NEW MEXICO OIL CONSERVATION DIVISION

STATE LAND OFFICE BUILDING

STATE OF NEW MEXICO

CASE NO. 10923

IN THE MATTER OF:

The Application of Marathon Oil Company for a High Angle/Horizontal Directional Drilling Pilot Project, Special Operating Rules Therefor, and an Unorthodox Producing Interval, Eddy County, New Mexico.

BEFORE:

DAVID R. CATANACH

Hearing Examiner

State Land Office Building

March 3, 1994

REPORTED BY:

CARLA DIANE RODRIGUEZ
Certified Shorthand Reporter
for the State of New Mexico

ORIGINAL

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I N D E X

E X H I B I T S

EXAMINER CATANACH: At this time we'll call Case 10923, which is the application of Marathon Oil Company for a high-angle/horizontal directional drilling pilot project, special operating rules therefor, and for an unorthodox producing interval, Eddy County, New Mexico.

Appearances in this case?

MR. KELLAHIN: Mr. Examiner, I'm Tom Kellahin of the Santa Fe law firm Kellahin & Kellahin. I'm appearing today in association with Mr. Dow Campbell, an attorney with Marathon Oil Company, from Midland, Texas. We're representing the Applicant in this case, and we have three witnesses to be sworn.

EXAMINER CATANACH: Any additional appearances? Let me swear in the witnesses at this time.

[And the witnesses were duly sworn.]

KURT MILLER

Having been first duly sworn upon his oath, was examined and testified as follows:

EXAMINATION

BY MR. KELLAHIN:

Q. Would you please state your name and occupation?

A. My name is Kurt Miller. I'm a geologist for Marathon Oil Company in Midland.

Q. Mr. Miller, on prior occasions, have you testified before the Division as a petroleum geologist?

A. No, sir, I have not.

Q. Summarize for us your education.

A. I received my bachelor of science degree in geology from the University of California, Los Angeles, in 1984. I received my master of science degree in geology from the Colorado School of Mines in 1987.

Q. Summarize for us your employment experience as a petroleum geologist.

A. I've worked for Marathon Oil Company as a geologist, full-time, since 1987.

Q. Have you been involved in making a geologic study of the facts surrounding this particular application?

A. Yes, sir, I have.

Q. Based upon that study, do you now have certain geologic conclusions and opinions?

A. Yes, sir, I do.

MR. KELLAHIN: Mr. Examiner, we tender Mr. Miller as an expert petroleum geologist.

EXAMINER CATANACH: Mr. Miller is so qualified.

Q. Mr. Miller, if you'll turn to what we've marked as Exhibit No. 1. Take a moment and explain to us where we are.

A. This is a general location map, showing the location of the Marathon Indian Basin "C" No. 1, within the Indian Basin field, and the proximity of that well to the South Dagger Draw field in the top center portion of the map, approximately five miles to the north.

Q. When you look north in this same township with your project well, you get to the north side of the township and there's a row of, what I would characterize, irregular-sized or short-sized sections?

A. Yes, sir.

Q. That's the approximate transition, if you will, between South Dagger Draw and Indian Basin?

A. Yes, sir, that's correct.

Q. All right. The spacing that you're dealing with in Indian Basin is what, sir?

A. 640 acres.

Q. What are your setback requirements for

wells within that reservoir?

A. 1650 feet.

Q. Let's turn to Exhibit No. 2. Let's identify the project area and the offsetting sections more specifically. Describe for us, exclusive of the structure for a moment, the information shown on the nine-section plat.

A. This is the nine-section plat surrounding the Marathon Indian Basin "C" No. 1. It shows the operatorship of these sections, and the wells that have penetrated the Upper Penn reservoir in the area.

Q. To your knowledge, has Marathon satisfied itself as to the accuracy of the offsetting operator information shown on the display?

A. Yes, sir.

Q. Have you caused notification to be sent to the other operators of your application for a high-angle/horizontal project area?

