STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

CASE 10,703

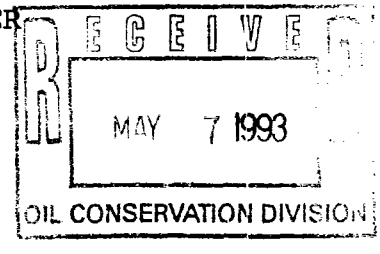
EXAMINER HEARING

IN THE MATTER OF:

Application of Marathon Oil Company for an unorthodox gas well location, Eddy County, New Mexico

TRANSCRIPT OF PROCEEDINGS

BEFORE: DAVID R. CATANACH, EXAMINER



STATE LAND OFFICE BUILDING

SANTA FE, NEW MEXICO

April 8, 1993

A P P E A R A N C E S

FOR THE DIVISION:

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I N D E X

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E X H I B I T S

APPLICANT'S EXHIBITS:

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WHEREUPON, the following proceedings were had at 10:32 a.m.:

EXAMINER CATANACH: at this time we'll call Case 10,703.

MR. STOVALL: Application of Marathon Oil Company for an unorthodox gas well location, Eddy 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. I have one witness to be sworn.

EXAMINER CATANACH: Any other appearances?

Will the witness please stand to be sworn in?

ERIC CARLSON,

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. My name is Eric D. Carlson. I'm a petroleum geologist.

A. And where do you reside, sir?

A. I reside in Midland, Texas.

Q. On prior occasions have you testified before and qualified as an expert petroleum geologist before the Oil Conservation Division?

A. Yes, sir.

Q. Pursuant to your employment as a geologist, have you made a study of the geologic facts surrounding Marathon's proposed Application for an unorthodox gas well location in Eddy County, New Mexico?

A. Yes, sir.

MR. KELLAHIN: We would tender Mr. Carlson as an expert petroleum geologist.

EXAMINER CATANACH: He is so qualified.

Q. (By Mr. Kellahin) Mr. Carlson, let's turn, sir, to your Exhibit Number 1. Identify this display for us.

A. Okay, this is a structure map on top of the Upper Penn formation in Eddy County, about 20 miles west of Carlsbad, the highlighted section, Section 36 of Township 20 South, Range 24 East. I did this while in the employ of Marathon Oil Company whom I work for.

Q. Okay.

A. And you'll see that it has a 100-foot contour interval, and in general the dip is eastward.

Q. What are you seeking to accomplish with a

well drilled at this proposed unorthodox location, Mr. Carlson?

A. Marathon wishes to drill a well that would be potentially commercially viable in both the Upper Penn and in the Morrow.

Q. In order to accomplish that, what are the choices for you in finding a location that gives you the optimum location for the Cisco portion of the project, which is the South Dagger Draw Pool, as well as accomplishes your objectives for the Morrow portion of the project?

A. Marathon has asked to drill a 9600-foot test that is located in Section 36 at a location 1980 from the south line and 660 from the west line.

Q. What is the proposed orientation of the spacing unit for the well?

A. The orientation is a laydown.

Q. It would be the south half, then, of the section?

A. It's a laydown 320, yes, sir.

Q. Is this location a standard location for the Cisco production?

A. No, sir. I'm sorry, excuse me. For the Cisco production it is a standard location.

Q. And will it be unorthodox for the Morrow

production?

A. Yes, it will.

Q. All right. Describe for me, then, when you look at a structure map in the Upper Penn, you are targeting your opportunities for Cisco production, are you not?

A. That is correct. We're interested in drilling a Cisco/Canyon well or an Upper Penn well. I prefer to use the term "Upper Penn" right here, if we could please.

We're targeting the Upper Penn well to stay within what we believe to be a production fairway of relatively low water/oil ratio at IP.

Q. When we look north of your location, the black dots, are those Upper Penn Wells?

A. Yes, sir, they are.

Q. And so your next location, then, is the southern stepout to your number 4 well in this section?

A. That is correct.

Q. The Examiner has heard a number of the Upper Penn cases before, but give him a quick summary of where you've located your well in relation to what is projected as the zero dolomite line markers.

