STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
State Land Office Building
Santa Fe, New Mexico
7 December 1978

EXAMINER HEARING

IN THE MATTER OF:

Application of Texas Oil & Gas Corporation for an unorthodox gas well location, Eddy County, New Mexico.

CASE 6398

BEFORE: Richard L. Stamets

TRANSCRIPT OF HEARING

A P P E A R A N C E S

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MR. STAMETS: We'll call next Case 6398.

MS. TESCHENDORF: Case 6398. Application of Texas Oil and Gas Corporation for an unorthodox gas well location, Eddy County, New Mexico.

MR. STAMETS: Call for appearances in this case.

MR. CARSON: Mr. Examiner, my name is Joel Carson, Losee, Carson, and Dickerson, P. A., Artesia, New Mexico, appearing on behalf of the applicant. I will have two witnesses, possibly.

MR. STAMETS: Any other appearances in this case?

MR. KELLAHIN: Tom Kellahin of Kellahin and Fox, appearing on behalf of Hanagan Petroleum Corporation, and I have one witness.

MR. STAMETS: Any other appearances? I'd like to have all witnesses stand and be sworn, please, at this time.

(Witnesses sworn.)

MR. STAMETS: You may proceed, Mr. Carson.

CHARLES W. COOKMAN

being called as a witness and having been duly sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. CARSON:

Q. Would you state your name, please?

A. Charles W. Cookman.

Q. And, Mr. Cookman, by whom are you employed?

A. I'm employed by Texas Oil and Gas Corporation, Midland, Texas.

Q. Mr. Cookman, in what capacity are you employed?

A. I'm a geologist.

Q. Have you ever testified before this Commission?

A. I have not.

Q. Would you tell the Examiner a little bit about your professional qualifications?

A. I graduated with a B.S. summa cum laude in 1972 from Western Michigan University with majors in mathematics and geology. In 1976 I graduated from Western Michigan University with a Master of Science in geology. In the same year I was employed by Texaco. I had a one-and-a-half year term with them, during which time I took classes in reservoir engineering. I did on site study of the Mississippi delta. I had several in-house log schools, log interpretation schools by Texaco, and also had log interpretation schools from Wellex, Dresser-Atlas, and Schlumberger.

And in addition to that I took a course through the New Orleans Geological Society, Exploration for Stratigraphic Traps in Terrigenous Depositional Systems.

And I'm presently employed by Texas Oil and Gas. I've been with the company for a half a year exclusively mapping the Morrow formation in southwestern -- or southeastern New Mexico.

MR. CARSON: Mr. Examiner, are the witness' qualifications acceptable?

MR. STAMETS: They are.

Q. (Mr. Carson continuing.) Mr. Cookman, would you explain the purpose of this application?

A. Texas Oil and Gas Corporation is seeking approval for an unorthodox location for the Wolfcamp and Pennsylvanian formations for its State Com Well No. 1, to be located 660 feet from the south and west lines of Section 18, Township 21 South, Range 26 East, Catclaw Draw Field, Eddy County, New Mexico. All of said Section 18 will be dedicated to the well in the Morrow formation.

Q. Mr. Cookman, I'll show you the Applicant's Exhibit Number One and ask you to tell the Examiner what that exhibit purports to show.

A. This Exhibit Number One is a land plat showing Texas Oil and Gas's acreage in the area and also showing the proposed location, indicated with an arrow and a circle.

Q. Was this exhibit prepared by you or under your supervision?

A. Yes .

Q. Mr. Cookman, I'll refer you to what's marked as Applicant's Exhibit Number Two, and ask you to explain that.

A. This is a production map in the area of our proposed location. The key for the production map will be found in the lower lefthand corner of the map.

Q. Would you explain to the Hearing Examiner all that's shown on the map, what your -- what your map shows insofar as to the Inexco McMinn State in Section 18 and the Hanagan Nan-Bet in Section 19?

A. Okay. As indicated on the map, the Inexco McMinn State is presently plugged and abandoned; however, previously it has produced in excess of 1 Bcf of gas.

To the south -- and approximately 800 barrels of condensate.

To the south, in the Hanagan Nan-Bet Well, in excess of 6 Bcf have been produced; approximately 15,000 barrels of condensate, and it is presently producing at a rate of .6-million a day, .68-million a day.

Q. I'll refer you to Applicant's Exhibit -- let me say this before I leave that exhibit.

Was this exhibit Number Two prepared by you

or under your supervision?

A. Yes, sir.

Q. I refer you to Applicant's Exhibit Number Three and ask you to explain what that purports to show.

A. Exhibit Number Three is an Isopach map on the lower Middle Morrow Sand. It indicates that we have a sand -- a stream channel with roughly a northwest/southeast trend. We expect to encounter in excess of ten feet of sand at our location.

Q. Now, how far -- what kind of control do you have to the east as far as possible production from -- to the east of this -- of your proposed location?

A. To the east of the proposed location in the objective sand as shown on the map, production has not been, it has not been proven within the sand. The only production we have within the sand is as shown by the two colored dots on the Isopach map.

Q. Would you explain to the Examiner what you find indicated from the McMinn State?

A. In the Inexco McMinn State we saw approximately six feet of sand and as you'll see later in the cross section, this six feet of sand is low perm sand. We believe that it is at the edge of the channel.

Q. Okay, now what about the Hanagan Catclaw, which is shown in Section 13?

A. The Hanagan Catclaw did not encounter the sand. The sand is not present at that location.

Q. And that well, has that well been plugged and abandoned?

A. No, I believe that well is presently producing -- that well is presently producing from the Lower Morrow.

Q. But not from the sands that you expect to encounter?

A. No, not from the Middle Morrow.

Q. What about the Hanagan Catclaw No. located in Section 24?

A. In Section 24 the Hanagan Catclaw Well No. 4 has not been perforated in the sand; however, a significant gas show was seen in our objective sand in that well, and can be seen on the cross section which we'll present later on.

Q. Would one expect that to produce from the lower Middle Morrow?

A. Yes.

Q. Was Applicant's Exhibit Number Three prepared by you or under your supervision?

A. Yes.

Q. Let me refer you to Applicant's Exhibit Number Four and ask you to explain that.

A. Applicant's Exhibit Number Four is a structure map on top of the Lower Morrow. It indicates that our dip is roughly toward the southeast at roughly one to two degrees. There is a flexure that goes through the center of the map, right through here. You can see the tightness of the contours in the center of the map as opposed to either side.

Q. And what effect does that flexure have on the prospect?

A. I believe that the flexure was present during Morrow time and probably controlled deposition of the stream channel that we -- of our objective stream channel, and I believe that the flexure was -- controlled deposition of the stream channel and to the south of the flexure we should see increased thicknesses of sand. To the north of the flexure I believe that the sand should be somewhat thinner and probably not have as good a permeability.

Q. Was this -- was Applicant's Exhibit Number Four prepared by you or under your supervision?

A. Yes.

Q. I'll refer you to Applicant's Exhibit Number Five and ask you to explain that.

A. Applicant's Exhibit Number Five is the cross section A to A-prime, the location of which is shown on the structure map. It indicates that down in the third

well on the cross section, the righthand side of it, you'll see our Isopach interval, which is the Isopach interval used for objective sand map.

It indicates that the channel as seen in the Inexco McMinn State No. 1 Well, which is all the way to the right, is a low perm channel. It is low perm and probably at the edge of the channel, and that as we move toward the Nan-Bet Well to the south, or toward the west, that we actually should encounter increased thicknesses of sand in a better position.

Q. Would you go ahead and explain your Exhibit Number Five insofar as it pertains to the McMinn State, your analysis of where its production came from?

A. In the McMinn State, if we look down the center column of the log, you'll see that in the Middle Morrow there is perforations. In the Middle Morrow there are perforations at this point, this point here. In the Lower Morrow there are perforations in this point here.

MR. STAMETS: Can we identify that so it will be written in the record?

A. Yes, sir.

There are perforations between 10,536 and 10,544.

MR. STAMETS: And are those the --

A. Those are the lower --

MR. STAMETS: -- box or the dots?

A. The dots are perforations; the box are DST's.

MR. STAMETS: Okay, then the dots as shown throughout the log, even though I don't believe I can read the numbers on this log, the dots do show the --

A. Well, to the left of the log, just below the datum -- the datum line, you can see our perforations marked with the numbers.

MR. STAMETS: All right. All the dots are located in the two lower yellow colored portions of the log.

A. Incorrect. There are more dots up on the third one. If you'll look, there's about three of them up there, and that is our objective sand.

MR. STAMETS: Okay.

MR. CARSON; That part reads Isopach interval.

A. Yeah.

MR. STAMETS: So you have three, three sets of perforations, then.

A. Yes, yes, and the lower Middle Morrow and the Lower Morrow Sands in this well have been commingled.

MR. STAMETS: Okay.

A. I believe that statistically looking at the net feet of porosity in the Lower Morrow compared with the net feet of porosity and permeability in the lower Middle

Morrow, which is the thinner sand on top of the datum, our objective sand, I believe that this log here indicates that most of the production has come from the Lower Morrow and that our objective sand has not yielded that much gas at this location.

You can just see that there is -- our net feet of porosity in the Lower Morrow is much greater than in the objective sand. And in addition, then, to the west of our location the Lower Morrow has been the dominant producer.

Q. Mr. Cookman, I would like to refer you to this Applicant's Exhibit Number Five insofar as it applies to the Hanagan Nan-Bet Well, and ask you to explain the -- what the log shows there.

A. The log in the Hanagan Nan-Bet Well shows that there are perforations, again marked by the dots, between 10,648 and 10,664. That is the lower Middle Morrow Sand. You can see that the Lower Morrow here has not been perforated. All the production in this well has come out of our objective sand.

Q. And how much has been produced from that well?

A. In excess of 6 Bcf; exactly 6-1-3-8-million cubic feet of gas, and 4809 barrels of condensate.

Q. Now, Mr. Cookman --

A. It presently is producing .681 thousand cubic feet of gas per day -- million cubic feet of gas.

It is presently producing 681 thousand cubic feet of gas per day. Sorry.

Q. Is the production in the Nan-Bet Well decreasing?

A. Yes.

Q. Let me go back and ask you this question. Is it possible to re-enter the Inexco McMinn State Well?

A. Not and make a profitable well.

Q. Explain to the Hearing Officer why that is.

A. Well, again, as we were talking about before -- as we mentioned before, the lower Middle Morrow in the McMinn State No. 1 has produced most of the gas. We've only had one Bcf production out of this well here, and I do not believe that we could make an economical recompletion within the sand, because we are at the low perm edge of it.

I do not believe that this sand will give up that much more gas. I think that it is necessary for us to move into a more optimum location, to catch the sand at a better location in order to get a profitable well.

Q. Now, would it be possible to move your location as -- if one looks at Applicant's Exhibit Number, I believe, Number Two, is it possible to move your location to the north, is it not? Applicant's Exhibit Number Three,

I'm sorry.

A. All right. Exhibit Number Three, that suggests that it might be possible, but when you take the Exhibit Number Three and combine it with the flexure that I see in Exhibit Number Four, the flexure in Exhibit Number Four runs right through like this.

