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:	)	CASE NO. 11,141
APPLICATION OF MARATHON OIL COMPANY	)	

ORIGINAL

REPORTER'S TRANSCRIPT OF PROCEEDINGS

EXAMINER HEARING

BEFORE: DAVID R. CATANACH, Hearing Examiner

November 10th, 1994

Santa Fe, New Mexico

This matter came on for hearing before the Oil Conservation Division on Thursday, November 10th, 1994, at Morgan Hall, State Land Office Building, 310 Old Santa Fe Trail, Santa Fe, New Mexico, before Steven T. Brenner, Certified Court Reporter No. 7 for the State of New Mexico.

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I N D E X

November 10th, 1994
Examiner Hearing
CASE NO. 11,141

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(Continued...)

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A P P E A R A N C E S

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* * *

WHEREUPON, the following proceedings were had at 9:15 a.m.:

EXAMINER CATANACH: At this time we'll call Case 11,141.

MR. CARROLL: Application of Marathon Oil Company for two additional high-angle/horizontal wells and to amend Division Order No. R-10,082, Lea County, New Mexico.

EXAMINER CATANACH: Are there appearances in this case?

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

EXAMINER CATANACH: Any additional appearances?

Will the witnesses please stand to be sworn in?

(Thereupon, the witnesses were sworn.)

MR. KELLAHIN: Mr. Examiner, I have provided you with a copy of the prior order issued by the Division. You, in fact, were the examiner in that case. It was presented back in March of 1994. It's Case Number 10,922. It's Order Number R-10,082.

The purposes of Marathon being back are to seek modification in that prior order.

The previous order had approved a project area for the horizontal well, and the initial well was to be

what we will tell you was the Denton Well Number 5.

Since then, the productivity of the Number 4 well has substantially reduced, and the Number 4 well has always been the better well to use to recomplete as the horizontal well.

We didn't choose it the first time because its producing rate was high enough to justify its continuing production.

So we're seeking to change from the Number 5 to the Number 4.

In addition, we're seeking approval of a second well, which we will show you is the Number 6 well. The testimony will be that it is fault-separated so that each of the two horizontal wells are accessing different portions of the same reservoir that are not in communication.

Those are most of the changes.

The last change is, because the Number 4 well is going to go horizontally into a 40-acre spacing unit for which there is still a vertical well producing, we need to combine the spacing units so that we have an allowable for the horizontal well that is the depth bracket on 40, times the two spacing units it's accessing, and to share that allowable with the vertical well, and that's what we're asking you to do.

The first witness this morning is Marathon's geologic witness, Mr. Val Ott. O-t-t is how he spells his name.

VALEN D. OTT,

the witness herein, after having been first duly sworn upon his oath, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. KELLAHIN:

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

A. My name is Valen D. Ott. I'm a senior geologist with Marathon Oil in Midland, Texas.

Q. Have you testified before the Division before as a geologist?

A. No, I have not.

Q. Summarize your education.

A. I obtained a bachelor's and master's degree in geology from Brigham Young University in 1979.

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

A. Subsequent to graduation I accepted a position with Marathon Oil in Casper, Wyoming. My duties there were exploration/development geology in various basins in the Rocky Mountains.

I was there about five years, and then accepted a

transfer to Marathon's research center in Littleton, Colorado. My duties there involved exploration and development geology projects around the world for Marathon.

I was there about three years and then accepted a position in Houston, Texas, also with Marathon Oil. While there, my duties included exploration and development projects in the Gulf of Mexico, Cook Inlet of Alaska, and eastern Canada.

Subsequent to that, I accepted a transfer to Marathon's mid-continent region in Midland, Texas, and have been working on the Denton-Devonian Pool since that time.

Q. Have you made a sufficient geologic study of the Denton-Devonian Pool to reach geologic conclusions that apply to this particular Application?

A. Yes, I have.

MR. KELLAHIN: We tender Mr. Ott as an expert geologist.

EXAMINER CATANACH: Mr. Ott is so qualified.

Q. (By Mr. Kellahin) Let me have you turn to the montage, Exhibit 1, that has the two different displays on it. If you'll identify the display for us, let me ask you some questions.

All right, sir, when we look at the left side of the display, what are we seeing?

A. The left side of the display is a diagram of the

Denton-Devonian Pool. The green-shaded area is an outline of the oil-productive interval for the Denton-Devonian.

