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 NOS. 10,869 10,881 (Consolidated)
CASE NOS. 10,869 AND 10,881, (REOPENED)	

REPORTER'S TRANSCRIPT OF PROCEEDINGS

EXAMINER HEARING

BEFORE: DAVID R. CATANACH, Hearing Examiner

September 21, 1995

Santa Fe, New Mexico

This matter came on for hearing before the New Mexico Oil Conservation Division, DAVID R. CATANACH, Hearing Examiner, on Thursday, September 21st, 1995, at the New Mexico Energy, Minerals and Natural Resources Department, Porter Hall, 2040 South Pacheco, Santa Fe, New Mexico, Steven T. Brenner, Certified Court Reporter No. 7 for the State of New Mexico.

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I N D E X

September 21st, 1995
Examiner Hearing
CASE NOS. 10,869 and 10,881

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E X H I B I T S

(Continued...)

E X H I B I T S (Continued)

Yates	Identified	Admitted
Letter from Randy Patterson, Land Manager, Yates Petroleum Corporation, requesting that the temporary rules be adopted on a permanent basis	52	52

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A P P E A R A N C E S

FOR CONOCO, INC.:

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By: WILLIAM F. CARR

* * *

WHEREUPON, the following proceedings were had at 2:36 p.m.:

EXAMINER CATANACH: At this time I'm going to call Cases 10,869 and 10,881, which is in the matter of Case Numbers 10,869 and 10,881 being reopened in accordance with provisions of Division Order Number R-10,050, which amended the special pool rules and regulations for the South Dagger Draw-Upper Pennsylvanian Associated Pool in Eddy County, New Mexico, providing for a limiting gas-oil ratio of 7000 to 1, cubic feet of gas per barrel of oil.

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 Conoco, Inc., and I have two witnesses to be sworn.

MR. CARR: May it please the Examiner, my name is William F. Carr with the Santa Fe law firm Campbell, Carr and Berge. We represent Yates Petroleum Corporation in this matter. I do not intend to call a witness.

EXAMINER CATANACH: Okay, any additional appearances?

Will the witnesses please stand to be sworn in?

(Thereupon, the witnesses were sworn.)

MR. KELLAHIN: Mr. Examiner, when you heard this case back in December of 1993, the issues for discussion

were two items.

One, whether or not in this associated pool we would delete the preclusion of simultaneous dedication in the pool. It's difficult to say, but under the associated rules, you cannot have simultaneous dedication of an oil well and a gas well.

As a result of that hearing, we deleted that requirement. And so in this reservoir, as of January of 1994, operators could in fact dedicate in a spacing unit both oil and gas wells. You may remember that we're on 320-acre spacing, that the oil allowable for a spacing unit is 1400 barrels of oil a day, and that you have a limiting -- special limiting gas-oil ratio of 7000 to 1.

The 7000-to-1 GOR limit was the other issue that you heard back in December of 1993. At the time of the hearing, the GOR in the pool was 10,000 to 1, and you directed that it be reduced to 7000 to 1.

Conoco is here to support making those two changes permanent. We're here to illustrate the positive response of the operators in the pool to those changes and so that you can see that a substantial amount of additional oil has been produced that might not otherwise be produced. So we're here to present a geologic presentation and an engineering presentation to confirm making those two changes permanent.

To aid you in your review of this matter, I've got a copy of the prior order that was issued in this case that dealt with these two topics. It's the 10,050 order.

All right, sir, with your permission I'll call Mr. Bill Hardie.

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, sir, would you please state your name and occupation?

A. I'm a senior geologist with Conoco, Inc., in Midland, Texas.

Q. On prior occasions have you testified as a petroleum geologist?

A. Yes, I have.

Q. In fact, you were the petroleum geologist that testified on behalf of Conoco in the last hearing on this topic, were you not?

A. That is correct.

Q. Have you continued to be involved in that capacity with your company for the development of production in the South Dagger Draw Associated Pool?

A. Yes, I have.

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

EXAMINER CATANACH: He is so qualified.

MR. KELLAHIN: Mr. Hardie, let's turn to Exhibit 1.

Mr. Examiner, I think as we go through the discussion, you may find it helpful to keep Exhibit 1 available. It serves as a good locator map for our discussion this afternoon.

EXAMINER CATANACH: All right.

Q. (By Mr. Kellahin) Identify for us the data that's shown on Exhibit 1, Mr. Hardie.

A. Exhibit 1 is a base map of the South Dagger Draw Pool. The outline of the pool is shown with the heavy blue line.

Also shown on the exhibit are all the wells currently producing from the pool. The operators for each of the proration units are also labeled in red type. There are 320-acre spacing for each proration unit.

Q. The blue outline represents the current boundary of the pool?

A. That is correct.

Q. All right, sir. It has other data on here. There's some production data on here?

A. Yes, there is. This particular exhibit shows the

average daily production over the last month that was available from *Dwight's*, and that's shown in blue. The first number is oil and gas production, and then the gas-oil ratio is shown. And that is again an average daily production, over the last month.

Q. When we look north of the north boundary of the pool, we're moving into -- What pool is that?

A. To the north of the South Dagger Draw Pool is the North Dagger Draw Pool.

Q. Okay. And as we move into the southwest portion of the southern boundary of this pool, what are we moving into?

A. We move into the Indian Basin Gas Pool.

Q. On this display, if it's a gas well or an oil well and they're shaded black, what does that mean?

A. That means that the well was drilled at the time when the pool rule changes were made back in November of 1994.

Q. I think it was --

A. I'm sorry, that's actually --

Q. -- actually ordered in January of 1994.

A. -- January of 1994. That's correct, I'm sorry.

Q. When I look at the gas well symbols and oil-well symbols that are in red, what do those represent?

A. Those are wells that have been drilled or staked

subsequent to Order Number R-10,050 on January 26th of 1994.