Q. Showing -- the witness is showing the flexure running southwest to northeast, pretty well across the north half of the section, is that right?

A. Yes, and I believe that flexure was present during Morrow time, present during Morrow deposition, and therefore controlled thickness of the sand to the south. The sand should be encountered in a thicker position in the south as opposed to the north of that flexure, so I prefer not to move up on that flexure or we'll encounter a thinner sand section, and possibly low perms.

MR. STAMETS: I'd like to have the witness mark the line of that flexure on my copy of Exhibit Three with this red pen.

A. Yes, sir.

MR. CARSON: Does it go that far to the south?

A. Yes. And you can see the flexure as -- on the contour map, just -- it's reflected by the tight contours between 7200 and 7300 feet, going laterally between

71 and 72 or 73 and 7400 feet, you can see that the amount of dip there is much less.

MR. CARSON: Mr Examiner, I'd like to move the admission of Applicant Exhibits Number One through Five.

MR. STAMETS: These exhibits will be admitted.

Q. (Mr. Carson continuing.) Mr. Cookman, in your opinion would the approval of this application afford the applicant the opportunity to produce his just and equitable share of gas,and will it prevent economic loss caused by the drilling of an excessive number of wells, and will it avoid the augmentation of risk arising from the drilling of an excessive number of wells, and will it otherwise prevent waste and protect correlative rights?

A. Yes, it will.

MR. CARSON: I have no further questions of this witness, Mr. Examiner.

MR. STAMETS: Are there questions of the witness?

MR. KELLAHIN: Yes, sir.

MR. STAMETS: Mr. Kellahin.

CROSS EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Cookman, if we could take these exhibits in order, let' s start back with your production map on Ex-

hibit Number Two for a moment, if you please.

A. Fine.

Q. Let me ask you some general questions about this pool. We're in the Catclaw Draw Morrow Pool, are we not?

A. Yes.

Q. And the Commission, through its pool rules, makes no differentiation between Upper, Lower, and Middle Morrow for that pool, do they? They consider it all one pool. You do not know?

A. I am not privy to that information.

Q. Do you know what a standard location would be under the existing pool rules for this pool?

A. Yes, right where the Inexco McMinn State Well has been drilled, 1650, 1650.

Q. All right, a standard location for a well in this pool would be no closer than 1650 from the section line.

A. Yes.

Q. Okay. Are you positive, Mr. Cookman, that that McMinn Well is a 1650 location?

A. It is 1980, 1980. I misspoke.

Q. So the Inexco McMinn Well is 1980 out of the west and south lines of that section?

A. Yes, it is.

Q. Okay. And would you agree with me or not,

Mr. Cookman, that a standard location at 1650 from the west and south lines is still available for drilling? There's no well at that location.

A. I would agree that it is available for drilling.

Q. And that would be more than 400 feet from the existing McMinn State Well?

A. Possibly. I'd have to do calculations to make sure it is.

Q. That's an approximation.

A. Approximate, all right.

Q. Do you know the footage location for the Hanagan No. 6 Well in Section 13, as it approaches that east line?

A. 1650 and 1650.

Q. So the Hanagan No. 6 Well is at a standard location?

A. Yes.

Q. How about the Hanagan --

MR. STAMETS: Whoa, I'm getting confused now. Is 1650 the standard location or is 1980 the standard location?

MR. KELLAHIN: 1650 is the standard location.

MR. STAMETS: Okay, and so your -- where I got confused is the McMinn State is at 1980, 1980, but

standard is 1650.

MR. KELLAHIN: Right. It's well within a minimum distance.

Q. (Mr. Kellahin continuing.) All right, let's proceed clockwise, then, Mr. Cookman. The well in Section 4 is also at a standard location, 1650 from each of its corner --

A. What Section 4? There's no Section 4 on my --

Q. I'm sorry, Section 24.

A. The well in Section 24 is 1650 and 1650.

Q. All right. And the Hanagan Nan-Bet Well in Section 19 is more than 1650 feet from the north line of Section 19.

A. Correct.

Q. In fact, it's 1980 from that line, is it not?

A. Yes.

Q. All right. So none of the offsetting three wells to your proposed location are closer than permitted by the pool rules.

A. Correct.

Q. Now let's look at your Exhibit Number Three, if you please.

There was one question I forgot on Exhibit Two. If maybe you'll indulge me for a moment, I'm curious about the color code in here. Would you explain that to me?

A. Yes. Strawn producer, I think that's self-explanatory. Undifferentiated Morrow could possibly be rewritten as commingled Morrow. In general, I tried to take and separate the Lower Morrow production from the Middle Morrow. Well, there are several wells here, in particular the well in Section 18, which is germane to location, it was not possible to differentiate between the Upper and the Lower -- or the Middle and Lower Morrow production. It was commingled. So rather than put it down as -- I could have put it down as commingled, I just called it undifferentiated.

Again, now the other colors, I think are pretty much self-explanatory. If you would like, I could show you what I've termed Middle Morrow and what I've termed LOwer Morrow on my cross section.

Q. We'll come to that in a moment.

A. All right.

Q. Let's take, for example, the well in Section 24, the Hanagan Catclaw No. 4.

A. Yes.

Q. I assume by the indication there that you have indicated that currently produces from the Lower Morrow.

A. Correct.

Q. Am I also to understand that the color code precludes the existence of Morrow production from any other

zone?

A. The color code indicates that no other zone has been produced.

Q. So the color code is simply confined to those wells -- I'm sorry, those Morrow sections that are currently produced.

A. Correct.

Q. And by this you do not intend to any way preclude the fact that there may be other potentially productive zones within the Morrow, for each of those wells.

A. Correct.

Q. Okay. Now let's go to Exhibit Number Three. I believe you indicated that in reference to this exhibit the proposed location would have some ten feet of sand available at that location for the lower Middle Morrow?

A. In excess of ten feet.

Q. And that the McMinn State Well encountered only six feet of sand?

A. Yes.

Q. Okay. Can I conclude by that statement, Mr. Cookman, that that acreage that shows less than six feet of pay within Section 18 to not be productive?

A. I would say that the -- yes, I would say that I would agree with that.

I would say anything six feet or greater

probably should produce some gas.

Q. Okay. Now, let's look at McMinn State itself. Now when was that well completed, would you tell me, please?

A. Sure. It was completed in 1972, 8-1-72.

Q. Okay, I believe you said the total cumulative production was just about one billion cubic feet of gas.

A. Yes, 1-0-3-8 million, to be exact.

Q. What portion of Section 18 would have been condemned by the previous production from the McMinn State?

A. Anything to the northeast of that six foot line we just referenced.

Q. It would appear to be something in the neighborhood of sixty percent of that section would not be productive, then.

A. Possibly.

Q. Now, in addition on Exhibit Three you've just drawn a flexure running generally from the northeast to the southwest corner across Section 18. Would you describe for me what a flexure is?

A. Looking at regional structure, if your structure comes down at a constant dip rate and in a certain area increases dip rate without having the dip rate actually reversed, then you might refer to that as a flexure.

You might call it a homocline or a monocline,

also.

Q. Can I assume, then, because of the existence of this flexure, that the portion north and west of the line of flexure would not be productive?

A. I don't think you can assume it would not be productive; however, I think that the flexure would indicate that the amount of sand present at that point might not be nearly as great; that our statistical risk would increase as we cross that flexure.

We run a statistically higher chance of running into a low perm section, but I would not characterize that as being nonproductive.

Q. Would a well drilled at the proposed location drain any portion of the northwest quarter of that section because of the existence of this flexure?

A. I believe it could.

Q. In what way? Can you drain across the flexure?

A. Yes. All you're dealing with is a wedge of sediment coming down below the flexure. To the south of the flexure you have a wedge of sediment which pinches out on top of the flexure. It does not preclude communication between the sands on either side of the flexure. I have not tried to infer that.

Q. So that I don't misunderstand you, perhaps everybody here understands but me, but one further question.

I assume, then, as you move to the northwest corner of this section there may be some production, but as you go in that direction it becomes less permeable. Is that what you're saying?

A. You lose sand. Whether or not it becomes less permeable, I can't say. We don't have adequate data. I can infer that it becomes less permeable because we can see way up here on the northwest -- in the northwest of the map in Section 2 there is a well that has not done very well in the same sand and is probably low perm.

Q. I see your Isopach takes into consideration a dry hole in Section 7, which is the Fasken Avalon State No. 1.

A. Yes, and I believe that is in a different sand channel.

Q. Okay. All right, let's go to Exhibit Number Four now.

Here you've confined your structure map to the top Lower Morrow, is that correct?

A. Yes.

Q. All right.

A. And that is shown as datum on the cross section A-A Prime.

Q. Okay. The McMinn State Well is located at a depth of 7274 on your structure map, is that correct?

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A. Correct.

Q. All right. Can I also assume on this exhibit that any area below that structure point for the McMinn State would be nonproductive?

A. I should hope not because the Hanagan Nan-Bet Well has produced in excess of 6 Bcf of gas, and that is a lower structural position.

MR. STAMETS: We seem to have some difference in the numbering here between Mr. Kellahin and myself.

(There followed a discussion off the record.)

Q. (Mr. Kellahin continuing.) Mr. Cookman, we were discussing the Nan-Bet Hanagan Well and you indicated in response to my question that perhaps the east half of this section is still productive because of the structural location of the Hanagan Nan-Bet. All right?

A. No, I did not indicate that. You asked me if I went down-dip from the Inexco McMinn State would I expect to run out of productive acreage, and I said no, because the Hanagan Nan-Bet proves that out, that we do have production down-dip of the Inexco McMinn State.

Maybe I misunderstood your question.

Q. Well, perhaps so, but in any event then, you could move to a standard location and be in a same structural position as the Hanagan Nan-Bet and obtain a commercially

productive well.

A. I don't see how you could say that, because if we move to the same structural position as the Hanagan Nan-Bet Well, that would be roughly at the bottom of the "n" on proposed location on Section 18. That position there would put us above the zero foot line on our Isopach map, which would definitely be nonproductive.

Q. Well, considering all possible productive Morrow zones within Section 18, what percentage of Section 18 is nonproductive?

A. What percentage? I cannot give you a precise percentage, but I said before, anything to the northeast of the six-foot line referenced before would probably be nonproductive in our objective sand.

Q. Mr. Cookman, have you -- have you calculated the drainage radius that you would anticipate from the well drilled at the proposed location?

A. I think that that's a question that should be directed to our engineer.

Q. You've not made any calculations on drainage radius?

A. This engineer will probably understand.

Q. You do not know of your own knowledge, then, or on behalf of Texas Oil and Gas Corporation, what the drainage radius for this well is anticipated to be?

A. Exactly which well -- you're referring to our well, the --

Q. Yes, the proposed location.

A. -- Catclaw Draw Well? You'd have to reference it to our engineer.

Q. Okay. Based upon your geology, Mr. Cookman, what portion of the production to be obtained from the proposed location would in fact come from the offsetting acreage?

A. You mean 13, 24, 19?

Q. Yes, sir.

A. Probably not much at all, since the well in Section 19, from what I understand that our engineer has done, is probably already starting to drain some of our acreage, and the well in Section 13, which is producing out of the Lower Morrow, is also probably draining our acreage. So I don't think that there's much chance of us draining them when they're already draining us.