Q. When we look at the right side of the display, what are we seeing?

A. We're seeing an enlarged area of the south half of that Denton-Devonian Pool.

Q. Within Section 11, what's the significance of the area shaded in yellow?

A. The area shaded in yellow in Section 11 is the lease operated by Marathon Oil.

Q. And that is the project area for the horizontal high-angle/directional drilling pilot project that the Division has previously approved?

A. That is correct.

Q. All right. As part of that approval, refresh the Examiner's memory as to what the concept was at the time we presented this case last to him on March 3rd of 1994.

A. At that time Marathon was seeking approval to drill a horizontal well from the Denton Number 5, which you'll note on the display in Section 11 in the yellow-shaded area. There's a wellbore there labeled Number 5. That would be the well that Marathon was seeking to drill the directional well from.

Q. What was the concept?

A. The concept was to drill down -- or kick off,

excuse me, kick off with a horizontal wellbore from the top of the Devonian and drill horizontally away from the Number 5 wellbore, which has severe water-coning, and encounter Devonian reservoir that did not have the severe water-coning problem that the Number 5 has.

Q. What was the planned direction for the horizontal portion of the wellbore?

A. At that time, I believe it was directed to the northeast.

Q. Why was that the purpose?

A. There were two objectives there. One was to encounter fractures within the horizontal segment of the proposed horizontal wellbore. The second objective was to stay within the 330-foot standoff around Marathon's operated leasehold.

Q. As part of the geologic study, did you also examine the transcript and exhibits from the prior case?

A. Yes, I did.

Q. Are any of your conclusions, geologic conclusions, different than the geologic conclusions we've already represented to the Division?

A. No, they are not.

Q. Let's go to Exhibit 2 for a moment and have you describe for us the geologic reasons that have caused you to recommend the horizontal well.

When -- Look at Exhibit 2 and show us what was trying to be achieved by using the Number 5 well.

A. On Exhibit Number 2, there is a dashed line that shows the outline of the Marathon-operated leasehold. Again, the Number 5 well is labeled within that leasehold.

At that time -- Excuse me, Mr. Kellahin, would you repeat the question? Are you referring to wellbore Number 5 or --

Q. Yes, sir, I want to start where we were in March --

A. Okay.

Q. -- have you describe what you were trying to achieve with the Number 5 well as depicted on this structure map.

A. Okay, I understand now.

At the time we were proposing to drill the horizontal well from the Number 5, we were proposing that in a northeasterly direction, which would have been upstructure, as you can see from the structure map, in a northeasterly direction that would have encountered, hopefully, open fractures within the Denton-Devonian and also would have stayed within that 330-foot standoff for the leaseholds.

Q. What do you propose to do by substituting the Number 4 well for the Number 5?

A. By substituting the Number 4 wellbore, we hope to get higher on the Denton-Devonian structure.

As you can see from the structure map, the highest point on that structure is immediately east of the Number 4 wellbore.

The proposed horizontal well from the Number 4 wellbore would be in an east southeast direction. It would be going upstructure and hopefully encountering the highest part of the Denton-Devonian structure. It would be approximately 168 feet higher on structure at the beginning of that horizontal leg than the previous approved horizontal well from the Number 5 wellbore.

Q. In terms of reservoir position, has the Number 4 well always been a better candidate for the horizontal technology than the Number 5 well?

A. Yes, it has.

Q. Why wasn't the Number 4 well originally selected, then?

A. At that time the Number 4 well was still producing at economically attractive rates. Since that time, the amount of oil that the Number 4 is producing has dropped off to about eight barrels of oil a day, which is subeconomic, and the well is currently shut in at this time.

Q. Let's go to the next topic. Part of our request

today is to also obtain approval to use the Number 6 well as a horizontal well.

Take this display and find the Number 6 well for us.

A. Okay, the Number 6 wellbore is in the eastern portion of the Marathon-operated leasehold. It would be in the southeast quarter of Section 11.

As you can see from the structure map, it's in a separate fault block from the Number 4 well.

Q. What's your plan for the Number 6 well?

A. The Number 6 well would be drilled in a northeasterly direction. The angle there would be north 20 degrees east, towards the Number 7 wellbore, and it would maintain approximately the same structural level as it currently stands, going slightly downdip, but stay within the same fault block that the current vertical wellbore is within.

Q. Why -- What are you trying to achieve by taking the Number 6 well and using it for a horizontal well drilled in that direction?

