure it out if you want me to. I have No. 15 producing water at minus 6650 feet. No. 17, what were the perforations I gave on it, the base of the one was 9821 and the other 3254 for the elevation. That's 6667, so I have the number 17, 17 feet below No. 15, yes, sir.

Q So you did get water higher in No. 15 than you did 17?

A Yes, sir, we did.

Q How do you account for that?

A I can't account for it.

Q Just another freak?

A It's an offset to No. 3, and I had a hard time with it too.

MR. BUELL: Had a poor companion?

A Yes.

Q Is that all --

A I might add that No. 15 was recompleted top allowable, top three-quarters allowable.

Q That's all of the Pan American wells--

A I believe so.

Q -- on completion now?

A I believe so.

Q I believe you testified to twelve different wells, is that right?

A Yes, sir, there should be twelve.

Q Out of the twelve there were nine wells attempted to be completed in the top of the Ellenburger, is that right?

A I didn't count them when I went through.

Q That's the way we have it figured out.

A Okay.

Q Of these wells, how many have been plugged back on account of water encroachment?

A I didn't count them either.

Q We figure five, is that correct?

A Sounds good.

Q Do you not normally consider gas-oil ratio a reservoir

tool along with pressure?

A Yes, sir.

Q Why have you presented no gas-oil ratio data?

A We haven't had any need to. We presented it in the past.

Q Well, in order to --

A I comparedit with the data that you presented.

Q In order to get a picture of the reservoir don't you need that?

A Yes, sir.

Q Particularly where you are dealing with a gas solution type of reservoir?

A That's right. The gas-oil ratio history of this field is relatively flat. There are several ways to explain it; it was mentioned here previously that when you decrease or drop down below the bubble point you expect an increase in GOR. Of course, that's true, but you don't expect it immediately. As a matter of fact, you expect a decrease in GOR until the time that your gas saturation reaches equilibrium.

MR. BUELL: Mr. Rodgers, you haven't had a question--

Q Have you ever had a ten-year lag like you have shown here?

A Oh, I don't know. I've never looked at it on a time

basis, only pressure basis, we are only 25 pounds below the bubble point. I don't consider that unreasonable.

Q What is the characteristic behavior of a solution gas reservoir regarding gas-oil ratio?

A It's constant until you reach the bubble point, and as your pressure drops below the bubble point or saturation, then you start getting a buildup or establishment of free gas saturation within your reservoir. At such time as that saturation builds up to the determined equilibrium gas saturation at which you have the permeability to gas established, then you will get an increase in the gas-oil ratio. So, you will take a decrease from a short period to a long period, depending on the KGKO characteristics of the reservoir. In some fields there are a number of examples where there was a marked decrease and extended period of time before you ever get back to an increase. There's also indications in here that, well, I'm through with your question.

Q Have you ever encountered a solution gas drive that has taken ten years for this to happen?

A Sir, I don't know.

Q Why hasn't the Fowler Ellenburger exhibited this behavior?

A We do not have a KGKO curve on the Ellenburger, on any Ellenburger to my knowledge. If I am correct, I think we are trying to get one now on some cores we dug up, but without a KGKO

I can't say that this behavior is expected or not expected, because I don't know what the equilibrium gas saturation is and at what pressure sufficient gas would have come out to create a marked increase in gas saturation.

Also, as I have said, in my opinion this solution gas drive, there are some indications here of some gravity segregation type of drive. We have cases that the gas-oil ratio is related in some instances as to structure. I think Lilly No. 3, this is a gas ratio in the upper and came in the field average of about a thousand. We could have some migration of gas upstructure in this case.

Q Can't it also be explained that where you have water drive along with solution gas drive, you have this type of behavior?

A Not in the presence of decreasing pressures. You can't throw away good pressure data.

Q There was some mention made I think in your direct examination to going around the ends of these faults and having water communication. Haven't you ever heard of communication through the aquifer?

A Yes, sir.

Q Why are you not submitting volumetric balance data for your examination?

MR. BUELL: May it please the Examiner, I'll answer that.

We did not anticipate that there would be any disagreement on the mechanism of this reservoir. It has been accepted by Pan American engineers for some time that it's solution gas drive. Had we known we could have, or if the Examiner would like to see them, we would be willing to submit them. I don't think Mr. Hinkle should criticize us for not anticipating every activity and turn this particular hearing has taken. We would have to bring a baggage-load of data to the hearing to cover every potentiality. We will be happy to submit it.

MR. NUTTER: I think as far as we are concerned, we don't care for material balance.

MR. HINKLE: We won't insist.

Q (By Mr. Hinkle) If there's no more water influx, why is the bottom hole pressure below saturation not showing an increasing decline?

MR. NUTTER: What is that question again, please?

Q If there is no more water influx, why is the bottom hole pressure below saturation not showing an increasing decline?

A It's in this area of somewhat straight line decline. On our plat of pressure up there we had a marked change of pressure decline in this reservoir. It is still declining. We don't have any indication of any leveling of pressures, and I stated all of these pressure points positively indicate that there is no

additional energy from this reservoir other than what oil and gas were initially in place. I hope that answers your question now.

MR. BUELL: Let the record reflect that Mr. Rodger's right finger was pointing at Pan American's Exhibit No. 2.

MR. NUTTER: Which finger?

MR. BUELL: Right index finger.

Q (By Mr. Hinkle) What was the last test data used in the volumetric balance?

A January, 1963.

Q If there is any degree of water drive, is not the structural position important?

A Yes, sir, it is important.

Q And are not correlative rights being violated if other operators have upstructure locations, regardless of how they got there?

MR. BUELL: Do you understand the question?

A Yes, I understand it, Mr. Buell. In general I think they probably would. It depends on the rate of water influx and the rate of production and the relative allowables. It's a complex question.

Q Did not Pan American go upstructure when they requested an exception in connection with SMU No. 15--

A Yes, sir.

Q -- to replace the No. 3?

A Yes, sir, we did.

Q Why did you do that?

A Well, we could have gone further upstructure if we drilled on 330; we drilled in the 40 offsetting the well, which was upstructure.

Q You could have drilled it right by the well you are going to replace, is that right?

A No, sir.

Q Why not?

A We wouldn't recommend it. We went into detail on that well at the hearing. That's our problem well. If we tried to drill next to it I don't know which way I would go from it. We didn't even consider it.

Q But you asked that the full 80 acres be credited, that notwithstanding the fact that the well had watered out, did you not?

A Yes, we did.

Q Why did you do that?

A The well did not water out under any natural circumstances. The Well No. 5, which is a southeast diagonal offset, is our lowest subsea completion down below 7,000 feet. We felt that that acreage was primarily still productive and certainly

was initially productive, which was our main consideration.

MR. BUELL: Mr. Examiner, could I move again that we incorporate the record of these four prior hearings that have been referred to so many times during the course of this hearing? I don't believe the record of this hearing will be complete.

MR. NUTTER: What did these four cases involve?

MR. BUELL: Yes, sir, the first case was Gulf's application for their --

MR. NUTTER: Their first application for the No. 3?

MR. BUELL: Yes. And their request included an 80-acre allowable and 80-acre unit. The Commission denied it. That was Case 2556. Then they came back under an amended application and a new case, number of 2676, and asked for Well No. 3 again with only 40-acre allowable, which the Commission granted. The next case was Case No. 2854, which was the application of Pan American for SMU No. 15, which Mr. Hinkle and Mr. Rodgers have just been discussing in some intimate detail. The next case was 2901, which involved our application for our companion well SMU No. 17, which has also been discussed at this hearing. In fact, Humble throughout this hearing and through their own witnesses and on cross examination, have time after time referred to those cases.