Q. What objections would you have to re-entering the McMinn State Well?

A. Considerable. I don't think we can go in there and make a profitable well.

Q. Let's look at your cross section.

You indicated for the McMinn State No. 1 Well that the perforations in that well have been confined to the Lower Morrow.

A. I did not indicate that. I indicated that the perforations in the Inexco McMinn State No. 1 had been -- were in the Lower Morrow and also in the Middle Morrow; specifically the lower Middle Morrow, the Tsonach interval. I indicated that most of the production, however, is probably from out of the Lower Morrow.

Q. Except for the perforations there is the dashed yellow line that indicates the bottom perforations in the Upper Morrow.

A. Dashed yellow line?

Q. Yeah.

A. I don't have a dashed yellow line.

Q. The dotted line in the colored in area right here

A. Yes, that indicates perforations.

Q. It's your testimony that there have been no perforations above that line in this well?

A. I did not testify that. There have been perforations in the Strawn in this well.

Q. But there have been no perforations in the Morrow?

A. In the Morrow, correct.

Q. Okay. Would you look at the Hanagan Petroleum Corporation Nan-Bet No. 1 Well?

A. Yes.

Q. Is it your testimony that there are no perforations below the top of the Lower Morrow?

A. Below, it is.

Q. Let me ask you one last question, Mr. Cookman. I'm having trouble correlating your Exhibit Five with the Exhibit Three to show where this six-foot net feet of sand is. Could you show me on the cross section where the six feet would be -- figure is?

A. The six foot figure, Inexco McMinn State No. 1.

Q. Right.

A. Okay. Look at the Nan-Bet Well, over to the left of that, and you see Isopach interval indicated; to the left of that you see the little dotted line coming across?

Q. Uh-huh.

A. Follow that directly to the right and you will come on to the McMinn State No. 1 with approximately six feet of porosity. We use a 50 API cutoff for Queen Sand in this area.

MR. KELLAHIN: I have no further questions at this time.

CROSS EXAMINATION

BY MR. STAMETS:

Q. Mr. Cookman, even though the Middle Morrow

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Isopach interval is the zone that you're really interested in this well, is it possible that you might find other pay zones in the Morrow formation?

A. It is -- in the Morrow it is always possible that you might run into something else; something extra that is not anticipated. However, whether or not we can predict with any certainty that we would run into another producing formation. I doubt that that is true In fact, I think that if we look at our production map, we can see that the Lower Morrow, which is probably -- would be our other objective, to the west of us in Section 13 and 24 is actually depleting. It is now producing at considerably lower rates than initial production. And the Inexco McMinn State Well itself was undergoing a pressure decline at the time. I don't believe that it -- it would probably be the Lower Morrow that we would have to perforate I don't believe that we can perforate the Lower Morrow and make a productive well I believe the Lower Morrow is depleting. I don't think there are any other sands present.

Q. Now, Mr. Kellahin elicited from you that you did have the opportunity for a standard location 1650 feet from the section line, either -- well, let's say 1650 from the south and west or 1650, 1980, whatever you chose, but that you could locate as close as 1650 to either the west line or the south line of the section. Why does Texas Oil

and Gas not choose to drill at a standard location?

A. Well, I believe if we drill at the standard location, that we are going to be statistically increasing our chances of not coming in with a good well. I believe that the closer we move to our proposed location, the better our chances of making a good well increase statistically.

Look at the 16 -- 660 from the south, 1650 location. That would put us -- if we took the 1650/600 location, that will put us directly on that ten-foot line, and that statistically is much poorer than our proposed location. The closer we get to that Inexco McMinn State Well, the -- statistically the greater chance we run of getting into that poor sand at the edge of the channel; possibly, again, low perm.

You could make another well just like the Inexco McMinn State Well, the McMinn State No. 1, but that was not a profitable well.

MR. STAMETS: Are there any other questions of the witness? He may be excused.

SAL J. PAGANO

being called as a witness and having been duly sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. CARSON:

Q. Would you state your name, please?

A. My name is Sal Pagano.

Q. Mr. Pagano, by whom are you employed?

A. I'm employed with Texas Oil and Gas.

Q. In what capacity?

A. As a district reservoir engineer.

Q. Mr. Pagano, have you previously testified before this Commission?

A. No, sir, I have not.

Q. Would you tell the Examiner your professional qualifications?

A. Yes, sir, I graduated from the University of Missouri at Rolla in December of 1973, receiving a BS degree in petroleum engineering.

I started work in the industry in Hobbs, New Mexico, in January of '74 and stayed there till approximately June of '74, when Amoco's Hobbs and Andrews offices consolidated in Andrews. I subsequently transferred to Andrews, at which time my responsibilities were drilling and production operations.

Also, I've done some waterflood work, waterflood production monitoring in Andrews up until June of 1975 and at that time I was transferred to Houston in Amoco's waterflood reservoir group and stayed there until approxi-

mately the first of '78, where my duties then changed to drilling and completion operations.

In July of 1978 I joined Texas Oil and Gas as a district reservoir engineer and have been there since that time.

Various schools include Amoco's Reservoir Engineering School, core analysis schools, formation evaluation schools, geology and geophysics for engineers, the Wright completion of well stimulation school, and Joe Chastain's artificial efficency school, during the time Janaury of '74 through the present.

MR. CARSON: Mr. Examiner, are the witness' qualifications acceptable?

MR. STAMETS: The witness is considered qualified.

Q. (Mr. Carson continuing.) Mr. Pagano, I'm going to refer you to Applicant's Exhibit Number Six and ask you to explain what that exhibit is and what it purports to show.

A. This exhibit is a plat of pressure versus cumulative production, pressure being bottom hole pressure divided by compressability factor, or Z factor. The production on the bottom of the page is listed in Bcf cumulative production.

As you can see, if we were to draw a line

through the data presented here, and we can extrapolate, the possible ultimate recovery would be from the Nan-Bet Com No. 1 to an estimated abandonment P/Z pressure of 600 psi, and that recovery would be approximately 8 Bcf.

Q. And how much has that well produced to date?

A. That well produced over 6 Bcf to date.

Q. Was this Exhibit Number Six prepared by you or under your supervision?

A. Yes, it was. It was obtained through the Dwight's information and the interpretation was done by me, yes.

Q. I refer you to Applicant's Exhibit Number Seven and ask you to explain that and what it's supposed to show.

A. This is a worksheet which -- which we use over there at Texas Oil and Gas to determine by pore volume analysis what an ultimate recovery may be for a gas well.

As you can see, using pressure and temperature data available from the wells within the immediate vicinity of the proposed location, we can expect that this particular Nan-Bet Well, with a cumulative of a little over 6 Bcf would have drained 765 acres.

Now, I want to qualify that by saying that that is the cumulative recovery to date. If we were to input an ultimate recovery of 8 Bcf, that drainage would

probably be even greater.

Q. Now there are some limitations on the application of this Exhibit Number Seven, are there not?

A. Yes.

Q. Could you explain to the Commission what those are?

A. The Morrow is -- production is governed highly by permeability development. It has been already established in several Morrow Fields in New Mexico that pore volume is not a very reliable number for possible drainage radius, or possible acreage that could be drained.

I would like to point out that this exhibit here should not be taken to be a quantitative measure of what the recovery would be, but rather a qualitative measure to indicate the magnitude of what the drainage radius may be.

As you can see on the bottom of Exhibit Seven, I've indicated that if we do have radial flow around the Nan-Bet Well, the radial -- drainage radius for this 765 acres would be 3,257 feet. That is a number which is over one-half a mile and considering that this well has probably drained an area more of a cigar shape than absolute radial drainage, that drainage radius could extend even further.

Q. Mr. Pagano, is it your opinion that the Hanagan Nan-Bet is presently draining Section 18 to the north?

A. Yes, sir.

MR. CARSON: I would like to move Applicant's Exhibit --

Q. Was Applicant's Exhibit Number Seven prepared by you?

A. Yes, it was.

MR. CARSON: I'd like to move the introduction of Applicant's Exhibits Number Six and Seven.

MR. STAMETS: These exhibits will be admitted.

MR. CARSON: I have no further questions of this witness.

MR. STAMETS: Are there questions of the witness?

MR. KELLAHIN: Yes, sir.

MR. STAMETS: Mr. Kellahin.

CROSS EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Pagano, I failed to hear what your qualifications were in this area. How long have you worked in Eddy County?

A. When I first went to work with Amoco in Hobbs my responsibilities were drilling and completion operations in southeast New Mexico.

Q. You're familiar with Morrow production in --

A. Yes, sir.

Q. -- Eddy County and Lea County?

A. That's right.

Q. And you're also familiar with the Catclaw Draw Morrow Pool rules?

A. Yes, sir.

Q. And the spacing, current spacing in that pool?

A. Yes.

Q. I assume you're also aware by your past experience that the Commission authorizes the proposition of drainage and counter-drainage so long as it's done at standard locations, so the simple fact that one of these wells may have drilled -- drained part of your acreage in 18 is permissible under the Commission rules, is it not?

A. Oh, yes, yes.

Q. Now, your exhibits at least Six, I believe, is limited to only one of the zones, is that true?

A. It is limited to the zone of production in the Nan-Bet.

Q. And Exhibit Number Seven is also limited to the Morrow -- Middle Morrow, in the Nan-Bet Well?

A. Yes.

Q. All right.

A. The objective sand.

Q. If in fact that acreage has already been drained by the Hanagan Nan-Bet Well, then your proposed location is going to be nonproductive, isn't it?

A. I didn't say drained 100 percent. It is -- by virtue of having a pressure sink here, it is probable that reserves under our tract is migrating across our lease line into the Nan-Bet lease area, and this is one reason why we choose to propose this location right there, to prevent that from happening to a further degree.

Q. You could also protect yourself by drilling a well at a standard location, could you not?

A. But not as well. Yes, but not as well.

Q. What would be the drainage radius for the proposed location?

A. For the proposed location?

Q. Uh-huh.

A. There's no way I can determine that without having the data from a well at that location.

Q. Wouldn't you agree, Mr. Pagano, that the Oil Division ought to assess some penalty factor against Texas Oil and Gas Corporation based upon the advantage it obtains from the proposed location?

A. Considering the stage of depletion -- well, that being that the Nan-Bet is approximately 75 percent de-

pleted, I do not feel that that would be 100 percent equitable.

Q. What portion of Section 18 has been depleted by the production from the Inexco McMinn State?

A. I would say a very small portion in the datum sand, because by previous testimony that only encountered a six-foot interval and was also commingled with an extensive section below wherein a large proportion of that gas was from the lower section.

Q. Assuming a homogeneous reservoir and simply an acreage drainage pattern based upon 640 acres, what would be the radius for a drainage pattern 640 acres?

A. 2,979 feet.

Q. Assuming an acreage drainage pattern using that as a radius at your proposed location, what percentage -- at the proposed location, that's 660 out of the corner -- what percentage of the 640 acres would be attributable to the acreage in 13, 24, and 19?