Q. There is one single exception to that general statement, is there not? If you'll look in Township 20 South, Range 24 East, and look down in Section 35, up in the northeast quarter of Section 35 there's the Preston 5 well?

A. Six.

Q. I'm sorry, is that a "6"?

A. Yes, the Preston 6 is a deviated well. It is currently producing from the Morrow formation.

Q. Other than that, everything else is this Cisco/Canyon production?

A. That is correct.

Q. All right. Let's set that aside then as a locator map and turn to Exhibit Number 2 and have you identify that, please.

A. Exhibit Number 2 is essentially the same map as Exhibit 1, with the only difference being that the production shown is cumulative production for each of the proration units. And again, it's shown -- first, the oil production, then the gas, and then the gas-oil ratio.

This exhibit shows -- By comparing the numbers, you can see that by far the highest cums are from the older, established portion of the South Dagger Draw Pool

which lies to the north. The newer wells, of course, are a year or less old and haven't cum'd nearly as much.

Q. When we look down in the area where the recent drilling has taken place, in the southern portion of the display, there is a difference in the shape of the well symbols. There's a red circle, and then there's a red square. What's the difference?

A. The red squares are wells that have been drilled and completed, but the production data is not yet available. So they are not included in the cum data that you see posted within that proration unit.

Q. But they do represent drilled and completed wells?

A. They have been drilled and completed.

Q. All right, let's go to the first of your geologic displays and have you turn to the structure map which is marked as Exhibit 3.

We've heard a great many cases about South Dagger Draw, but I think it's always helpful to have you take a minute or two, Mr. Hardie, and give us the deposition and the word picture of how we are positioned in South Dagger Draw, particularly in relation to the gas pool, the Indian Basin Gas Pool, and North Dagger Draw, the oil pool to the north.

A. Okay. This structure map is on top of the

dolomite reservoir, which produces in South Dagger Draw.

In general, the structural elevation increases as we move to the south along the dolomite fairway, and that increase in elevation coincides with changes in the reservoir fluids, namely that you produce oil in the lower portions of the reservoir. Particularly up at the northern end of the map, at North Dagger Draw, you produce oil in the northern portions of South Dagger Draw, and then as you continue moving south you gain elevation until at some point you pass from the oil column into the gas cap, which comprises the Indian Basin gas field. And that begins at the southern part of this map and continues beyond the boundaries of this map.

Q. The eastern boundary of production is controlled by what components, Mr. Hardie?

A. The eastern-end production is controlled by an oil-water contact. And you can tell by looking at the row of sections in 20 South, 24 East, the north-south row comprising Sections 12, 13, 24 and 25, that there's only wells developed on the western half of those sections, and that's because you move downdip as you go to the east and into the water-producing portion of the reservoir.

Q. What determines the western boundary of the reservoir?

A. As you move to the west, you also gain structural

elevation, and you enter a gas cap. As you can see, the wells, particularly in the northern half of the pool -- As you move from east to west, they start out as oil wells, and gradually you start to encounter gas wells. And then ultimately the dolomite itself pinches out to the west, and that is the limit of the field.

Q. Is the South Dagger Draw Associated Pool properly designated as an associated pool?

A. Yes, it is.

Q. Within the same common source of supply, there are a combination of gas wells and oil wells?

A. Yes.

Q. Summarize for us whether or not in your opinion as a geologist you see any positive benefit from having the rule deleted whereby operators in the pool are now allowed to simultaneously dedicate a spacing unit between gas and oil wells. Has that been a good thing?

A. Yes, it has. There have been several important developments that have occurred as a result of the pool rule change, namely, all of the wells that you see highlighted in red were drilled, and they probably wouldn't have been drilled if not for the pool rule change.

Q. Describe for us why you have that opinion.

A. Because of the simultaneous -- or the lack of simultaneous dedication an operator was forced to choose to

produce either oil or gas, but not both, from a single proration unit. Therefore, as one encounters a thinner oil rim moving updip, the risk of finding oil becomes greater. And should one drill a well that had uneconomic oil production, the obvious alternative would be to complete in the gas cap, thereby leaving that oil in the ground. So...

Q. With the deletion of that limitation, then, the operator has the flexibility to assume the risk of drilling the well and has therefore the opportunity to complete it both as a gas and/or oil well?

A. That is correct.

Q. And that's happened, hasn't it?

A. It has.

Q. Can you give us an illustration of where that represents a situation in any of these spacing units?

A. There are actually several spacing units where that has occurred. An example, it would be the case that Conoco brought forth initially and that is in the south half of Section 35 of 20 South, 24 East, where our Preston Federal Number 1 gas well had been drilled. I believe that was drilled in the early Seventies.

Conoco wished to come in and develop the eastern portion of that proration unit, and we suspected there would be oil production there. So we had to choose: Do we shut in the Preston 1 and drill the oil wells? Or do we

drill additional gas wells? And we sought to have the simultaneous dedication clause removed. It was, and we drilled two -- subsequently drilled two oil wells, the Preston 7 and the Preston 10.

There are numerous other examples.

The irregularly shaped -- or the irregular sections south of that, Section 35 and 36, each have gas wells and oil wells. And there are other examples we could document all over the South Dagger Draw Pool.

Q. Let's turn now to Exhibit Number 4. What are we looking at, and why is it important?

A. Exhibit 4 is a color-fill contour map of the isopach of the dolomite reservoir. The color notation is such that the thinner the reservoir, the darker blue the color is. And then as we get thicker and thicker, we go from dark blues to greens and ultimately to yellow, indicating the thickest portion of the reservoir. And it varies from zero at its outer edges to upwards of over 400 feet along its axis.

Q. When you're talking about thickness, what are you measuring and are you using any cutoffs?

A. We are measuring only a lithology, and that is dolomite. In Dagger Draw, dolomite is the reservoir. There are no porosity or permeability cutoffs applied to this map.

Q. When you look at thickness and compare it to rate or cum, is there any correlation between thickness and those characteristics of the reservoir?