A. Yes, sir, we have.

Q. And has there been any objection received, to your knowledge, from any of the offset operators?

A. No.

Q. Show for us the significance of the structure that you have interpreted on this exhibit.

A. As I think I mentioned, this is a structure map, top of the Upper Penn reservoir, the producing reservoir within the Indian Basin field.

The significance of the structure here is that almost all of the wells downdip of the minus 3500-foot contour have watered out in the Indian Basin Field from gas production, and some of the wells just updip of the minus 3500-foot contour have also watered out or have seen some water encroachment.

Q. What is the objective of trying to take the existing well in Section 26, apply a short radius lateral to that well, and continue to produce, then, out of the Indian Basin? Why are you trying to do?

A. The objective is to position the short radius horizontal such that we stay above suspected water zone below the producing portion of the reservoir. And, being near the current gas/water contact, we'll be able to greatly increase the exposure of the borehole to the

reservoir interval and enhance productivity and ultimate recoverable reserves.

Q. Why would that make a difference over the ability of the vertical well to continue to produce its share of the gas out of the reservoir with its well?

A. The data we have on the vertical well at this time, we are seeing an increase in water production. We feel that water is coming into the wellbore from the zone beneath where the gas is being produced. And, if this continues as it is currently, we think the well will soon reach a point where it will not be producible.

Q. What is the basis for determining that you want to go south, within the spacing unit?

A. There's really two reasons. One is that the well directly to the north and wells also to the northeast, do not have the dolomite--productive dolomite facies within the top of the Upper Penn as we have in our well. So, we know the reservoir continuity does pinchout to the north, and we know that the reservoir is present to the south.

Also, we are going updip in that direction, away from where we think water

encroachment would be, and that is why we have chosen that direction.

Also, we are not going to go west at all from our current location, so we will not infringe upon the standard setback.

Q. Your application seeks to have a drilling/producing window that is contained within the section, whereby you would have an east boundary of 1650, a southern boundary of 1650, but that the north and west boundaries of the producing/drilling window would be 1500 feet from those two boundaries?

A. That is correct.

Q. What's the reason for that?

A. We ran a gyro on this well and, although the surface location is 1650 feet from the lease line, the kickoff point is 20 feet west of that point where we are initially drilling that horizontal out of the current well.

Q. So, the actual wellbore at the kickoff point has drifted slightly out of a standard location, and you want an additional footage in order to avoid any encroachment into the offsetting spacing units?

A. That is correct.

Q. All right. Do you have a cross-section that illustrates the relationship of the controlling wells in this area and shows us how you plan to do this?

A. Yes, sir. That is Exhibit 3.

Q. If you'll identify for us Exhibit No. 3?

A. Exhibit No. 3 is a south to north cross-section. The location of that cross-section is shown on Exhibit 2. It goes from the well immediately south of our "C" No. 1, through our well, and to the dry hole to the north in Section 23.

It is hung structurally on a minus 3600 foot datum, and the correlation of the top of the Upper Penn is shown. The perforations in the wells are also shown, and the DST information is shown.

The proposed short radius lateral is shown just left of our well location on the cross-section, by a schematic diagram of that horizontal.

Q. If the drilling engineer is successful in his efforts to execute your plan, where will that lateral be when we look at the log of the

Indian Basin "C" No. 1 well?

A. The window within the "C" No. 1 is from 7400 feet in depth to 7420 feet in depth.

Q. Why is that the objective?

A. Based on a log analysis, examining of cuttings from this well, and, I think as the reservoir engineer may testify, the production log that we have run on this well, the gas production appears to be coming from the approximately lower 10 feet of perforations in this wellbore, and that is a dolomite which is a producing rock type within the reservoir. The perforations above that point are actually within a tight limestone and add nothing to the production.

Q. The plan is to drill the lateral southerly, towards the well to the left on the cross-section? Towards the Apache Federal well?

