STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

IN THE MATTER OF THE HEARING CALLED BY THE OIL CONSERVATION DIVISION FOR THE PURPOSE OF CONSIDERING:

APPLICATION OF KLM OIL & GAS FOR A HIGH ANGLE/HORIZONTAL DIRECTIONAL DRILLING PILOT PROJECT, RIO ARRIBA COUNTY, NEW MEXICO.

CASE NO. 10348

REPORTER'S TRANSCRIPT OF PROCEEDINGS

EXAMINER HEARING

BEFORE: JIM MORROW, Hearing Examiner

July 11, 1991
8:25 a.m.
Santa Fe, New Mexico

This matter came for hearing before the Oil Conservation Division on July 11, 1991, at 8:25 a.m. at the Oil Conservation Division Conference Room, State Land Office Building, 310 Old Santa Fe Trail, Santa Fe, New Mexico, before Maureen R. Hunnicutt, RPR, Certified Court Reporter No. 166, for the State of New Mexico.

FOR: OIL CONSERVATION DIVISION

BY: MAUREEN R. HUNNICUTT, RPR
Certified Court Reporter
CCR No. 166

I N D E X

July 11, 1991
Examiner Hearing
CASE NO. 10348

* * *

E X H I B I T S

A P P E A R A N C E S

FOR THE DIVISION:	ROBERT G. STOVALL, ESQ. General Counsel Oil Conservation Commission State Land Office Building 310 Old Santa Fe Trail Santa Fe, New Mexico 87501
FOR THE APPLICANT:	KELLAHIN, KELLAHIN & AUBREY Attorneys at Law BY: W. THOMAS KELLAHIN, ESQ. 117 North Guadalupe Santa Fe, New Mexico 87501
BENSON-MONTIN-GREER:	AL GREER (Not present) (Appearance entered by Mr. Kellahin on his behalf.)

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NEW MEXICO OIL CONSERVATION COMMISSION

EXAMINER HEARING

SANTA FE, NEW MEXICO

Hearing Date JULY 11, 1991 Time: 8:15 A.M.

NAME	REPRESENTING	LOCATION
W. Kellahin	Kellahin Kellahin & Aubrey	Santa Fe
Maurice Trimmer	Byram Co.	"
James Bruce	Hinkle Law Firm	ABQ
Harvey P. Francis	ENSCO Tech. Co.	Denver
Glenn Otness	Apache Corp	Denver
Ray Johnson	Apache Corp.	Denver
T. P. Tippett	Leasehold Unlimited	Littleton
Daniel R. Sommer	KLM O&G	Littleton, CO

EXAMINER MORROW: Call Case 10348.

MR. STOVALL: Application of KLM Oil & Gas for a high angle/horizontal directional drilling pilot project, Rio Arriba County.

EXAMINER MORROW: Appearances.

MR. KELLAHIN: Mr. Examiner, I'm Tom Kellahin of the Santa Fe law firm of Kellahin, Kellahin & Aubrey appearing on behalf of the applicant, and I have three witnesses to be sworn.

EXAMINER MORROW: Would those witnesses please stand and be sworn?

(The witnesses were duly sworn.)

MR. STOVALL: Mr. Kellahin, is Benson-Montin-Greer going to officially enter an appearance in this case?

MR. KELLAHIN: Yes. Mr. Examiner, Mr. Al Greer on behalf of Benson-Montin & Greer called me yesterday and asked if I would enter an appearance on behalf of his company, and I said I would do that. Mr. Greer is an interested operator in the pool, and he takes no position with regard to this case, but did want to enter an appearance at this time.

EXAMINER MORROW: Very well, sir.

MR. KELLAHIN: I would like to call as my first witness Mr. Dan Sommer.

DANIEL R. SOMMER

the Witness herein, having been previously duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. KELLAHIN:

THE WITNESS: Why don't you give them this copy, Tom, because this is highlighted in regard to locations and you can see how it relates to the rest of those wells?

MR. KELLAHIN: This one doesn't have the Exhibit stamp on it, but I will do that after the hearing. It should be Exhibit No. 1.

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

MR. KELLAHIN: Now it has got it okay.

(Discussion off the record.)

Q. (By Mr. Kellahin) Mr. Sommer, would you please state your name and occupation?

A. My name is Daniel R. Sommer, and I'm a petroleum geologist.

Q. Mr. Sommer, where do you reside?

A. I reside in Littleton, Colorado.

Q. And by whom are you employed in this case?

A. KLM Oil & Gas of Topeka, Kansas.

Q. What is it that you've done for KLM?

A. I serve as a consultant geologist and I have

generated this drilling prospect on their behalf and have formerly done other geological consulting in other areas of the western U.S.

Q. Mr. Sommer, on prior occasions have you testified before the Oil Conservation Division.

A. No, I haven't.

Q. Summarize for us you educational experience as a geologist.

A. I have a BS in geology from Fort Lewis College in Durango, Colorado, in 1978 and an MS degree in geology from the University of Nevada, Reno, 1981.

Q. Subsequent to graduation, summarize for us your employment experience as a geologist.

A. Since my graduation and BS, I worked for AMOCO Production Company for four years, and since then I have served primarily as a consulting geologist for both major and small, independent oil companies in the midcontinent and Rocky Mountain regions.

MR. KELLAHIN: Mr. Examiner, we'd tender Mr. Sommer as an expert petroleum geologist.

EXAMINER MORROW: We accept his qualifications.

Q. (By Mr. Kellahin) Mr. Sommer, let me direct your attention to what we've marked as KLM's Exhibit No. 1. Before we talk about the specific details of your interpretation and the information of this display, orient

us first of all to the pool that you're seeking approval for the high angle/horizontal well.