A. Yes, there are, and you can actually see that on this map, in that virtually all the wells -- or the vast majority of the wells are drilled along the thickest portion of the reservoir.

As you encounter thinner dolomite pay, the odds of drilling an uneconomic well increase greatly. So there's just not enough oil or gas in the thinner portions to justify development.

Q. And as you move south, into the southwest, you're moving higher on structure and therefore higher into the gas?

A. That is correct, the oil -- the oil rim becomes gradually thinner as you move to the south.

Q. Describe for us the role the water component of the reservoir plays.

A. The entire reservoir is water-productive, irregardless of where one completes. As you move downstructure there comes a point at which you pass from the oil-producing part of the dolomite into 100-percent water production. But there is virtually no well in this field that is water-free, productionwise.

Q. Having looked at the thickness of the reservoir,

let's turn now to Exhibit 5 and look at the oil column in that reservoir. Describe for us what we're seeing on Exhibit 5.

A. Exhibit 5 is again a color-filled isopach map of the portion of the dolomite reservoir that lies within the oil column.

Q. Describe for us how you make that interpretation.

A. That's based on mud-log shows which would indicate that -- the bottom portion of the reservoir, which contains oil -- and completion information, which indicates position of the gas-oil contact.

This -- Again, the color-coding scheme on this goes from light greens to the thinner portion and darker greens indicating progressively thick portions. The oil column in the pool ranges from, of course, zero at the outer edges to just over 100 feet along its axis.

Q. When you examine the oil column, you're identifying a thickness for the oil column?

A. We're identifying only that portion of the dolomite which lies within the oil column. And again, there are no porosity cutoffs, no permeability cutoffs. You couldn't necessarily pick locations based on this map, because it doesn't say anything as to whether or not the dolomite will have enough porosity and permeability to produce oil.

Q. At the time of the hearing in December of -- 1993? I lost track of my dates.

A. 1993, that's correct.

Q. 1993. -- what was the extent of the reservoir in terms of a pool boundary?

A. At that time, our best interpretation of the position of the oil column is shown by the dashed -- the heavy dashed red line that you can see passing through the boundary between Township 20 South and the irregular row of sections there. That's basically pulled straight off of the exhibits that we presented at that hearing in December of 1993.

Q. The southern pool boundary of this pool at that time was approximately at the transition line between the townships?

A. That is correct.

Q. It was not generally believed that the oil column at that point would extend this far to the south, was it?

A. Well, it wasn't that it wasn't believed. There was just no evidence to actually make a map of the oil column extending that far, because there were no wells drilled.

Q. All right. So there was an absence of data and therefore no conclusion one way or the other?

A. Right, we strongly suspected that the oil column

continued southward, but that wasn't to be discovered until the wells were drilled.

Q. Can you use this map to illustrate the importance of the change of the rule on simultaneous dedication?

A. What the change in the rule allowed were for operators to begin drilling and exploring for oil. And -- in this portion of the reservoir that was thought to be gas-productive.

And by drilling those, they indeed proved up the oil column and proved up an additional six sections of oil production.

And in fact, if you were to take from Exhibit Number 1 and total up all the oil production on a daily basis, those six sections that were proved up as a result of that pool rule changing currently produce about 5500 barrels of oil per day. And we contend that that oil production would have never occurred, had it not been for the removal of the simultaneous dedication clause.

Q. Okay. Let's turn and look at the gas column now, if you'll turn to Exhibit 6. All right, if you'll turn to Exhibit 6, would you identify this display, tell us how you've constructed it, and give us the major points of conclusion?

A. Exhibit 6 is similar to Exhibit 5, except this time we're looking at an isopach or a thickness map, the

portion of the dolomite reservoir that is gas-filled. Again, the color scheme goes from thinner portions, being indicated by yellow colors, and then they become progressively more red as the gas column becomes thicker. And it varies from zero at the outer edges to upwards of 350 feet thick in the Indian Basin gas field, or at least the portion of the Indian Basin gas field shown on this map.

Q. Again, you're dealing with gas quantity as opposed to some kind of quality?

A. We're speaking strictly in terms of quantity of dolomite within that gas cap. There are no porosity or permeability cutoffs applied, so that this is not necessarily an indication of how productive a well may be.

Q. Again, it's characteristic in this reservoir, which has really been separated into two separate pools politically by the Division. You've got the North Dagger Draw, South Dagger Draw and Indian Basin, is really one reservoir, is it not?

A. In a regional sense that is correct, they are the same reservoir, although there are reservoir zonations within the overall dolomite fairway that --

Q. And we have a narrow reservoir that's two or three miles wide and approximately how long?

A. That's a good question. It's been mapped for at

least 50 miles. It extends a great distance.

Q. And we are in a reservoir that is complicated because you can move into the gas column and still have water production that may be at rates even higher than the water production of an oil well?

A. That is correct.

Q. Okay.

A. This map clearly shows what would have happened were it not for the removal of simultaneous dedication. There's ample thickness of dolomite within the gas cap, which would have justified operators going in and completing these as gas wells.

Q. Had they done that, it would have precluded the recovery of oil that might otherwise have been produced?

A. That is correct.

Q. Okay. All right, sir, let's turn -- On a number of these displays you've shown a line of cross-section which runs through that irregular township. Is it 20 1/2? Do they call it Township 20 1/2 South?

A. 20 1/2 South.

Q. And it's that row of short sections from 32 through 36?

A. That's correct.

Q. In that area, then, within the reservoir portion you've got a line of cross-section?

A. Yes, it passes --

Q. Let's look at that.

A. -- in an east-west direction from the Mojave Number 2 to the Stinking Draw Number 1 well.

Q. All right, let's take a minute and unfold the display and then I'll have you talk about it.

You've constructed this from east to west, you've got five wells shown on the display. Describe for us why we're looking at this. What's the importance?