A. We would be within the dolomite facies of this reservoir system.

Q. Okay. Is your interpretation of the general limits of the zero dolomite line consistent with those lines used by other operators in trying to find Upper Penn production?

A. To a large extent consistent, yes.

Q. Let's turn now to Exhibit Number 2, Mr. Carlson, and have you identify and describe that exhibit.

A. Number 2 is a waiver. It is a letter we've received from Conoco, Incorporated, stating that they have -- if I might quote, it says, "Conoco waving [*sic*] all objection to this application..."

So essentially it says that Conoco accepts that we can drill this, and they have no objection to our drilling this unorthodox location near the west line of Section 36.

Q. And you have agreed, then, to exchange of certain data with regards to the project --

A. Yes.

Q. -- as contained in this.

When we look at Section 35 -- When we look at Section 35, is that the section that is operated by Conoco?

A. Yes. Conoco operates two laydowns in Section 35, both the north half and the south half.

And in -- not so very long ago, maybe about half a year ago or so, Conoco approached us and asked us for an exception location waiver for the number 6, which is located in the very northeast corner of Section 35, and we granted them a similar agreement to what we see here.

Q. All right. What happens to your opportunities in the Upper Penn if you move the well location farther east so that it is standard as to both pools?

A. It's Marathon's opinion that the risk increases for an Upper Penn well that would have an unacceptable water/oil ratio, a subeconomic water/oil ratio.

Q. Let's look now at the geologic conclusions you've reached about your opportunities in the Morrow. Do you have a display that illustrates that?

A. I have brought along with me three displays, Mr. Kellahin, to illustrate basically our feeling about the Morrow.

First, just once again to orient you, we have Exhibit Number 3. This is a structure map, and you can see toward the bottom the mile bar, if you will, to indicate the mile. Also the Morrow penetrations have been circled, as indicated on the exhibit. The contour

interval, once again, is 100 feet.

What we're looking at is a structure map on the top of the Middle Morrow. The Upper Morrow, of course, is a relatively limy sequence, has a lot of limestone. There's a couple shale breaks and a couple sandy breaks.

Below this horizon, the Morrow is predominantly sand and shale.

Q. From the interpretation of the structure, what does this tell you about the location of the well insofar as the Morrow attempt is concerned?

A. Basically, the structure does not have a large impact, in my professional opinion, on the Morrow itself.

We're including the structure map simply to orient you, to show that we're just slightly downdip from the Conoco well in Section 6 and to show you that we are updip of previous Morrow penetrations in the Indian Hills State Lease, Section 36, the number 1 and the number 2 well.

So basically I suppose there's a chance we could see a sand that might have been wet in the number 1 or number 2, that might be pay in the number 5 well potentially.

Q. Let's turn, then, to your primary geologic

displays that have caused you to reach conclusions about the location of the well, insofar as the Morrow is concerned.

A. Okay.

Q. Exhibit Number 4, Mr. Carlson, what is this?

A. Exhibit Number 4 is a gross sand map. In order to evaluate Morrow geometries, one must look at gross sands to develop an idea of the facies. And so this is a map of a very thin sand interval, only about 20 feet thick or so, which is located the first stand above the previously shown unconformity.

Q. And you have identified this as the B-1 Upper sand?

A. Yes, this is the B-1 Upper sand. And interestingly, this sand has made something like close to approximately half the reserves in the Cemetery area, in the Cemetery-Morrow Pool. So it's an important Morrow producer in the Cemetery area.

Q. When we specifically are at Section 36, what is the sand thickness in that section that gives you support for your conclusions about locating the Morrow portion of the well?

A. In Section 36, as one can see, the maximum thickness in this particular stringer is nine feet, and we feel that there's a fair chance that we could see

that again in the southwest corner of the lease.