A. Okay. This area is known as the West Puerto Chiquito-Mancos pool, and the Gavilan pool area. It's located in the extreme eastern portion of the San Juan Basin and south central Rio Arriba county, approximately six miles north of Regina, New Mexico.

Q. Can you identify for us the Benson-Montin-Greer Canada Ojitos Unit?

A. Yes. As noticed on this map, the gasline indicates the southern boundary of the Canada Ojitos Unit of the West Puerto Chiquito field.

Q. Is there an indication on this display of where we might find the Gavilan-Mancos pool?

A. No, there is not, but it lies directly on the west in Township 24 North, Range 2 West.

Q. When we look at the line of cross section that is shown on this structure map and commencing at the point that's marked "A" --

A. Yes.

Q. -- that well is in what pool?

A. That is in the West Puerto Chiquito-Mancos and part of the Canada Ojitos Unit.

Q. And as we move, then, south and then east through the line of cross section, are each and every one of those

wells in the subject pool that you're seeking behind the well pool?

A. Yes, they've all been designated West Puerto Chiquito field.

Q. You've shown on the display an interpretation of structure. Is that your personal interpretation?

A. Yes, sir, it is.

Q. What was the data available to you as a geologist upon which you prepared the structure map?

A. Both subsurface well control from the existing wells in the southern part of the field and published information regarding the structure of the northern portion of West Puerto Chiquito.

Q. Give us a summary, Mr. Sommer, of your geologic interpretation of the structure in this area.

A. Basically this area lies on the very eastern edge of the San Juan Basin and consists of monoclinal dip to the west at approximately 6,000 feet per mile at the outcrop and diminishing to approximately 100 feet per mile on the edge of township -- Range 1 West.

Q. Describe for us the geology of the West Puerto Chiquito-Mancos oil pool?

A. Again, basically, the field consists of monoclinal dip. Production has been attained from the Niobrara member of the Mancos formation consisting of the

"A," "B" and "C" benches.

The reservoir itself consists of both a source and a reservoir: the source being high organic carbon content, the reservoir being nonpermeable, low-porosity, siltstone-shale sequences that due to fracturing have been able to contribute production due to these high-capacity fracture systems.

Q. What is the spacing with regards to this pool for wells dedicated to the pool?

A. Currently the recognized spacing is 640 acres.

Q. In order to be consistent or standard with that spacing pattern, what is the footage setback from the side boundaries of the section?

A. Presently there are 1650-foot setbacks from the section line down to the boundaries.

Q. What is the objective or the goal that you're seeking to accomplish with this horizontal well, Mr. Sommer?

A. Our goal is to penetrate the perpendicular-angle, existing, horizontal fracture trends, which we interpret to be a northwest-southeasterly direction; therefore, we propose to drill a 2800-foot, lateral section, perpendicular in a northeasterly direction to intersect these fracture systems and keep our horizontal portion within the recognized setback limits of the spacing unit.

Q. When we look at -- Section 33, is it?

A. Yes.

Q. -- Section 33 of Township 24, North 1 West, that is the spacing unit that will be dedicated to this well?

A. Yes, sir.

Q. Are there any other West Puerto Chiquito-Mancos wells in that section?

A. No, there are not.

Q. You've shown on your display a proposed location. Immediately to the west of the location is a dry hole marker?

A. Yes, sir.

Q. What does that indicate?

A. That was a shallow, cretaceous, Pictured Cliff, dry hole, and due to the existing wellbore, we moved our location approximately 50 foot to the east, which would give us approximately 1710-foot setback from the west line.

Q. When we look at the other wells, there's some gas well symbols in that section. What do those represent, those type of wells?

A. Those all represent shallow, Pictured Cliff, gas wells of the Rio Blanco field.

Q. Is there any particular reason you have selected Section 33 as the section in which to test the pilot project for the horizontal well?

A. Yes, sir. Our interpretation, we feel that there

is a recognizable fracture trend of northwest to southeast; therefore, by drilling in a northeasterly direction, we would hope to encounter maximum fracture concentration.

Q. Provide the Examiner with the reasons you believe that fracture trend is oriented in the northeast -- I'm sorry -- the northwest/southeast direction.

A. Through the use of high-altitude photography and land set imaging, we feel that we've been able to delineate these fracture systems due to the uplift and recurrent movement of the Nacimiento feature, which is just east of the map area, and reactivation of the Nacimiento uplift during Tertiary and Cenozoic time movement on preexisting basement features has caused considerable fracturing, extensional fracturing in this area on a northwest/southeast trend.

Q. When we look at the structural map and see the orientation of the structural contours, they generally run from northeast to southwest. Your analysis indicates that there is a fracture system perpendicular, generally perpendicular to the orientation of the structure?

A. Yes, that's correct.

Q. And so that your plan, then, is to go approximately parallel to the strike of the structure as displayed on the exhibit?

A. Yes, as a regional structure, that's correct.

(Applicant KLM Exhibit No. 2 was marked for identification.)

Q. Let's look at your cross section now, Mr. Sommer. That's marked as Exhibit No. 2. Give us a chance to unfold this.

(Discussion off the record.)

Q. Using Exhibit 1, which has the line of cross section on it, and starting with the west or the A position of the left side of your Exhibit No. 2, take us from left to right on the cross section and give us a summary of the wells that you've selected to utilize for the cross section.