Of course, we can't go into the detail that was gone into in those cases without prolonging this hearing, but it seems that

Humble has made them such an intimate part of this hearing that the Commission should have the benefit of having them incorporated by reference into the record of this hearing. I think the Commission has recourse to any information and data in their files as records, but from a formal standpoint we think they ought to be made a part of the record.

MR. HINKLE: We object to the testimony for the reasons I stated this morning. For that same reason we would like to object to the introduction in evidence of Pan American's Exhibit No. 1, in that it has been shown conclusively here that Mr. Rodgers did not prepare this exhibit. It was prepared by a committee of geologists representing Pan American back in 1952. It shows very conclusively that they have not taken into consideration information that was available to them at that time in connection with the faults that were shown on Humble's Exhibit No. 1. We do not believe it is competent evidence in that he has not prepared it, he is not qualified to testify here that it is a correct exhibit.

MR. BUELL: Mr. Examiner, if I may speak on that, and again formally offer our Exhibit No. 1, admitted it is true, which we said at the outset of our direct, that the basic structure map represented by Exhibit 1 was not prepared solely and exclusively by Mr. Rodgers. We admit that, in fact we are a little proud of it, that it is a result of a team of people working. This same

picture with minor variations has been presented to the Commission many, many times. I think Mr. Hinkle is a little mistaken when he said Mr. Rodgers wasn't qualified to speak about this exhibit because if the Examiner recalls the cross examination, I think Mr. Hinkle proved that Mr. Rodgers is more than qualified.

He has not only verified this picture from a geological standpoint, he has gone further and verified its accuracy from a factual standpoint, a performance production standpoint. He has verified this structure map every way in the world that it could be verified. He has made some addition to it within the center of the exhibit as new data have become available.

Mr. Rodgers has incorporated his interpretations into this exhibit. We could have instructed Mr. Rodgers to tell one of your engineers to prepare you a structure map. That engineer would have gone and copied this one and we could have said it was prepared under his supervision. We didn't want to use that subterfuge. I contend Mr. Rodgers has substantiated this, he says it is correct. He adopts it as his own. It is legal testimony, legal exhibit and still should be admitted.

MR. HINKLE: We still contend that we have not had an opportunity to be confronted with those who actually did prepare the exhibit and to cross examine, which you ordinarily do in an exhibit of this kind.

MR. BUELL: If we are going to carry this to a ridiculous extreme, we haven't had the opportunity to cross examine the surveyor who showed the property lines on Humble's Exhibit No. 1. That's very critical from the standpoint of productive acreage. You could carry this to a ridiculous extreme. I think Pan American has furnished a witness that has supported in every way our Exhibit No. 1.

MR. NUTTER: I think most of the pertinent data in Cases 2556, 2676, 2854 and 2901 has been covered today. I'm familiar with those cases and I heard two or three of them I think. I think most of the pertinent data has been covered here, so we won't actually incorporate those cases into the record. We will take administrative notice of such pertinent data as hasn't been covered. As far as Exhibit No. 1 is concerned, we will admit that today.

(Whereupon, Pan American's Exhibit No. 1 was admitted in evidence.)

MR. HINKLE: That's all the cross examination.

BY MR. NUTTER:

Q Mr. Rodgers, I want to ask you a couple of questions. First of all, is your No. 9 well still producing?

A Yes, it is.

Q How much is that making now?

A I have the February Engineering Committee Report here. It made 744 barrels of oil in January, and in February for some reason it dropped to 464.

Q That unit with the No. 9 and 17 received a top allowable, so the balance, I presume, is being produced from the No. 17?

A Yes, that's my understanding.

Q Now, back to this Exhibit No. 1 and this fault and the plane of the fault, if this is the line on the east side of the structure?

A Yes, sir.

Q The fault that comes down through No. 9 and cuts inside Well No. 2 down in the southeast. If this is the line at which this fault intersects the top of the Ellenburger, and No. 5 and No. 1 and No. 2 actually cut the fault or had repeat sections of Ellenburger, does that mean that the thrust of the fault is so great that No. 5 would have cut the fault but the point at which the fault extends to the top of the Ellenburger is a full half mile east?

A Yes, sir, that's the interpretation.

Q What is the angle of thrust of this fault, do you know?

A I don't recall the angle, Mr. Nutter. It's what is classified as a low angle thrust fault, which is reasonably common in this general area.

Q What is the thickness of the Ellenburger here?

A In that No. 5 it's over 500 feet. I had that here a-while ago. That well is on the cross section that we introduced as an exhibit. No, we didn't introduce it, did we?

MR. BUELL: No, sir.

MR. HINKLE: Are you going to use it as an exhibit?

A No. The top of the Ellenburger is 9730 feet, the fault occurs at 10,320 feet, so that's roughly 600 feet down, and that fault was, it was an ideal pick in that we had a repeat Simpson section in that well. We drilled that one to a TD of 11,150 feet, so we drilled about 1400 feet below the top of the first Ellenburger.

Q (By Mr. Nutter) This fault occurs at 10,320, the top of the Ellenburger is some 600 feet above that, but the fault doesn't come out of the Ellenburger on the top of the Ellenburger on its surface. It comes out, I should say, 2600 feet to the east?

A That's right. That fault intersects the next well, the Gulf Plains Knight 1-E at a depth of 9980, somewhere along in there, then it came out between the two.

Q It intersects the Ellenburger at 9980 in the Gulf No. 1 Plains?

A Yes, sir.

Q What's the top of the Ellenburger in that well?

A 9,620.

Q Do you have the data as to the point at which the fault is picked in the Ellenburger in the Plains Knight No. 2?

A Yes, sir. I believe I can work it up here. I don't have that well on that cross section. It intersects it at minus 6310 subsea. Now, if I can find an elevation on that well. Would it happen to be on your exhibit?

MR. BUELL: If it might help, we offered a log of that well as a Pan American exhibit in the first Gulf case. It intersected at 6310 because the top is 7617.

Q This well, the fault was not in the Ellenburger?

A No, sir, it was above it.

Q Now, the No. 9 up there in Section 15 --

A Yes.

Q -- the fault is in the top of the Ellenburger there?

A It's at minus 6823, and the top of the Ellenburger is 6788 subsea, so it's some 50 feet down. That has a repeat Simpson section.

Q However, this well shows the top of the Ellenburger being contiguous with the fault, doesn't it, because it shows the fault going right through the well on the top of the Ellenburger?

A Well, yes, sir, it's a drafting discrepancy then. The

well should be sitting slightly left of the fault, or west, because you have some 50 feet difference in there on the tops.

MR. NUTTER: Are there any other questions of Mr. Rodgers?

BY MR. HINKLE:

Q Mr. Rodgers, can we see the cross section that you referred to in your testimony there in answer to Mr. Nutter's question?

A Yes.

MR. BUELL: Let's identify the cross section. That is Pan American's Exhibit No. 2 in Case 2854, which was heard July 10th, 1963.

Q (By Mr. Hinkle) Now, the cross section which you have just referred to shows an extrapolated fault, does it not, which goes through SMU No. 5 and Plains Knight No. 1-E?

A Yes, sir.

Q If you extend that to the top of the Ellenburger, where would it come out?

A It would come out -- you are looking at two points there. By considering all four points that we used on this fault, it would come out at the trace line shown.