A. Yes, that is correct, approximately plus or minus 500 feet, depending on the ease of getting that footage.

Q. What's the basis for having an objective of 500 feet, more or less?

A. From my understanding, it's basically a mechanical zone of comfort. We feel we can get

500 feet. We may, if it is drilling a well, as we get out to 500 feet, we may exceed that number.

Q. Are you seeking the flexibility to make those types of decisions in the field, such that so long as you honor the proposed setbacks, you might change the azimuth or extend the length of the lateral?

A. Yes, sir.

Q. Were Exhibits 1, 2 and 3 prepared by you or compiled under your direction and supervision, Mr. Miller?

A. Yes, sir, they were.

MR. KELLAHIN: We move the introduction of Mr. Miller's Exhibits 1, 2 and 3.

EXAMINER CATANACH: Exhibits 1, 2 and 3 will be admitted as evidence.

MR. KELLAHIN: That concludes my examination.

EXAMINATION

BY EXAMINER CATANACH:

Q. Mr. Miller, the No. 1 well is currently producing?

A. Yes, it is currently producing.

Q. Do you know how much it's producing at

this time?

A. Yes. It's making approximately two million cubic feet of gas per day and 150 barrels of water per day, and we've seen some increase in the water production and dropping off of the gas rate.

Q. 150 barrels of water a day?

A. That's right.

Q. And you said that it's producing from a limestone?

A. No. Actually, it's producing from dolomite. What I was referring to, the interval that is perforated, by examining the cuttings and the logs, I feel that most of the upper part of the perforated interval is actually tight limestone. All the production appears to be coming from the lower 10 feet or so of perforations. And the rock type, based on cuttings and the logs, again, is a dolomite in that interval. So that agrees with what we understand about the reservoir and agrees with the production log we have over this well.

Q. Okay.

A. As you go to the north, the well downdip on the cross-section, that same interval

is all tight limestone, and it was a dry hole.

Q. So your objective is to just drill the horizontal wellbore up-structure, to get above the gas/water contact?

A. Well, we believe that the water is actually channeling behind pipe in our well, as it currently is, and that by staying in that dolomite interval I referred to, from 7400 to 7420, that window, we should stay out of that water.

Q. So, it's really a mechanical problem with the well?

A. Yeah, there is some channeling behind pipe based on a production log. We do feel that the position that we're at structurally, that well has seen water encroachment, as other wells in the downdip area have seen, too.

Q. The objective is to get above the water and to get out of the water in your wellbore?

A. That is one objective. And, as I mentioned, by drilling the horizontal in a relatively thin reservoir, we should be able to greatly increase our exposure of the wellbore to the reservoir, increasing our productivity of the well.

Q. Are there fractures in the wellbore that you believe this is a fracture reservoir?

A. We feel that fractures are of minor importance. The vuggy porosity is the dominant factor of the production capability of the dolomite reservoir, in that we don't see a whole lot of indication of large, free-going fractures.

Q. By increasing your wellbore's exposure to the formation, that's just going to increase your recovery?

A. We feel that it will. It is experimental, in that no other horizontal wells have been drilled in the field in this reservoir.

Q. How long do you think your current well would last before it watered out?

A. We feel that probably within the year, or a matter of months. But it's difficult to estimate, from what I understand.

EXAMINER CATANACH: I think that's all I have.

MR. KELLAHIN: Mr. Examiner, I would like to recall Mr. Craig Young, who is our drilling engineer, as the drilling expert in this case.

May the record reflect that Mr. Young has been qualified as an expert, and continues to testify in that capacity in this case.

EXAMINER CATANACH: The record shall so reflect.

CRAIG E. YOUNG

Having been previously duly sworn upon his oath, was examined and testified further as follows:

EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Young, if you'll turn to what we've marked as Exhibit No. 4, what is shown on this display?

A. This is a wellbore, a current wellbore diagram representing the condition of the well today.

Q. Is this a viable candidate to take this wellbore, with this type of configuration, and reenter it for a short radius lateral, as Mr. Miller testified he wanted to accomplish?