A. I constructed this cross-section to document why within an individual proration unit you would get both gas and oil wells.

And if I could go through each one of these completions and explain why the well was either produced -- or completed as a gas well or an oil well, I think that will become apparent.

Q. Let's start on the east side at A' and take the Marathon Stinking Draw 1, and take a moment and show us how you've color-coded the log so we understand what your method is.

A. Okay. The color-coding relates to the lithology. Colored shales in brown, dolomite is colored purple. That would be the Cisco reservoir. And then limestone, which is nonreservoir rock, is shown in blue.

Q. Within the dolomite portion, you have subdivided

the dolomite into Cisco subdivisions, have you not?

A. That is correct. Those are correlable markers within the Cisco reservoir.

Q. And then across the center portion, at least on the log for this well, is a red line, a horizontal red line. What does that mean?

A. That is a reference elevation at minus 4000 feet subsea, which approximates the gas-oil contact for this portion of the reservoir.

So we know, based on production history and completions, that if you're completing above that line it's more than likely going to be a gas well, if you complete below that line, you have a good opportunity for making it an oil well.

However, the oil rim here is very thin -- it's generally about 50 feet thick -- so that the opportunity to produce oil is only available in a narrow window of the reservoir.

Q. Let's start, then, with the Marathon well, using the reference line, and have you tell us whether we have a gas well, oil well or some other creature.

A. Okay. The Marathon Number 1 Stinking Draw was one of the first wells that were drilled after the change in the pool rules. It was completed as a gas well after numerous attempts to complete in the oil column.

Marathon began their completion attempts in the lower portion of the reservoir and produced high rates of water and small amounts of oil. But the well was economic and they began adding pay higher up, above the minus-4000-foot reference elevation.

And ultimately, this well was completed as a gas well, simply because the water cuts in the lower portion were too high to be economically produced.

This well has cum'd within about a two-year period only 13,000 barrels of oil, but about 400 million cubic feet of gas.

Q. As Marathon goes to its next well in that same spacing unit, we get the Stinking Draw Number 2?

A. Yes.

Q. Do you recall its sequence with the 1 and 2? Is this Number 2, in fact, drilled as the second well?

A. Yes, it was.

Q. So Marathon's got what is a gas well in Number 1?

A. Right.

Q. And they move to the Number 2, and that turns out to be an oil well?

A. That's correct, they surmised that by moving updip they would encounter the oil column in a more favorable reservoir condition, better porosity, better permeability, and they were correct.

The Number 2 Stinking Draw has the advantage of the fact that the bottom of the reservoir gains elevation, and essentially it passes into the oil column, so that everything below the minus-4000-foot reference elevation to the base of the dolomite in that well was within the oil column.

Q. All right, sir. Now they've got an oil well, but under the old rule they would have had to shut in the Number 1 well?

A. That was correct.

Q. All right. And so as we move, then, to the third well, which is the next one on the cross-section, what do we find with that well?

A. Before we move to the third well, I'd like to explain why Marathon has completed pay up higher.

Initially, they completed down low, produced it until the oil became uneconomic in terms of rate, and then they began adding pay higher up in the section. The general idea is to keep the well economic and gradually add gas pay in order to do that. Although it is still an oil well, it does have a relatively high GOR of 10,000 to 1.

Q. And as they moved, then, to the west, they drilled the Number 3 well?

A. The Number 3 well was another attempt to complete in the oil column. And as you can see, they gained

elevation.

But there was an unfortunate circumstance in that, if you look at the reference elevation line of minus 4000 feet subsea to the bottom of the reservoir, you can see that in the gamma-ray character the dolomite is getting fairly shaly, so that the reservoir quality was very poor where the oil column happened to be. And to date this is an uneconomic well. It produces low amounts of oil and low amounts of gas. I suspect Marathon will very soon begin completing uphole in the gas portion.

Q. Again, the rule change gives Marathon the operational flexibility to maximize the hydrocarbon recovery in this combination of gas-oil zone?

A. That is correct.

Q. Okay. As we move to the Yates Mojave well, what's the importance of that well?

A. The Yates Mojave well, as you can see by its relationship to the base of the reservoir, with the reference elevation of minus 4000 feet, there is no oil column within this well, or at least no significant amount of oil column within the well.

Yates tested several zones throughout the dolomite when they completed this well and ultimately ended up completing it in the very uppermost portion as a gas well.

Q. Again, Yates has benefitted by the rule change?

A. Yes, not in this particular well but elsewhere.

Q. Okay.

A. Yes.

Q. So this example is not unique in the reservoir?

A. No, it's not. I take that back, Yates has actually benefitted in this proration unit --

Q. Yes.

A. -- by the rule change.

Q. And then finally, the last of the Yates wells on this cross-section, the Mojave 2?

A. Right, the Mojave 2 is in the same proration unit as the Mojave 1 and documents the benefit Yates has seen by the pool rule change. They drilled their Number 2 Mojave past -- through the gas-cap portion of the dolomite and then picked up a lower buildup in the Cisco that Conoco calls the Cisco C-5 zone. And the C-5 zone appears to be separated from the rest of the reservoir by a thin shale zone, and it is the source of the vast majority of the oil production that has been discovered as a result of the pool rule change.

That is a -- The lower zone is actually very economic in terms of oil production. This is a newly drilled well. On September 16th of 1995, this well was producing 289 barrels of oil per day and about 1.1 million

cubic feet of gas.

Yates completed both in the reservoir -- the C-5 reservoir in the oil zone and, in the upper portion, the gas zone.

Q. In summary, Mr. Hardie, your geologic conclusions as they affect this issue?

A. The conclusions are fairly simple. The change in the pool rule, particularly the dropping of the simultaneous dedication, has allowed a considerable amount of development in a relatively thin oil rim in the southern portion of the South Dagger Draw Pool. So it's provided a mechanism by which operators can go in and develop that oil without the excessive risk that simultaneous dedication clause would have created.

