STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

CASE 10,565

EXAMINER HEARING

IN THE MATTER OF:

Application of Conoco, Inc., for directional drilling and an unorthodox bottomhole gas well location, Eddy County, New Mexico

ORIGINAL

TRANSCRIPT OF PROCEEDINGS

BEFORE: MICHAEL E. STOGNER, EXAMINER

STATE LAND OFFICE BUILDING

SANTA FE, NEW MEXICO

October 1, 1992

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 12:15 p.m.:

EXAMINER STOGNER: This hearing will come to order. Call the next case, Number 10,565.

MR. STOVALL: Application of Conoco, Inc., for directional drilling and an unorthodox bottomhole gas well location, Eddy County, New Mexico.

EXAMINER STOGNER: Call for appearances.

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 two witnesses to be sworn.

EXAMINER STOGNER: Any other appearances?

There being none, will the witnesses please stand and be sworn at this time?

(Thereupon, the witnesses were sworn.)

EXAMINER STOGNER: You may be seated.

Mr. Kellahin?

BILL HARDIE,

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. Hardie, for the record would you please state your name and occupation?

A. My name is Bill Hardie. I'm a geologist with Conoco in Midland, Texas.

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

A. Yes, I have.

Q. And pursuant to your employment as a geologist for Conoco, have you made a study of this particular Application?

A. Yes, I have.

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

EXAMINER STOGNER: Mr. Hardie is so qualified.

Q. (By Mr. Kellahin) Mr. Hardie, let me direct your attention, sir, to Exhibit Number 1, and so that you might orient the Examiner to your company's request, would you take a moment and describe the information shown on this display?

A. Exhibit Number 1 is a land plat, and on it we're showing that portion of South Dagger Draw we're interested in.

The solid yellow shading indicates Conoco's 100-percent working-interest acreage. The cross-hatched yellow indicates our partial working-interest acreage.

The proposed well, the Preston Federal Number 6, is indicated on the map in the north half of Section 35. It has a surface location shown by the open circle that is 990 feet from the north line, 460 feet from the east line, and a bottomhole location indicated by the crosshairs that has a location of 660 feet from the north, 660 feet from the east.

Q. What are the formations that you propose to test with a well drilled and bottomed as you propose?

A. We propose to test the Cisco-Canyon Oil Reservoir and the Morrow Gas Reservoir.

Q. The Cisco production is attributable to the South Dagger Draw Upper Pennsylvanian Oil Pool?

A. That is correct.

Q. What is the spacing for the pool?

A. Spacing is 320 acres.

Q. And a standard well location would be where, sir?

A. Would be 660 feet from lease lines.

Q. The proposed bottom-hole location, then, in the Cisco formation is going to be a standard location?

A. Yes, it is.

Q. Why are you unable to drill at a surface location that is -- overlies the bottomhole location?

A. On topographic maps there's a Box Canyon Draw

that runs east-west across the north portion of Section 35. That draw lies exactly at our proposed bottomhole location.

So in order to reach that location, we had to set back from the draw and then directionally drill to that bottomhole location.

Q. In addition to the Cisco formation, do you propose to drill and test any other formations?

A. We propose to drill beyond the Cisco to the Morrow formation, which lies approximately 1500 feet below the base of the Cisco.

Q. The proposed spacing unit for the Morrow would have what orientation to it?

A. The Morrow spacing is -- Well, they're developed on 320-acre proration units, and both of the proration units for both the Cisco and the Morrow would be -- would comprise the north half of Section 35.

Q. The location in the Morrow is going to be an unorthodox location?

A. Yes, it will be.

Q. Let's turn now to the geologic information that you have developed concerning the Cisco.

A. Okay.

Q. If you'll identify Exhibit Number 2 for us?

A. Exhibit Number 2 is an isopach map of the

Cisco-Canyon Dolomite reservoir.

The reservoir itself, Dagger Draw, consists of a dolomitized carbonate buildup that was developed on the edge of the Delaware basin so that in this part of the world it trends more or less northeast-southwest.

It attains a maximum thickness at its core, as you can see on the contours, of about 350 feet in thickness, and then it thins outward toward the flanks to a zero line on either size of what we call this dolomite fairway.

Q. In addition to the isopach, have you prepared a structure map?

A. Yes, I have. That's Exhibit Number 3.

Q. All right. Identify and describe that display.

A. Exhibit 3 is a structure map on the Cisco-Canyon Dolomite reservoir. We're looking at a 50-foot contour interval. This shows a general dip that runs from southwest to northeast so that the southwest end of the map is the highest, the northeast end is the lowest.