A. I don't have those numbers with me right now. I'm sorry, I do not have that.

Q. By simple mathematics we can calculate that, or the Examiner could calculate that, could he not?

Would you agree that that would be one appropriate way to minimize the advantage in drainage that you will obtain at this proposed location?

A. Only if the current production versus the ultimate possible recovery from the Nan-Bet were taken into consideration, yes.

Considering that the Nan-Bet has probably already extended into the drainage radius, that is, is encroaching the lease line there in Section 18.

Q. Let's talk about that Nan-Bet Well drainage radius. Now that is confined simply to the lower Middle Morrow, your calculations, right?

A. Yes, uh-huh.

Q. It doesn't take into consideration the potential production from other Morrow zones.

A. It does not.

Q. All right. Confining ourselves only to the lower Middle Morrow, you've indicated, I believe, that that drainage pattern was cigar shaped or elliptical --

A. And it's clearly obvious because the channel is shaped that way. If you were to draw a circle using that radius that was calculated, you would go beyond where the sand lies.

Q. Okay. For sake of clarity, would you take my copy of Exhibit Four and draw for me what you believe to be the drainage pattern?

A. You would do that to me, wouldn't you? May I have your sand trend map, please?

Q. Say again.

A. The sand trend map? That would be easier.

Q. Okay.

A. That's very rough, but that should give you a picture. Now, keep in mind that's assuming that this 3,257 feet, that's on a presumption that pore volume is applicable and I have already stated that pore volume is not applicable but it can be indicative of the magnitude of it.

MR. STAMETS: Tom, could I see that and make the same drawing on my copy?

Q. You're aware, are you not, Mr. Pagano, that the Catclaw Draw Morrow Pool here is a prorated gas pool?

A. Yes, sir.

Q. Could you identify for us any of the wells within the pool that are currently making the top allowable?

A. I don't believe there are any.

Q. Are you aware of what percentage of the current allowable the offsetting Hanagan wells are making?

A. No, sir, I do not -- I'm not aware of it.

Q. You're aware, however, that the Catclaw Draw Morrow gas proration orders of the Commission at that time made it impractical to establish prorationing on anything other than a straight acreage basis.

A. Yes, sir, and that is why I qualified saying that it is just a qualitative measure, this drainage.

Q. Mr. Pagano, I was looking on Exhibit Number Four and I -- in fact, all the exhibits show a white acreage area in Section 18. What does that represent?

A. That is the acreage, I believe, Inexco has leased and it is not a part of TXO's acreage holding in Section 18.

And that acreage is -- I don't know what the terms of the acreage is, but it is held.

Q. Has Inexco agreed to join you in the proposed drilling of this well at this location?

A. No, sir, not at this location.

Q. Has Inexco indicated to Texas Oil and Gas where they would propose to have this well drilled?

A. No, they have not.

Q. But you know as a fact that they object to the proposed location?

A. Yes, sir.

Q. Mr. Pagano, am I correct in understanding that the proposed location, the only zones that you anticipate to obtain production are going to be the lower Middle Morrow?

A. No. sir. The zones -- the target zone will be the lower and Middle Morrow. There are possible other zones, as already testified, and it's just anyone's speculation as to what they may be.

Q. So apart from the fact that your testimony indicates the Nan-Bet Hanagan has drained some portion of Section 18 as to the Lower Morrow, would you not agree that the Division ought to assess some penalty factor with regards to the other Morrow production?

A. I'm not sure I understand your question, sir.

Q. Okay. Apart from the lower Middle Morrow --

A. Okay.

Q. -- there is potential production from other Morrow intervals.

A. Yes.

Q. Would it not be appropriate for the Division to assess a penalty against Texas Oil and Gas Corporation for zones other than the depleted lower Middle Morrow in order to offset the advantage you would obtain by a well at this location?

A. Once again, the other wells producing from other sands are on the far end of their ultimate recovery. In other words, they are nearing depletion, also.

If that amount of depletion was considered, just like we would with the Nan-Bet Middle Morrow, I would say that would be fair.

Q. Have you made any calculations as to drainage radiuses or reserves recovered from any of the other wells?

A. Yes, sir.

Q. Specifically have you made that calculation of the drainage radius as to the Inexco McMinn State No. 1 Well?

A. Excuse me, I believe I have. I'll see if I can find it.

On the drainage radius, no, sir, I have not. I've just estimated that we know that it's plugged and we do have the ultimate recoveries. I have not estimated what the drainage radius was.

MR. KELLAHIN: I have no further questions. Thank you.

MR. STAMETS: Any other questions of this witness?

MR. CARSON: I just have one question.

REDIRECT EXAMINATION

BY MR. CARSON:

Q. Do you happen to have the pool rules with you, Mr. Pagano?

A. Yes, I do.

Q. Some mention was made that the pool rules provide for proration on a straight acreage basis, but there's some qualifying language in there, is there not?

A. Yes, sir, there is.

Q. What is that language?

A. Okay. It says here that in Section II, I believe, Item 36, that considering the available reservoir information. That was the qualification at the time. 100 percent surface acreage formula is the most reasonable basis for allocating the allowable production among the wells delivering to the gas transportation facility.

Q. There's another statement in there that that rule is adopted because of the early stage of development of the pool.

A. That is in Item Number 30.

Q. But there's more data now, is that not correct?

A. That is correct.

MR. CARSON: No further questions.

RECROSS EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Pagano, Texas Oil and Gas has not filed an application with the Oil Conservation Division to amend any of the proration orders, has it?

A. No, sir, they have not, to my knowledge.

MR. KELLAHIN: No further questions.

MR. STAMETS: Any other questions of the witness? He may be excused.

The hearing will be recessed until 1:15.

(Thereupon the noon recess was taken. Thereafter the following proceedings were had, to-wit:)

MR. STAMETS: The hearing will come to order, please. Mr. Kellahin?

MR. KELLAHIN: Call Mr. Hugh Hanagan.

HUGH HANAGAN

being called as a witness and having been duly sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Hanagan, would you please state your name, by whom you're employed, and in what capacity?

A. My name is Hugh Hanagan. I'm vice president of Hanagan Petroleum Corporation out of Roswell, New Mexico.

Q. You hold a degree in geology, do you not, sir?

A. Yes, I do.

Q. Are you familiar with and have you made a study of the facts surrounding this particular application?

A. Yes, I have.

Q. Hanagan Petroleum Corporation is an operator

in the Catclaw Draw Morrow Pool in Eddy County, New Mexico, is that correct?

A. Yes, that's correct. They're the major operators.

Q. Have you had your qualifications as an expert geologist accepted by the Oil Conservation Division at previous hearings?

A. Yes, I have.

MR. KELLAHIN: We tender Mr. Hanagan as an expert witness.

MR. STAMETS: The witness is considered qualified.

Q. (Mr. Kellahin continuing.) Would you please refer to what has been marked as Hanagan Petroleum Corporation Exhibit Number One and identify that for us, please?

A. Exhibit Number One is a land plat covering the Catclaw Draw area and the offset acreage to it, and the color code on it is the outlined blue area is the -- the Catclaw Draw limits, productive acreage dedicated to the Catclaw Draw Field. The black circled wells, solid black wells surrounding the field are dry holes in the Morrow, Morrow dry holes. The four yellow circled wells are Morrow, presently producing Morrow wells in the field. The half yellow circled wells are -- colored wells, are wells that have produced gas in the Morrow and are now abandoned.

Underneath each well in the field you will see a date, which was the spud date.

Also marked in Section 26 of 21, 25, is the discovery well for the Catclaw Draw Morrow, which was drilled by Hanagan Petroleum, No. 1-Y Catclaw Draw Well.

Q. How many, personally, how many wells does Hanagan Petroleum Corporation operate in this pool?

A. Let me see, one, two, three -- approximately ten wells; ten out of the seventeen.

Q. At this point has the pool been fully developed?

A. Yes. The field has now reached the developed stage, we feel. You can see that it's pretty much controlled on all sides by the right dots, or the dry holes, and with, perhaps, the only exception would be on the extreme east side there just east of Section 17 and 20 of 21, 26. There it butts up directly against the Avalon Morrow Field. So there is -- so it just runs from the Catclaw right into the Avalon in that particular area.

Q. I note that there are several locations which appear to be unorthodox locations within the boundaries of the pool. Would you identify those locations and describe how they came to be unorthodox?

A. Yes. There are no unorthodox locations, or rather there are no wells in the pool right now that have

ever been penalized on allowable due to unorthodox location.

The well in Section 1 of 21, 25, which was drilled by Fasken, was drilled and completed as a well before the Catclaw Draw Field was ever discovered.

The well -- the nonstandard location of our Nan-Bet Well in Section 19, which is a standard 320-acre location, was drilled and completed before the well had -- before the field had expanded to over a mile from the -- from the -- in other words, that location was in excess of a mile from the field boundaries at the time it was drilled.

The two locations drilled by Hanagan in Section 36 of 21, 25, of which the one in the northwest northwest has been abandoned, it was the No. 3 Catclaw Draw, those two were unorthodox locations or nonstandard due to topography. In that area the Hackberry Hills are present and the topography is very rugged in there. Both locations were surveyed in the field by a representative from the Division, Oil Conservation Division, and were approved to be because of topographic reasons.

You will -- the location in Section 2 of 21, 26, which is a 1980 from the west, 660 from the north, of that section, was also drilled by Hanagan, the No. 1 North Forks. That well was drilled at that location after the permanent field rules and prorationing of the Catclaw Draw Field.

At a hearing about that time, in the time that the prorationing took effect in the field, it was determined by the dryholes drilled in the area and production, and so forth, it was determined at that time, and also because the Avalon Field was also being developed to the east, there had to be a boundary set, somewhat of a boundary set, on this field.

Q. Am I correct in assuming, Mr. Hanagan, that all wells at a location closer than 1650 feet to a section line were drilled at a time when the rules authorized that and that none of those wells required notice and hearing before the Oil Conservation Division?

A. That is correct.

Q. All right. Let me show you what we've marked as Exhibit Number Two and ask you to identify that.

A. Before we go on, the only other comment I'd like on that Exhibit One, you will also notice that Hanagan Petroleum has drilled four dry holes on the west side of that field at orthodox locations, and more than one of those would have probably been productive at an unorthodox location, but we chose to drill those at orthodox locations and in so doing we've gotten four dry holes, in keeping with this pattern of 1650 foot locations.

Q. Well, let me ask you this, Mr. Hanagan. Were any of those proration units the subject of an application

by Hanagan for an unorthodox location?

A. Yes. There was one, the well in Section 34, of 21, 25, which, of course, was drilled -- we did have an unorthodox hearing for that well and after the hearing we did drill it at the normal location of 1650 feet.

Q. What was the outcome of that hearing?

A. The hearing was, of course, a penalty against us if we would drill it closer than that. Now that location again was not requested at a 660 location, though. It was 1650 from the north and 1100 foot from the east, yes, from the east line, so again we were not trying to crowd into a 660.

Q. Let's look at Exhibit Number Two and have you identify that for me.

A. Exhibit Number Two is a structure map prepared by the Roswell Geological Society. It's in a published book and just been Xeroxed off of that book.

It's being submitted just to show you the general structural picture of the Catclaw Draw Field. The mapping horizon was the top of the "B" or the top of the Middle Morrow Zone, of which, I believe that Texas Oil and Gas, it's the same point that Texas Oil and Gas calls their top of the Middle Morrow.