It provides a mechanism by which a newly discovered oil pool can encroach upon an established and existing gas field, namely the Indian Basin gas field.

It's allowed protection of correlative rights by operators here. For example, should an operator be offset on one flank by somebody completed in the gas cap and on another flank by somebody completed in the oil column, he can now compete for both the gas and the oil, due to the dropping of that clause.

And I think the evidence that will be presented by our reservoir engineer, Mr. Beamer, will show that

there's really no evidence that the simultaneous dedication, coupled with the new limiting GOR, has created any adverse effect on oil production.

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

We move the introduction of his Exhibits 1 through 7.

EXAMINER CATANACH: Exhibits 1 through 7 will be admitted as evidence.

MR. CARR: No questions.

EXAMINATION

BY EXAMINER CATANACH:

Q. Mr. Hardie, what kind of further development do you anticipate in the southern portion of this pool?

A. Currently, our best guess is that the oil column will continue to be pushed southward. I strongly suspect that Sections 3, 10 and 15 of Township 21 South, Range 23 East, will contain oil. That hasn't been proved up. You can see in that, that there are gas wells in those sections. Those were drilled back in -- probably the Sixties, and they are producing out of the Indian Basin gas field.

But at the time those were drilled, everyone suspected that it was a gas reservoir with a gas-water contact. Nobody knew there was a thin oil rim. So those

haven't been tested yet.

Q. Do you anticipate that oil column being pushed much further than the south of Section 15? 14, 15?

A. My best guess to that would be that we're looking at about -- that would be about the limit of it, because you continue to gain elevation. And the wells that are at the very highest portion in the Indian Basin gas field are completed from the very top to the very bottom of the dolomite, and they do not produce oil. Typically, these flanking wells were produced only in the upper portion of the dolomite.

Q. In the existing -- Sections 1, 2, 11, 12 and 14, there certainly is -- Is there a potential for more drilling of oil wells in those sections?

A. Yes, there is, and I'm sure that's ongoing. You can see the open circles, red circles, indicate staked locations that have yet to be drilled. Most of that, or -- if not all of that, I believe, is operated by Marathon.

Q. How about for gas wells? Is there much potential for more gas well drilling?

A. By the time you've developed the oil column, you've actually overdeveloped the gas cap, so that you really don't need that many well locations to deplete the gas cap.

But that number of wells would be necessary to

develop that thin oil, then. So by the time everybody has drilled up their oil wells, it will just be a matter of recompleting upsection to the gas cap, once the oil has been depleted.

I think it's important to note also that the Indian Basin gas field was discovered, I believe, in the 1950s, and has produced an enormous amount of gas -- I believe 1.5 TCF -- before anybody ever discovered that there was an oil rim at the bottom of it. And any subsequent damage to the oil rim was probably caused a long time ago before we ever knew the oil existed. So it's difficult to say that we are damaging anything now, because it's so late in the game already.

Q. So you think the gas production from the Indian Basin had some effect on this area in terms of the oil column in these wells?

A. It undoubtedly pulled down the reservoir pressure. It may or may not have caused a migration of the oil column updip. We can't document that.

Q. Do you have any instances where these pool rules have, in fact, protected correlative rights?

A. There's a good example in the Mojave Number 2, I believe. The Mojave 2, as you can see on the cross-section, was completed in both the oil column and the gas cap. And I believe the reason that Yates shot the gas cap

there was because Marathon had also completed the gas cap in some wells to the south. So they were in that case protecting their correlative rights in the oil column and in the gas cap.

EXAMINER CATANACH: I have nothing further of this witness.

MR. KELLAHIN: Mr. Examiner, my next witness is Bob Beamer. He spells his last name B-a-e- -- ?

MR. BEAMER: B-e-a- --

MR. KELLAHIN: B-e-a-m-e-r.

Mr. Beamer has compiled a wealth of information on the reservoir. We will mark it and introduce it as the various exhibits. We're going to touch the highlights and look at one or two specific examples to illustrate this matter, but there is an amazing amount of information that can be used as a reference to this issue in the case file, but it's certainly not our intent to fully explore all the information.

BOB BEAMER,

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

A. My name is Bob Beamer. I'm a reservoir engineer with Conoco out of Midland, Texas.

Q. Mr. Beamer, on prior occasions, have you testified as a reservoir engineer before the Division?

A. Yes, I have.

Q. Have you made an engineering investigation of the South Dagger Draw Associated Pool with regards to the issue of trying to determine whether or not there's any adverse effects apparent or perceived with maintaining the gas-oil ratio at 7000 to 1?

A. Yes, I have.

Q. And what conclusion have you reached?

A. We see no detrimental effect from the change in the pool rule.

Q. Let's turn to Exhibit Number 8, then, and have you identify what you're showing to the Examiner, and then we'll look at some of the items.

A. Exhibit 8 is a summary of the performance of each well in the South Dagger Draw Field.

Q. And what's the source of the data?

A. The source of the data is primarily from *Dwight's* database, queried on September the 11th of this year, a few instances from PI scout reports and also from operators' reports.

Q. You started in the north end of the pool with the

tabulation and worked your way to the south till you got to the end --

A. Yes.

Q. -- is that how it's organized?

A. That's correct, from north to south, and it's ordered by proration unit. The left-hand column designates the 320-acre spaced unit and then shows each lease and well number within that unit, gives the location, an indication of the status, and then simply a current cumulative production of liquid and gas. And then what I've done is compute the cumulative GOR from that data.

The next columns show last month's daily average production of oil and gas and a computed GOR from that data.

The final two columns, then, refer to the last month of data available and then the first month of data available.

Q. That first well, then, the first month was April of 1991?

A. April of 1991, yes, sir.

Q. You've gone through and on some of these you've indicated low oil or you identify it with a highlight of "gas well"?

A. Yes.

Q. What's your reason for doing that?

A. In the heading, you'll notice, my GOR columns, I have a single asterisk, and that's noted at the -- page 6, the final page of this exhibit. And by definition, a gas well is defined as a GOR in excess of 30,000 to 1.