Q We figure that it would come out just to the east of the Plains Gulf. What is that number?

MR. BUELL: Knight 1-E. Plains Knight No. 1-E.

Q (By Mr. Hinkle) Yes, Plains Knight No. 1-E, approximately 200 feet from it, is that correct or not?

A Well, it's not shown on this cross section. It will come out, well, it's my testimony, sir, that it comes out on this trace line.

Q Well, it appears to us that if you project it to the top of the Ellenburger that your fault line would be moved over near the Plains Knight No. 1.

MR. BUELL: Mr. Hinkle, I know you don't mean to, you are just arguing with the witness. He has given his answer.

MR. HINKLE: That's all right. I think that's all.

MR. NUTTER: Any other questions of Mr. Rodgers? The witness may be excused.

(Witness excused.)

MR. BUELL: Mr. Examiner, may I at this time read from the transcript of Case 391 that I referred to some hours ago with Mr. Dutton? Let me read the point my question was based on and I will hand the transcript to Mr. Hinkle so that if he feels it's out of context in any way he can read anything in that he wants.

I'm reading on page 6 in the transcript of Case 391, that portion of the hearing that was held August 18, 1954, which, if memory serves me correctly, was the third hearing under Case 391,

the third session. Some lawyer with Stanolind, who is now Pan American, named Townsend was asking our geologist, Mr. Tom Ingram, these questions that I will read, and I will be reading Mr. Ingram's answer.

"Q What are the factors that limit the production in this field in your estimation?"

"A The production is limited by the two major thrust faults and the oil-water contact."

"Q What is your estimate of the oil-water contact?"

"A Subsea of minus 7250."

"Q Upon what information do you base that?"

"A Drill stem test and production data."

"Q In your opinion is the Fowler Ellenburger Pool in communication with the major aquifer?"

I feel sure, Mr. Examiner, that they meant a instead of the, a major aquifer.

"A No, I don't think it is. It is based principally on the fact that we fail to find any large quantities of water."

I will read from page 20 of the same transcript, a statement made by a Mr. Hinkle for Humble Oil and Refining Company. "The Humble has one well, I believe, in the Fowler Pool. The Humble would like the record in this case to show that they are in accord with the showing that has been made here by the Stanolind, and

their recommendations that this field be continued on an 80-acre spacing and proration basis."

MR. HINKLE: We do not question the record as read by Mr. Buell. If there is a discrepancy in Mr. Dutton's testimony I am sure he was just mistaken in his memory.

MR. BUELL: I am sure of that too. I would like the record to also show that we certainly recognize that a concurrence of the type that Mr. Hinkle made for Humble doesn't necessarily go to each and every bit of data that was introduced.

MR. HINKLE: Really, that was only on the 80-acre spacing portion of the hearing.

MR. BUELL: The only reason I read it further was that he agreed that he concurred with the showing, which might have been intended to include Mr. Ingram's lack of water bit.

MR. NUTTER: Do you have anything further on your direct case, Mr. Buell?

MR. BUELL: No, I have a short closing statement.

MR. NUTTER: Would you make your statement first, please? Did you want to put on any rebuttal?

MR. HINKLE: No, I have a short statement.

MR. BUELL: I would like to direct your attention to any of the many exhibits that have been introduced that show the spacing pattern in this pool. There are many of them that have

been introduced and would like to direct your attention to the fact that prior to the Commission approval of the Gulf's No. 3 well, this field was a textbook case, and the prettiest picture of uniform and orderly 80-acre development that probably anyone in the industry has ever seen. Unfortunately today that is not the case.

With the exception granted Gulf, Pan American has requested two which have been approved, Humble here today is asking for two more. In my opinion, these two requests being made by Humble here today go much further and are a larger degree of violation of the purpose and intent of the pool rules than any of the previous exceptions granted by the Commission.

I would like to again remind the Commission that many wells were drilled in this pool in conformance and in reliance on those spacing orders. In many cases, by asking for an exception, the operator could have obtained structural advantage, but they played by the rules. If the Commission does intend to continue their policy of granting spacing exceptions, I would sincerely request they at least maintain the standards in the exceptions that they maintained up to today.

The Gulf well was a 330 location, but they did show the Commission that economic waste would result if they were forced to move back to the center, or more nearly a regular location in the

center of their 40-acre unit. There was no controversy as to the productivity of the 40-acre tract on which the well was drilled.

I can see some justification for the Commission if they were going to grant an exception not to force Gulf to drill a new hole, but here in Humble's application we're looking at two new holes. There's no previous well in existence by which they can save money, they simply want to crawl in as close as they can to their lease line for structural advantage.

It would be my recommendation to the Commission that if they do approve these, that they be required in the case of their Knight No. 2 to either move to the center of the 40 in which the unorthodox location is being requested, or better still, drill a regular location and receive complete 80-acre allowable. They claim that it's productive. Now they're asking for a companion well over on their State "AB" lease. It's not similar to any companion well cases that have been approved by the Commission in this pool before. It's in the same 40 acres with the existing well. It's 330 feet from the line. Really it's not a companion well, if you wanted to give it a name I guess it would have to be a lover well because they're getting out of their normal 40.

With regard to Humble's structural interpretation as presented by their Exhibit No. 1, if the Commission should feel, and I think the record completely refutes the accuracy of that inter-

pretation, but if the Commission does feel that is a reasonable and accurate interpretation and they continue to prorate and regulate this pool thinking it's three, and regulate it as one, we'll have a conservation nightmare. If the Commission feels that that presentation is accurate and that we do have three separate and distinct reservoirs, they would be playing Russian Roulette with the rights, they would be playing Russian Roulette with conservation unless they split this field into three fields and prorate each of the three reservoirs as a separate and distinct reservoir.

It doesn't take any imagination at all to visualize the damage that could be caused by waste as well as of correlative rights by trying to prorate three reservoirs as if they were one.

Actually I think that the record shows that the Pan American structure is the most reasonable, it has withstood the time, it is being presented at hearings in which Humble concurs, all subsequent data have confirmed the accuracy of that interpretation. I feel that the interpretation presented by Pan American is the most accurate. It would be Pan American's recommendation that the two requests for unorthodox locations made by Humble here today be denied.

MR. HINKLE: Mr. Examiner, the Pan American's Exhibit No. 1 has been used in all of the cases which have involved exceptions. It's the same structure map which was used at the time

of the hearing regarding the field rules which were adopted. All of these cases have gone on on the assumption that the structural condition as portrayed by that exhibit is correct. Now, it was only Humble went along with the field rules. They drilled a well and a half without asking an exception, and spent some $350,000 in doing it. It wasn't until after these exceptions were granted that Humble made a new study of this whole situation, and the result of their work is portrayed in Humble's Exhibit No. 1, which shows the faulting condition in the area, and which we have endeavored to show today that was not taken into consideration in compiling the original structural map which has been, you might say, the guide, the basis for the orders of the Commission.

The Humble firmly believes that there is a faulting condition that virtually affects correlative rights of their leasehold interest in this case; that the fault, with respect to their State "AB" lease in Section 16 runs to the northeast of their No. 1 well and that the No. 1 well is not effectively, or not draining at all that portion of the 80 acres which has been dedicated to that well which lies to the north and east.