Q. You've then independently studied the information contained on Exhibit Number Two and can verify from

your own knowledge that it's true and accurate and correct?

A. Yes, that's correct.

Q. Let me ask you to indicate for us the meaning of the color codes on the left part of that exhibit.

A. Okay. Again, the Catclaw Draw Field area, producing area, is outlined in blue. The producing wells, all of the wells in the Catclaw, are color coded, which code is below. The green colored wells are very good wells which have recovered between six to ten billion cubic feet of gas to date.

The purple wells are wells that are considered good and have accumulated between three and six billion cubic feet, and the 4 well in blue is one to three billion cubic feet. The brown wells are wells that have accumulated less than one billion cubic feet of gas.

So you can see that there is a pattern on the production itself and the best wells in the field, three out of the four of the classed very good wells are near this proposed location; two of them are offsets to this unorthodox location.

You will also notice that the hachured lines or one hachured line is colored orange; in this area anything north of this orange hachured line, the sands are thin. They are becoming very fine-grained and less permeable. The permeability is decreasing drastically, and the fact of the

matter is some of the wells on a little further north are almost all shale. So you have -- you have a transition zone from a very good sand to a tight, impermeable sand, and then into a shale.

The blue line, anything south of that blue line, there are good permeable sands. The problem is that they have water. Now, they have had some gas, too, but that's a problem to the south of that line, is the water, water situation. So the permeability of the sands in there are generally good but their problem, again, like I say, is wet.

Q. In your opinion, Mr. Hanagan, what portion of the proration unit, being Section 18, to be dedicated to the proposed well, would either be nonproductive or the permeability would be so tight that the area could not be drained?

A. I can't visualize over -- over the extreme southwest corner of that section being productive in any of the Morrow Sand zones.

Q. Could you estimate in terms of percentage what percentage of Section 18 --

A. I'd say probably twenty percent productive. Anything south and west of the McMinn Well.

Q. Please refer to what we've marked as Exhibit Number Three and identify that.

A. Exhibit Number Three is an electric log, a compensated neutron formation density log, run by Schlumberger on this well. It is a detail bottom portion of the log, which includes all of the Morrow Zone, the Morrow formation, and of course, all this zone is considered by the Commission, or the Division, as being one reservoir, or at least it is all thrown into one reservoir.

But on this log we have correlated it as to our correlations, how we correlate throughout the field and really throughout all of Eddy County.

Q. Let's stop for a moment, Mr. Hanagan, and have you compare your method of correlation to the testimony used by Mr. Cookman when he referred to the upper Middle Morrow and the lower Middle Morrow.

A. All right.

Q. So that we can equate the testimony.

A. All right. On the correlation part of it, where we have the "B" zone listed on the extreme lefthand corner of that log, we have "B", and interval of approximately over 100 -- about 150 feet or so.

At the top of that "B" zone is the top of the Middle Morrow zone, and looking at their correlation, Texas Oil and Gas, I think it's the same point.

The "C" zone, we consider as being the equivalent to their lower Morrow zone, and again, we're

using the same top. In other words, the minus datum of 7088 for the top of the Middle Morrow would be the same as Texas Oil and Gas. The top of the Lower Morrow, at a minus 7272, would be their point. So those two are in agreement.

Now, the breaking down of the individual zones in the area, I have, as you can see, a red asterisk on the righthand side of that log. There's one marked approximately at the 10,400 foot zone, just above the 10,400 foot part of the log. That is what we call the "A" zone, or the Upper Morrow zone. We would not expect that sand to be productive in this immediate area, but it is productive in the field area.

The second asterisk, going down, would be at approximately 10,480. That asterisk is opposite two sets of green perforations. That zone does produce, again, in the -- in the Catclaw Field. It is -- it does contain gas.

The third productive sand in the Catclaw is marked at approximately 10,540. This is the sand zone, the uppermost sand zone that was originally perforated in the McMinn Well. It is the zone, I believe, that Texas Oil and Gas is calling the six or eight feet of net pay on their log, on their Isopach maps. It is productive in the field area.

There is the fourth asterisk, which is ap-

proximately 10,575, in that neighborhood. In the center of that shale zone just above where the lines are marked, vertical lines are marked on the log, just above there is a sand zone that is deposited on a limited basis in the Catclaw Draw Field.

This zone we call the Nan-Bet pay zone, and it is what we call the stray sand, or the Nan-Bet pay. So you can see, based on that, that the -- based on this correlation, the zone that their comparing to be comparable to the Nan-Bet pay, we do not, so we are not in agreement with those -- that particular sand.

As we go on down, the double asterisk, double red asterisk at about 10,680, or in that neighborhood, where you have the two thick sand zones which, by the way, are colored in yellow, they can either be sand, true sands, or some of them can be a lie, but anyway, they're the clean zone. That -- or those two zones we call the main Catclaw Draw pay, and it is also, of course, the Lower Morrow pay.

Also noted on this exhibit is the completion date of the McMinn Well, which we have as 8-1-72, for a calculated absolute open flow of 11,700 Mcf. The original perforations are marked in red and I also have some "X's" marked on the log, the top of which are at 10,536 and the base at 10,724.

While this well was being drilled we were

drilling the No. 4 Catclaw and I was out there and I looked at the samples on this well. They were tight, fine-grained sand. The drill stem test, which you will notice the intervals on this log, and the outcome of the maximum flow. You will see three drill stem tests in the Lower Morrow zone in the boxes to the right of the depth.

The test number one, circled number one, of course, was a packer failure. As you can see on the log there isn't any clean sand there and they probably wouldn't have gotten anything anyway.

DST number two was the Upper Sand of the Catclaw Draw pay and it was tested -- it tested a maximum of 160 Mcf. The bottom hole pressures on that test indicated that it was in the reservoir, in the Catclaw reservoir, but the flow pressures and the outcome of the test indicated it to be a clean, tight sand, just as it drilled. There was hardly any drilling break in it. The samples were fine grained, so it was expected to be tight.

The second test -- I mean the third test, which included both sands, flowed at a maximum rate of 780 Mcf, again indicating tight, low permeability, compared to the offset wells that have flowed as high as 7 and 8 and 10 million out of that same equivalent zone.

The bottom zone, again, was similar to the upper sand in that -- in the Catclaw Draw pay, in that it's

fine grained, tight, again. The pressures indicated -- the flow pressures indicated low permeabilities. Again the pressures indicated field -- shut in -- bottom hole pressures were similar to the field.

To further substantiate tightness, was after it was perforated, which was perforated mainly in this -- the main Catclaw Field pay and that one little zone in the lower part of the Middle Morrow, it was perforated. All three of those perforated intervals were treated with 3,750 gallons of acid, of which it didn't do too good, so they re-acidized those perforations with 16,000 gallons. So you can see that again the permeability is extremely low in there. They had a problem.

Q. Let me ask you this, Mr Hanagan. On your Exhibit Number Three you've indicated perforations at a point on the exhibit where you color coded it green.

A. Yes, sir.

Q. Mr. Cookman's testimony earlier this morning in relation to his Exhibit Number Five indicates that there are no perforations at that point.

A. That's correct. They apparently were unaware that this well was recompleted in the Morrow on 4-10-74 for 2600 Mcf plus 2 barrels of distilate and 25 barrels of water from perforations 10,460 to 724. They added two such perforations. Then they turned around and acidized all five

sets of perforations with 1500 gallons of acid and went in with a water frac, 20,000 gallon water frac plus 30,000 pounds of sand, at that time.

So there are -- as you can see, all but the Nan-Bet pay, what we call the Nan-Bet pay, or the stray sand zone, that zone that -- the stray in the Catclaw -- I mean the Morrow "A" zone, outside of those two zones, all of the other zones in the Morrow were perforated, were treated, and were produced in this well.

Q. Okay. I would direct your attention to Texas Oil and Gas Corporation Exhibit Number Five.

I believe Mr. Pagano's testimony this morning emphasized his belief that the Nan-Bet Well in Section 19 with regards to the lower Middle Morrow had already drained his acreage. Would you discuss for us the Nan-Bet Well, the zones in which it's been perforated and what other zones may be available in that well for production that has not already occurred?

A. Yes, the Nan-Bet Well is one of the best wells in the field, as has been pointed out. The perforated interval from their cross section, 10,648 to 64, is what we call the Nan-Bet pay zone, and it is perforated and has produced gas, but approximately a year after that well was completed, we did perforate the upper field pay sand from 10,870 to 82. Let me get my specs out; this is pretty small

writing here. I take it back, 10,770 to 82, which would be the -- the upper -- on our Exhibit Three it would be the upper sand in the Lower Morrow section, the equivalent to the depth on their well, in the McMinn, of 10,660 to 73. The reason that we did not perforate the lowermost sand, which was again developed in the Nan-Bet, was because it's wet. It was drill stem tested and recovered water on the test.

So the Nan-Bet pay for the majority of its productive life has been perforated and has produced gas from both the Middle Morrow and Lower Morrow Sand. So all of the production accredited to the Nan-Bet cannot be credited to just the one sand, as testified by Texas Oil and Gas.

Q. Are all the perforations properly located on Texaco -- I'm sorry, Texas Oil and Gas Exhibit Number Five with regards to the Nan-Bet Well?

A. No, they are not. They only have one -- one zone open and they should have had two. There are two zones open. So --

Q. Yeah.

A. Go ahead.

Q. I was going to ask you if you had any other comments with regard to the cross section as presented by Texas Oil and Gas in Exhibit Number Five.

A. Well, I could say the major disagreement is

in the breaking down of the individual sands. They -- they, of course, are all considered by the Division as all of one pay, so to speak, but we -- our main difference is this, and it's primarily a pretty good difference. I didn't notice a north/south cross section, which would have shown this situation a lot better.

Q. But let me come to that in a moment, Mr. Hanagan. Let me ask you a few more questions about the logs on that cross section.

I believe you'll find the Hanagan No. 4 Catclaw Well on that cross section.

A. That's correct.

Q. All right. From what Morrow zones has the No. 4 Well been producing?

A. The Catclaw 4 has produced strictly from the Lower Morrow Sands, as correlated in the McMinn Well, again, they would be correlative to both of the perforated -- the lower perforations on the McMinn Well. That's the same zone that we call the main Catclaw pay field, field pay.

Q. Are there other Morrow zones present and productive in Well No. 4 that would be drained by Texas Oil and Gas if a well was approved at their proposed location?

A. Yes, there is. There are. There are productive sands behind the pipe in both the Nan-Bet and the Catclaw Draw No. 4 that have not been perforated or produced.

Q. Well No. 6 in Section 13, I believe, is also on that cross section.

A. Yes, it's the far left well, yes, sir.

Q. What zones have been produced -- what Morrow zones have been produced from that well now?

A. The perforated zone, the only productive zone, or the zone perforated to date has been the main Catclaw pay field, or Lower Morrow Sand. Nothing above the Lower Morrow has been perforated.

Q. With regards to that well, are there other Morrow zones present and potentially productive in that well which would be drained if the Texas Oil and Gas Corporation's proposed unorthodox location is approved?