However, it must be stated that the B-1 Upper, in my professional opinion, is a beach sand. And it maps up nicely as a strike-oriented beach sand, but the unusual thing about this sand is, like several sands on the Texas Gulf Coast, for instance, if you have a tidal inlet or something like that, you might see that that tidal inlet, when the sand was deposited, the tidal inlet was just water. There wasn't sand there; it was water.

So later on, when the stuff gets buried, that tidal inlet might be filled with something other than beach sand. It happens a lot along the Texas Gulf Coast and other sandy places. And it also, we believe, happens here because we keep seeing in rather unusual places some clay -- what I'll call a clay plug or shale-outs that I have interpreted to be places where tidal channels cut through these sandbars through time.

Q. If we move to a more standard location for the south half Morrow --

A. Uh-huh.

Q. -- what does that do to your opportunities in that sand member?

A. Well, unfortunately it really raises the risk, I believe, because as you can see, the Conoco

well in Section 35, the northeast quarter, unfortunately, saw in this particular genetic increment of strata of the B-1 Upper, saw zero sand, what I have interpreted to be from the facies analysis and from the character of the electrical logs and gamma ray logs, the neutron density logs, it had what appeared to be a shale-out, a shale plug.

Typically, these have a hot gamma expression. They look like sometimes there's a little organic matter in them. And it sure looks like, judging from the geometry of this particular sand body -- which once again, this one little stringer that gets to a maximum of only about 24 feet in about a mile and a half southeast -- this one stringer has made half the gas out of there in Cemetery Pool. So we want to be sure that we can increase the likelihood of success in this stringer.

If we move westward we have a very good chance, in my technical opinion, of staying away from the channel plug, which you can see there's some evidence in the Conoco well, and potentially hitting an entirely new reservoirlet that's not been drained by any other wells in the B-1 Upper.

Q. Why would you not go to the extreme 40-acre tract in the southwest quarter for the Morrow

penetration?

A. That is really, more than anything else, Mr. Kellahin, a matter of economics.

It turns out that the Morrow potential out here over the years has been profitable, but not greatly lucrative in this particular area. And so we feel that it is not an economically viable business decision to drill a straight-up Morrow well at this time when prices of gas aren't up.

So we want to be able to have other potential in the wellbore. And so when we look at the number 5 location we see that it is a stepout from the number 4 location in the Cisco -- I'm sorry, on the -- now you've got me going. But in the Upper Penn.

And as we see, we feel that since we're going to the Upper Penn anyway, in the number 5, we can take the number 5 down to the Morrow for the incremental cost or costs; we're talking about a $100,000 dryhole cost. So we don't know how far south, obviously, the pool goes, and we might never drill another well south of the number 5.

Q. Finally, then, Mr. Carlson, let me have you turn to Exhibit Number 5, and summarize and describe this display for us.

A. Okay, this is another exhibit of a net sand.

In fact, it is the exhibit which addresses the sand that Conoco is producing from. This sand we call the B-3 Upper Sand, and it is located the first good sand below the unconformity I showed you in Exhibit Number 3. Okay?

And all it shows us is -- It's a facies map in a sense. It shows us the amount of sand in the area, and it also shows a description of what that sand is.

If you look to the lower left-hand corner of the display, Mr. Catanach, you will see that the labels for these wells, we have indicated if it's a channel sand by the "CH" designation.

If we feel that it's a non-channel facies, maybe a crevice splay facies or potentially a limy or beachy facies, a lagunal facies, we've indicated with an "N" after the letter.

And finally, if the area -- if the strata in question, the B-3 Upper, has been uncomformably removed by that Middle Morrow uncomformity right above it, we've indicated that with "UR".

All right, it's a pretty complicated map. But what it shows us, so I get it down to a nutshell, is that we can reasonably project a north-northwest-to-south-southeast-trending channel running through the

Conoco well, that are producing from this channel in our technical opinion, and that because the overwhelming channel geometry out here is of such north-northwest-to-south-southeast nature, we feel that to best, most likely intersect that nice 28-foot sand channel, we want to be in the westernmost portion of our lease.