A. Okay. Well No. 1 is a well drilled within the Canada Ojitos Unit and is operated by Benson-Montin-Greer. This well was drilled in approximately 1970 and completed as a Niobrara "C" zone producer. It has initial potential of approximately 79 barrels of oil, 24,000 cubic feet of gas a day, and through to December of 1990 has a cumulative production of approximately 121,000 barrels of oil.

The second well is what was drilled in Section 28 of 24 North 1 West by Mobil Producing. This well had initial potential of 35 barrels of oil and 39 MCF of gas a day, was completed through perforations from the Niobrara "A" through the Niobrara "C" zone, hydraulically fractured. This well, due to its proximity to a fracture system, proved not to be an economic well and has currently

been temporarily abandoned.

The fourth well on the cross section -- or the third well -- was drilled in Section 3 by Amoco Production Company. Again it was completed in the "A," "B" and "C" members of the Niobrara. Again it was hydraulically fractured with limited success, and to date with only 6,200-plus barrels will probably be uneconomic.

Our proposed location is in between these two wells.

Also noted on the structural cross section, there's a nosing through Section 34, which has been designated as the "Schmitz Anticline." We feel that we should benefit from additional fracturing concurrent with the Schmitz Anticline.

The last well on the cross section is as much Nassau Resources, the Wishing Well, in Section 35. It again was completed by limited-entry techniques in the "A," "B" and "C" zone, and was hydraulically fractured, had an initial potential of 402 barrels of oil and 359 MCF of gas, and to date has cumed over 93,000 barrels. This well demonstrates that the type of well, an economic well, that can be found if a guy's in close communication with the fracture system.

And again the final well on the cross section was drilled by Amoco, the State CC well. It values -- it had an

IT of 325 barrels of oil, and, again, completed in the "A," "B" and "C" zones of the Niobrara, has a cumulative production of over 208,000 barrels, and also demonstrates the types of wells that could be obtainable when a person is in or near one of these high-capacity fracture systems.

(KLM Applicant Exhibit 3 was marked for identification.)

Q. Let me direct your attention now, Mr. Sommer, to Exhibit No. 3.

A. Exhibit 3.

MR. KELLAHIN: Mr. Examiner, we have a drilling engineer that will talk about the aspects of the high-angle wellbore and the engineering components of it, but I did want to ask Mr. Sommer some geologic questions about the planned program for the horizontal well. Looking at Exhibit No. 3 what are we seeing, Mr. Sommer?

A. We're looking at a vertical profile of our proposed horizontal drilling pilot project.

Q. (By Mr. Kellahin) Why have you selected to target as the principal objective the Niobrara "C" zone of the pool?

A. Both from our investigation and literature research, it has been determined that the "C" zone of the Niobrara is the primary producing interval of the southern portion of the West Puerto Chiquito field.

Q. Give us a summary of the anticipated plan for drilling and completing this well insofar as it fits within your geologic goals that you're trying to achieve.

A. Basically, we intend to drill a 6900-foot pilot hole, at which time we will run an e. log survey in the well to determine the size formation boundary tops, and at that time adjust, if warranted, our kick-off points so that we may enter our targeted Niobrara "C" zone at the optimum depth.

Q. When we look at the ownership of Section 33, are all those working interest owners under the control of KLM as the operator of the section?

A. Yes. KLM owns 100 percent working interest in the prospect section.

Q. And what is the status of the necessary approvals for use of the surface for the drilling of this?

A. The west half is fee lease, and the landowner has been notified, and the location has been verified, and he has been satisfied with our intent.

Q. What is your timing for the commencement of this well, Mr. Sommer?

A. Our anticipated timing is approximately August 1st, depending on rig availability and service company availability and so forth.

MR. KELLAHIN: That concludes my examination of

Mr. Sommer. Mr. Examiner, we would move the introduction Exhibits 1, 2 and 3.

EXAMINER MORROW: Exhibits 1, 2 and 3 are admitted.

(Applicant KLM Exhibits 1, 2 and 3 were admitted into evidence.)

MR. KELLAHIN: You can stay there.

EXAMINATION

BY EXAMINER MORROW:

Q. Are all of the wells on the cross section vertical --

A. Yes, they are.

Q. -- wells?

A. Yes, they are.

Q. Do you have any information from horizontal wells which have been drilled or started in this pool?

A. We are aware that BMG of Farmington has just recently completed the drilling of the first horizontal well in this immediate field area.

Q. Do you have any information from that test?

A. As far as we know, the well was a mechanical success, but of course the other information is being held confidential as far as production rates and so forth.

Q. And is it -- is that the only well that you know of?

A. To my knowledge, that is the only attempted well

in the West Puerto Chiquito field area.

Q. Do you know of any in the east area?

A. I do not know of any in the east.

Q. Are the -- the dates -- you probably said this in your testimony -- the dates shown on the cross section at the base of each well or electric log, are those completion dates?

A. Those are completion dates; that's correct.

Q. We had three or four cases six weeks ago, American Hunter presented an application, and in their testimony -- I understand it was probably some distance from here -- but in their testimony they told us that the orientation of the fracture system is north and south rather than northwest/southeast. Do you have knowledge of that, and could you explain the difference if you know the difference?

A. Well, I believe that that particular location is located in 27 North 1 or 2 West, and in that particular area the orientation of the basin is approximately north/south. However in our area, the emplacement of the Nacimiento uplift, the northern boundary, has created a wrench in the basin where there is a western change in direction of the basin boundary, and due to that wrenching, we feel has created a northwest/southeast extensional fracture system.