So what I've done here is, any well that has a GOR in excess of 30,000 to 1, I have shaded in dark with bold numbers so that all gas wells, then, are designated in that manner.

Another designation that I've made on this spreadsheet, tried to make it easier to see the total proration unit, gas production, is to bold those numbers within the boxed outline.

Q. All right, sir. Let's turn now to Exhibit Number 9. What's contained in the package of documents that are shown as Exhibit 9?

A. These are development history plots, production curves, if you will, by pool and by operator --

Q. All right.

A. -- within the South Dagger Draw-Cisco Pool.

Q. Okay, let's turn behind the identification page for Exhibit 9 and look at the first display.

A. The first display is a performance plot of the total South Dagger Draw-Cisco Pool from 1990 through 1994, and it shows, from the bottom up, the stepstair curve is the number of wells, and we can see a gain of about 23

wells from the beginning of 1994 through the end of that year.

The bold solid line, next curve up, is the oil production curve.

The next curve up, the dashed, is the gas rate in MCF per day for the total field. And then the topmost dotted curve is the -- No, I'm sorry, that middle curve, the dashed curve, is water rate in barrels per day.

And the final curve, then, the dotted, is the gas rate, MCF per day.

Q. For purpose of this display, you stopped the data as of December of 1994?

A. I did that because the *Dwight's* database is not fully consistent for each operator. For instance, Marathon's data is carried active through May of 1995. Conoco's data is current only through February. Yates' data is only through February. And it creates quite a disruption in the curve to show that plot.

However, on the subsequent displays on this exhibit, I've shown each major operator's performance curve, and I think you can better see the impact of the change in the rule.

Q. Let's do that, let's turn to the next display and look at the Marathon-operated wells in South Dagger Draw, have you demonstrate what you've just concluded, that you

don't see an adverse consequence from either the simultaneous dedication provision or the GOR rule.

A. Well, first of all, picking up from what Bill just testified to, it's obvious that there has been a continuity of development in the South Dagger Draw field. Marathon alone has drilled 22 wells since January of 1994, and the response in the oil production is pretty significant, about 3000 barrels a day above what they were producing in January of 1994.

Also, from this plot, they're producing about 25 million cubic feet of gas per day, in excess of what they were making in January of 1994.

Q. Marathon's oil production went from about 500 barrels a day to 3500 barrels a day? Was that it?

A. Actually, it looks like in January of 1994 their production was about 200 barrels a day.

Q. Okay.

A. So that would be more like 3300 barrels a day increase.

Q. All right. Let's look at the next operator, the Conoco-operated.

A. Conoco-operated, we've added about three wells since the pool change. However, we have been able to maintain our production rate level, approximately 200 barrels a day greater than the January, 1994, level. Our

gas production has increased about 3 million a day above the January level. We think it's been a successful program.

Q. If the GOR was resulting in too high a gas withdrawal rate from the reservoir, would you see any effect of that on any of these curves or plots in this set of exhibits?

A. Within the time frame that we're talking about, I'm not sure that we would. It is possible if that gas rate were too high, that it could draw down the pressure where we might see a decline, but we haven't noticed any adverse effect.

Q. What this does, then, is, you're able to look at this and satisfy yourself that the rule change has resulted in a substantial amount of additional oil now being produced?

A. Yes.

Q. All right. Whether or not the gas has had any effect on that oil recovery, we can leave to later displays then?

A. Yes.

Q. All right. You've looked at the Conoco. Let's look at the Yates-operated wells.

A. Yates-operated wells, of course, Yates operates primarily in the northern half of the pool, and really they

have not been affected to the degree that Marathon or Conoco has been affected. They simply were pretty well developed, even back at the end of 1993.

Q. Okay, and then the last display?

A. The last display is the remaining operators within the field, which is Santa Fe, McKay and I believe Nearburg, and this shows little additional development and essentially a relatively flat gas production rate and a slight decline in their oil production, which is probably typical from what we'll see later.

Q. All right. Let's turn now to Exhibit 10, have you describe for us what you've packaged in this exhibit set, and then let's pick out some examples that illustrate what conclusions you're going to make.

A. The front sheet identifies what's within this packet, and they are production plots by proration unit for the south end of the Dagger Draw -- of the South Dagger Draw field. And essentially what we're looking at is from the irregular sections in 20.5 South, going south. So all proration units from that point south.

Q. Okay, let's turn to the first page, then. If we look at the east half of 34, just so we see how you've set up the information, you've got a dashed line and an indication of the maximum gas allowable for the spacing unit of the 9.8 million a day?

A. Yes, that's correct.

Q. And production has been below that ceiling, has it not?

A. Yes.

Q. All right. What does this curve show you? Is there any other conclusion you can reach?

A. Well, I see no evidence of any interference from any offsetting wells. We've been able to maintain our production from this -- Actually, this is one well within the proration unit, our Preston Number 5. We did a successful remedial frac job in early 1994, which brought our production back up to about 200 barrels a day, and we've been able to maintain that. Our gas rate has been relatively flat, and we see no evidence of any interference.

Q. Okay. I'd like to take you to page 3 of this exhibit set, and look at the south half of Section 35. Here within this spacing unit there are multiple wells, are there not?

A. Yes, and this happens to be another Conoco-operated proration unit on our Preston Federal lease.

Q. Let's have you show us which one is the gas well and which are the two oil wells.

A. The Preston 1 is the gas well, and it's been on production since the early 1970s. I show its production

only starting in 1993, mainly so that we could spread this display out and see any effects, if there were any, from offsetting wells.

In January of 1994 we drilled our Preston Number 10, which from the map is quite a ways removed from our Preston 1. It was completed as an oil well in the southwest corner of that proration unit.