A. Yes. It should be no problem at all in this particular wellbore.

Q. All right, sir. Let's turn to Exhibit No. 5. What are we looking at here?

A. Exhibit No. 5 is the result of the

directional surface survey that Kurt had mentioned. Basically, it was a gyro tool that was run to gather the deviation on the vertical wellbore. The upper right-hand quad depicts the displacement of the well.

Q. Surface location of the subject well is 1650 from the west and north boundaries of the spacing unit?

A. That is correct.

Q. When we get to your proposed kickoff point in this well, where are we?

A. At our proposed kickoff point, we are approximately 20 feet to the north and approximately 40 feet to the west.

Q. If we adjust the north and west boundaries of the drilling/producing window such that they're 1500 feet rather than 1650, does that give you enough operational flexibility, as a drilling engineer, to stay within that adjusted setback?

A. Yes. There should be no problem with that 1500 foot setback line.

Q. What is the basis for the kickoff point?

A. The basis for the kickoff point here

was one to kickoff below the shale that overlies the Upper Penn formation, or to minimize our contact with that shale.

Q. Why would you want to do that?

A. Basically, having the shales open, will tend to aggravation drilling and completion problems, and seize our open hole completions throughout the life. It's just a problem you may have to live with.

Q. Let's turn to Exhibit No. 6. Identify and describe what's shown on that display.

A. Basically, this is a plane view of our proposed horizontal well. It shows Section 26, it shows the proposed setback, and it shows the current bottomhole location of approximately 1630 feet from the north, 1610 from the west.

Q. What's the basis of proposing a lateral of 500 feet in length?

A. Experience in the short radius tells us that the first 300 to 500 feet are pretty easy to get. After that our costs tends to go up rapidly. A lot of that depends on the formation you're drilling, but current technology as it exists, the 500 foot is a reasonable length in a formation like this.

Q. Let's turn to Exhibit 7. Let me have you take this illustration shown on Exhibit 7 and walk us through the procedure.

A. Okay. This is a vertical section of the proposed well. The vertical line represents the current wellbore.

What will be done initially, we'll pull the production equipment again, squeeze the perforations that are existing in the wellbore, we'll section mill the casing, kick out of the casing, and drill approximately a 45-foot radius curve.

After that's done, then that curve will be drilled to approximately a 90-degree inclination.

After that's done, we will proceed with the drilling of our horizontal section.

Q. What's the drilling fluid used for the process?

A. Typically, in these type scenarios, a sheer cleaning polymer, an XCD type polymer are used.

Q. How are you going to know where you are at a given point in the process?

A. We have the results of the survey that

was presented earlier, and again we'll be running MWD tools right behind the motors we'll have a probe to tell us, in three dimensions, exactly where we are. We also have steering tool backups should the MWD tool fail.

Q. Once you have completed the drilling and stopped at the endpoint of the lateral, what, then, do you do?

A. Basically, at that point in time, we'll pull all the drilling equipment out of the well, run in with tubing to the end of the well, circulate the drilling fluids out, and then come up and set our protection equipment up such that tubing goes through the end of the curve, we have a production packer, and we'll attempt to get the well flowing at that point in time. It's more represented on the next exhibit.

Q. Turn now to Exhibit No. 8, Mr. Young. Do you have an illustration to show how you propose to complete the well?

A. Yes. This is a proposal on how we would complete the well. After the horizontal is drilled and all the drilling fluids are displaced out of the hole, we'll run in and land the production tubing basically at the end of the

curve.

Production tubing, then, would come back into the vertical well up to a packer. We would have a normal packer type completion from that point forward.

Q. Anything unusual or particularly complicated or troublesome about the drilling and completion of this well?

A. No, there's not.

MR. KELLAHIN: That concludes my examination of Mr. Young. We would move the introduction of his Exhibits 4 through 8.

EXAMINER CATANACH: Exhibits 4 through 8 will be admitted as evidence.

