STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

IN THE MATTER OF THE HEARING CALLED BY THE OIL CONSERVATION DIVISION FOR THE PURPOSE OF CONSIDERING:	)	CASE NO. 12,182
APPLICATION OF CONOCO, INC., FOR POOL CREATION, SPECIAL POOL RULES AND THE ASSIGNMENT OF A SPECIAL DEPTH BRACKET ALLOWABLE, LEA COUNTY, NEW MEXICO	)	ORIGINAL

REPORTER'S TRANSCRIPT OF PROCEEDINGS

EXAMINER HEARING

BEFORE: DAVID R. CATANACH, Hearing Examiner

May 13th, 1999

Santa Fe, New Mexico

99 MAY 27 AM 5:46 OIL CONSERVATION DIV.

This matter came on for hearing before the New Mexico Oil Conservation Division, DAVID R. CATANACH, Hearing Examiner, on Thursday, May 13th, 1999, 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

May 13th, 1999
Examiner Hearing
CASE NO. 12,182

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A P P E A R A N C E S

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By: W. THOMAS KELLAHIN

* * *

WHEREUPON, the following proceedings were had at 10:16 a.m.:

EXAMINER CATANACH: At this time we'll call Case 12,182.

MR. CARROLL: Application of Conoco, Inc., for pool creation, special pool rules and the assignment of a special depth bracket allowable, Lea County, New Mexico.

EXAMINER CATANACH: Call for 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 two witnesses to be sworn.

EXAMINER CATANACH: Call for additional appearances.

Will you please swear in the witnesses, Counselor.

(Thereupon, the witnesses were sworn.)

MR. KELLAHIN: Mr. Examiner, Conoco, is before you this morning to ask you for special pool rules for what we have called the South Hardy-Strawn Pool. This constitutes what Conoco in their opinion believes is a new Strawn discovery. When you begin to look at the maps and start with the locator map, that you'll see we are in close proximity to what is now known as the South Cass-Strawn

Pool.

We're going to present to you evidence of separation between the South Cass Pool, which is identified on Exhibit 1 in the green outline and will be the southwest quarter of Section 36, and the southeast quarter of the additional section to the west. You can see it's centered in the gray area. There will be a line of cross-section.

The discovery well is the Hardy 36-26; it's the northernmost well on the cross-section line. The closest pool, then, is immediately to the south.

We're asking you for 160-acre oil spacing, that no more than one producing well for each 160-acre spacing unit be permitted, that a special depth bracket oil allowable, not to exceed 600 barrels of oil a day, be authorized, that we would abide by the statewide gas-oil ratio of 2000 to 1, that we would ask for well locations to be standard. If they're 660 setbacks from the outer boundary, we would ask that you relax the internal boundary lines. It's our preference that you use a 10-foot internal setback from a quarter-quarter line.

The information here is unique in that often you will see a request for a discovery and pool rules very soon after the well is completed. In this instance, the Hardy 36-26 was completed a year ago, April of 1998, and that has afforded an opportunity for Conoco's technical people to

satisfy themselves of the separation of this well from those wells that continue to produce in the South Cass Strawn.

We have a geologic presentation that will show you the geologic predicate for the separation, followed by an engineering presentation which will authenticate the geologic conclusions, show you convincing evidence of that separation, show you drainage calculations to justify the 160-acre spacing, and then finally to show you step-rate tests that demonstrate conclusively that a maximum oil allowable of 600 a day is the most optimum, efficient rate at which to produce this well and future wells in the pool.

JOSEPH L. HUCK,

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

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q. All right, sir, would you please state your name and occupation?

A. My name is Joseph L. Huck, and I'm a geophysicist.

Q. Mr. Huck, on prior occasions have you testified before the Division as a geophysicist?

A. No, I have not.

Q. Summarize for us your education.

A. I have a bachelor's in geophysical engineering from Colorado School of Mines and a master's in business administration from Columbia University.

Q. In what years did you obtain your degrees?

A. My geophysics degree was in 1973, and my master's in business administration was in 1981.

Q. Are the geologic and geophysical conclusions and opinions that are about to be expressed those of your own?

A. Yes, they are.

Q. You reside in Midland, Texas, I believe?

A. Yes, I do, Midland, Texas.

Q. And your current responsibilities with Conoco would include this project?

A. Yes.

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

EXAMINER CATANACH: He is so qualified.