Q. You feel that caused some additional fractures?

A. Yes, I do.

Q. It seems like it might.

A. Yes, I do.

Q. Okay. What was the name of the anticline? I didn't catch it.

A. It's noted as the Schmitz Anticline. That's S-c-h-m-i-t-z.

Q. The well is proposed as a 90-degree well, and I guess there's -- how much dip did you say?

A. Well, in this particular area the dip is in a northwesterly direction at approximately a hundred feet a mile; however, by drilling at northeasterly direction, we should essentially be drilling parallel to strike.

Q. Oh, okay.

A. However, you know, depending on what open-hole surveys show at the end of the drilling of the pilot hole, we may have to adjust those somewhat, depending on our --

Q. Approximately?

A. -- accuracy, yes.

Q. You're asking for approximately 90 degrees, and it wouldn't be exactly that. You would follow the formation.

A. That's correct, probably within a 20-foot interval.

EXAMINER MORROW: Okay. Bob, do you have any

questions?

MR. STOVALL: I have just got a couple, and they're as much curiosity as anything, I guess.

EXAMINATION

BY MR. STOVALL:

Q. How thick is the "C" through here?

A. Well, the "C" zone varies; well, it's approximately 60 or 70 feet thick.

Q. There is not any water problems in the Niobrara, is there?

A. No, there isn't.

Q. In looking at your -- looking at your structure map, I assume that down around section 1 of, what is it, 1 West, 23 South?

A. Yes. 23 North, 1 West.

Q. Is that an outcrop there of the Mancos?

A. Approximately the Dakota outcrop is a little further, about a mile east, but the Niobrara "A" zone there does not crop out to the surface, but those sub "C" Gavilans there are on the Niobrara zone.

Q. That's that ridge you can see from the --

A. Yes, sir.

Q. Now, if I remember correctly, that steep dip continues on further north up even as far as 27; is that right?

A. Yes, it does.

Q. But it moves further east, is that what you're indicating?

A. Yes, it does.

Q. Now, are you familiar -- and I believe, and I just want to confirm, I believe Mobil sought the establishment of a pool, and I think it may have been for the Schmitz section. What is that?

A. That's in section --

Q. 34?

A. 34, yes. They -- Mobil, I believe, they had filed for Mancos -- new pool Mancos destination and at one time was designated as Regina field, and then later it was reincorporated into West Puerto Chiquito field.

Q. I think there is another one, maybe, Mr. Kellahin, you can tell me. Do you remember when that one --

A. It was in section --

Q. -- temporary rules and then they didn't come back to --

A. In section 15 they, I think, might have tried for an additional new field destination. The number 1-15 Badland Hills in the very southern -- or Section 15 of 23 North, 1 West, there's a plus 9-19 sub "C" there.

Q. Okay that may be the pool I'm thinking of. Okay.

A. And I understand that that well has been P&A'd.

Q. And one last, the little stapled-type, light-dotted boundary that you show, the light-dotted lines around the --

A. That shows our proposed surface location, and then --

Q. No, excuse me. I'm talking about, it starts at the west end. Is that the forest --

A. That's the Santa Fe National Forest boundary.

Q. I see that, okay.

MR. STOVALL: No further questions.

EXAMINER MORROW: The witness may be excused.

HARVEY FRANCIS,

the Witness herein, having been previously duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Francis, for the record, would you please state your name and occupation?

A. My name is Harvey Francis. I'm a horizontal driller and manager for ENSCO Technology.

Q. Mr. Francis, on prior occasions have you testified before the Oil Conservation Division of New Mexico?

A. No, I have not.

Q. Summarize for us your educational background and your employment experience.

A. I'm not a degreed engineer. I'm a high school graduate, got out of the service and went to work in the oil business in West Texas. I roughnecked and I drilled on holes in Fort Stockton, Texas; and from there I went to work for a company called Christianson Diamond Products Company. At that time I was down-hole pool supervisor, evolved into sales and supervisory, and eventually manager, left there went to work for Eastman Oil Well Survey Company where I directional drilled throughout the world. Came back to the United States --

Q. How long did you work for Eastman?

A. Five-and-a-half years.

Q. I see.

A. Came back to the United States and directional drilled for Eastman a couple of years here, and was a manager in the Rocky Mountains for a company called DIG for two years; started my own business, ran my own business from 1979 until 1983, directional drilling throughout the Rocky Mountains, and left that company and went back to Midland and Saudi Arabia where I was a manager and supervisor, and came back home and was a drilling consultant, and went to work for ENSCO Technology.

Q. Summarize for us, based upon your experience as a

horizontal driller, the approximate number of horizontal wells that you have been personally involved in.

A. Probably 20 to 30 that I personally drilled.

Q. When you talk about "personally drilled," summarize for us the specific details of the drilling aspects that you were involved in.

A. Well, I was used for the preplanning, some of the engineering, post-engineering, pre-engineering information and planning, and then I actually went to the wellsite and the drilling of the wells, selection of the tools, and follow through on the original plan, and changing and making any impromptu decisions that needed to be made to the well.

Q. What is it that you have done for ENSCO -- it's E-N-S-C-O -- concerning the KLM horizontal well that's the subject of this application?

A. I've had a tremendous amount of contacts with Mr. Dan Sommer and gathered the information from Dan for the preplanning, correlated with my Houston office and the engineering department within my company, and submitted engineering information to them, which generated a well plan and, of course, a cost summary for the well for my part of it.

Q. Are you familiar with the details and the various engineering aspects of the horizontal portion of the well?

A. Yes, sir, I am.

MR. KELLAHIN: We tender Mr. Francis, Mr. Examiner, as a practical, experienced engineer with expertise in horizontal drilling.