EXAMINATION

BY EXAMINER CATANACH:

Q. Mr. Young, I'm a little unclear about the location of the kickoff point. First of all, what depth is that?

A. The approximate kickoff point is 7362.

Q. At that depth, the location of the wellbore, you told me, is...

A. 1630 feet from the north line, 1610 feet from the west line.

Q. Where does the 1500 foot setback come

into play?

A. Due to the desire to drill in a due south orientation, what that does is give us some flexibility in the field. If, for example, we lose control of the tools during a period of time and start turning, it gives us time to react and correct back, without encroaching over the setback. It gives us a window of cushion there.

Q. Why would you need that flexibility in the north direction?

A. For this particular well, since we're already--I guess, to answer that question, we in all probability will not need that 1500 foot. But, as we get down there, and, for example, if we kickoff--I can't see us needing the 1500 foot. It's to provide the flexibility for field operations.

The only thing I could think of is if we kicked off in the wrong direction, and through trying to change directions and coming back to the due south direction.

Q. That direction has already been established?

A. That is correct.

Q. And it is directly due south?

A. That is correct.

Q. What type of drilling fluid do you use?

A. Typically, we like to use a sheer cleaning polymer, typically an XCD type system, a xanthene gum type system. What this does is gives us low viscosity while we're pumping. Then, when we stop pumping, it kind of provides us a lot of gel strength to hold cuttings.

Other advantages are, it's very good friction reducer, it's a very good lubricant, to help us slide out.

In this type of drilling we don't rotate the pipe while we're drilling, so all of its's sliding and we have an incredible amount of friction we're always combating.

Q. How big a section of casing do you mill in this type of operation?

A. 50 feet. Below kickoff point, we'll go 20 feet. Above kickoff point, we'll go 30 feet.

Primary reason for 30 foot above, is to remove magnetic effects and let us orient during kickoff. Primary reason for 20 foot below, is to give us time to get the bit out of the casing before we run into the stub we've left down there.

Q. Again, you only intend to take the well 500 feet at this point, but you want the flexibility to go further?

A. That is correct.

EXAMINER CATANACH: Okay. That's all I have of the witness. He may be excused.

MR. KELLAHIN: Call at this time, Mr. Examiner, our reservoir engineer, Rod Steward.

RODNEY STEWARD

Having been first duly sworn upon his oath, was examined and testified as follows:

EXAMINATION

BY MR. KELLAHIN:

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

A. My name is Rodney Steward. I'm a petroleum engineer with Marathon Oil Company in Midland, Texas.

Q. Mr. Steward, on prior occasions, have you testified as an engineer before the Division?

A. No, I have not.

Q. Summarize for us your education.

A. I received a bachelor of science in petroleum engineering, from the University of Oklahoma, in 1988.

Q. Subsequent to graduation, would you summarize your employment experience as a petroleum engineer?

A. I have been employed by Marathon Oil Company since graduation, in Midland, Texas, as both operation and reservoir engineer.

Q. Do your duties include reservoir duties with regards to the Indian Basin Upper Pennsylvanian gas pool, and within the area that this project is requesting?

A. Yes, that is correct.

MR. KELLAHIN: We tender Mr. Steward as an expert petroleum engineer.

EXAMINER CATANACH: Mr. Steward is so qualified.

Q. Mr. Steward, summarize, from an engineering perspective, what you're trying to accomplish.

A. The objective of the project is to improve productivity from this wellbore, while minimizing water production, extending the well's life, and hopefully increasing ultimate recovery.

Q. Let me have you turn, sir, to what's marked as Exhibit No. 9. What is this?

A. This is a section of a production log

run in this well. I believe it was run December 15th of last year.

Q. To what purpose have you utilized this information in deciding what to do with this well?

A. We've used this log in trying to determine where the production, both gas and water, are occurring in the wellbore.

Q. What have you concluded?

A. We see two interesting features in this well. In the far left track of the log, there is a section that is shaded in a squiggly line. Below 7420 feet, you're looking at a no-flow baseline. As you move up the wellbore, when the width of the shading increases, you're seeing increased flow rate in the wellbore. And you reach 100 percent flow of the well by the time you get to about 7405.