It is necessary in order to protect their correlative rights and to get their fair share of the production from what they believe is the central fault plane, that the exception be made. The reason they want structural position is that they firmly

believe, as we have shown by the evidence here, that this is at least a partially water drive situation. All of the evidence I think clearly shows that in that Pan American themselves have completed most of their wells in the top of the Ellenburger, taking into consideration that this is a water drive field rather than a gas solution mechanism. It also shows that there has been and there continues to be an encroachment of water in the area in that five of their wells have already been plugged back to take care of the water encroachment. All of their wells now have water completely.

In connection with their J. E. Knight No. 2, they feel there that the whole 80 acres is not productive due to the faulting condition in that area, which we have already shown, but they feel that 62 acres of it is productive. There again, on account of the water drive situation they firmly believe that they should be accorded the privilege of taking advantage of the structural position. The Commission has already set up its dedication of acreage to the Gulf No. 1, acreage which adjoins the part that Humble proposes to dedicate to its No. 2, which shows it is productive.

The Commission has already found that at least part of that is productive. We believe that the exceptions which have been made by the Commission to the existing field rules are precedents to granting exceptions to Humble in these particular cases, in that

Gulf has two wells on 330 locations which are just immediately south of the Knight No. 2. Pan American, in connection with its Number 17, SMU 17 well has been granted an exception the same way that we are asking here, in that it is sharing a proration unit with another well, No. 9.

Humble proposes, of course, to share the proration unit which has already been dedicated to its No. 1 well, with its No. 2 well. If the applications of Humble are not granted, it seems to us that Humble would be denied rights that the others have been accorded by reason of the exceptions which have already been made. It would be highly inequitable under the circumstances to not grant the applications of Humble.

MR. NUTTER: Anyone else have anything further?

MR. KASTLER: I have two prepared statements, Mr. Nutter. First, in regard to the statement in connection with the case which was advertised as Case 3039 involving the State "AB" Well No. 2, in the past no operator has been allowed more than one well in this pool on each 40 acres. Therefore, Gulf, as an operator in the Fowler Ellenburger Pool, recommends the Commission not permit such practice to commence.

If the Commission decides that two wells should be allowed on the 80-acre proration unit, then the new wells should be located within 150 feet of the center of the Northeast, Northeast

of Section 16. Our statement in connection with the case which was advertised as 3040 is this: Gulf Oil Corporation in the past has objected to new wells being drilled off pattern and we also do in this case. However, if the Commission does grant an exception in this case, the operator should be required to locate the well within 150 feet of the Southwest, Southwest of Section 14.

MR. NUTTER: Thank you.

MR. BUELL: I would like the record to reflect, if Mr. Hinkle doesn't object, that Pan American, like Gulf, would have no objection to a companion well on the Humble State "AB" Lease being drilled within 150 feet of the center of the Northeast, of the Northeast Quarter.

MR. DURRETT: I would like to state for the record that the Commission has received numerous telegrams and letters concerning this case. Very briefly, we have a telegram from Delhi-Taylor Oil Corporation concerning Case 3039 proposing that the case be denied. We have a telegram from Standard Oil Company of Texas in Case 3039 recommending denial. We have a letter from Skelly Oil Company pertaining to Case 3039 objecting to granting of the application.

We have a telegram from Continental Oil Company concerning Cases 3039 and 3040 opposing both cases. We have a letter from Atlantic pertaining to Cases 3039 and 3040 opposing Humble, and

we have a telegram from Standard Oil Company of Texas concerning Case 3040 recommending denial.

MR. HINKLE: Mr. Examiner, for the purpose of the record I would like to ask Mr. Buell one question. With the exception of Skelly, are not all of the operators who have communications here that have just been referred to members of the SMU Unit?

MR. BUELL: I wasn't listening too closely, but I think you are right. Those interest owners are shown on our Exhibit No. 1.

MR. HINKLE: Do you know whether the Skelly has any interest in the Fowler Ellenburger area at all?

MR. BUELL: Skelly, to my knowledge, is not an operator in the Fowler Ellenburger Oil Pool. They do have Blinebry wells and they do hold acreage in this immediate area.

MR. NUTTER: I think for the sake of the record, Mr. Hinkle, we will read part of this letter here from Mr. George Selinger with Skelly. "While we do not produce from the Fowler Ellenburger Pool, we do operate a lease in th[illegible]chwest Quarter of Section 16."

If there is nothing further in Cas[illegible]s 3039 and 3040, we'll take a brief recess and resume the hearing.

I N D E X

STATE OF NEW MEXICO)
) ss
COUNTY OF BERNALILLO)

I, ADA DEARNLEY, Notary Public 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.

Witness my Hand and Seal this 4th day of June, 1964.

Ada Dearnley
NOTARY PUBLIC

My Commission Expires:

June 19, 1967.

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 3039-3040 heard by me on May 7, 1964.

....., Examiner
New Mexico Oil Conservation Commission

NEW MEXICO OIL CONSERVATION COMMISSION

SANTA FE, NEW MEXICO

Application of Humble Oil & Refining Company for an unorthodox oil well location and non-standard proration unit in the Fowler-Ellenburger Pool, Section 14, Township 24 South, Range 37 East, Lea County, New Mexico

Case No. 3040

New Mexico Oil Conservation Commission
Santa Fe, New Mexico

Comes the Humble Oil & Refining Company, acting by and through the undersigned attorneys and hereby makes application for an unorthodox oil well location and non-standard proration unit in the Fowler-Ellenburger Pool for Humble's proposed J. A. E. Knight No. 2 well to be located 330 FSL and 330 feet FWL of Section 14, Township 24 South, Range 37 East, Lea County, New Mexico and in support thereof respectfully shows:

1. That the proposed location would be an exception to the Fowler-Ellenburger Pool field rules and instead of the S½SW¼ of Section 14, Township 24 South, Range 37 East being designated as the proration unit for said well, it is proposed that 62 acres out of the S½SW¼ of Section 14 be dedicated to said well, which is believed to be the productive acreage within said 80 acre legal subdivision because of the faulting condition in the area.

The within application is to be substituted for an application made by Humble Oil & Refining Company by telegram dated April 13, 1964. It is respectfully requested that this matter be set down for hearing before an examiner at the first examiner's hearing in May, 1964.

Respectfully submitted,

HUMBLE OIL & REFINING COMPANY

By _____
Attorney

HINKLE, BONDURANT & CHRISTY
Attorneys for Humble Oil & Refining Company

BEFORE THE OIL CONSERVATION COMMISSION

OF THE STATE OF NEW MEXICO

IN THE MATTER OF THE APPLICATION OF HUMBLE OIL & REFINING COMPANY FOR UNORTHODOX LOCATIONS IN FOWLER (BLINEBRY) OIL POOL IN LEA COUNTY, NEW MEXICO.	))))))	No. 3040

ENTRY OF APPEARANCE

The undersigned, Atwood & Malone of Roswell, New Mexico, a firm of attorneys, all of whose members are duly licensed to practice law in the State of New Mexico, hereby enters its appearance as local counsel with Guy Buell, Esquire, of the Texas Bar, for Pan American Petroleum Corporation in the above entitled cause.

DATED at Roswell, New Mexico, this 30th day of April, 1964.

ATWOOD & MALONE

By _____

Attorneys for Pan American
Petroleum Corporation
Post Office Drawer 700
Roswell, New Mexico

DOCKET NO. 13-64

DOCKET: EXAMINER HEARING - THURSDAY - MAY 7, 1964

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

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

CASE 3037: Application of Texaco, Inc. for an unorthodox location, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval of an unorthodox location for its State "BO" Well No. 4, located 660 feet from the South line and 659 feet from the West line of Section 13, Township 11 South, Range 32 East, Moore-Wolfcamp Gas Pool, Lea County, New Mexico.