Q. (By Mr. Kellahin) Let's take a moment, Mr. Huck, and have you unfold Conoco Exhibit 1. Let's use it as -- for a moment as a locator map.

When you look at the map and see within the southwest quarter of 36 and the southeast quarter of 35, what is scribed in that 320 acres by the blue outline?

A. That is the South Cass Pool.

Q. What are the current spacing requirements for the

South Cass-Strawn Pool?

A. Forty acres.

Q. And the wells in that pool are operated by Conoco?

A. Yes, they are.

Q. Show us the discovery well that is the subject of the case this morning.

A. The subject well is in the northeastern quarter of Section 36, and it is highlighted by the large purple circle.

Q. On the Examiner's copy of Exhibit 1, I have linked the cross-section line, and when you start with the discovery well at the northern end of that cross-section line and link the other lines on that cross-section, we will see the line of cross-section that you have prepared?

A. That is correct.

Q. Give us a short summary, before we look at your technical displays, of the major opinion you have reached about the relationship between the Hardy 36-26 well and those existing wells currently within the South Cass-Strawn Oil Pool.

A. Okay, there's really three main things that I intend to show today.

The first is that the reservoir zone in the 36 Number 26 is a dolomite reservoir, where in the other wells

the zone that produces is a limestone.

The second is that there is a structural separation between the 36-26 well and the 36 Number 1 well. There's a fault through there.

And that I believe what controls the production is a stratigraphic zone or interval within the Strawn and that the zone that produces in the 26 well is separate from the South Cass Pool.

Q. To illustrate and support those opinions and conclusions, what type of displays have you prepared that we're about to show the Examiner?

A. I have two maps. One is a depth map on the top of the Strawn interval. The second is a map to indicate the stratigraphic zones that I think control production in these pools. The third is a seismic line which connects these three wells and clearly shows the reservoir which produces and the fault which separates the 36-26 from the Number 1 well, and the last is a geologic cross-section through these five wells.

Q. All right, Mr. Huck, let's show the Examiner the first of those displays. If you'll turn to Exhibit Number 2, would you identify Exhibit Number 2 for us?

A. Yes, this is a depth map on the top of the Strawn. The top of the Strawn in this area is an erosional surface. The map is at a scale of one inch to 1000 feet.

The contour interval is 50 feet. It's based on 3-D seismic and the wells that have penetrated deep enough to offer control on the Strawn.

The colors on this map -- The reds are the highest portions of the structure, grading down through the yellows into the blues, which are the deepest portion of this map.

Q. How do you use this map to reach any of the conclusions that you have just illustrated to the Examiner?

A. There is a fault located in Section 35, essentially east-west, extending into Section 36, and I believe that fault offers structural separation between the wells.

Q. Why do we not see on this map the continuation of that fault line in an easterly direction so it bisects Section 36 and physically separates out the discovery well from those wells currently in South Cass?

A. The top of the Strawn is an erosional surface, so relief created by the fault has been eroded away, and you see very little evidence of relief or structure developed by that fault.

Q. When we get down to the producing portion of the Strawn interval, then we will be able to see other geologic illustrations that clearly convince you of this separation?

A. That is true.

Q. And the reason we don't see it here is, we're looking at just above that producing horizon?

A. Yes, we are looking above the zone, and this is an unconformity surface, so it's been flattened and smoothed to some extent.

Q. When you spot the wells on here, are these all Strawn wells, or do they belong to other horizons?

A. The smaller blue symbols with a depth posted next to it are shallow wells. Wells that have been deep enough to encounter the Strawn are larger black circles. They're located in Section 20 primarily -- that's the Warren McKee area -- and in Section 23 and 15 -- that's the Cass Pool. But around Section 36 the wells marked by the black triangle -- there's four of them -- those are the wells I believe are in the South Cass Pool. The well we are discussing is the 26 well marked by a large black square.

Q. Let's just set this display aside, then --

A. Okay, one other thing, if I may. Two other wells in Section 36 encountered the Strawn but have not been completed into the Strawn.

Q. Let's turn to your next display, Mr. Huck. It's Exhibit Number 3. What type of display are we looking at now?

A. This is generated from the seismic data, and it is an isochron map, which is a time-thickness map.

Q. We're looking at an interval now within a certain vertical context?

A. Yes, yes.

Q. And what is that interval?

A. This is what I believe to be the productive zone within this portion of the Strawn.

Q. What does the color code tell you?

A. The colors in this case, the reds are the thins, the thinner portions of the reservoir, and the greens are the thicker portions of the reservoir.