EXAMINER MORROW: Appears to be well qualified.

Q. (By Mr. Kellahin) Mr. Francis, let me have you take the schematic that we've shown as Exhibit No. 3. Mr. Sommer has indicated that his company plans to drill a pilot hole. Let's start at that point and have you summarize for us your understanding of the pilot hole aspects, and then let's go back and talk about how you propose to establish the kickoff point and commence, then, the drilling of the angle portion of the well, and concluding with the horizontal or lateral portion of the wellbore.

A. Yes, sir. To begin with, the pilot hole was recommended to be drilled to 6900, based upon the figures that KLM had given us.

Q. What is accomplished by the drilling of a pilot hole?

A. The pilot hole lets you correlate. After you drill your pilot hole, you run your electric logs, and then you can get very tight control on your formation tops, which lets you stay within a very close area in the pay zone.

Q. Once that's done, then you will establish the top of the Niobrara or some other marker for the pool, and then

establish a kickoff point for the angle portion?

A. Yes, sir, that's correct.

Q. All right. Describe for us that process.

A. Okay. Based on the data that we have today, which I will use the data that's on this proposal to make -- for simplification and ease of understanding it, I will just submit that the figures are -- turn out to be as we drew the plan for simplicity.

Okay. We're going to drill a pilot hole to 6900 feet log to well, and we will then set 9-5/8 casing at approximately 5700 feet after plugging back the well. The reason that we want to set the casing at 5700 feet -- as you can see, kickoff point is 6137, true vertical depth or "TVD."

Although that seems like a long way, if there's any changes and we make any errors in our formation tops -- and that does happen -- we've got room to work; and the reason why that is, is from the bit to the top of the survey instrument is plus or minus 90 feet, and you must have room from the bottom of your casing down to your survey point to eliminate magnetic interference.

The casing acts as a long magnet with either the negative or the positive on either end, so you must have some distance from your casing. So if we were unfortunate and we miscalculated the top, and one of the tops was quite

a bit more shallow than what we had anticipated, we can still have the maneuverability to raise the kickoff point.

EXAMINER MORROW: Where is the kickoff point again? I missed that.

THE WITNESS: 6137 true vertical depth as proposed.

MR. KELLAHIN: It should be reflected on Exhibit 3's notation which Mr. Francis has summarized some of the markers.

Q. (By Mr. Kellahin) All right. Once you've established your kickoff point, then what do you do, Mr. Francis?

A. I will go in with my drilling tools. My drilling tools, a brief summary of those is I will go in with a mud motor or a down-hole drilling motor. We'll use a positive displacement tool, a true drill, which my company owns, and it will have approximately a 1-1/2-to-2-degree bent housing. It will have -- on top of the motor it will have a bent sub, normally a 1-1/2-to-1-3/4-degree bent sub.

We're proposing to drill an 8-1/2 hole, so at 10 degrees a hundred, you're looking at approximately a 1-1/2-degree bent sub, and probably in reality a 1-3/4-degree bent housing. If we have trouble building angle, we've still got more that we can crank our tool up 2 degrees and not misalign our orientation; and also if push comes to shove, we have a special pad that we can put on our

motors to increase the angle.

The biggest problem with the horizontal drilling is the curve where you don't get the actual build rate, and if you're trying to build -- have a buildup where it is 10 degrees per 100 feet, it's very easy to get behind, and once you get behind, just say you make 100 feet with only 8-1/2 or 9 degrees, the following 100 feet you may need to make 10 to 12 to 14.

The problem with that system is the limitations of the 8-1/2-range tool. Really, the top side of that is about 14 degrees, so if you couldn't make 10, it's doubtful that you could make 14. The problem with this is that you're going to come in very low because you must intersect the end of the curve with the angle desired.

If you don't, you'll -- if you don't have enough, you'll go out the bottom. If you've got too much, you'll come out the top. It causes a problem at the very end of the curve, and operationally you may not get the horizontal displacement that you desired because it's kind of like a Chinese finger puzzle, if you will. So you can't control the horizontal section of the well as well if you do not have a good intersection of the end curve.

Q. Assuming you're successful with building the curve as you plan, what then do you do?

A. Okay. We were proposing building the curve to 57

-- approximately 57-1/2 degrees or, say, just below 60 and setting 7-inch casing. There is probably two good reasons for that. First of all, mechanically we found in our business -- my company has drilled well over 300 wells -- we found that no matter where you drill wells -- and this holds true for the Wyoming area, North Dakota and Utah and, of course, in south Texas also, the area between 40 and 60 degrees is kind of a no-man's-land area -- we found that it's not only in the actual drilling of it, it changes characteristics. We found that through the life of the well if you have much hole problems, that's probably where it's going to come from.

So we propose to set the pipe at roughly 60 degrees or just under 60 degrees, just for a little insurance, if you will. And so that takes care of the operations; however, in production of the well, which I'm not really dealing with, in the production of the well it's a great place to set pipe because you can still work in and out the bottom curve with any production equipment, very easy to run liners, et cetera, with casing at this depth.

So we propose, then, after we set the 7-inch casing, to come out of that drilling a 6-1/8 hole. With that we will run a 4-3/4 mud motor, configured essentially the same way, with again the bent housing and the bent sub on top of it.

Now, once we get to approximately 84 to 86 degrees, depending on the build rate of the well, we will pull that, although we will be short of 90, and we will go in with what we call just a "straight steerable system." What it really consists of is 1/2-degree bent housing in most cases, slightly under-gauge, near-bit stabilizer on the mud motor, and straight orientation sub on top of the mud motor.