CASE 3038: Application of Kennedy Oil Company for a waterflood buffer zone and capacity allowables, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks the designation of the N/2 SW/4 of Section 20, Township 16 South, Range 31 East, Square Lake Pool, Eddy County, New Mexico, as a buffer zone adjacent to a waterflood project operated in the S/2 SW/4 of said Section 20 by Newmont Oil Company. Applicant further seeks the assignment of capacity allowables for its Rowley Federal Wells Nos. 1 and 2, located in Units K and L, respectively, of said Section 20.

CASE 3039: Application of Humble Oil & Refining Company for an unorthodox location and a dual completion, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval of the dual completion (combination) of its State "AB" Well No. 2 to produce oil from the Fowler Ellenburger and Fowler Blinebry Pools at an unorthodox location 1400 feet from the North line and 330 feet from the East line of Section 16, Township 24 South, Range 37 East, Lea County, New Mexico. Applicant proposes that the Ellenburger completion will share the 80-acre proration unit with an existing well, its State "AB" Well No. 1, a maximum of one pool allowable to be produced from said unit. The proposed dual would be completed with 4 1/2 inch and 2 7/8 inch parallel strings of casing.

CASE 3040: Application of Humble Oil & Refining Company for an unorthodox location and a non-standard proration unit, Lea County, New Mexico. Applicant, in the above-styled cause, seeks authority to complete its J.A.E. Knight Well No. 2 at an unorthodox location 330 feet from the South line and 330 feet from the West line of Section 14, Township 24 South, Range 37 East, Fowler Ellenburger Pool, Lea County, New Mexico. Said well would be dedicated to a 62-acre non-standard proration unit comprising the SW/4 SW/4 of said Section 14 and 22 productive acres of the SE/4 SW/4 lying West of the fault transversing said quarter-quarter section.

CASE 2691: (Reopened) In the matter of Case No. 2691 being reopened pursuant to the provisions of Order No. R-2373, which order established temporary 640-acre gas proration units for the Lusk-Morrow Gas Pool, Lea County, New Mexico, for a period of 18 months. All interested parties may appear and show cause why said pool should not be developed on 160-acre gas proration units.

CASE 3041: Application of Penrose Production Company for two triple completions, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval for the triple completion (conventional) of its L. G. Warlick Well No. 2 and its Sunshine State Well No. 1 located in Units B and C, respectively, Section 19, Township 21 South, Range 37 East, Lea County, New Mexico, to produce oil from the Penrose Skelly, Blinebry and Drinkard Oil Pools through parallel strings of 2 1/16 and 2 3/8 inch tubing.

CASE 3042: Application of Gulf Oil Corporation for a unit agreement, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval of the Northwest Tatum State Unit Area comprising 1600 acres of State land in Township 12 South, Range 35 East, Lea County, New Mexico.

STATEMENT TO BE MADE IN CASE 3040.

EXAMINER HEARING

MAY 7, 1964

Gulf Oil Corporation in the past has objected to new wells being drilled off pattern and we also do in this case. However, if the Commission does grant an exception in this case, the Operator should be required to locate the well within 150 feet of the center of the SW/4 SW/4 of Section 14.

William O. Lotter
Gulf Oil Corporation

OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO

Date_____

CASE 3040 Hearing Date 9 am 5/7/64
DGN ② 6E

My recommendations for an order in the above numbered cases are as follows:

Enter an order authorizing Humble Oil & Rfg Co to drill its J.A.E. Knight Well No. 2 at an unorthodox location in the Fowler Ellenburger Pool 330 feet from the South line & 330 feet from the West line of Section 14, Township 24 South, Range 37 East, NMPM Lea County, New Mexico. Base approval upon finding that Humble has own productive acreage in this area, has drilled a well at a standard location which proved to be non-productive and will be deprived of ~~the~~ an opportunity to produce its just & equitable share of the oil in place unless ~~it~~ and/or may request permitted the non-standard location. Deny Humble's request for a 62-acre non-standard unit. Permit well to produce ½ of a standard allowable. To produce more, because of limited productive acres and because of unorthodox location of well would tend to violate correlative rights of offset owners. To produce 50% of std allowable will not cause waste or violate rights

BEFORE THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO

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

CASE No. 3040
Order No. R-2724

APPLICATION OF HUMBLE OIL & REFINING
COMPANY FOR AN UNORTHODOX LOCATION AND
A NON-STANDARD PRORATION UNIT, LEA
COUNTY, NEW MEXICO.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 o'clock a.m. on May 7, 1964, at Santa Fe, New Mexico, before Examiner Daniel S. Nutter.

NOW, on this 18th day of June, 1964, the Commission, a quorum being present, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS:

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

(2) That the applicant, Humble Oil & Refining Company, seeks authority to drill its J. A. E. Knight Well No. 2 at an unorthodox location 330 feet from the South line and 330 feet from the West line of Section 14, Township 24 South, Range 37 East, NMPM, Fowler-Ellenburger Pool, Lea County, New Mexico.

(3) That the applicant has drilled a well at a standard location in the NW/4 SW/4 of said Section 14 and that said well was non-productive from the Fowler-Ellenburger Pool.

(4) That the proposed unorthodox location should be approved in order to afford the applicant the opportunity to

produce its just and equitable share of the oil and gas in the Fowler-Ellenburger Pool.

(5) That the applicant also seeks approval of a 62-acre non-standard proration unit in the Fowler-Ellenburger Pool comprising all of the SW/4 SW/4 of Section 14 and a portion of the SE/4 SW/4 of Section 14, Township 24 South, Range 37 East, NMPM, Lea County, New Mexico.

(6) That the productivity of any of the SE/4 SW/4 of said Section 14 is doubtful and that inclusion of said acreage within the non-standard proration unit to be dedicated to the subject well would allow the applicant to produce more than its just and equitable share of the oil and gas in the subject pool from said well, thereby violating correlative rights.

(7) That approval of a 40-acre non-standard proration unit in the Fowler-Ellenburger Pool comprising the SW/4 SW/4 of said Section 14 to be dedicated to the applicant's J. A. E. Knight Well No. 2 will afford to the owner of each property in the pool the opportunity to produce his just and equitable share of the oil and gas in the pool, provided the J. A. E. Knight Well No. 2 does not receive more than one-half of a standard 80-acre allowable in the Fowler-Ellenburger Pool.

IT IS THEREFORE ORDERED:

(1) That the applicant, Humble Oil & Refining Company, is hereby authorized to drill its J. A. E. Knight Well No. 2 at an unorthodox location in the Fowler-Ellenburger Pool 330 feet from the South line and 330 feet from the West line of Section 14, Township 24 South, Range 37 East, NMPM, Lea County, New Mexico.

(2) That a 40-acre non-standard proration unit in the Fowler-Ellenburger Pool comprising the SW/4 SW/4 of Section 14, Township 24 South, Range 37 East, NMPM, Lea County, New Mexico, is hereby created and dedicated to the Humble Oil & Refining Company J. A. E. Knight Well No. 2 to be located 330 feet from South line and 330 feet from the West line of said Section 14.

(3) That the above-described non-standard oil proration unit shall receive one-half of a standard 80-acre allowable in the Fowler-Ellenburger Pool.