So, what we see is, all the production from this well is coming from the bottom 10 feet of perforations. And that basically helped us determine and justify the geologist's interpretation of the log and cuttings. In fact, all the dolomite section is low in the perforations.

Q. Does that tell you, based upon this data, where, in the reservoir, you need to put the lateral?

A. That gives you an indication of where the productive interval in the wellbore is.

Q. So, from your engineering perspective, where will you recommend that the lateral commence in the reservoir?

A. The lateral will be drilled in that area, below 7400 and above 7420.

Q. Have you plotted the production on this well?

A. Yes, I have.

Q. Let's turn to Exhibit 10. What is that?

A. Exhibit 10 is a production plot of the Indian Basin "C" No. 1, dating from 1980 forward.

Q. If we continue to produce this as a vertical well in the reservoir, without doing any more work on it, what do you forecast or foresee to happen to this well?

A. We forecast this well to continue declining rapidly. In general, the gas wells in this field begin to see increased water production at some time in their life as water

encroaches upon the well. At that time, the gas rates start to fall off. They literally roll over, and the wells die.

Q. Are you beginning to see that, or anticipate that event to occur in the near future in this well?

A. Yes.

Q. What kind of current rates do you have in the well?

A. This well is currently producing about two million cubic feet of gas a day, and about 150 barrels of water. The well was producing four million cubic feet of gas a day as recently as 1992.

Q. What is your forecast of the remaining productive life of this well, if we don't do anything?

A. You know, it's very hard to pinpoint, but we don't believe the well will last more than a couple of years, at tops, and probably much less than that.

Q. If the Division approves the application of the horizontal technology to this well, what do you hope to achieve, then, in terms of recovery? Will this improve or decrease

ultimate recovery from the reservoir?

A. This has never been tried before in Indian Basin, and our analysis indicates that we should improve recovery simply by abandoning this wellbore at a lower bottomhole pressure.

Q. Why would that be the case?

A. As you move down-structure, these wells are being encroached on by water and they're watering out. And, when you deplete the well or when it waters out, it's at a higher bottomhole pressure then those wells will be up-structure of the current contact.

Q. Have you visited with other operators in the area to determine whether or not they'll have any objection to the application of this technology in this portion of the pool?

A. Yes, we have.

Q. Have you received any objection?

A. No, we have not.

Q. Have you received any communications or support?

A. Yes, we have.

Q. Turn to Exhibit No. 11. Would you identify and describe that?

A. This is a letter from Mr. Rick Hall of

Oryx Energy Company addressed to Mr. Kellahin. This letter basically offers Oryx's support to this experimental project.

Q. What is the timing or the schedule for doing this work, Mr. Steward?

A. At the current time, we are looking at performing this work sometime later this summer, as we watch the oil rates fall off.

MR. KELLAHIN: Mr. Examiner, that concludes my examination of Mr. Steward. The final exhibit is Exhibit 12. It's our certificate of mailing in compliance with the notice rules.

We would move the introduction of Mr. Steward's Exhibits 9, 10, 11, which are his exhibits, and 12 is the notice. We move the introduction of Exhibits 9 through 12.

EXAMINER CATANACH: Exhibits 9 through 12 will be admitted as evidence.

EXAMINATION

BY EXAMINER CATANACH:

Q. Mr. Steward, is it possible to calculate the recoverable reserves at this point in time from the wellbore, left as it is?

A. Left as it is? The problem you're

dealing with, with trying to estimate remaining reserves in these wells, is you don't know. It's more of a mechanical problem. The gas rate falls off as the water comes up and at some point they die.

At this point in time, I think it would be really hard to project these reserves.