With that particular system and a steering device on top with that particular assembly, with that assembly, you can make minor correction runs as you drill horizontally. Note, I said that we would stop about 85 degrees instead of 90, the reason being is because once you've got an arc started, your drilling tool tends to follow that arc and straighten out rather slowly; so by the time you get to 90 degrees, you would have broke the arc and in theory be drilling 90 degrees.

So at that time you actually rotate your drill string just as you would any drilling assembly. And if you get off course in any way, we would know this because we would be taking surveys every 30 feet and calculating and projecting every 30 feet.

Q. Up to that point, how are you steering or controlling where you are?

A. Oh, okay. On this particular well we recommended

that we ran a steering tool, a wire-line steering tool, in conjunction with what we call a "wire-line, wet-connect system." At any rate, what the wire-line, wet-connect does is you've got the steering tool locked in to the top of your mud motor in a latching assembly.

You've got the wire line stretched through almost to the surface with a landing sub. It's fluted. I don't know if I'm talking the wrong -- It's fluted, and you can pump through it; and the beauty of it is, you can pull off from the surface, rotate it just as you would any MWD or any other subsurface orienting device. It gives you real-time surveys, and it works well either in well, air mist, foam or aerated mud.

Q. Let's talk about the drilling fluid. From surface down through building the curve, what are the fluids or the mediums that you're going to drill with?

A. We're going the run just a regular drilling fluid. We believe that -- just the regular drilling fluid that could be aerated. These formations in this particular area are essentially underbalanced even on the top part, and we believe that the aerated mud system should be the mud to use. Just a standard aerated mud is what we're talking about.

Q. When you've finished building the curve, and you're now drilling the horizontal lateral, how do you drill

and set that up for production?

A. I don't --

Q. All right. You continue to drill with what type of tool completing the lateral?

A. Okay. With this bent-housing tool, the 1/2-degree bent housing, because it's a steerable system.

Q. Once you've competed that lateral, then, what does the operator do to set it up for production? Is it simply an open-hole lateral, or is it lined in some type --

A. Again, that's not my area of expertise. However, most do run either a pre -- a pre-perforated liner or slotted liner, and there are a lot of specialty liners, but there are a lot of open-hole completions; and I'm not sure how Al Greer has completed his. I work with Al Greer, and I'm not certain how he has completed his. Again, completion is not my area of expertise.

Q. In your opinion, is the proposed plan of drilling this horizontal well, one that meets the standards of the industry for horizontal wells and should be reasonably feasible for the drilling of the well?

A. Yes, sir.

MR. KELLAHIN: I believe that's all the questions I had of Mr. Francis, Mr. Examiner. We'll tender him for cross-examination.

EXAMINER MORROW: Okay.

EXAMINATION

BY EXAMINER MORROW:

Q. Do you know if surface casing will be set in the well? And maybe that's on the diagram, too.

A. Well, actually the surface casing, I'm sure the surface casing will. Again I am not the actual engineer, but I'm certain that it will be.

Q. Will the 7-inch be circulated with cement behind the --

A. Yes, sir.

Q. -- to the surface?

A. I don't think so. They were planning on hanging a liner.

Q. I'm talking about the 7-inch.

A. That's what I'm talking about, hanging a 7-inch liner.

Q. Well, I'm really talking about the 9-5/8 more than anything.

A. Pardon me. Yes, sir, it will be.

Q. It will be circulated.

And it would be a liner of 7 inches.

(Discussion off the record with the reporter.

MR. KELLAHIN: The 7 inches is the liner.

EXAMINER MORROW: Yeah, is a 7-inch liner. I confirmed his previous answer.

Q. (By Examiner Morrow) Do you know what -- what between 5700 feet and 6137 that will be -- Let me withdraw that question. That's not important since I know that you're going to hang a liner and cover that, and I assume cement it back up into the 9-5/8.

A. Yes, sir.

Q. Okay. Will the well be under control at all times, or would you at allow it to flow formation fluids while drilling or not?

A. I would think -- I'm really out of school here. I need to get with the drilling engineer, but I would assume that standard horizontal drilling techniques does -- does normally require the flowing back of the formation or drilling of a live well; and so, therefore, the answer to your question, I can only suppose as an absolute yes because you couldn't drill it without that.

Q. How would you control that flow?

A. I would recommend -- that's a relatively low-pressure area. I would recommend just using a rotating head of some sort.

Q. Would you have a standard flowout preventive setup --

A. Oh, yes, sir.

Q. -- in some of the wells in addition to that rotating --

A. Yes, sir, definitely, complete with high drill.

(Off the record with the court reporter.)

A. Yeah, "high drill."

Q. And two round --

A. Yes.

Q. -- run --

A. In fact with --

Q. -- and then the rotation?

A. Yes, sir.

Q. You indicated it would be just a regular mud. That's a water base?

A. Water-base mud. There has -- I'd like to leave that open just a little bit. We're still kicking around what kind of mud to run, but at this time we're leaning toward just a nonevasive, water-type mud at this point with aeration.

Q. Mr. Greer you mentioned, I understand he may have used some oil?

A. Mr. Greer used gasified oil, a very interesting concept.

MR. KELLAHIN: He's an interesting guy.

Q. (By Examiner Morrow) Now, the data transmission and your directional and angle formation will be through the wire line --

A. Yes, sir.

Q. -- is that your testimony?

A. Yes. It's a single conductor wire line.

Q. How do you get the signal from the place where the wire line doesn't extend up to the surface?

A. We have on the surface a wire line truck with a dual drum that goes up into the derrick, runs the line down through the crown, in through a rotating packoff, and goes down in and there's a -- it just essentially a plug that rides down approximately 150, 200 feet above the wet connection.