A. Yes. The drill stem test taken in the Middle Morrow, it's a little tight but it's -- there was a test there that indicated gas in the amount of something like 8 or 900 Mcf that well flowed, so we do feel like there is some gas productive in the Middle Morrow in that well.

Q. Let me direct your attention to the Inexco McMinn State No. 1 Well in Section 18. What was the total cumulative production on that well?

A. Well, my figures, there was just a slight difference than theirs. Both of them -- it's a billion cubic feet. Mine was exactly 1,000,047,175 Mcf.

Q. In your opinion, Mr. Hanagan, has the Inexco

McMinn State No. 1 Well already depleted that portion of Section 18 that is productive from the Morrow?

A. Yes. In my opinion the majority of gas accumulated from the McMinn Well was accumulated from the Lower Morrow Sand, which is the Catclaw Draw main pay sands. We can correlate it into the Nan-Bet. We can correlate it field-wise. That's where the majority of the gas came from. Little or no gas probably came from that little six-foot section. They perforated in the Middle Morrow, and as I remember it, such was their testimony to that effect.

Also, I have the monthly production figures on the McMinn Well, and these figures also indicate that this was a tight well. Outside -- there was only one month that it ever produced any more than -- the maximum production was around 70,000 barrels for one month. But to give you an idea of -- even though they potentialed this well for 11,000 Mcf, the first eight months of production averaged 35,685 barrels per month. So you can see even from the beginning the well only averaged about a million a day.

MR. STAMETS: You said barrels. You mean --

A. I mean Mcf, for the total month. In other words, overall, looking at the -- at their monthly statistics, their average the first nineteen months was about a million a day average. It was slightly over a million a day, which doesn't show to me to be a very highly productive well, or

a tight well, as I think we all know it was a tight well.

But it's merely to show that the well from the offset was tight.

Q. Mr. Hanagan, I show a copy of Texas Oil and Gas Corporation Exhibit Number Three and direct your attention to the cigar-shaped drainage pattern that Mr. Pagano drew on that exhibit earlier this morning.

I'll give you a red pencil and ask you if you will draw upon that exhibit your opinion as to the drainage pattern that has occurred with regards to the Hanagan Nan-Bet Well No. 1 in that section.

MR. STAMETS: Will you hand him another one here and he can draw it on both?

A. Now, we're talking about -- we're talking about the Morrow production, not starting to get into the -- all individual sand zones, isn't that correct? We're talking about the general drainage pattern, or let's say, where you would expect the most gas production. Isn't that what we're saying?

Q. Well, you can clarify your idea of the drainage pattern any way you like. It was Mr. Pagano's testimony that the drainage pattern he drew was confined specifically to the lower Middle Morrow.

A. Right.

Q. All right, sir.

A. Based on that, of course, based on our testimony in that we do not recognize the six-foot sand as being the equivalent to the Nan-Bet, you can see that this cigar would be entirely wrong. It would have to be wrong, because it wouldn't even have been present in the McMinn Well, that particular sand. So that throws the cigar -- north/south cigar shape out the window, along with the testimony of reserve calculations, because those reserve calculations were not based on one single sand zone. They were based on two sand zones.

My cigar would be -- would be in a cigar shape, too, because that's pretty much the way it is, but it would be exactly the opposite. It would be east/west, including the No. 2 well in Section 23, and that cigar would come all the way east. In other words, it would include Section 23, 24, 19, all the way up to the well in Section 20.

Q. Would you indicate that with a red pencil? Would you use the red pencil, Mr. Hanagan?

A. Oh, okay. It would -- it would include all of 23, 24, and 19, all the way up to the -- to the poor producing well in Section 20 of 21, 26.

Again, I go back. The Hanagan -- the Catclaw Draw No. 2, the No. 4 Well, and the Nan-Bet Well, are your three most productive wells in the field, and therefore,

there's where your cigar should be, where the majority of the gas is that field is there.

Q. Okay.

MR. STAMETS: Let me have my copy of that back, please.

A. And that, by the way, is where the thickest sands are and the most permeable sands.

Q. Did you have some additional logs that you wanted to discuss with regards to this particular application, Mr. Hanagan?

A. Well, I have -- I don't have any for exhibits. I have the office copies of logs on all the offset wells, and it may be, since it has developed that our main difference geologically appears to be the little six-foot zone in the McMinn Well as being equal to the Nan-Bet zone, they say it is and they say it's been drained. I say it is not, and that little six-foot zone hasn't been drained because it's too tight to be drained. So what I'm -- so perhaps maybe I ought to put on the wall here those three logs and give you a north/south look.

Q. Let's do it, Mr. Hanagan. Would you put those logs up here. We'll introduce them as exhibits and with the Examiner's permission we can, perhaps, substitute further copies after the hearing and his originals might be returned to him.

MR. STAMETS: I imagine we can do that.

(There followed a discussion off the record.)

Q. (Mr. Kellahin continuing.) Would you identify what I have marked as Hanagan Exhibits Four, Five, and Six?

A. Exhibit Number Four is the Fasken Well in Section 7 of 21, 26. It's the direct north offset to the McMinn Well.

Exhibit Number Five is the McMinn Well, located in Section 18 of 21, 26.

The Exhibit Number Six is the south offset to the McMinn Well, located in Section 19 of 21, 26, and it is, of course, the direct south offset to the McMinn.

Now these wells are pretty muchly lined up almost exactly north/south. The Fasken well, the northernmost well, the Fasken Well, which is a dry hole in the Morrow, you can see that the correlations are such, the way we have them, that the Catclaw pay field is present, the Lower Morrow Sands are present in it. They were tight. They recovered a little bit of water, but so much -- they were tight enough to where they didn't even recover much water. They were thinner than the Catclaw pay but correlative in our opinion.

You'll notice that the -- in the center of the Morrow section on all these logs, that we have the area

that we call massive, a massive shale, which is this area right in here. It's a good correlative marker. In fact, most geologists can map and do map in Eddy County on the base of that massive shale, which by the way, Texas Oil and Gas in that cross section, they carry that marker,that same marker.

But you can see an interesting -- for example, on the "A" Sand of the Morrow, the Fasken Well encountered it and got water. The sand is either a sandy lime or is shaled out both in the McMinn Well and the Nan-Bet Well. This section in here is all the "B" zone or Middle Morrow zone. You can see that the Fasken Well had some porosity in approximately the middle part of the Middle Morrow. They got water on it, it's still fairly fine-grained sand, though, and fairly well broken.

The McMinn Well, you can see where that's perforated and again, you have a division. We can divide -- or we have divided these sands down, for example, in the McMinn Well, this is what we call the B-1, the middle part, which would be the uppermost part of the Middle Morrow; the B-2 zone, which we call the middle part of the Middle Morrow; and then the lower Middle Morrow, which we call lower Middle Morrow and also Texas Oil and Gas calls it the same thing.

So to this point we're correlating all right.

Then from the McMinn to the Nan-Bet Well is where our difference is. Again, you can see that the correlation is good. Here is the Upper Sand and basically our difference is in the Middle Morrow section, breaking it down.

You will notice there's a considerable Morrow Sand development in the Nan-Bet Well. You can see the correlations are good again. Here is your upper sands in the Middle Morrow; here is your middle sand; there is the middle sand. Here is your lower sand, equivalent, we think, to the McMinn Well, and you may notice that the middle sand in the Nan-Bet, right here, flowed 7-1/2 million on the drill stem test, so we know it's -- we think it's equivalent to the two zones that Inexco perforated in the McMinn. It's tight. There's a little bit of porosity logged here but again that's a fine grained sand. It's not clean and it's been -- they probably didn't recover any gas, or very doggoned little, out of that zone.

So the main point of completion is this interval right in here. Texas Oil and Gas testified that this sand is equivalent to the Nan-Bet pay sand. Now, I think you can see from this log that there is little doubt in my mind that this sand is equivalent to that sand in the Nan-Bet which carried water.

So there is what I'm attempting to show you

that the main correlation difference is, is they have jumped from one sand to the other. If this correlation is true, then the Nan-Bet upper zone hasn't drained a doggoned bit of their acreage -- of their zone, because it's not the equivalent zone. It's not the equivalent zone at all.

Q. Thank you, Mr. Hanagan, would you return to your seat?

Mr. Hanagan, were Exhibits One through Six either compiled by you directly or compiled under your supervision, with the exception of Exhibit Number Two, which is a Roswell Geological Society Symposium plat?

A. Correct.

MR. KELLAHIN: We move the introduction of Exhibits One through Six.

MR. STAMETS: These exhibits will be admitted, with the provision that Mr. Hanagan may have Exhibits Four, Five, and Six back and at some time submit a duplicate set that gives us the interval from the top of the Morrow Clastic to the total depth of the well.

A. Do it as soon as we get back.

MR. KELLAHIN: That concludes my direct examination, Mr. Examiner.

MR. STAMETS: Are there questions of the witness?

MR. CARSON: Yes, sir.

CROSS EXAMINATION

BY MR. CARSON:

Q. Mr. Hanagan, your Nan-Bet Well in Section 19 was originally drilled as an unorthodox location, was it not?

A. No, it was not. It was drilled before the -- before the Catclaw Draw Field -- in other words, it was drilled further than a mile from the field limit. It was not an unorthodox location.

Q. But it was drilled pursuant to an order of the Commission after notice of hearing, was it not?

A. No, sir, it was not. It has never gone to a hearing. That's the reason I put these spud dates. You'll notice that the discovery well in Section 26 and the second well, which was in Section 23, the No. 1 and 2 Catclaw Wells, were the only wells drilled in the field at the time -- the Nan-Bet was our third well drilled.

In other words, what I'm saying is there were two field wells at the time the Nan-Bet was drilled. One was in 23 and one was in 26. So our third well in the field was the Nan-Bet. We jumped over a mile away to drill the Nan-Bet Well, from production.

Q. So the hearing that you had was really for a nonstandard proration unit, is that correct?

A. Well, we had no hearing on the Nan-Bet, as

far as unorthodox location.

Q. Well, that -- I think that my question was, second question was, was a nonstandard proration unit as opposed to an unorthodox location.

A. No. There was never a hearing. You'd have to give me the number because there was never a hearing on the Nan-Bet for prorationing reasons or spacing reasons.

It was drilled before it was ever in the Catclaw Field, before the Catclaw Field was ever extended out that far. It's our third well drilled in the field, so at the time that the Nan-Bet was drilled in 19, the Catclaw limits was Section 23 and 26; that was all that was in the Catclaw Field.

Q. Mr. Hanagan, let me refer you to Hanagan Exhibit Number Two. Do you have a copy of it there? It's --

A. Yes, uh-huh.

Q. -- I think you called it, yeah, Roswell Geological Society map. Now, what does -- you show an orange line along the top. What is that? What is the orange line supposed to signify?

A. Well, as I said, the -- everything north of that orange line, the sands in the Morrow, and particularly in the Lower Morrow, are either getting thinner, they're getting fine grained and tight, or there's shale in there. And almost to the fact that just above where the -- just

north of the -- of the exhibit here, there's shale, and there is very little sand even left.

So what I'm saying is, what I'm indicating is that any well drilled particularly in the Catclaw main pay, but even in the other ones, are either getting poorly developed, less sand, more shale, finer grain, and less permeability.