In this portion of the Cisco Reservoir, it's particularly important that we try to keep the wells as structurally low as we possibly can if we want to

produce oil, because we're so high in South Dagger Draw that we're actually up in the gas cap.

So our best location in the north half of Section 35, taking advantage of structure, would be to move the well as far north and as far east as we possibly could. Therefore, we have proposed a bottomhole location in the Cisco of 660 from north and east.

Q. Describe for us the meaning of the dashed green line that has been labeled "Southern Limit of Oil Production".

A. The southern limit of the oil production, as I've shown it there, is the most optimistic interpretation of the position of that oil limit. It very easily could be farther north.

If you'll look in Sections 25 and 26, the wells that have been drilled by Yates Petroleum in the past months are all oil wells. If you look further south, the next well you find in the Cisco Reservoir is the Preston Federal Number 1 in the south half of Section 35. That's a gas well.

So at some point between those two wells in 26 and our Preston 1 well is a transition from an oil-producing to a gas-producing reservoir.

Q. Have you prepared a display that helps

visualize the relationship of the water, gas and oil as we move from North Dagger Draw through South Dagger Draw and finally into Indian Basin?

A. Yes, I have. This is Exhibit Number 4.

Now, when we look at the distribution of hydrocarbons in Dagger Draw, we see that they cannot be adequately explained by structure alone.

For example, looking at Exhibit 3, we see oil production in Section 26. Based on structure alone, there's no reason we shouldn't see oil production in Section 35 and even farther south in that Mojave well in the short Section 35.

So we have to come up with an alternative explanation as to why there is no oil column there.

And we've found that the observed relationships are consistent with those of a dynamic aquifer. That is, an aquifer that is actually flowing. And in this case, we believe it to be flowing toward the northeast.

In looking at Exhibit Number 4, I've represented this diagrammatically, where we have the water zone, in this case flowing to the northeast, and that has altered the ordinary relationships of the hydrocarbons such that we've swept the oil column in a downdip direction toward the northeast.

The results of that for North Dagger Draw are that we see a tilted oil/water contact, and that has been documented.

And South Dagger Draw we see, as is shown on this diagram, an updip limit of the oil column. And we've documented that just by looking at the existing production.

And in Indian Basin we see a tilted gas/water contact, and that well has been documented. There is no oil production in Indian Basin toward the south.

Q. Having helped us visualize the relationship of the hydrocarbons to the water and how that has affected the distribution of the oil, have you prepared a cross-section that shows the relationship of the available well data?

A. Yes, that is in Exhibit Number 5.

Q. Okay.

A. This is the north-south cross-section that I've labeled as A - A prime on Exhibit Number 3. This is passing from the Yates Mojave well, which was drilled a few months ago, northward through the gas-producing portion of the reservoir and into the oil-producing part of the reservoir in Section Number 26, ending on the Vicki Number 1 well.

The logs I've shown here are porosity logs,

with the exception of the Yates Conoco Number 3 "AGK". That well was drilled so recently that the logs are not yet available. However, the perf rated interval was made available there, and it's shown in the dark lines on that log stick.

Q. Toward the bottom of each log, I'm also showing the producing rates, so we can in fact verify that these wells are gas wells or oil wells.

The shaded area that I've shown represents the Cisco Dolomite reservoir. The red shading indicates the gas-producing portion, the green shading indicates that portion which is oil-producing, and then the blue indicates the water-producing portion.

If you look over at the left or the right side of this cross-section, you can see that updip pinchout of the oil column that I referred to earlier.

The gas/oil contact that we've shown here is really a matter of conjecture. Because oil in the reservoir is such a high gravity it's impossible to determine the gas/oil contact based on open-hole logs. So we have to use producing data. We have to look at where wells are completed to determine the position of that contact.

And you can see that if that contact is shifted up or down any amount, it could greatly affect

that southern limit of the oil production. Therefore, that further emphasizes the need for us to place our well as far north as we possibly can.

Q. Placing the well 660 from the north and east boundaries of the section does place it in the bottomhole location, so that it is standard in this reservoir?

A. That's correct.

Q. What do you achieve with a well at this location, then, if it is continued on into the Morrow reservoir?

A. If we -- one of the -- The next exhibit that I'll show, the documents that we feel like the Morrow is also prospective.

And one of the difficulties we encounter in testing the Morrow is that it is so risky that about the only way you can economically test the Morrow is to add a tail onto existing Cisco wells.

Q. Let's turn to the Morrow display. It's Exhibit Number 6.

A. This is a structure map on the top of the Morrow clastics. This is the producing interval at the Morrow horizon.

The wells which have actually penetrated the Morrow are indicated on the map by a purple circle

around them. So you can see there's not a lot of control for this map.