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

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

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

Jack M Campbell
JACK M. CAMPBELL, Chairman

E. S. Walker
E. S. WALKER, Member

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

esr/

GOVERNOR
JACK M. CAMPBELL
CHAIRMAN

State of New Mexico
Oil Conservation Commission

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

LAND COMMISSIONER
E. S. JOHNNY WALKER
MEMBER

P. O. BOX 871
SANTA FE

June 19, 1964

Re: Case No. 3039 & 3040
Order No. R-2723 & R-2724
Applicant:
HUMBLE OIL & REFINING CO.

Mr. Clarence Hinkle
Hinkle, Bondurant & Christy
Attorneys at Law
Box 10
Roswell, New Mexico

Dear Sir:

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

Very truly yours,

A. L. Porter, Jr.

A. L. PORTER, Jr.
Secretary-Director

ir/

Carbon copy of order also sent to:

Hobbs OCC x
Artesia OCC
Aztec OCC
OTHER Mr. Guy Buell
Mr. Bill Kastler

NEW MEXICO OIL CONSERVATION COMMISSION

SANTA FE, NEW MEXICO

5-1-61

APPLICATION FOR MULTIPLE COMPLETION

Operator		County	Date
HUMBLE OIL & REFINING COMPANY		Lea	April 17, 1964
Address		**Lease**	**Well No.**
Box 2100, Hobbs, New Mexico 88240		New Mex. State "AB"	2
Location of Well — **Unit**	**Section**	**Township**	**Range**
"H"	16	T-24-S	R-37-E

1. Has the New Mexico Oil Conservation Commission heretofore authorized the multiple completion of a well in these same pools or in the same zones within one mile of the subject well? YES X NO ____

2. If answer is yes, identify one such instance: Order No. R-2525 ; Operator, Lease, and Well No.:
Pan American, South Mattix Unit, Well No. 1 (Dual)

3. The following facts are submitted:	Upper Zone	Intermediate Zone	Lower Zone
a. Name of Pool and Formation	Fowler Blinebry		Fowler Ellenburger
b. Top and Bottom of Pay Section (Perforations)	5,400 5,750 EST.		10,150 10,530 EST.
c. Type of production (Oil or Gas)	Oil		Oil
d. Method of Production (Flowing or Artificial Lift)	Flowing		Flowing

4. The following are attached. (Please mark YES or NO)

Yes a. Diagrammatic Sketch of the Multiple Completion, showing all casing strings, including diameters and setting depths, centralizers and /or turbolizers and location thereof, quantities used and top of cement, perforated intervals, tubing strings, including diameters and setting depth, location and type of packers and side door chokes, and such other information as may be pertinent.

Yes b. Plat showing the location of all wells on applicant's lease, all offset wells on offset leases, and the names and addresses of operators of all leases offsetting applicant's lease.

Yes c. Waivers consenting to such multiple completion from each offset operator, or in lieu thereof, evidence that said offset operators have been furnished copies of the application.*

No d. Electrical log of the well or other acceptable log with tops and bottoms of producing zones and intervals of perforation indicated thereon. (If such log is not available at the time application is filed, it shall be submitted as provided by Rule 112-A.)
To be filed later.

5. List all offset operators to the lease on which this well is located together with their correct mailing address.
Pan American Petroleum Corporation, P. O. Box 68, Hobbs, New Mexico 88240

Gulf Oil Corporation, P. O. Box 670, Hobbs, New Mexico 88240

BEFORE EXAMINER NUTTER
OIL CONSERVATION COMMISSION
Oppt EXHIBIT NO. 6
CASE NO. 3039 3040

6. Were all operators listed in Item 5 above notified ~~and furnished a copy of this application~~? YES X NO ____. If answer is yes, give date of such notification April 14, 1964.

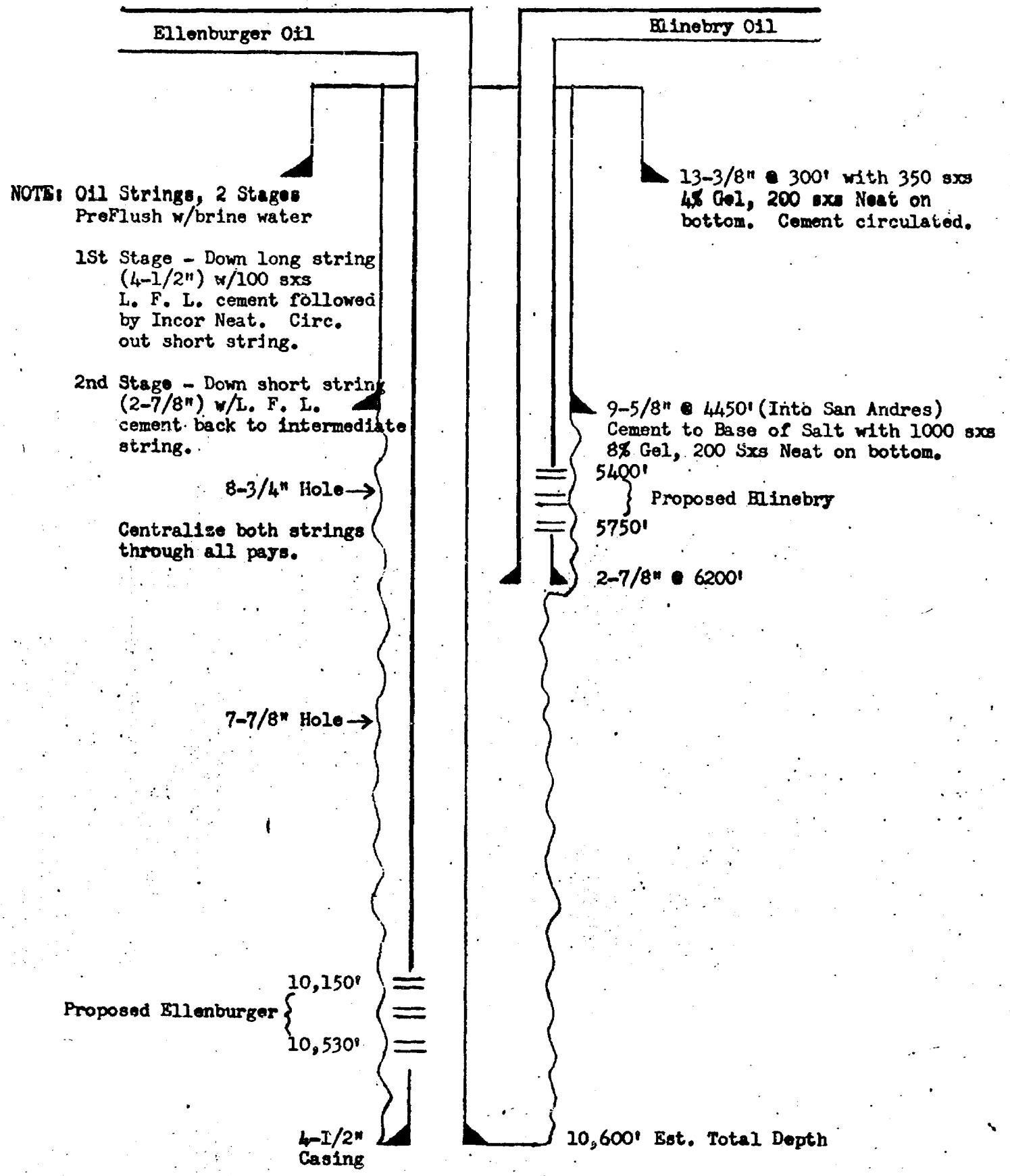
CERTIFICATE: I, the undersigned, state that I am the Agent of the Humble Oil & Refining Company (company), and that I am authorized by said company to make this report; and that this report was prepared under my supervision and direction and that the facts stated therein are true, correct and complete to the best of my knowledge.