And that can be backed up by the well in Section 1, for example, and 2. The Well in 1 is producing not from the Catclaw Draw field. It's not any good there. It's producing from the Middle Morrow and is a very poor well. It will never produce a billion cubic feet of gas.

The well in Section 2, same thing. The sands are fine grained, tight; Conoco worked on that well for months trying to make a well out of it. It is now abandoned. The only gas they ever got out of it was in the "A" Sand and it was water wet. It had gas and water.

Q. Now, if Exhibit Two is a rather small scale, but I take it that you -- that the way this is shown, that you would consider the Inexco Well to be a noncommercial well and was above what you would consider to be the productive area.

A. No, what I'm saying -- I didn't say that there was no production north of that line. I was just explaining that well in Section 1, for example, and the one

in 2. What I'm saying by that line is even in our 6 Well, which is located in Section 13, the west offset to the McMinn Well, the sand starting getting less permeable, even in the 6 they got less permeable.

For example, in the 6 we had to treat that well to make a well out of it. I mean to increase the volume of it; whereas, in the south offset, the Catclaw 4, the Nan-Bet, they were natural completions. We never even touched them with a bit of acid and we haven't to this day.

So what I'm saying is that, even in 13 and even more so in 18, is going eastward and northeastward the permeability is less and the sands are finer grained. You're losing your permeability; you're losing your reservoir character. That's your strapping mechanism for that part of the field.

Q. Mr. Hanagan, at one time you had some interest in this -- your company had some interest in this Section 18, did they not?

A. No, we never did have an interest in Section 18.

Q. I don't mean an interest in the sense of owning an interest, but an interest in the sense of bidding on the lease and trying to acquire the lease on it, a lease on Section 18.

A. We did not bid on the lease. Well, I'll take

it back. Maybe we did. I don't know.

You mean at the state sale?

Q. At the state sale.

A. I think we did bid on that lease, yes.

Q. The record will, of course, show you didn't get it, but I think it will show that you bid on it.

A. Yes, we did. We bid a nominal fee, as it turned out.

Q. Yes.

A. That's correct.

Q. Did you have some interest in drilling on that yourself at the time?

A. No, we did not.

Q. By yourself I mean Hanagan Petroleum.

A. No. There was only two things. One, it's protection acreage, which we all buy to keep somebody like Texas Oil and Gas from drilling there, and/or with the possibility of maybe reworking the well if it looked like it was justified, which certainly I don't think that we would now. The casing's been pulled and all that business, so really, I would have to say we would have -- it would have been worth our bid if we'd have gotten it at that nominal fee for protection reasons.

Q. Okay. And, Mr Hanagan, would you -- based on your Exhibit Number Two, would you recommend drilling a

well at an orthodox location in Section 18?

A. I would not, and we have not placed a 660 location against a well like is being done there.

Q. No, that's not my question, Mr. Hanagan. My question was, based on your Exhibit Two would you recommend, if this were yours, would you recommend drilling a well at a standard location?

A. No, I would not, because if I had, we've have bought that lease. We'd have been bidding with you on that lease.

Q. Do you feel that a standard drilling -- drilling of a well at a standard location would probably either end up in a dry hole or a noncommercial well?

A. I think probably on any part of that whole section you're going to be fighting a poor well, in the whole Section 18.

Q. Now, Mr. Hanagan, again referring to your Exhibit Number Two, the blue line on the bottom is supposed to stand for, say, the sands are permeable but wet, is that correct?

A. In general, that's -- that's correct.

Q. Now, you're presently -- your company's presently drilling a well in Section 28, are they not?

A. Well, now, there we're in a different field, as you might be aware.

Q. Well, I'm not, but it would be your testimony that the geology changes in that interval?

A. Yes. I can tell you why. On our Exhibit Three, on the McMinn Well for Exhibit Three on that log section, now, just immediately below the massive shale interval the main Avalon pay field is here. This sand over in 28 where we're drilling, this sand is either gone or poorly developed. This sand is carrying water. So we're looking at a different animal in the Avalon pay. That was --

MR. STAMETS: Let the record show that the witness was indicating the area he was drilling for was immediately above the Catclaw Draw pay.

A. Yes, that's correct.

It's the upper part of the Lower Morrow, is what we consider the Avalon pay and the lower part of the Lower Morrow is what we consider the Catclaw.

Q. Mr. Hanagan, I'd like to refer you now to your Exhibit Number Three, which is the correlation of the logs.

Now, is it my understanding that what you show in green on this exhibit was in fact perforated?

A. At a later date. The red ones are the original perforated zones when the well was first completed. The green were perforations perforated after -- some time after the well was drilled; about two years later.

Q. Is it -- is -- has the well been produced through these -- in these zones shown in green?

A. All five sets were open after they perforated it. I testified how they treated them, but all of these five zones were open at the time that they abandoned the well, to our knowledge.

Q. Well, now, let's see, I'm afraid I'm confused here.

A. The green were the new perfs.

Q. In your well? This was Nan-Bet?

A. No. These are perfs in the McMinn Well.

Q. Okay, in the McMinn. Okay.

But you have no knowledge as to whether it produced through those perforations or not.

A. Yes, they did. They had all sets of perforations open since -- since the recompletion date of April of '74.

What I'm saying is, from 8-1-72 to 4-10-74, approximately a little less than, let's see, about two years, a little over two years, they produced just from the red perfs, the lower perfs, the original perfs, and then from that point on they produced from all five sets; they had all perfs open.

Q. Now, Mr. Hanagan, is it -- I'm a little bit lost here. Is it your testimony that the geology throughout

the Catclaw Draw Field is more or less uniform?

A. The -- not every sand member, I don't mean that, because all the sand members do not cover the whole area, but the main, what we call the main Catclaw pay field, we feel that we can correlate it to be equivalent throughout the field, correct. The Lower Morrow Sand, the main pay sand of the field.

Q. Okay. In that case you do not feel that you're dealing with channel sand, is that correct?

A. No, sir, not that sand.

Q. Okay, now --

A. There are other sands. I don't think all Morrow sands are channel sands, no.

Q. Well, I understand, but what -- what sands do you believe that you're dealing with in what you consider to be your Nan-Bet pay zone?

A. I think the Nan-Bet pay is a channel sand, yes, sir, and it's limited in areal extent, and generally, it depletes in a hurry, so you know it's limited in areal extent, not only from the way it produces but you can't find it in any of the offset wells. You know darned well it's limited in areal extent.

Q. So, would you more or less agree with Texas Oil and Gas's Exhibit -- with the Texas Oil and Gas Isopach, which showed your -- the Lower and Middle Morrow to be a

channel?

A. The Lower and Middle Morrow. I can't be in agreement with that exhibit, because I'm talking about two sands and you're talking about one. You're saying that the -- that the Nan-Bet zone perforated what you call the Middle -- the lower Middle Morrow that is perforated in the Nan-Bet is equivalent to this little eight-foot zone in the McMinn, and I'm saying it isn't. They're not -- they're entirely different sands. Therefore, I'm saying that there is another sand which I think you can see by that cross section. There is an additional sand in the Nan-Bet that's not even present in the McMinn, and that sand is the Nan-Bet pay.

Q. Excuse me, just a minute.

I don't think I have any further questions of this witness.

CROSS EXAMINATION

BY MR. STAMETS:

Q. Mr. Hanagan, do you feel that if the Division allows this well that Texas Oil and Gas is proposing to be drilled, that the production from that well should be restricted to offset any advantage they might gain because of their location? I know you don't want to see it drilled --

A. Well --

Q. -- but if we do allow it?

A. What are you asking me?

Q. Okay, if the Division allows this Texas Oil and Gas to drill the well at the location as they propose, would you feel that the production from that well should be restricted in any way to offset the advantage that they would gain?

A. Very muchly so. They're dedicating 640 acres and by their own admission most of it is not even productive. So where is all the gas going to come from? You know where it's going to come from.

Q. Over a period of years the Division has used several methods of restricting production. In a case like this they've often used acreage factor, which is less than a one, and this acreage factor is then determined either by the amount of acreage that is productive or which has been testified as being productive, or we have another formula, which bases it on the amount of additional overlap of the drainage radius outside the acreage owned by the operator, and the variation of the location from a standard location.

Do you feel that either one of those is acceptable, and one is preferable over the other?

A. Well, the -- the calculating a drainage area on a circular basis is not true because the drainage in this particular case is not the same. That is when you calculate

a drainage area in a circular pattern, you're assuming that it's the same permeability, the same amount of gas, and everything, is present in that entire circle. And the evidence here is that there is definitely a restriction either from the depletion or lack of permeability to the east and northeast over almost all of this acreage. Therefore, I can't go on the circular drainage proposition.

Even the offset wells do not have the same permeability; therefore a circular method, you have got to assume that the porosity, permeability, everything is the same, and it isn't. I don't know.

My answer, I guess, the way I feel about it, most of the gas is not going to come from the Catclaw 6, which is the west offset. Certainly not going to come from the north because it's a dry hole, and it's not going to come from the east because it's either impermeable or wet. It's got to come from the south and the southwest, those two strong wells or ours, and that is exactly where they put their location, closest to those two wells, and that is where the majority of gas is, that's where the best permeability is; that where the thickest sand and more pay zone is. Therefore, the direction of drainage in my mind, there is no doubt where it's going to be. It's going to be southwest and south. It's going to be where the gas is drained from and not from those other directions, except in a very

restricted amount.

Q. You testified earlier that you felt that only not more than twenty percent of the acres in Section 18 would be productive at the location that they proposed. Do you feel that that's a proper allowable factor to give a well at this location? Twenty percent of the standard proration unit?

A. At that 660 location or the standard?

Q. At the 660 location.

A. Well, twenty percent of 640 is what? How many acres? 120 acres?

Q. 128 acres.

A. 128 acres. There isn't that many productive acres there. If there was, they could drill at 1650. If there was that many productive acres there, they could just drill at their standard location.

Q. What it boils down to, Mr. Hanagan, is that if the Examiner doesn't have a bit of testimony that he can rely on for establishing some sort of a penalty, then he will utilize whatever he can determine, so if you have some recommendation for the penalty factor, what it should be and why, I would appreciate it.

A. Well, I've got to go along with the acreage basis, primarily because that's the way the field rules are written, and the allowables are based on acreage; not based

on drainage patterns or anything, just based on acreage, surface acreage, and in my opinion if you use a twenty percent factor, you're saying practically the whole southwest quarter of that section is productive, and I don't think even the southwest quarter, that whole quarter, is productive. Therefore, I'm going to base my opinion on a number of acres, and it's got to be something less than 100 acres, of productive acres in that, under the drill site.

Q. Okay.

MR. STAMETS: Any other questions of the witness?

MR. KELLAHIN: If the Examiner please.

REDIRECT EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Hanagan, would not another appropriate method of restricting production for this well be some factor that combined an acreage factor and encroachment or an overlap factor?

A. I think there is one. I don't know what it is exactly. The wells have been pretty well tested, I mean, so you can -- you could do it. Almost every zone, every zone that shows promise in the offset wells, now, I'm not talking about the McMinn Well, I'm talking about the west

offsets, southwest offset, and the south offset. Pretty much every zone in the whole Morrow section has been tested, drill stem tested, to the effect you could come up with some fairly good idea.