Q. You would not have that opportunity if required to move to a standard location in the Morrow?

A. We really believe there's a fair chance that this channel would not be present if we were 990 feet from -- or excuse me, if we were at a standard location. We feel we would miss that channel.

Q. Were the geologic displays prepared by you, Mr. Carlson?

A. Yes, they were.

MR. KELLAHIN: The next exhibit, Mr. Examiner, is Number 6. It's our certificate of mailing for purposes of notification.

And with that exhibit, then, we move the introduction of Exhibits 1 through 6.

EXAMINER CATANACH: Exhibits 1 through 6 will be admitted as evidence.

MR. KELLAHIN: That concludes our presentation.

EXAMINATION

BY EXAMINER CATANACH:

Q. Mr. Carlson, are you telling me the primary driving mechanism for this mechanism would be the Morrow? Or would it be both?

A. I would like to restate that we feel an Upper Penn well can be justified on the economics alone for the Upper Penn horizon, but a Morrow well can only be justified economically right now if we're only drilling incrementally from the Upper Penn into the Morrow, which represents about 1700 feet.

Q. Let me rephrase. The location was picked -- The unorthodox location was picked primarily because of Morrow considerations?

A. Yes, the Morrow, unorthodox portion, yes, we feel that there is such a much better likelihood of success in both the B-1 Upper and in the B-3 Upper sand -- There's so much more likelihood of success in the westernmost portion of that lease than in the center of the lease, that we must -- We're going to drill a Morrow; we want to take it here to have a look at it.

Q. Would a move to a standard Morrow location affect the risk in the Upper Penn?

A. Yes, it would in the sense that you'd be drilling an Upper Penn well to get there, and you would

evaluate it.

But effectively at this point, we don't have enough technical justification right now to drill a well to the Upper Penn east of the Number 5.

EXAMINATION

BY MR. STOVALL:

Q. In other words, part of the location decision was made based upon the Upper Penn geologic interpretation, as well as the Morrow geologic interpretation?

A. Yes, if I were an engineer I would use the word "wellbore utility".

Q. Now, let's back up a minute. If you were drilling only to the Upper Penn -- forget the Morrow -- would you -- and I realize that you're actually in a -- technically in an orthodox Upper Penn location, but would you be affected by the Upper Penn if you went further east? Would that be a higher-risk well?

A. Yes, I would state that the last risky place to drill another Upper Penn well, in our opinion, is at the location for the 5 well.

EXAMINER CATANACH: Got it out.

MR. STOVALL: That's what you were trying to find out?

EXAMINER CATANACH: Uh-huh.

THE WITNESS: But that Marathon would have a real -- Marathon won't drill a standup Morrow well out there. We don't feel the economics justify it.

FURTHER EXAMINATION

BY EXAMINER CATANACH:

Q. Does Marathon not operate the north half of that section?

A. Marathon operates the north half as well.

Q. Why can't you dedicate a west half to it?

A. Well, there are a lot of legal and land issues that have come up as a result of our attempts to space this.

I guess I will cite precedent here. We already had the north half and south half laydown spacings in the Pennsylvanian, so we felt that protecting our -- I'm sorry, I'll just stop, just say legal precedent here.

Q. The north half is currently dedicated to one or more wells --

A. Yes, sir.

Q. -- in the Upper Penn?

A. Yes, sir.

Q. Not in the Morrow?

A. At the current time the north half is not producing from the Morrow. It has produced from the

Morrow in the well number 1.

Q. And the north half was dedicated to the well number 1?

A. Yes, sir. The Upper Penn allowable is that area-wide allowable.

Q. What's the status of the well number 2 in the southeast quarter of Section 36?

A. The number 2 well is currently shut in. It was originally completed as a Morrow well. It did not recover the investment. Recently we attempted to complete a Strawn sand between the Morrow and the Upper Penn. That was an unsuccessful effort, so currently we are evaluating other options for the well.

Q. Do any of those plans include any additional attempt at a Morrow completion?

A. No, sir, we're not -- When the well was drilled to the Morrow, anything that looked like it might possibly be porous was perforated in the Morrow.