But there is a sufficient amount to define a northeast trending nose that runs through Section 35. This has led us to propose extending our Cisco well onto the Morrow about another 1500 feet in order to test the Morrow Reservoir.

The nearest adjacent Morrow production that we have here is in Section 36, which is to the east of our proposed well. Marathon's Indian Hills Number 1 and Indian Hills Number 2 wells both produced economic reserves from the Morrow.

Q. In your opinion, Mr. Hardie, does approval of this Application represent the best opportunity for Conoco to test the Cisco, as well as an opportunity to penetrate and test the Morrow?

A. Yes, it does.

MR. KELLAHIN: That concludes my examination of Mr. Hardie, Mr. Examiner.

We move the introduction of his Exhibits 1 through 6.

EXAMINER STOGNER: Exhibits 1 through 6 will be admitted into evidence at this time.

MR. STOVALL: I have a question while you're looking, Mr. Examiner.

EXAMINER STOGNER: Yes, please.

EXAMINATION

BY MR. STOVALL:

Q. If you are going to -- If this is your bottomhole location for the Cisco, how much -- What is the offset for the Morrow? I mean, are they going to be at the same bottomhole location?

A. Yes, they will be. The proposal is to deviate to a point 660 from the north and east before we encounter the Cisco, and then continue vertically downward on to the Cisco and into the Morrow.

MR. KELLAHIN: In order not to have too narrow a radius target in the Morrow, our Application requested an opportunity to be unorthodox, so long as we were no closer than 660 to the northeast boundary of the section.

Q. (By Mr. Stovall) So conceivably it could be a little further --

A. Yes.

Q. -- south and west, then?

A. We've designated those 660 lines as hard lines. We will not go beyond them.

EXAMINER STOGNER: I have no questions of this witness.

MR. KELLAHIN: Thank you.

EXAMINER STOGNER: You may be excused.

MR. KELLAHIN: I'd like to call Mr. Jerry Hoover.

JERRY HOOVER,

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. Hoover, would you please state your name and occupation?

A. My name is Jerry Hoover. I'm a petroleum engineer with Conoco, Incorporated. My current title is senior conservation coordinator.

Q. On prior occasions have you testified as a petroleum engineer before the Division?

A. Yes, I have.

Q. And pursuant to your employment by the company, have you made a study of the facts surrounding this Application?

A. Yes, I have.

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

EXAMINER STOGNER: Mr. Hoover is so qualified.

Q. (By Mr. Kellahin) Mr. Hoover, let me ask

you, sir, to turn to Exhibit Number 7 and identify that display for us.

A. Exhibit 7 is a copy of the well location acreage dedication plat, showing the surveyed surface location for this proposed well at 460 from the east line, 990 from the north line.

The dashed line also shows the orientation and size of the proposed proration unit for both Morrow and Cisco.

Q. When we look at the dot in the northeast of the northeast, that represents the surface location at which you will commence drilling the well?

A. That's correct.

Q. But for the fact that this well is ultimately targeted to an unorthodox bottomhole location in the Morrow formation, the other aspects of this Application could have been approved administratively, could they not?

A. Yes.

Q. You qualified for a standard well location in the Cisco, and the directional drilling could have been accomplished with an administrative application, but for the fact that you're too close to the eastern boundary of the spacing unit for Morrow production?

A. And too close to the northern boundary.

Q. You'll be 660 from the northern boundary?

A. Okay, that's correct, you're correct.

Q. All right, sir, let's turn now to the subject of waivers. Have you identified who the offset operators are towards whom the well in the Morrow formation encroaches?

A. Yes, we have. Those were indicated on Exhibit Number 1, the location map, showing Marathon as the offset operator to the east in Section 36, showing Yates the offset operator to the north in Sections 25 and 26.

Q. And other than Yates and Marathon, any encroachment is towards Conoco-operated tracts?

A. That is correct.

Q. Have you obtained any waives from either of those two companies?

A. We have.

Q. Identify and describe for me Exhibit Number 8.

A. Exhibit Number 8 is a waiver from Marathon Oil Company, waiving their objection to the unorthodox Morrow location being tested in combination with an orthodox Cisco location.

This is a combination that has been accomplished several times in this area, and Marathon

has waived objection to it if we also allow them to do the same thing.

Q. That has become a matter of regular practice among operators in this area when they elect to put additional footage on the bottom of a Cisco well and look for potential production in the Morrow?