Signature

* Should waivers from all offset operators not accompany an application for administrative approval, the New Mexico Oil Conservation Commission will hold the application for a period of twenty (20) days from date of receipt by the Commission's Santa Fe office. If, after said twenty-day period, no protest nor request for hearing is received by the Santa Fe office, the application will then be processed.

NOTE: If the proposed multiple completion will result in an unorthodox well location and/or a non-standard proration unit in either or both of the producing zones, then separate application for approval of the same should be filed simultaneously with this application.

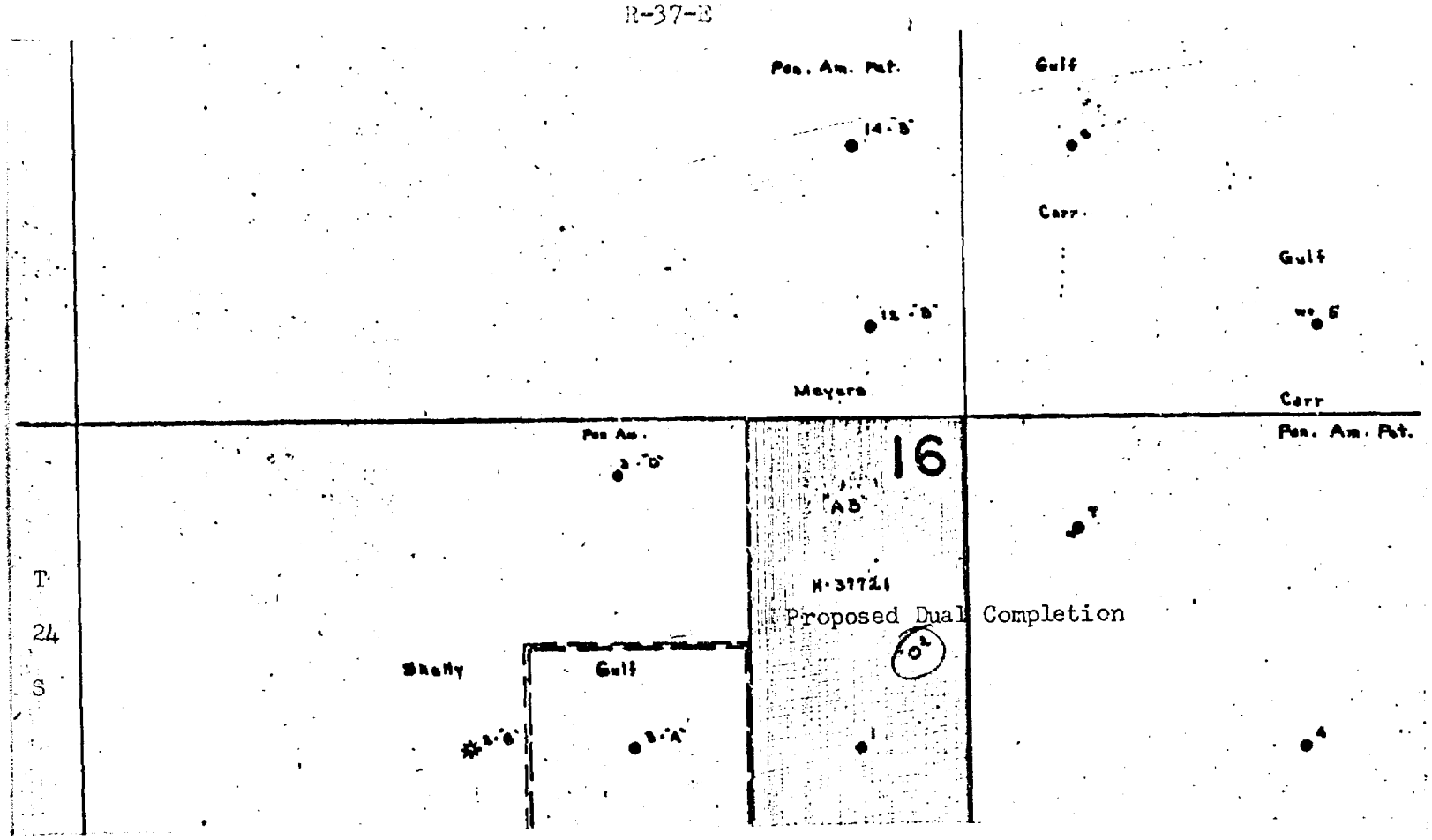
HUMBLE OIL & REFINING COMPANY
New Mexico State AB, Well No. 2
Proposed Dual Completion
4-16-64