A. We would drill the Number 6 horizontal wellbore only in the event that we were successful in the Number 4.

If we can achieve additional production from the Number 4 horizontal and it is successful, then we would like approval to move to the Number 6 and drill the same

type of a horizontal well using the same technology to hopefully improve the oil rates from the Number 6.

Q. What's the reason for proposing to utilize horizontal technology in this portion of the pool, as opposed to additional vertical wells in this area?

A. The problem with the vertical wellbores in the Denton field is that the Denton-Devonian is a tight carbonate that's highly fractured, and because of that fractured nature, in a vertical wellbore there's severe water-coning around that wellbore.

And because of that severe water-coning, the water production increases considerably, the oil production diminishes, and we're not able to effectively drain a lot of the reservoir away from the vertical wellbores.

Q. Have you prepared cross-sections that illustrate your concept of accessing the very top, the crown, if you will, of the producing interval within this area?

A. Yes, I have.

Q. Let's look first, Mr. Ott, at Exhibit Number 3 and have you identify that for us.

A. Exhibit Number 3 is a cross-section oriented southwest to northeast through the Denton-Devonian Pool. It was submitted before the Conservation Division back in March, during our original request for authority to drill a horizontal well from the Number 5 wellbore.

Q. When you look at that cross-section and you find the Denton 5 well, which was the project well then, look down on that display and find the horizontal line that's indicated in red. What's the significance of that?

A. The small index map located down in the right -- or left-hand corner of the display, shows the Number 5 wellbore with a red line oriented to the northeast. That was the proposed pathway of the horizontal wellbore.

Q. All right. Now, while we keep that display out, let's go ahead and have you identify the cross-section that's marked Exhibit 4.

A. Exhibit 4 is a cross-section, again, through the Denton-Devonian Pool, labeled B-B'. It's oriented east-west, and on the small index map down in the lower left-hand corner, you can see from that index map that it goes through wells -- excuse me, Denton wells Number 9, Number 4, Number 3 and Number 7.

Also on that index map is a red line from Denton wellbore Number 4. That continues in a southeasterly direction. That would be the proposed direction for the horizontal leg of the Denton Number 4.

And also from the Number 6 is a red line extending to the northeastward. That would be the proposed pathway of the horizontal leg for the Denton Number 6 horizontal well.

Q. When we compare the two displays, Exhibit 3 to Exhibit 4, and look at the relationship of the Number 5 and the Number 4, describe for us what you are attempting to achieve with this Number 4 well that you were probably not going to do with the Number 5.

A. Shown on the cross-section, B-B', is an orange band that represents a tight interval at the top of the Denton-Devonian. That tight interval has very low matrix porosity and permeabilities.

The better part of the reservoir, and where most of the production in the Denton field has come from, is in the interval immediately below that orange band, which would be the main part of the reservoir, and there's much more porosity and permeability within that interval.

Shown on the cross-section B-B' is also an interval updip from the vertical wellbore for the Denton Number 4. The red line that you see there is the proposed path of the Denton Number 4 horizontal wellbore.

That, in our opinion, would access parts of the Devonian reservoir updip from any vertical well that's previously been drilled, and hence would be able to produce oil in an updip position that would otherwise be left behind and not produced by any vertical wellbores.

The cross-section, A-A', that was previously submitted to the Division, shows the proposed path of the

horizontal leg of the Denton Number 5, which is also marked in red on cross-section A-A'.

You can see from that diagram that it would not access this higher portion of the reservoir, and would indeed leave behind some oil that could not be produced even with the horizontal wellbore from the Number 5.

Q. When we substitute the Number 4 for the Number 5, do you have an opinion as to whether, in order to appropriately access the entire upper portion of the reservoir, it's going to be necessary for this horizontal portion of the Number 4 well to cross out of its 40-acre spacing unit into the adjoining spacing unit that's now dedicated to the Number 3 well?

A. Yes, that is correct. As you can see on cross-section B-B', there is a vertical blue line through the center of that cross-section, labeled "Proration Unit Boundary". That would be the projection of where that 40-acre spacing unit would be intersected by this cross-section.

And the proposed horizontal leg from Number 4, the proposed horizontal wellbore from Number 4, would indeed cross that proration unit boundary.

Q. Let's go back to Exhibit Number 2 and have you describe for us what you're going to do with the Number 6 well.

If the Number 4 well is successful -- and you judge success, I guess, by the only criteria and that would be productivity -- if it's successful at a certain producing rate, then you want to apply the same method to the Number 6 well; is that not true?