Q. It's my understanding the Conoco well in Section 35, that is producing from the B-3?

A. That's what we call it, sir.

Q. Any B-1 production in that well?

A. No, sir. The B-1 is shaled out, the B-1 Upper is shaled out.

Q. Okay, and it's your geologic opinion that

that shale-out extends southeastward into Section 36?

A. Yes. One of the reasons I brought such a big display here is to show from other work that I've done within the Indian Basin field proper that the general trend of these plugs is southeastward.

You can also see a really good case for a pretty southeastwardly trend in -- just northeast of Section 36 where we have some nice beach ridges that are interrupted by another, in my opinion, shale-out.

Q. As I recall, there's been some pretty prolific Morrow production encountered in this area recently. Is that anywhere in this area here?

A. If you define the area as within about 20 miles away, there have been occasional Morrow producers recently.

However, within the immediate area of Section 36 there has not been any recent prolific production, with the exception of -- it looks like Conoco might be.

And Conoco really did something rather unusual, because most of the Morrow production in Cemetery Pool has been two sections east of 36, down to about five sections south, and running a line that's really east of Section 36.

So Conoco, obviously, they drilled a nonstandard Morrow location and they would potentially

have Upper Penn reserves in that wellbore, behind pipe.

So although I can't speak for Conoco's exploration philosophy, I can say that it was a very much -- it was a risky Morrow well. It was well away from the established commercial, good, excellent well production.

Q. Besides the Conoco well, do you have any other evidence that would indicate that that fairway may be shaled out, Mr. Carlson?

A. No, sir. The strongest evidence I have is that if you make a facies model and you do the work, you see -- you can make a facies story that shows this, that this is a fairly typical analog, for instance, to the Gulf Coast of the United States or to the Middle East coast. And really at this point, we have only the data point in the Conoco well.

If you go over to Section 35, we can see that they happened to see another shale plug over there. It was predicted from my maps, from the inlet shale plug that I had drawn in Section 12 a couple sections south of 36. So I've been able to predict these shale plugs out here.

Q. You mentioned something earlier about a move east in the Upper Penn would put you in closer contact to the water, to the oil/water contact. Is that what I

heard?

A. Well, although the exact details of facies architecture in the Upper Penn have not been worked out, many questions still remain about the reservoir system.

What we can notice is that through Section 14, 23 and 26 there's a fairway of oil production only or two wells wide, in which the initial IPWOR is less than 2. And we were able to convince our management, based on this fairway analysis, to drill the number 3 and then the number 4 well.

But we have real doubts about how wide that fairway might be, because in the developed portion of the field it's only one or two wells wide.

We do not feel that -- I guess we should say the risk of a water/oil ratio as high as 5 or 6 or maybe 7 at IP is greatly increased as you move just one location eastward from the number 5, and that IP would probably be subeconomic.

Obviously, if we were just interested in drilling eastward right away, we would have offset the number 3 well to the east, because, as you know, Yates has offset to the northeast of the number 3 well. So that would be -- we would drill in the northeast of the northwest if we were moving a little eastward.

You know, if we felt comfortable, we would have already offset where we have three wells around it.

But certainly the Yates well in the southeast of the southwest, which is the number 2 AJG, has been a disappointing well.

So we're a little skeptical. We might be able to develop it eventually. At this time we don't have enough information to propose a well yet. We think that...

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

MR. STOVALL: Not me.

EXAMINER CATANACH: Is there anything further, Mr. Kellahin?

MR. KELLAHIN: (Shakes head)

EXAMINER CATANACH: There being nothing further in this case, Case 10,703 will be taken under advisement.

(Thereupon, these proceedings were concluded at 11:00 a.m.)

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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 April 15, 1993.

STEVEN T. BRENNER
CCR No. 7

My commission expires: October 14, 1994

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 10763, heard by me on April 8 1993.

David R. Catanach, Examiner
Oil Conservation Division