A. That's correct.

Q. Identify and describe for us Exhibit Number 9.

A. Exhibit Number 9 is a letter from Yates, also agreeing to the same type of consent.

Q. Conoco has agreed with both Marathon and Yates that we would waive similar objection to their wells in the specified acreage?

A. That's correct.

Q. All right. Let's skip now 10 and 11 for a moment and go to the topo map, which is marked 12. Let's deal with the surface issue.

A. Yes.

Q. Describe for us, Mr. Hoover, why you were not able to obtain the approval of a surface location that would be consistent with the bottomhole targets so that you could have drilled this well vertically.

A. Yes, in the center of this topo map, in Section 35, you can see the close contours and the

shaded area moving across the northern half of Section 35, indicated as the Box Canyon Draw, and that runs directly across the proposed 660/660 location.

Q. Does the current unorthodox surface location meet all the surface limitations in use for a well drilled at that unorthodox surface location?

A. Yes.

Q. Let's now talk about how you're going to drill this well directionally.

If you'll go to Exhibit 10, although the display does not start at the surface, I would like you first of all to look at the horizontal plan --

A. Yes.

Q. -- which is on the right portion of Exhibit Number 10. Tell us what the horizontal plan is for the well.

A. Yes, in the lower right-hand part of this display, the crossing axes in that plan show you the surface location for this well at 460 from the east line.

The diagonal line showing the azimuth of 47 degrees north and west is the proposed direction of drilling for this well, which will be extended to a point -- and you see the two hard lines, the north hard line and the east hard line -- it will be extended to a

point inside those. It will be no closer than the 660 to either the north or the east boundary. We would like to maintain the latitude that is generally needed in directional drilling to be anywhere within that 330-foot box that is allowed for a standard Cisco completion at this location.

Q. Okay, take us now from the surface and look at the vertical section. There's a portion of the vertical section that has been deleted from the display, so orally describe for us what happens at the surface and how do we get down to the kickoff point at 4631 feet that represents the first data point on the vertical section?

A. Yes, this display begins just above the deviation point for the directional drilling.

Initially, we will drill a conventional 13-1/2-inch hole to 1200 feet. We will set 9-5/8-inch surface casing at that point, and a gyro survey will be run on wire line to determine the exact location, the deviation, the deflection of the well at that point, at the setting of the surface casing.

Then conventional drilling will be continued with an 8-3/4-inch hole down to approximately 4600 feet, which brings us within the context of what this display shows.

Q. Starting there, what will you do at the kickoff point?

A. All right, at approximately 4600 feet we're going to first of all drop a magnetic multi-shot survey and pull it back to surface, taking readings about every 250 feet so we can establish precisely the deflection and the azimuth of our hole at this point before we begin the directional drilling portion of the hole.

Then we'll go in-hole with a deflecting assembly which includes a mud motor and a bent sub. When that's downhole, they'll shoot a single shot in order to check the orientation of that sub, and with a steering tool at the surface they will orient that in that northwest direction as shown on the horizontal plan here.

Then drilling will proceed for approximately 100 feet, deviating that hole out of the vertical plane and setting the oriented direction for the hole.

Q. Having done that, will you commence to build angle on the well?

A. That's correct, we'll then go in-hole with a belt assembly which is designed to increase the angle of deviation by about 1 1/2 degrees per hundred feet of drilling.

After about 800 feet of drilling, we should have built the 12 degrees that is indicated on this display that we would like to establish.

Q. Once that point is established, what then do you do?

A. All right, at that point we'll go in-hole with what is called a packed-hole assembly. That simply means that at that point we will want to maintain that 12-degree deviation for a period of time of drilling, and that packed-hole assembly will be maintained for about 600 additional feet of drilling, which will maintain the deflection at 12 degrees.

Q. Then what do you do in order to take the well back to a vertical situation?

A. At that point we'll go in with an angle-drop assembly, which will allow a gentle decrease in the deviation. The deviation will decrease about three-quarters of a degree per hundred feet.

And by the time we've reached the top of the Cisco at about 7600 vertical feet, we should be back to a zero deviation. And at that point we can continue drilling vertically on through the Cisco and through the Morrow.

Q. Summarize for us how you propose to test and complete the well.

A. The well will be tested in the Morrow to see if there's any potential there.

We'll have to then come uphole and also test the Cisco.

The size of this hole that we're drilling and the casing that's planned for it will support a dual completion in the two zones if the water production is not too great in the Cisco.

And so if both are economically producible, that is, a viable scenario, that we could dual the well in both zones.

If the water production is too great in the upper zone, where it would require a submersible or some other type of pumping means, then it would be a choice of which one to complete in this well.

Q. Identify for us what's contained on Exhibit Number 11.

Did I misnumber that exhibit?