A. That is true.

Q. All right. What do you obtain with the Number 6 well that you don't achieve with a vertical well?

A. Again, let me refer back to the issue of coning around vertical wellbores.

As I mentioned, the Denton-Devonian reservoir is a tight carbonate for the most part that is highly fractured. We believe that those fractures are in communication vertically throughout the reservoir.

It is supported by an active water drive at the base of the reservoir, and therefore when you produce the oil from a vertical wellbore, you encounter water-coning from those vertical fractures.

The current water cut within the reservoir ranges anywhere from about four -- about 90 percent to about 98 percent water cut within the reservoir.

With a horizontal well such as we propose from the Number 4 and the Number 6, we anticipate that that water cut in those wellbores will be diminished considerably, from about 95 to 98 percent, down to about 85

to 90 percent. There will still be water production, but we feel that the oil production will be increased, the total oil will be increased, by using a horizontal wellbore.

Again, that would be to get away from the vertical wellbore, get away from the water-cone fractures, encounter additional fractures that have not been -- that have not been previously produced and have not been filled with water.

Q. We've requested the authorization to extend the horizontal portion of the Number 6 well so that if we choose to do so, we may drill it into the spacing unit that is currently dedicated to the Number 7 well.

What's the reason to have that approval?

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

Q. For the Number 4 well we have asked for approval to extend its horizontal portion into the spacing unit for the adjoining Well Number 3, and that was so that we could adequately expose the top portion of the reservoir in that entire lateral.

When we look at the Number 6 well, we want the chance to take that lateral not only up to the point of its spacing unit, but into the adjoining spacing unit for the Number 7 well.

What's the reason to do that?

A. Again, that would be to try and intersect an adequate fracture system that had not been water-coned, such that we could improve the oil productivity for the Number 6 wellbore and hence drain additional reservoir that would not be drained by a vertical wellbore.

MR. KELLAHIN: That concludes my examination of Mr. Ott.

We move the introductions of Exhibits 1 through 4.

EXAMINER CATANACH: Exhibits 1 through 4 will be admitted as evidence.

EXAMINATION

BY EXAMINER CATANACH:

Q. Mr. Ott, do you see any geologic evidence that shows that the eastern portion of that proration unit is separated in the Devonian from the western portion?

A. Yes. I would refer you to Exhibit Number 2, which is the structure map. That map is based on both subsurface well control and also 3-D seismic data.

Marathon's 3-D seismic interpretation fairly conclusively demonstrates that there is a north-south fault running through the lease, and therefore the Number 6 would be fault-separated from the western portion of the reservoir.

Q. Okay. Do you know offhand what the producing

capability of the Number 6 well is at the present time?

A. Let's see, the Number 6 is currently producing at 30 barrels of oil per day.

EXAMINER CATANACH: I have nothing further.

Mr. Kellahin?

MR. KELLAHIN: At this time, Mr. Examiner, we would call our reservoir engineer, Craig Kent.

CRAIG KENT,

the witness herein, after having been first duly sworn upon his oath, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Kent, would you please state your name and occupation?

A. My name is Craig Kent, and I'm a reservoir engineer with Marathon Oil Company in Midland, Texas.

Q. Mr. Kent, on prior occasions have you testified in that capacity before the Division and qualified as an expert witness?

A. Yes, I have.

Q. Pursuant to your employment in that field of expertise, have you made a study of the reservoir and production information available for this project?

A. Yes, I have.

Q. And based upon that study, do you now have

certain petroleum engineering conclusions and opinions?

A. Yes, I do.

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

EXAMINER CATANACH: Mr. Kent is so qualified.

Q. (By Mr. Kellahin) From a reservoir perspective, Mr. Kent, is this project feasible and practicable?

A. Yes, it is. This is a -- almost a classic case for trying to recover additional oil through the use of horizontal wellbores.

We have both -- two of the things you want to look for in oil reservoirs or horizontal wells or good applications.

Q. What are those things?

A. Vertical fracturing and water-coning issues.

Q. What do you hope to obtain with either the first and/or the second well that you can't obtain with additional vertical wells?

A. What we're hoping to attain is the production of additional oil that will not be recovered through the existing vertical wellbores and would not be recovered through additional vertical wellbores.

Q. Applying conventional engineering methodology and calculations, have you been able to forecast or quantify the volumes involved here?