When you get ready to make a connection, for instance, obviously you're disconnected. You take your pump out, leave your pump pressure off, bleed off your packoff, come back down and plug into it. This is a very quick displacement. It's about two minutes and sometimes less. The beauty of it, it's a real-time survey, so as soon as you plug in, you've got a survey. It's not like a traditional MWD where you have to wait 15 seconds, 2 minutes or something. As soon as you plug in, you've got a real-time survey. That's a real plus for --

Q. Well, whenever you're going to get data from down hole, you plug in with the wire line --

A. Yes, sir, that's correct.

Q. -- as far as you have it?

A. Yes, sir, that's correct.

Q. And the traditional or, I believe what you called it, the system conducts a signal through the drilling --

A. Traditionally --

(Off the record with the reporter.)

THE WITNESS: I'm sorry.

Q. (By Examiner Morrow) -- fluid.

A. Yes, sir, that's right. What's traditional today is a standard what they call "MWD" or "measurement while drilling," and that does transmit signals normally through the mud or the drilling fluid. The problem with that is when you aerate, then that signal is, at best, corrupted. Sometimes you can't get it to work at all, and more often than not you're going to have corrupt, incorrect data being set up. Some data you can't even read. So it normally takes a lot of rig time to go ahead and use those systems in an aerated mud due to fact of the corrupted signals coming up through the aerated mud.

Q. What did you call your system?

A. It's a wire line, wet connect, is what we really call it.

Q. You indicated that when you get out in the horizontal portion of the well, that you would turn the bit with a rotary cable.

A. I will turn the mud motor with the rotary cable, and the mud motor will also turn the bit. The bit will be

rotating approximately 100 rpm, plus or minus, from the mud motor; and you will also in addition to that turn the rotary cable, which compounds the rpm. However fast you're turning your rotary cable, you add to the rpm that you're pumping through the mud motor.

Q. All right. So you would continue to turn with your mud motor at about the same speed you were when you were building your angle? That's a question.

A. Yes, sir.

Q. Okay.

A. Yes, sir.

EXAMINER MORROW: That's all the questions I have. Bob, do you have any?

MR. STOVALL: Boy, you guys are way beyond me on that one. I've got a lot of things that occurred to me. No, no questions.

EXAMINER MORROW: Mr. Francis, you may be excused. Thank you.

MR. KELLAHIN: Mr. Examiner, I'd like to call Mr. Kemp Hipple. Mr. Hipple is a landman. I want to verify the offset notice to the adjacent operators.

(Discussion off the record.)

MR. KELLAHIN: No, he was not available now. On production information Dan Sommer knows a great deal about the practical aspect of how they're going to attempt

production. We can recall him.

MR. STOVALL: I have a few questions that I'd like to ask him.

MR. KELLAHIN: We're going to recall you, Dan.

KEMP HIPPLE,

the Witness herein, having been previously duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Hipple, for the record, would you please state your name and occupation?

A. Yes. Kemp Hipple. I'm a petroleum landman. I live in Littleton, Colorado.

Q. Mr. Hipple, on prior occasions have you testified before the division?

A. I have not.

Q. Summarize for us your educational employment background with regard to petroleum land management.

A. Well, I'm not degreed. My degree isn't in petroleum land management. I have, however, been a petroleum landman for 14 years working for many majors and independents from coast to coast.

Q. With regards to the ownership in Section 33, have you been the individual responsible for consolidating the working interest ownership under a common plan of

development of Section 33 for this particular well?

A. I have.

Q. And have you accomplished that task?

A. I have.

Q. Have you also as a petroleum landman identified for the Examiner what you understand to be the current status of the working interest of the operators that adjoin Section 33?

A. Yes, I have.

Q. And how did you accomplish that task?

A. Through the running of the records and being in contact with the working interest owners.

Q. Is that something that you regularly do as part of performing your duties as a petroleum landman?

A. Yes, it is.

MR. KELLAHIN: We tender Mr. Hipple as a practical petroleum landman.

EXAMINER MORROW: We accept his qualifications.

(Applicant KLM Exhibit 4 was marked for identification.)

Q. (By Mr. Kellahin) Let me direct your attention, sir, to Exhibit No. 4. Very quickly looking at the center of the display in Section 33, which is the section that's the subject of the hearing --

A. Yes, it is.

Q. -- it notes names on there. Identify for us what the purpose is of those notations.

A. Those are the record title, working interest owners that we have our agreements with: west half of the section being Mobil 100 percent, east half being Mobil 50 percent and A.G. Hill 50 percent.

Q. When we look at each of the adjoining sections around Section 33, what have you shown for each of those sections?

A. Those are the record title, working interest owners.

Q. And to the best of your knowledge, that information is true and accurate and current?

A. Yes, it is.

Q. Pursuant to that information, have you caused notice of this hearing to be sent to all those particular individuals?

A. Yes, we have.

(Applicant KLM Exhibit 5 was marked for identification.)

MR. KELLAHIN: Mr. Examiner, Exhibit No. 5 -- and I'll have to submit the original.

EXAMINER MORROW: You've seen to it?

MR. KELLAHIN: There it is.

MR. STOVALL: Way ahead of yourself.

MR. KELLAHIN: Way ahead. Here's an extra copy, Mr. Examiner.

We would at this time move the introduction of Exhibits 4 and 5 and tender Mr. Hipple for examination.

EXAMINER MORROW: All right. We accept Exhibits 4 and 5.