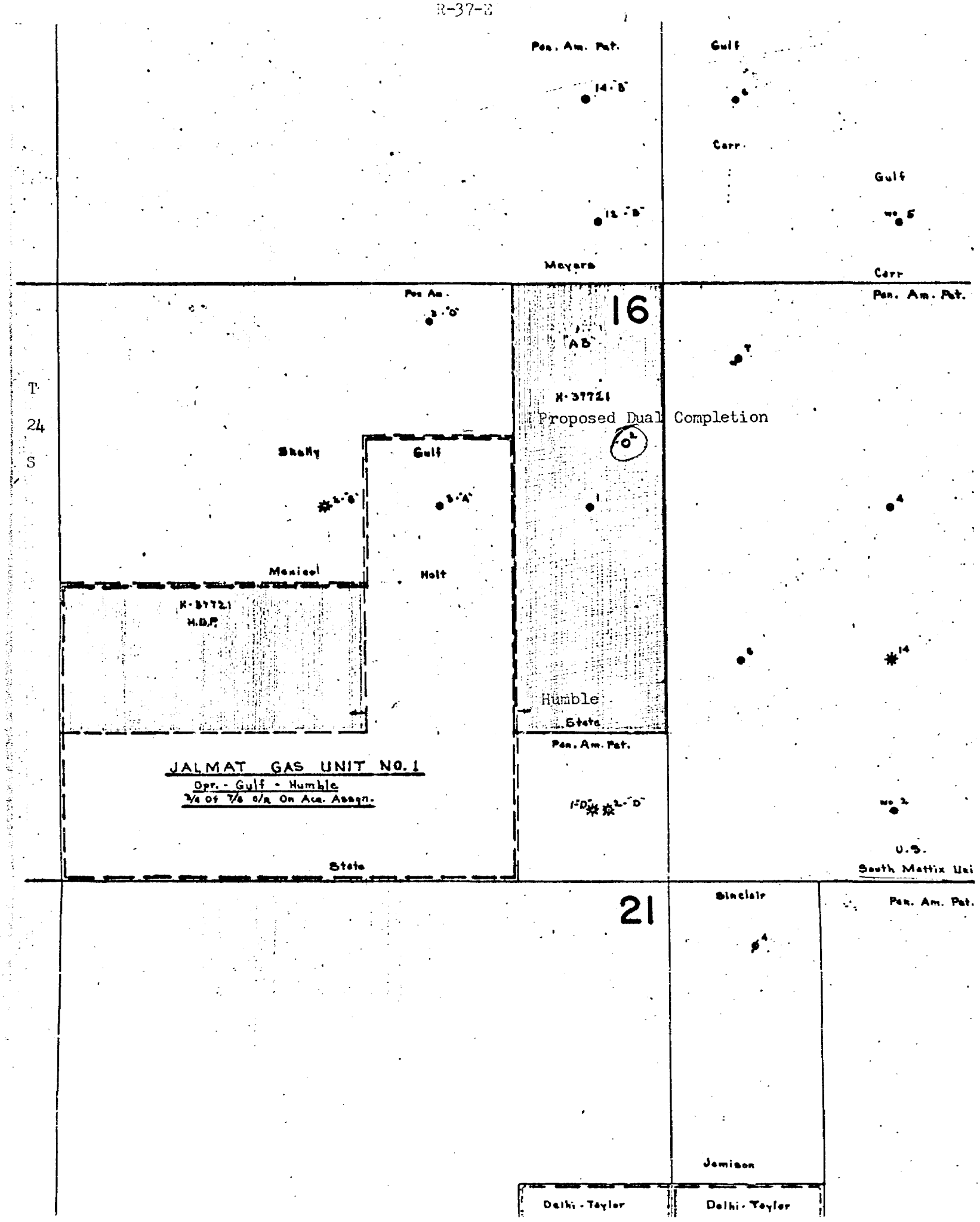
HUMBLE OIL & REFINING COMPANY

NEW MEXICO STATE "AB" LEASE

R-37-E



R-37-E


Pan. Am. Pat.
14-B
Gulf
6
Carr.
Gulf
12-B
No. 5
Meyers
Carr
Pan. Am. Pat.
Pan Am.
3-D
16
"AB"
T
24
S
R-3772-I
Proposed Dual Completion
Shelly
Gulf
3-B
3-A
1
4
Monsel
Holt
R-3772-I
H.B.P.
6
14
Humble
State
Pan. Am. Pat.
JALMAT GAS UNIT NO. 1
Opr. - Gulf - Humble
3/4 of 7/8 o/a On Acc. Assgn.
1-D
2-D
No. 2
U.S.
South Mattix Unit
State
21
Sinclair
Pan. Am. Pat.
4
Jemison
Delhi - Taylor
Delhi - Taylor

HUMBLE OIL & REFINING COMPANY

MIDLAND, TEXAS

MIDLAND AREA

April 14, 1964

POST OFFICE BOX 1600

FOWLER (ELLENBURGER) FIELD

Gulf Oil Corporation
P. O. Drawer 1938
Roswell, New Mexico

Attn: Mr. M. I. Taylor (3 copies)

Pan American Petroleum Corporation
P. O. Box 268
Lubbock, Texas

Attn: Mr. Neil S. Whitmore (3 copies)

Gentlemen:

Humble Oil & Refining Company has made the following application to the New Mexico Oil Conservation Commission:

(1) Application for an unorthodox oil well location and dual completion in the Fowler (Ellenburger) and Fowler (Blinebry) Pools for Humble Oil & Refining Company's N. M. State "AB" No. 2 to be located 1400' FNL and 330' FEL, Section 16, T-24-S, R-37-E, Lea County, New Mexico. The Ellenburger completion will share the 80-acre proration unit with the existing Ellenburger well, N. M. State "AB" No. 1. A maximum of one Ellenburger top allowable will be produced from this shared unit. A combination dual completion is proposed with 4.5 inch casing set for the Ellenburger and 2.875 inch casing set for the Blinebry.

(2) Application for an unorthodox oil well location and non-standard proration unit in the Fowler Ellenburger Pool for Humble Oil & Refining Company's J. A. E. Knight No. 2 to be located 330' FSL and 330' FWL of Section 14, T-24-S, R-37-E, Lea County, New Mexico. A 62-acre non-standard proration unit will be requested.

Exceptions of this type have previously been granted under Orders R-2579 and R-2374 to Pan American and Gulf, respectively. It is anticipated that these matters will be set for hearing on May 7, 1964. If you have no objection to Humble's application, it will be appreciated if you so indicate by signing below and returning two copies to this office.

Yours very truly,

HUMBLE OIL & REFINING COMPANY

R. R. McCarty

WSD/sam/ns

COMPANY_____

BY_____

DATE_____

DRAFT

JMD/esr

[redacted]

BEFORE THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO

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

CASE No. 3040

Order No. R- 2724

APPLICATION OF HUMBLE OIL & REFINING
COMPANY FOR AN UNORTHODOX LOCATION AND
A NON-STANDARD PRORATION UNIT, LEA
COUNTY, NEW MEXICO.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 o'clock a.m. on May 7, 1964, at Santa Fe, New Mexico, before Examiner Daniel S. Nutter, ~~Examiner duly appointed by the Oil Conservation Commission of New Mexico, hereinafter referred to as the "Commission," in accordance with Rule 1214 of the Commission Rules and Regulations.~~

NOW, on this day of June, 1964, the Commission, a quorum being present, having considered the ~~application~~ testimony, the record, ~~evidence adduced~~, and the recommendations of the Examiner, ----------, and being fully advised in the premises,

FINDS:

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

(2) That the applicant, Humble Oil & Refining Company, seeks authority to drill its J.A.E. Knight Well No. 2 at an unorthodox location 330 feet from the South line and 330 feet from the West line of Section 14, Township 24 South, Range 37 East, NMPM, Fowler-Ellenburger Pool, Lea County, New Mexico.

(3) That the applicant has drilled a well at a standard location in the NW/4 SW/4 of said Section 14 and that said well was non-productive from the Fowler-Ellenburger Pool.

(4) That the proposed unorthodox location should be approved in order to afford the applicant the opportunity to

produce its just and equitable share of the oil and gas in the Fowler-Ellenburger Pool.

(5) That the applicant also seeks approval of a 62-acre non-standard proration unit in the Fowler-Ellenburger Pool comprising all of the SW/4 SW/4 of Section 14 and a portion of the SE/4 SW/4 of Section ~~2~~ 14, Township 24 South, Range 37 East, NMPM, Lea County, New Mexico.

(6) That the productivity of any of the SE/4 SW/4 of said Section ~~2~~ 14 is doubtful and that inclusion of said acreage within the non-standard proration unit to be dedicated to the subject well would allow the applicant to produce more than its just and equitable share of the oil and gas in the subject pool from ~~its J.A.E. Knight Well No. 2~~ said well, thereby violating correlative rights.

(7) That approval of a 40-acre non-standard proration unit in the Fowler-Ellenburger Pool comprising the SW/4 SW/4 of said Section 14 to be dedicated to the applicant's J.A.E. Knight Well No. 2 will afford to the owner of each property in the pool the opportunity to produce his just and equitable share of the oil and gas in the pool, provided the J.A.E. Knight Well No. 2 does not receive more than one-half of a standard 80-acre allowable in the Fowler-Ellenburger Pool.

IT IS THEREFORE ORDERED:

(1) That the applicant, Humble Oil & Refining Company, is hereby authorized to drill its J.A.E. Knight Well No. 2 at an unorthodox location in the Fowler-Ellenburger Pool 330 feet from the South line and 330 feet from the West line of Section 14, Township 24 South, Range 37 East, NMPM, Lea County, New Mexico.

(2) That a 40-acre non-standard proration unit in the Fowler-Ellenburger Pool comprising the SW/4 SW/4 of Section 14, Township 24 South, Range 37 East, NMPM, Lea County, New Mexico,

is hereby created and dedicated to the Humble Oil & Refining Company J.A.E. Knight Well No. 2 to be located 330 feet from the South line and 330 feet from the West line of said Section 14.

(3) That the above-described non-standard oil proration unit shall receive one-half of a standard 80-acre allowable in the Fowler-Ellenburger Pool.

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

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