A. Yes, I have.

Q. Let's look at those results and your work product. If you'll turn to Exhibit 5, let me have you identify that display.

A. Exhibit 5 is a production plot on -- showing the logarithm of rate versus time for the J.M. Denton Well Number 3.

Q. Why is this of any importance?

A. What we looked at, first starting with the proposal for our Number 4 horizontal well, was a volumetric study on the 80 acres surrounding Wells 3 and 4.

Q. What did you want to know?

A. What I wanted to look at was what the oil in place in the uppermost portion of the Devonian was, how much oil had been produced, and then therefore, how much oil -- how much oil was left to be produced from the vertical wellbores, and then how much oil, recoverable oil, would be left in the reservoir.

Q. All right. As part of your analysis, then, show us what information on Exhibit 5 was utilized by you in making that study.

A. Looking at the bottommost dark curve on the Exhibit 5, the J.M. Denton 3, that's a plot of daily average oil production from 1970 through 1974.

Shown on the far right is a dotted line

representing our projected decline for that well.

To date the well has cum'd about 2.9 million barrels of oil and has remaining reserves of just over 250,000 barrels of oil. Its current rate is roughly 130 barrels a day.

Q. All right, sir. Let's contrast that now to the production information shown on Exhibit 6, which is the data for the Denton Number 4 well.

A. Again, Exhibit 6 is a production plot for the Denton 4 well. The bottommost curve, the darkest line on the plot, represents daily average oil production for the Denton 4 from 1970 through 1994.

To date, the well has cum'd about 1.6 million barrels of oil, and its last rate prior to being shut in was about eight barrels a day.

The economic limit for the Devonian wells in this area is roughly 15 barrels of oil.

Q. All right. So the 4 Well is now a good candidate to be utilized for the horizontal purpose?

A. That's correct.

Q. When you analyze that 80-acre spacing unit between the 3 and the 4, have you been able to quantify the original oil in place?

A. Yes, I have.

Q. Is there a -- Before we go to the actual summary

of that information, let's step through that and have you show us Exhibit 7 and describe for us how this -- these two wells have been produced historically.

A. Exhibit 7 is a -- kind of a cartoon cross-section of the J.M. Denton 3 and 4, showing the completion intervals in each well and the recoveries based on the production history from individual zones within the two wells.

Historically, these wells were completed near the bottom of the Devonian, because as you move from the bottom to the top we see more matrix porosity in the bottom of the reservoir, diminishing as you move to the top. As you get to the top, both the porosity and the productivity are controlled more by fractures than by the matrix system.

Looking at the two wells, prior to about 1990, our completions were limited to what -- the producing intervals below what I've labeled "Reference Line". You can see our recovery from the Denton 3, about 2.7 million barrels; the Denton 4, about 1.4 million barrels.

Contrasted with recoveries above that reference line, the Denton has totaled about 95,000 barrels; in Denton 4, about 218,000 barrels of oil.

Q. As part of your engineering work, you want to focus in on the remaining oil potential that can be recovered from the upper portion of the Devonian Pool?

A. That's correct.

Q. All right. When we look at your calculations, what portion of the Upper Devonian Pool are you identifying?

A. All I'm looking at is that portion of the Devonian Pool above what I've labeled the reference line on Exhibit Number 7, which is roughly about minus 8100 subsea.

Q. All right, that represents the remaining potential, then, in those two spacing units in the Devonian Pool?

A. That's correct.

Q. All right. Let's go to the calculations shown on Exhibit 8. Take us through that and show us what you've done.

A. Exhibit 8 is a summary of the volumetric calculations to determine the remaining recoverable oil in the 80 acres surrounding Denton Wells Number 3 and 4.

From the geologic mapping, we see a bulk volume of about 64,000 acre-feet. We have an average porosity of about 2 1/2 percent, with water saturation around 46 percent. That gives us original oil in place in that upper portion of the Devonian of around 4 million barrels of oil.

Based on core analysis that we have on these wells, recoveries should range on the order of 40 to 50 percent. We used 40 percent for our analysis, which would

leave us recoverable oil in the upper portion of around 1.6 million barrels.

Our projected ultimate recovery from Wells 3 and 4 is about 660,000 barrels of oil, taking into account the historic production from the two wells, plus the remaining 250,000 barrels of oil to be recovered from the Number 3.