Q. On this display there is a difference with the extension of the fault --

A. Yes.

Q. -- between this map and the last map?

A. Yes, the same fault that we saw on the previous map, extending through Section 35, also extending in to Section 36, extends further east, because we are structurally lower on what's mapped on this map, and the fault has significant throw throughout Section 36.

Q. Do you have sufficient data to determine the precise east endpoint of this fault?

A. Through the seismic data, yes, you can map it.

Q. Are you satisfied geologically that there is a fault separation between the South Cass wells and the Hardy 36-26 well?

A. Yes, I am.

Q. Is that fault separation a significant enough distance to totally displace the producing intervals between the current pool and the discovery well?

A. Yes, it is.

Q. Let's have you help us see that. Do you have a seismic profile line that will illustrate that point?

A. Yes, the next exhibit, which would be Exhibit 4, is a seismic profile abstracted from the 3-D survey which we have over a large portion of Lea County, and it is generated along the cross-section which has been marked on the previous two maps.

Q. If we want to find where each well is within the vertical profile, there is a well number associated with that well?

A. Yes, the wells are marked at the top of this section, and they are indicated by either dashed or solid black lines extending down through this section, and the total depth of the wells are marked by a black circle.

Q. Starting with the 26 well, let's go down vertically from the shallowest depths until we reach the -- it looks like a purple line to me -- the first shaded horizontal colored line?

A. Yes.

Q. What does that represent?

A. That is my interpretation of the top of the Strawn.

Q. How does that line relate to Exhibit Map Number 2?

A. That is the exact pick that the map in Exhibit 2 was made from, and it is an unconformity surface. You can see if you look from the left to the right that the interval mapped by these horizons does thin from the left to the right.

Q. Continue down the line of information for the Number 26 well, and you have a horizontal green line. What does that represent?

A. That is my interpretation of where the top of the pay zone for this Strawn pool is.

Q. And then the next line down is the red line. What does that represent?

A. The red line is what I have interpreted and believe to be the base of the reservoir zone.

Q. And then finally the yellow horizontal line.

A. The yellow horizontal line is the top of the Devonian, and you can see between the Number 26 and the Number 1 well that there is a fault interpreted on that line.

Q. In your opinion, is the quality of the data sufficient to allow you to make this interpretation?

A. Yes, it's clearly shown on this line and many other lines throughout the survey, you can clearly map this fault.

Q. Let's go to the left and find the nearest well that currently is in the South Cass Pool. It's the Hardy 36-1 well. When you read down on that data point, you find the same information as you found for the 26 in terms of finding these markers that are connected with the color code?

A. The same horizons exist in the 36 Number 1 well, yes.

Q. Between the two wells is a vertically oriented line in yellow. What does that represent?

A. That represents the fault that separates the Number 1 well from the 26 well.

Q. And what tells you on this illustration that that fault is sufficient enough to displace the producing Strawn horizons in the 26 well from the other wells currently in the South Cass Pool?

A. Looking at the left side of the fault, you can see the green and the red horizons picked, which are the top and the base of the pay zone. And also on the right side of the fault you can see the green and the red horizons. And there is sufficient separation or throw across that fault to completely separate what I believe to

be the producing zone.

Q. Let's turn to your last display. If you'll set Number 4 aside, let's look at Exhibit 5. Identify Exhibit 5 for us.

A. Exhibit 5 is a geologic cross-section going through the five wells which we've already looked at on the seismic line and as marked on the previous two maps.

Q. Take us, in the 36-26, the discovery well on the far right, starting at the top, lead us down through the color code so we know what you're saying with this illustration.

A. Okay. In the legend we have the Strawn limestones, which are clean limestones marked in the pale blue color. Strawn dolomite is marked in the purple colors. And slightly dirtier limestones, shaly limestones, are in the brown colors.

In the lithology column of all the wells, the limestone is filled to be a little brighter blue.

Q. On the far right scale on this log there is an area shaded in yellow. What does that represent?

A. That represents the porosity zone. That's from the neutron log, and any porosity greater than four percent is highlighted in the yellow color.