And then in June of 1994 we drilled the Preston Number 7, also as a gas well, within that proration unit.

Q. If you're looking at the locator map, Mr. Beamer, you can see that the south half of 35, that Conoco spacing unit, has got this 7 and 10, your oil wells, on the southern boundary of that spacing unit, and you're offset to the south by the Marathon Stinking Draw wells, and then there's a gas well --

A. Yes.

Q. -- in 36?

A. Yes. And I --

Q. When you compare the performance of these wells one to another, do you see any adverse effect on your oil wells by the Marathon gas well to the south?

A. No, we haven't. And in fact, on the display I show the timing sequence of the Stinking Draw wells' completions, and there is no obvious effect to date on our production.

Q. Okay. Are there any other examples in Exhibit Set 10 that are important to you to bring to the Examiner's attention?

A. We might look at page 4, which is the north half of Section 36. It's a Marathon-operated proration unit just east of our Preston Federal lease, where they had production established early in 1993.

Subsequent to that, we drilled two wells offsetting them, the Preston 8 and 9, both as oil wells. There is no evidence on this plot of any detrimental effect to the Marathon production from these two wells.

Q. The slope on their decline on their oil production didn't change when you brought the Preston 8 and 9 on line?

A. Not noticeably, no.

Q. Okay.

A. And again, the gas rate is well below the maximum allowed gas rate.

Q. Okay. Anything else on Exhibit 10?

A. Nothing of significance. I think that all of the spacing units are producing within the maximum allowed gas rate.

Q. And if the Examiner follows this same method of analysis that you've illustrated with those two examples, then he can see for himself the performance of these other

wells in the pool?

A. I think so.

Q. All right, sir. Let's turn to Exhibit 11. Describe for us what you have packaged together in Exhibit 11.

A. These again are production plots for several 320-acre spacing units or producing units, trying to show some comparisons of performance.

First of all, on page 1 of this exhibit, I've selected an area within the North Dagger Draw-Cisco field --

Q. Why would you want to go way up in North Dagger Draw for an example?

A. Well, I selected an area that is fully developed on oil spacing, simply to show what the -- what a typical North Dagger Draw-Cisco performance is.

Also, keep in mind that in this portion of the reservoir, thinking in terms of a common reservoir, although different designation of pool limits, pool outlines, we're looking at a considerably thicker oil section in this area of the reservoir. And we see a somewhat typical established decline of about 45 percent for a mature producing unit on the North Dagger Draw.

Q. Let me understand your method. You went into North Dagger Draw, found you would have to have taken two

spacing units in North Dagger Draw?

A. That's correct.

Q. Because that's on 160s?

A. Yes.

Q. So you formed a hypothetical west-half spacing unit in Section 19?

A. Yes.

Q. Which would contain six wells?

A. Yes.

Q. You then plotted all that data and established, in the mature part of the oil pool, what would be a typical decline percentage in an area that would be unaffected by gas withdrawals?

A. Yes, that's right.

Q. And you got about a 45-percent decline?

A. Yes.

Q. So now you have an example by which you can compare what oil wells will do when you move closer to the gas cap?

A. Yes, we're looking at this as more or less a prototype.

Q. Okay. Taking that as a benchmark, if you will, let's turn to Exhibit 2, and now look down in South Dagger Draw in the north half of 14, where your oil column is substantially thinner, and yet you're using the same size

of unit for comparison. What do you see?

A. Well, we see similar performance. Again, this is a mature development in this spacing unit. The declines established are somewhat greater, but again we're in a thinner oil section than would be anticipated. But there's nothing abnormal indicated by these trends.

Q. The change of the rules in the GOR and the dedication don't appear to show any exhibited effect on the performance of the wells in the north half of 14?

A. Well, that's true. But again, this is in the older area of South Dagger Draw, and it was pretty much developed at the time of the rule change.

Q. Okay, let's look down a littler farther south, then, and move into another area of South Dagger Draw. We're now in the east half of 23.

A. 23.

Q. Yes, sir. Tell us what you see with those wells.

A. Again, this is a mature developed area. We see a shallow rate of decline, relatively shallow, through the completion of the last well in this proration unit, at which time, then, we do begin to see the effects of a fully developed proration unit, and the decline then becomes steeper but well established. And again, we're looking at -- Again, we're moving south, or we're moving into a thinner oil column, and the steeper declines are about what

would be expected.

Q. And those expectations on a steeper decline are attributable to the reservoir conditions, as opposed to a change in the pool rules?

A. That's my opinion, yes.

Q. All right, sir. Exhibit Number 11, page 4, we're now in the south half of 26. What do you see here?

A. South half of 26?

Q. Am I on the same --

A. Yeah, I'm wondering -- I may have mislabeled this, because the south half of 26 is not a designated proration unit. So that's what's confusing me.

Q. Well, could it be of 36?

A. Yes, it would be Section -- South half of Section 36.

Q. All right. So if you'll correct page 4 and change the "2" to a "3" in the caption, we're going to have the right spacing unit, right?

A. Yes.

Q. All right. Show us what you see.

A. And I show this primarily to show a possible effect of drilling the Preston 8 and 9 wells -- I am sorry, Mr. Examiner, there's obviously a problem with this exhibit, and I would have to --

Q. Let's cross this sucker out and say that doesn't

look right. All right?

A. Well, there's something wrong here, because I don't have -- as an identified proration unit, and I'm trying to make a case for Preston 8 and 9, which would influence either the north half of 36 or the southeast of 26. So I apologize for the confusion on this one.

Q. Let's turn to the last display, which is page 5. Now, on page 5, in 36, this has got to be the north half of 36, because the spacing units are laydowns?

A. Well, I do recall this is the proper designation, and this does not relate to a given proration unit. I specified this only to show the results of offset drilling on our Preston Federal lease.