Q. Now, this is not total production from these wells, is it?

A. No, that's not. That is only the production that has come from the upper portion of the Devonian.

Q. All right. So if you just blindly look at the production plot, it's not going to match these numbers --

A. No, that's correct.

Q. -- because you're selecting only a portion of that production?

A. That's correct.

Q. All right. When we look, then, about what's left available for a horizontal well in that 80-acre tract, what's the number?

A. The number that's left is about 937,000 barrels of oil, based on volumetrics.

We've done some conceptual modeling to look at horizontal wellbores. That has indicated that we should recover about 650,000 barrels of oil from a horizontal drilled in this location.

If we were to -- We did not model a vertical well, but it wouldn't be too far off to assume that a vertical well would recover roughly the average of the total recovery of 3 and 4 in the Upper Devonian, or about 300,000 barrels of oil.

Looking at cost, a horizontal well out of the 4 is going to run us about $800,000 to $900,000. A vertical well drilled to hit the peak of the structure is going to cost us somewhere in excess of $1.5 million. So not only are we going to recover more oil, we're going to be able to do it at quite a bit less cost.

Q. And that's simply because you can utilize an existing wellbore and then take it horizontal?

A. That's correct.

Q. All right. As far as the 3 and the 4 go, that looks to you to be a feasible engineering plan with good potential and that it should be an economic project?

A. It should.

Q. All right. Let's talk about how to do it.

The depth bracket oil allowable on 40 allowable in the pool is what? 356 was it?

A. 365.

Q. I can't keep it straight. 365 is 40-acre oil depth bracket?

A. Correct.

Q. How do you propose the Examiner allow you to produce that allowable when you're going to have this wellbore crossing over into the spacing unit for the Number 3 well?

A. What we would propose is that the depth bracket allowables for both 40-acre tracts be combined into one, and then that allowable be shared between Well Number 3 and Number 4, in order to produce both wells.

Q. Okay. Ownership in the project area is common, is it?

A. That's correct.

Q. So there's no inequities here involved in combining spacing units?

A. That's correct.

Q. All right. Let's now turn your attention to the engineering conclusions. When we look at the Number 6 well, what did you do to analyze that?

A. We went through the same methodology for the Number 6 proposal as we did for Number 4.

Exhibit Number 9 is a production plot for Denton Number 6, showing the daily average production from 1970 through 1994.

The well currently is producing about 30 barrels of oil a day. It's cum'd about 1.4 million barrels. It has remaining reserves of roughly 15,000 barrels of oil.

Q. If the first well is a success, how do you judge whether it is or not?

A. What we'll look at is how the productivity matches up with what our original projections have been.

Q. And if that is a success, then, would you apply the same methods to the recompletion of the Number 6 well as a horizontal well?

A. Yes, we would.

Q. Now, the rate on the Number 6 is a little higher. It's about what? 28 to 30 a day?

A. That's correct.

Q. You said your economic threshold was 15 barrels a day?

A. That's correct.

Q. Are you sacrificing any remaining recoverable oil in the Number 6 well if you take it out of production and utilize it for the horizontal technology?

A. No, we won't, because we will be -- By drilling a horizontal well, we'll be connecting that wellbore to a reservoir that won't otherwise be drained by either the Number 6 or the Number 7 well.

Q. When you get through the -- You've shown the plots on those two wells, you've shown the comparison of the interval, showing what you're trying to forecast.

If you'll turn now to Exhibit 12, show me the

conclusions about the relationship between the 6 and the 7 spacing units.

A. Exhibit Number 12 is again a volumetric analysis of the remaining oil to be recovered between the Wells 6 and 7.

In this case, we have a bulk volume of about 12,000 acre feet. Our porosity is a little higher at about 3 percent, and again water saturation of 46 percent.

That left us with oil in place in the upper portion of the Devonian only of about 887,000 barrels of oil.

Using the recovery factor of 40 percent, that left us with recoverable oil in those two 80-acre tracts -- or two 40-acre tracts, of about 355,000 barrels.

We're projecting ultimate recovery from the 6 and 7 Wells of about 160,000 barrels of oil, leaving remaining recoverable oil of about 195,000 barrels.

Q. All right. Is it going to be economic to go and look for that remaining oil?

A. I believe it will. Using the horizontal technology which gives us dramatically reduced costs due to utilizing existing wellbores, I think this will be a very economic project.