(Applicant KLM Exhibits 4 and 5 were admitted into evidence.)

EXAMINATION

BY EXAMINER MORROW:

Q. I guess I need to know about KLM's interest in this. Is it a farm-in or what is the --

A. Yes, it is.

Q. -- the situation?

A. Yes, it is a farm-in.

MR. STOVALL: From both Mobil and Hill?

THE WITNESS: Yes.

EXAMINER MORROW: I don't believe I have any further questions.

MR. STOVALL: I don't think I do.

MR. KELLAHIN: Thank you, Mr. Hipple.

Dan, would you come back?

MR. KELLAHIN: Mr. Examiner, we would like to recall Mr. Sommer at this time for some additional questions with regards to the plan or the program for the drilling of the

horizontal well.

The Examiner has some additional questions, Mr. Sommer.

And I'll pass him for examination.

DANIEL R. SOMMER,

the Witness herein, having been previously duly sworn, was recalled, examined and testified further as follows:

EXAMINATION

BY EXAMINER MORROW:

Q. All right. Mr. Sommer, the question I had concerned the surface casing. Do you know where it would be?

A. Yes. We plan on setting it at 13-5/8 string at 400 feet.

Q. And I assume you would circulate the cement to the surface?

A. Yes, sir.

Q. Would that cover the fresh water strata in the area or not?

A. Yes, it will. If you'll note on all the wells presented on the cross section, I think the deepest surface casing set, there's approximately 365 feet, so we're going to have an extra joint of pipe in there.

Q. Have you made any projections on what you think the wells will produce for your AFE purposes?

A. It's very difficult to determine or estimate what kind of production one might expect from a fractured well. Looking at the well history of West Puerto Chiquito field, the vertical wells vary from uneconomic to very successful. There is one well that has produced in excess of 2.3 barrels. Our estimate, I don't think we could really make and accurate estimate in a fractured reservoir.

EXAMINER MORROW: Okay. Those were the questions I had.

Bob?

MR. STOVALL: Yes, I have a couple of questions as far as the drainage of the well.

FURTHER EXAMINATION

BY MR. STOVALL:

Q. Do you have any opinion as to the length of these fractures that you hope to intercept?

A. Well, the literature has shown that Al Greer with BMG through the use of limited data, being two interference tests within the West Puerto Chiquito field, he felt that those tests showed communication of wells of up to six miles. With limited data, I'm not sure that -- In certain instances that may be the case; however, it is known that these fracture systems can extend for miles.

It is uncertain whether or not they are all communicated within one another, whether there's -- you

know, there's longer fracture systems and there's shorter ones, but he has been able to demonstrate through interference tests that some of the wells within his unit have shown communication over miles.

Q. It's very good communication, I believe, like pressure response within --

A. Yes, sir.

Q. -- 30 minutes of a mile or 3/4 of a mile.

Is this area -- you're talking about basically a northwest/southeast fracture orientation, very -- a perpendicular, sort of minor fracture system that would --

A. Yes, it is common that you would have conjugate fracture systems at angles of 60 degrees from the primary fracture orientation or secondary fracture systems.

Q. Assuming you were successful in accomplishing what you would like to do, do you have an opinion as to what the potential drainage radius of a horizontal well which intercepts significant fracture might be?

A. Being that this area has not to date been explored with the horizontal program, looking at other areas, particularly the Bakken Shale, North Dakota and the Austin Chalk of South Texas, in North Dakota they have -- are currently applying for 320-acre spacing limits, and current is 640. The Austin Chalk is similar where they currently have 640-arce spacing, and some operators have

applied for 320-acre spacing.

And as you know, this area is currently under 640-acre spacing. There have been some wells drilled in Gavilan-Mancos pool to the north in 25 North 2 West on 320-acre spacing; however, we, you know, at this time would intend to stay within the 640-acre spacing rules.

Q. One last question. Do you know or does your company have any sort of ongoing farm-out agreements with any of the surrounding tracts, or if you're successful, you could step out and do some --

A. Yes, we do. We put together a fairly large acreage position in the southwestern portion of 24 North 1 West in the northwestern portion of 23 North 1 West with BHP, Mobil and A.G. Hill.

Q. So if this is a success and it looks like you've intercepted, you can step on out and do another one?

A. Yes. We'd have other locations available to us.

MR. STOVALL: No further questions.

EXAMINER MORROW: All right. You may be excused again, Mr. Sommer.

MR. KELLAHIN: That completes our presentation, Mr. Examiner.

THE COURT: Case 10348 will be taken under advisement.

(The foregoing hearing was concluded at the approximate hour of 10:25 a.m.)

STATE OF NEW MEXICO)
) ss.
COUNTY OF SANTA FE)

REPORTER'S CERTIFICATE

I, MAUREEN R. HUNNICUTT, RPR, a Certified Shorthand Reporter and Notary Public, DO HEREBY CERTIFY that I stenographically reported these proceedings before the Oil Conservation Division; and that the foregoing is a true, complete and accurate transcript of the proceedings of said hearing as appears from my stenographic notes so taken and transcribed under my personal supervision.

I FURTHER CERTIFY that I am not related to nor employed by any of the parties hereto, and have no interest in the outcome hereof.

DATED at Santa Fe, New Mexico, this 18th day of September, 1991.

Maureen R. Hunnicutt

MAUREEN R. HUNNICUTT, RPR
Certified Shorthand Reporter
CSR No. 166, Notary Public

My Commission Expires:
April 25, 1993

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 10348 heard by me on Sept 19 1991.

Michael E. Stogner, Chief Hearing Officer
Oil Conservation Division