Q. Being this is experimental, is it possible you might lose this well by horizontally drilling it?

A. There is a possibility that, well, when you do perform the work, the likelihood of you being able to reenter the well and get back into the vertical completion is very slim. So, when you elect to do the work, then, you're going to take the horizontal well as its final completion.

Q. Do you think it's possible that this type of experiment can be conducted on the well that's already been watered out?

A. We've had little to no success in isolating water production in these wells, and we're not the only operator. There are no wells that we currently operate, that I know of, which have a gas productive interval, a small gas productive interval, that is still above the

encroaching water in which, you know, you could apply this technology.

Why horizontal technology is applicable here is that you have a narrow gas window still remaining in the well's producing area.

Q. You don't think it could be done on wells that are already watered out?

A. We don't have any wells that I think it could be done on right now.

EXAMINATION

BY MR. STOVALL:

Q. If a new well were being drilled in this reservoir today, would it be practical to drill it as a horizontal well initially, in an effort to, I guess, spread out the pressure sync and possibly reduce water encroachment in the first place, or would that work in this reservoir?

A. Depending on where in structure you are. We have a very low vertical permeability compared to the horizontal permeability. So, in areas high on structure, where you have several hundred feet of gas column, then a horizontal well is not applicable simply because you really don't have the positive aspects for it.

Very close to the gas/water contact is where it's more applicable. Historically, the method of operation out here has been when a well waters out, you move to the most up-structure spots you can on your lease in that reservoir, and drill another vertical well.

In this particular case, in Section 26, that well is down-structure roughly a hundred feet and, if I can refer to Exhibit 2, I think you can see it a little better, the structure map.

That well is approximately 100 feet down-structure of the Apache Federal "C" No. 1, and that well has already watered out. So, to come up-structure and drill another vertical well, would mean you're moving closer towards a well that's already been encroached upon and ceased to produce.

FURTHER EXAMINATION

BY EXAMINER CATANACH:

Q. Is there any way to quantify the additional recoveries you might get from this type of scenario?

A. We have looked at some numbers, using both reservoir models and analytical approaches.

What we've determined, or what we estimate, is we should be able to get anywhere between 250 to 300 million, up to closer to a Bcf of incremental gas. It's a pretty broad range right now, what we're working with.

Q. Is that 1 Bcf, that's additional from what you may recover from the vertical wellbore?

A. That's correct.

Q. Do you see this kind of technology as being widely applicable in this pool, or is this generally limited?

A. I see the technology as being very applicable along near the gas/water contact. I see it as not so applicable on top of structure, where you still have a very large gas column.

FURTHER EXAMINATION

BY MR. STOVALL:

Q. As the water moves in on the structure, would it be--water is coming from the west, right?

A. That's correct.

MR. KELLAHIN: No, east.

Q. Right. East. I'm trying to picture it. As the water moves in towards the west and it's filling up the structure, do you see doing

this to wells as the water--I mean, you could conceivably develop a line of horizontal wells, as the water encroaches more and more?

A. Over time you could do that.

MR. STOVALL: Nothing else.

EXAMINER CATANACH: That's all I have. The witness may be excused.

Is there anything further?

MR. KELLAHIN: That concludes our presentation.

EXAMINER CATANACH: There being nothing further in this case, Case 10923 will be taken under advisement.

(And the proceedings concluded.)

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 10923, heard by me on March 1994.

David R. Catanach, Examiner
Oil Conservation Division

CERTIFICATE OF REPORTER

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

I, Carla Diane Rodriguez, Certified Shorthand Reporter and Notary Public, HEREBY CERTIFY that the foregoing transcript of proceedings before the Oil Conservation Division was reported by me; that I caused my notes to be transcribed under my personal supervision; and that the foregoing is a true and accurate record of the proceedings.

I FURTHER CERTIFY that I am not a relative or employee of any of the parties or attorneys involved in this matter and that I have no personal interest in the final disposition of this matter.

WITNESS MY HAND AND SEAL April 11, 1994.

CARLA DIANE RODRIGUEZ, RPR
CSR No. 4