Q. You couldn't possibly get the remaining recoverable oil by drilling a new vertical well?

A. No, that's correct.

Q. It just won't justify it, not even close?

A. That's correct.

Q. Okay. So the only way to go about that in the separated fault block is, if the first well is successful, do the same thing with the Number 6?

A. That's right.

MR. KELLAHIN: All right. That concludes my examination of Mr. Kent.

We move the introduction of his Exhibits 5 through 12.

EXAMINER CATANACH: Exhibits 5 through 12 will be admitted as evidence.

EXAMINATION

BY EXAMINER CATANACH:

Q. Mr. Kent, what are the plans for the Number 5 well ultimately?

A. Number 5, I would say, should the 4 and 6 be successful, I still think Number 5 would be a potential candidate for horizontal drilling.

But again, as was stated earlier, from a geological standpoint Number 4 has always been a superior candidate.

And now due to its productivity, we're able to go into that well and utilize it for a horizontal drain.

EXAMINER CATANACH: I have nothing further of this witness.

MR. KELLAHIN: All right, sir.

Mr. Examiner, I call at this time Marathon's drilling engineer, Steve Pohler. He spells his last name P-o-h-l-e-r.

STEVEN POHLER,

the witness herein, after having been first duly sworn upon his oath, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q. Would you please state your name and occupation?

A. Steven Pohler, senior production engineer, Marathon Oil Company.

Q. On prior occasions, Mr. Pohler, have you testified before the Division?

A. No, I have not.

Q. Give us a quick summary of your education and employment experience.

A. I have a BS in petroleum engineering from Texas Tech University, and I've worked with Marathon Oil Company for the past 13 years in varying responsibilities, and the last two and a half years have been with the drilling completion department.

Q. You're going to have to speak up. That

microphone doesn't do a thing for you.

A. Okay.

Q. It helps the court reporter; it doesn't amplify your voice.

A. Okay.

Q. Let's cut to the summary.

For this project, have you examined the presentation made by Marathon to the Examiner back in the spring of this year?

A. Yes, sir.

Q. Is the plan for the Number 5 Well, as it was forecast, the same plan you intend to utilize if they approve the substitution of the Number 4?

A. Yes, sir.

Q. And if that well is successful, then it's the same plan for the Number 6?

A. Yes, sir.

Q. Let's go through the displays rather quickly, then, and have you give us the highlights.

First of all, when we look at Exhibit 13, what do we see?

A. It's just a plan view of the horizontal proposals and the directions that they will be going, and the dashed lines on that are showing the 330 setbacks for the acreage.

Q. All right. This is a forecast of the direction

and the anticipated length?

A. Yes, sir.

Q. In terms of operational flexibility, you're seeking authority to make field changes --

A. Yes, sir.

Q. -- so long as the producing interval stays within the 330 setback from the outer boundary of the project area?

A. Yes, sir.

Q. And that's the significance, then, of the dashed line within the shaded yellow area?

A. Yes, sir.

Q. All right, let's look at the schematic for the Number 4 well, which is Exhibit 4 [*sic*].

A. This is a present completion diagram of the Number 4 well, showing the interval that it's producing at right now is 11,226 to 11,600, and a cast-iron bridge plug is presently set at 11,640.

Q. Any mechanical reason not to utilize this wellbore?

A. No, sir.

Q. Looks like a good candidate?

A. Yes, sir.

Q. Let's go to the planned concept on 15, and show us what you forecast to be the direction and length.

A. We plan to enter the wellbore and go at a direction of -- After we build our 90-degree-radius curve, a 45-foot radius, we plan to go in a south direction of 70 degrees east at a 900-foot lateral and stay within our 330 setback.

Q. All right. Let's go to Exhibit 6, and I think -- 16, and I think that's a good exhibit to have you tell us the procedure, starting with determining the kickoff point, and taking us through drilling and completing the well.

A. The well will -- The present perforations will be squeezed off, drilled out, and then tested to assure that there's no leakage in the present producing interval.

A section will then be cut from approximately 11,210 to 11,250, and than a kickoff point will be made at 11,240.

Prior to kickoff point, a gyro will be run in the well to orient us on our downhole location and orient us in the direction of -- so we can plan our kickoff to the south 70 degrees east.

We will kick off at 11,240, approximately, and drill a 90-degree, 45-foot-radius curve towards the south 70 degrees east.

At that point, we will drill a 900-foot horizontal lateral on a 100-degree inclination until we've reached our final end point, staying in the south 70

degrees east.