Q. All right. So when I look at the west half of Section 36, that's what you intended?

A. This is what I intended to show, yes.

Q. All right. Describe the conclusions and what you see.

A. Well, on this plot, then, is the combined production from those wells within the west half of 36. And then I have also labeled the completion dates of four Preston Federal wells.

And my conclusion from this is that there is no damaging influence on the Marathon-operated Indian Hill States wells.

Q. Based upon your search of comparisons and looking at the performance of the wells throughout the pool, from the north end all the way down to the south end, do you see any documented evidence or data by which you can infer as a reservoir engineer that there has been an adverse result from the two rule changes that took place in January of 1994?

A. No, I have not seen any detrimental effects as a result of that pool rule change.

Q. As a reservoir engineer, what is your recommendation to the Division Examiner?

A. Well, I would recommend that the rules be made permanent and --

Q. Do you see any reason not to make them permanent at this time?

A. No, not from our analysis of the data.

MR. KELLAHIN: That concludes my examination of Mr. Beamer. We move the introduction of his Exhibits 8 through 11.

EXAMINER CATANACH: Exhibits 8 through 11 will be admitted as evidence.

MR. CARR: I have no questions of Mr. Beamer.

EXAMINATION

BY EXAMINER CATANACH:

Q. Mr. Beamer, when you're looking at these

proration units and you're analyzing the decline on these --

A. Yes.

Q. -- how do you know what the decline that you've plotted is attributed to? How do you know that it's not -- that -- Say you go from a 28-percent decline to a 70-percent decline. How do you know in your analysis that that's not due to excessive gas withdrawals?

A. Well, in this particular case, this is in an area of the reservoir that is completely within the oil zone. Any gas-cap production is quite far removed, if I remember the plot that you're referring to.

Q. Well, I'm looking at Exhibit Number 11.

A. Yes, page 3.

Q. Yeah.

A. Yeah, the east half of 23. I really wouldn't anticipate any noticeable effect from gas-cap withdrawals because of the significant distance.

In other words, you go over about a mile and a half to the Carl Number 3 -- well, about a mile to the Carl Number 4. That well has been on production for quite some time before the rule change, and -- My interpretation of the data is that the decline simply has been affected by the completion of the development of that proration unit.

We've seen in North Dagger Draw, for instance,

that 40-acre spacing is more than sufficient. In other words, a Cisco oil well should typically drain more than the 40-acre drainage radius.

Q. Well, did you analyze any proration units where there was some gas wells located on it?

A. The one -- The best example, I think, that I had was that of our Preston Federal lease, the south half of 35, and as I remember, that's shown in Exhibit 10, page 3, where we had the existing fairly prolonged production history of the Preston Federal Number 1 gas well.

We have drilled and completed the Preston 7 and 10 in 1994, and to date -- Although I don't show the production curve for the Number 1 well alone, I can tell you that we have seen no substantial change in its decline rate.

Q. The Number 1 being an oil well and --

A. The Number 1 being a gas well.

Q. Gas well.

A. And the Number 7 and 10 being oil wells.

To get other proration units with the combination gas wells and oil wells within them, you pretty much get into the newer developed area to the south, and I think the history available to us is a little bit too early for us to see any trends.

Q. So is it possible to say in that newly developed

area that you're not having any kind of adverse effect on ultimate oil recoveries, either as a result of the high GOR or allowing gas wells?

A. Are you asking do we see any detrimental effect?

Q. Well, is it -- Yeah, do you see any at this point, and is it possible to conclude at this point that there isn't any detrimental effects?

A. We have not seen any to this time, and our conclusions are based, again, on what we see primarily from established production trends up in 35, and I'm assuming that we will see a similar performance to the areas to the south.

Q. So you're saying based on the data you have right now, you can conclusively state that there's not going to be a reduction in ultimate oil recovery by --

A. By the simultaneous dedication.

Q. Okay.

A. Yes, I think I could say that.

Q. That's based on the data you have right now?

A. That's right.

Q. You don't think additional data is necessary to reach that conclusion?

A. I don't think so.

Q. Is there going to be much more development, do you think, in these sections down to the south?

A. We show by the open circles those wells which are staked. I can speak for Conoco -- I can't speak for Conoco, because I can't speak for Conoco's management.

I know that we would like to drill some additional development wells, and we plan to push those. But the time frame on our development, I can't really say for sure.

If the open locations are drilled, that will pretty much develop the reservoir, in our opinion.

EXAMINER CATANACH: Okay, I don't think I have anything else.

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

EXAMINER CATANACH: Mr. Carr, I believe you had a statement or something?

MR. CARR: May it please the Examiner, I have a brief statement for Yates Petroleum Corporation.

As you know, Yates is a major operator in the South Dagger Draw-Upper Pennsylvanian Associated Pool. Based on Yates' operations in this pool under the temporary rules it is the experience of Yates that adoption of the temporary rules on a permanent basis will not adversely affect this reservoir by reducing the ultimate recovery of oil and gas therefrom, and that it will enable operators in the pool -- adoption of these rules will enable operators

within the pool to produce the oil and gas therefrom in a manner that will protect the correlative rights of all interest owners in the pool.

And I have a copy of a letter from Randy patterson, Land Manager for Yates Petroleum Corporation, requesting that the temporary rules be adopted on a permanent basis.

EXAMINER CATANACH: Okay, that letter will be admitted as evidence in this case.

Is there anything further?

MR. KELLAHIN: Mr. Examiner, there should be a letter directly in your file from Marathon Oil Company demonstrating support for the same conclusion, that they're prepared to have these rules made permanent.

EXAMINER CATANACH: Okay. There being nothing further, this case, Case 10,869 and 10,881, will be taken under advisement.

(Thereupon, these proceedings were concluded at 3:48 p.m.)

* * *

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 10868 10881 heard by me on 9/21 1995.

David R. Catanach, Examiner
Oil Conservation Division

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 1st, 1995.

STEVEN T. BRENNER
CCR No. 7

My commission expires: October 14, 1998