Q. If I understand what you've told me, it's your opinion that restrictive production penalty developed on a straight acreage factor alone would not be sufficient to protect your correlative rights.

A. Well, that's right.

Q. And that a restrictive production factor based simply upon encroachment or overlap formula by itself would not adequately protect your correlative rights.

A. Yes.

Q. But perhaps a combination of the two systems would, in some way offset the unfair advantage gained by the applicant.

A. I think that would be the truest way of doing it, yes.

MR. KELLAHIN: I have no further questions.

A. Would be a combination.

MR. STAMETS: Any other questions?

MR. CARSON: May I recross just a minute?

MR. STAMETS: You certainly may.

RECROSS EXAMINATION

BY MR. CARSON:

Q. Mr Hanagan, I'd like to refer you again to your Applicant's Exhibit Number Two and the --

MR. STAMETS: Whose Exhibit Number Two?

A. Not applicant's. I mean Hanagan Exhibit Number Two, and the Texas Oil and Gas production map.

First, do you agree with the production figures?

A. On your exhibit now?

Q. Do you agree with the production figures attributed to the Hanagan Nan-Bet?

A. Well, of course, reasonably well. Of course, I have a little up-to-date figures, you know, but basically they are --

Q. Well, that's actually low, then.

A. They're a little low, not much. That's approximately right. That's probably up around August figures. I don't know, isn't that correct? September figures, something like that. I think the last production book is August, through August, so I assume that these figures are about there, and I -- yes, I would say that they look in the ballpark.

Q. Now, if you refer to your Hanagan Exhibit Number Two, would that not mean -- compared with your pro-

duction figures, would that not mean that if you reduce this to a productive acreage system, rather than a straight acreage system, that you will have overproduced your proration.

A. No, no, because of this. The -- at the same time, and during almost exactly the same period of the beginning period, the McMinn Well was producing; therefore, during the history of the Nan-Bet production and the time that the McMinn was being produced, they had their opportunity for four years to get their amount of gas, just like the Nan-Bet. Therefore I say that they had their opportunity to get what gas, what part of the gas the Nan-Bet has accumulated to date, they had that opportunity, and took advantage of it. They produced that well.

Q. I understand what you're saying, but my question was, was if you reduce Section 19 to a productive acreage formula, have you not -- are you not draining someone else?

A. Strictly to a productive acreage?

Q. Formula, yes.

A. Formula? Yes, I think you are in a way, and that's the reason I say a combination formula, like Mr. Kellahin was talking about, is probably right. But I guess maybe I'm so biased, but when you're starting from such a small amount of productive acreage, that I feel like you are

in Section 18, that it's highly immaterial, because you only have a very small amount of productive acreage to start with.

MR. CARSON: I don't think I have any further questions of this witness.

MR. STAMETS: Any other questions?

MR. KELLAHIN: No, sir.

MR. STAMETS: He may be excused.

MR. CARSON: I'd like to call one witness in rebuttal and that's I'd like to recall Mr. Cookman, please.

CHARLES W. COOKMAN

being recalled as a witness and having been previously sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. CARSON:

Q. Mr. Cookman, would you correlate the Texas Oil and Gas cross section A-Aprime with Mr. Hanagan's logs that are pasted on the wall there?

A. Yes.

Q. Taking into consideration the fact that those are not exhibits that will go in the record, I suppose, and that you're going to have to identify them verbally so that the reporter can get it down.

A. We can take our Exhibit Number Five and the last two logs on the right of our Exhibit Number Five are exactly the same as these logs here.

MR. STAMETS: That would be Five and Six.

MR. HANAGAN: No, that is not true.

A. This is the McMinn State 1. This is the Nan-Bet 1, and I have the McMinn State 1 here, and the Nan-Bet 1 right here, so if I set my cross section at this point right here, we will be looking from north to south, whereas he's looking from north to south going this way.

And I think that after I get this thing set on here, you can see that we do have a significant disagreement.

Hanging my datum, which is the top of the Lower Morrow, on his top of the Lower Morrow, that Mr. Hanagan picked, we can see that our objective sand as it comes through slightly climbing up the section, going from south to north, will come in and will correlate right in here. The well --

MR. CARSON: What is "right in here"?

A. Okay, right in here would be 10, 5, 10,526.

MR. STAMETS: And that's on Exhibit Number Four.

A. On Exhibit Number Four on the Avalon State No. 1 Well. That is significantly -- thatis somewhat dif-

ferent than his correlation with the McMinn State No. 1 Well. Mr. Hanagan's correlation with the McMinn State No. 1 Well would put the same sand that I've referenced up at 10,513 in the Avalon State No. 1. I believe that the McMinn State No. 1 objective section has to be correlated somewhat deeper than the Avalon State No. 1 Well, and that correlating the Inexco McMinn State objective sand, or the Lower Middle Morrow sand, as I have termed it, with this sand here, which Mr. Hanagan has termed the B-3, is incorrect, because looking at my cross section, you can see that the sands as they go from south to north are slightly climbing in the section, whereas Mr. Hanagan would actually have those sands climb and then drop significantly, and that the sands present in the Nan-Bet No. 1 Well between 10,464 and 10,500 have somehow miraculously disappeared in the McMinn State No. 1 Well; they're not present at all.

Q. Do you have any other comments to make on the correlation of your logs with Hanagan's Exhibits Four, Five, and Six?

A. These are Four, Five, and Six?

Q. Yes.

A. Just that I believe that a more correct view of our objective sand can be gained by hanging the cross section on the Morrow massive shale, over the top of the Lower Morrow. The top of the Lower Morrow would be a cor-

relative time in the Morrow Basin and is much closer to our objective sand than the top of the Middle Morrow or the top of the Morrow Clastic, which are almost 200, 300 -- almost 200 feet above our objective sands.

Q. One other question, Mr. Cookman, not relating to the logs. Earlier you testified, or at least an indication was made, that Inexco would not join this venture if the -- if the old Inexco McMinn State Well were not re-entered. As a matter of fact Inexco has joined regardless of where the location is, is that correct?

A. I believe so.

MR. CARSON: I don't think I have any further questions.

MR. STAMETS: Any questions of this witness?

MR. KELLAHIN: Nothing.

MR. STAMETS: Does anybody have anything further in this case?

MR. KELLAHIN: If the Examiner please, I believe there are a number of telegrams and letters addressed to the Commission, which I have a copy of a few of them, which object to the drilling of the well at this particular location.

MR. STAMETS: We have a telegram from Atlantic Richfield Company, filing an objection. We have a letter from Union Oil and Gas.

MR. HANAGAN: Union of Cal.

MR. STAMETS: Union of Cal, sorry about that, which is an objection, to the location.

I also have a letter from Inexco Oil Company, which is dated November 30th, 1978, which is in opposition to granting the unorthodox location.

MR. KELLAHIN: I have a brief closing statement.

MR. STAMETS: Mr. Kellahin, you may have your brief closing statement.

MR. KELLAHIN: Mr. Stamets, I believe that the existing pool rules for the Catclaw Draw Morrow Pool are a very lenient and they allow a great latitude on -- for operators, including Texas Oil and Gas, to drill a well within their proration unit at a standard location, so long as it's no closer than 1650 from the section line. I think that's generous.

The testimony has shown that Texas Oil and Gas, in fact, has acreage that has previously been drained by Inexco McMinn State No. 1 Well. I believe the testimony shows that the unit is depleted and that if Texas Oil and Gas wants to undertake the drilling of a well on this unit they can do so at a standard location 1650 from the west and south lines.

We believe to allow an exception and to grant

approval for the drilling of this location and then to assess a penalty factor, does an injustice to Hanagan as operators of the offsetting wells. We believe this is the type of case for which the location ought to be denied.

I understand that the Division frequently approves locations of this type and then assesses a penalty factor. I believe that the only proper solution here would be to deny the application. However the Examiner believes that restricted production factor should be applied, as you know, this is a prorated pool. It's been Mr. Hanagan's testimony that a straight acreage factor, as sometimes applied by the Division, would not of itself completely protect his correlative rights. In addition, an encroachment factor, using a straight acreage formula and the business of the overlapping circles, of itself is not sufficient protection for the offset operators, and that perhaps the only thing appropriate, if a restriction is applied, is some formula that takes into account both of those factors.

It's our position, however, that a substantial portion of this unit, Mr. Hanagan's testified at least 80 percent of it, is not productive. I think Mr. Cookman's estimate was something more than 60 percent is not productive. That's a very serious problem and that must be taken into account in any order.

In addition, however, you can't ignore the

fact that they are moving closer to the boundary line than any of the offset wells and that, too, has to be taken into account.

Thank you.

MR. STAMETS: Mr. Carson?

MR. CARSON: I will make just a brief statement.

The first remark I have to say is it appears that from Mr. Hanagan's testimony and from the evidence that we have produced ourselves, that one of the serious problems here is that Texas Oil and Gas is being drained and everybody is glad to see it.

And that's understandable, but that's the reason why we have to -- we've sought this unorthodox location. We've talked in terms of penalties and so forth, if any penalty is to be assessed, it should be taken into -- what should be taken into consideration is that the offset operators have far overproduced their wells and that -- and that Texas Oil and Gas now seeks to protect itself by the drilling of this well.

And in the determining the amount of productive acreage, it's rather difficult from the protestant's testimony insofar as it's suggested that -- that the area north of the orange line is for some purposes productive acreage but for other purposes it's nonproductive acreage,

and I believe that the 20 percent figure that he has -- Mr. Hanagan has set forth is far too low.

That's about all I have to say.

MR. STAMETS: If there's nothing further, the case will be taken under advisement.

(Hearing concluded.)

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REPORTER'S CERTIFICATE

I, SALLY WALTON BOYD, a Court Reporter, DO HEREBY CERTIFY that the foregoing and attached Transcript of Hearing before the Oil Conservation Division was reported by me; that said transcript is a full, true, and correct record of the hearing, prepared by me to the best of my ability, knowledge, and skill, from my notes taken at the time of the hearing.

Sally W. Boyd CSR

Sally W. Boyd, C.S.R.

I do hereby ... in the ... 6398, heard by ... 13-78.

Richard L. Stamets, Examiner
Oil Conservation Division

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STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION COMMISSION
State Land Office Building
Santa Fe, New Mexico
7 March 1979

COMMISSION HEARING

IN THE MATTER OF:

Application of Texas Oil & Gas Corporation for an unorthodox gas well location, Eddy County, New Mexico.

CASE 6398

BEFORE: Commissioner Ramey
Commissioner Arnold

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Oil Conservation Commission: Lynn Teschendorf, Esq.
Legal Counsel for the Commission
State Land Office Bldg.
Santa Fe, New Mexico 87503

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MR. RAMEY: Call Case 6398. Application of Texas Oil and Gas Corporation for an unorthodox gas well location, Eddy County, New Mexico.

We've had a request from the applicant to continue this case indefinitely.

It will so be continued.

(Hearing concluded.)

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Sally W. Boyd

Sally W. Boyd, C.S.R.

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