Q. At the kickoff depth, are we in the Devonian Pool?

A. Yes, sir.

Q. So everything will be isolated in the interval between the vertical well and the horizontal well?

A. Yes, sir.

Q. How do you achieve that isolation?

A. By -- Our section will be cut in the Devonian, and we will stay in that tight cap, and we'll have the cast-iron bridge plug and the perforation squeezed and casing isolation above us.

Q. You'll have the ability to steer and know where you are, subsurface?

A. Yes, sir, we'll use the technology MWD, which is a continuous motor readout, measurement-while-drilling technology. It will give us azimuth, inclination and direction we're going, continuously at the surface.

Q. You'll have the ability, then, to make changes in the field, if it's determined appropriate, so that you can change the azimuth or the distance drilled?

A. Yes, sir. Yes, sir.

Q. How will you set it up for production?

A. Production -- After the drilling is done, we will circulate the mud out of the hole with fresh water and go

in the hole with a completion tubing and a packer.

And the completion tubing will be run just around where -- the carved section into the horizontal.

And a packer will be isolated in the vertical section.

Q. Anything unusual about the application of this technology in this particular area?

A. No, sir.

Q. All right. When we go to the Number 6 well as a potential candidate, that's done in substantially the same method?

A. Yes, sir.

Q. All right. Let's look at those exhibits quickly. If you'll look at 17, identify that for me.

A. It's a wellbore schematic of the present operation of the well, showing production from perforations 11,826 to 11,958, and a cast-iron plug is presently set at 9068.

Q. All right. Then Exhibit 18, show us where you're headed.

A. This is a plan view that we will be drilling. The horizontal will be done in a north 20-degree east direction at 1000 foot.

Q. All right. Again, you want the operational flexibility to modify this forecast, provided you stay no

closer than 330 to the outer boundary of the project area?

A. Yes, sir.

Q. All right, show us the lateral plan.

A. The lateral plan will be the same.

Our kickoff point will be at approximately 11,840 feet, a 90-degree, 45-foot-radius curve will be drilled, and then a 1000-foot-long horizontal will be drilled at approximately a 100-degree inclination.

Q. Again, the well will be completed in the same fashion?

A. Yes,sir.

Q. All right, sir. Were Exhibits 13 through 19 prepared by you or under your direction and supervision?

A. Under our direction and supervision, sir.

MR. KELLAHIN: We move the introduction of Exhibits 13 through 19.

EXAMINER CATANACH: Exhibits 13 through 19 will be admitted as evidence.

MR. KELLAHIN: And that concludes my examination of Mr. Pohler.

EXAMINATION

BY EXAMINER CATANACH:

Q. Mr. Pohler, the Well Number 4, the perforations that will be squeezed in that well are 11,226 to 11,600?

A. Yes, sir.

Q. Okay. Do you know what the cut section is in the Number 6 well?

A. In the Number 6 well?

Q. Yes, sir.

A. The section will be approximately the same type deal, a 50-foot window approximately -- approximately, it will be at 11,810 to 11,850, give or take -- or -860, I'm sorry, 50 foot.

Q. These will be drilled essentially the same way that you had originally intended to drill the Number 5 well?

A. Yes, sir.

Q. And the lateral section in the Number 6 is going to be again, approximately, 900 feet?

A. Number 6 will be 1000 feet.

EXAMINER CATANACH: Okay, that's all I have of the witness.

Do you have anything further?

MR. KELLAHIN: Mr. Examiner, Exhibit 20 is my certificate of notification of the interest owners in this case.

Request the admission of Exhibit 20.

EXAMINER CATANACH: Exhibit 20 will be admitted as evidence in this case.

MR. KELLAHIN: And that concludes my

presentation, Mr. Examiner.

EXAMINER CATANACH: There being nothing further in this case, Case 11,141 will be taken under advisement.

(Thereupon, these proceedings were concluded at 10:08 a.m.)

* * *

CERTIFICATE OF REPORTER

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

I, Steven T. Brenner, Certified Court Reporter and Notary Public, HEREBY CERTIFY that the foregoing transcript of proceedings before the Oil Conservation Division was reported by me; that I transcribed my notes; 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 November 12th, 1994.

STEVEN T. BRENNER
CCR No. 7

My commission expires: October 14, 1998

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 11141, heard by me on November 10 1994.

David R. Catanach, Examiner
Oil Conservation Division