A. This is the second page of number 12.

MR. KELLAHIN: Okay.

MR. STOVALL: Number 10, you mean, Mr. Hoover?

THE WITNESS: Yes, sir, Number 10.

MR. KELLAHIN: Then I've misnumbered the exhibits, because the topo plat -- I'm sorry, I know

what it is.

MR. STOVALL: Let's go back here a minute. Are you referring to the directional well plan page, Mr. Kellahin?

MR. KELLAHIN: The directional well plan page should be stapled onto Exhibit Number 10.

THE WITNESS: In your it is stapled. I did not get Tom's stapled.

MR. STOVALL: Well, you gave me the wrong copy, Mr. Kellahin. I was supposed to get the messed-up one.

MR. KELLAHIN: That was my intent, but --

THE WITNESS: This is simply the tabulation of all the data that went into the drawing of the diagrams on the first page.

MR. KELLAHIN: All right, sir. Exhibit Number 11 is the Certificate of Mailing, Exhibit 12 is the topo map, and is there a -- Did you get Exhibit Number 11? Okay.

That concludes my examination of Mr. Hoover, then.

We would move the introduction of Exhibits 7 through 12.

EXAMINER STOGNER: Exhibits 7 through 12 will be admitted into evidence.

EXAMINATION

BY EXAMINER STOGNER:

Q. Mr. Hoover, so I'm sure where the offsets are, I'll refer to Exhibit Number -- I'm sorry, hang on a second.

MR. STOVALL: Yates is north and Marathon is east, is what it is; is that correct, Mr. Hoover?

THE WITNESS: That's correct.

MR. STOVALL: Yates is north and northeast?

THE WITNESS: Yes. Each well is labeled with the operator.

MR. STOVALL: And Yates includes all the various Yates entities that are referred to in their letter?

THE WITNESS: Yes.

MR. STOVALL: Myco and all the others?

THE WITNESS: Yes.

Q. (By Examiner Stogner) Okay, in referring to Exhibit Number 12, has the Preston Federal Well Number 6 surface location been staked and approved by the BLM?

A. Yes, it has. That's been cleared on surface.

Q. And that is the exact location?

A. Yes.

Q. No further authorization from that entity needs to be waited on at this time?

A. I have not had any indication of any problems with it.

They did their surface inspection. We had an archeological survey completed before we filed this Application.

Q. Okay. The Cisco Canyon formation in this particular area is part of the South Dagger Draw Upper Pennsylvania associated pool; is that correct?

A. That's correct.

Q. And the proration unit, rather be gas or oil, is both, 320 acres?

A. That's correct.

Q. And what's your understanding of standard location in either an oil or gas proration in that pool is?

A. Standard location for either oil or gas well in the South Dagger Draw Pool is 660 offset from the boundaries of the proration unit.

Q. So in essence, that's a standard location. But for the Morrow zone in this particular instance, that's what makes it unorthodox?

A. That's correct.

EXAMINER STOGNER: Any other questions of this witness?

MR. STOVALL: Yeah.

EXAMINATION

BY MR. STOVALL:

Q. The only other one is, your interpretation of the Yates waiver is that -- Their language is, the intent is they would approve a like offset both in terms of direction and distance; is that correct?

A. That's correct. And we have agreed with them that, yes, we would consent to their -- a similar arrangement for them.

EXAMINER STOGNER: Any other questions of this witness?

MR. KELLAHIN: No, sir.

EXAMINER STOGNER: Mr. Hoover may be excused.

Anything further, Mr. Kellahin?

MR. KELLAHIN: No, sir.

EXAMINER STOGNER: Does anybody else have anything further in Case Number 10,565?

MR. STOVALL: Yes, I think we ought to sing Happy Birthday to Mr. Kellahin. He's working on the last year of his first half century.

MR. KELLAHIN: Oh, no, you should not do that. We won't do that.

EXAMINER STOGNER: Well, we won't sing, but we will officially on the record wish you a very happy and joyful birthday, Mr. Kellahin.

MR. KELLAHIN: Well, I thank you, Mr. Examiner. The last time someone proposed that they did it in the form of a motion, and it was denied. So --

MR. STOVALL: It must have been Carr.

MR. KELLAHIN: Thank you, Mr. Examiner. That's the first successful birthday motion that this Division has ever granted me.

EXAMINER STOGNER: With that, I will take this case under advisement, and also Mr. Kellahin's birthday.

(Thereupon, these proceedings were concluded at 12:46 p.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 October 10th, 1992.

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. 10505, heard by me on October 1992.

, Examiner
Oil Conservation Division