Q. What criteria have you selected to show you the productive interval within the Strawn pay for this well?

A. On this well, to the right of the gamma-ray curve, which is the left portion of the log curve, there are some black bars. There's about an eight-foot bar near the top of the well. That is open and producing. But the major pay zone is deeper down. It's a 46-foot interval through that large dolomite which is shown on the log.

Q. As we move to the left and pick up the 36-1 well, which is the nearest well in the South Cass Pool, describe for us the differences you see between the Hardy 36-26 and the well I've just identified.

A. The major difference is that the large dolomite that was encountered in the Hardy 36-26 well is not present in the Hardy 36 Number 1 well.

Q. And as you continue to the left on the cross-section, describe for us what is the conventional producing Strawn zones in those wells.

A. They are also marked by the black bars, which show the top and base of all the perf'd zones in the wells, and you will see that those wells are all perforated within clean limestones.

Q. Summarize for us, then, using this display, the major points that you have concluded geologically that separate out the Hardy 36-26 well from the other Strawn wells in this area.

A. The lithology is different for the major pay zone

in the Hardy 36-26 from the other wells on the cross-section. The fault -- There's clear fault separation between the two wells. It's form-lined in on the structural cross-section here, but it's clearly evident on the seismic line.

And the stratigraphic zone, as we saw in Exhibit 3, the major pay zone, which is that dolomite, does not extend into the Number 1 well.

Q. When we look at the size and shape of the Hardy State 36-26 Pool, is there any structural relationship that exists in that pool to cause you to believe that there is an original gas cap in that pool?

A. No.

Q. It would appear to be a typical Strawn oil pool that doesn't have a structural component to give you downstructure oil wells that have water and upstructure oil wells that have gas? It's not that kind of creature?

A. No.

Q. Is there any water production associated with these wells?

A. None to date.

Q. Do you see any indication of a water column or a water leg to the reservoir?

A. Not -- No, we don't.

Q. Based upon your geologic and geophysicist

perspective, do you see any reason not to approve the Application as requested by Conoco?

A. No, I do not.

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

We move the introduction of his Exhibits 1 through 5.

EXAMINER CATANACH: Exhibits 1 through 5 will be admitted as evidence.

EXAMINATION

BY EXAMINER CATANACH:

Q. Mr. Huck, you mentioned there were two other wells in that section that penetrated the Strawn?

A. That is true, in Section 36, yes.

Q. And where are those located?

A. If -- Yes, the map you're looking at now, the stratigraphic zone map, in proration unit E there is the Number 7 well, is located there.

Q. Is that the one that 10-8-90 by the side of it?

A. Yes, it is.

Q. Okay.

A. Yes, it is. And the other one is probably in proration unit N to the south. It's Number 15. It's got a depth of 10,340.

Q. Okay, those wells penetrated the Strawn but have

not been completed?

A. Yes, the Number 15 well, the one to the south, is producing from the McKee, and at some point we do intend to recomplete that well to the Strawn.

Q. And the Number 7 well?

A. The Number 7 well, it had no pay within the Strawn interval.

Q. You didn't do a cross-section from the South Cass up to the Number 7 well, did you?

A. I have done that. I do not have that with me. It clearly shows that it is downfaulted from the wells -- the 21 well and the 1 well, which are the other wells in Section 36 in the South Cass Pool.

Q. It did show that there's a fault there?

A. Yes. And there is a fault interpreted on this log too.

Q. Have you been able to identify the extent of the Strawn structure in that northeast quarter?

A. Which northeast quarter?

Q. The one where the Number 26 well is located?

A. Yes, I believe that the color on the stratigraphic map towards the north, up into Section 25 and 26 and also into 30, seismically maps out to be the same pool. The 26 well is the only penetration in that pool at the moment.

Q. Okay, but all of that -- you feel like it all is connected, it's the same?

A. At this point in time, based on seismic interpretation, yes.

Q. So you've got some potential to drill some additional wells up there?

A. That is our intention.

Q. On that same exhibit, what are those yellow lines?

A. Oh, okay, the yellow lines represent the Conoco acreage. The Section 36 is outlined in yellow. We own that a hundred percent. The striped yellow lines represent partnership acreage.

So a section -- Like in Section 34, there's no yellow color. We do not own an interest in that section.

Q. Okay. Are there any additional wells planned at this point?

A. We have an outstanding AFE to our partners for a well located in Section 30. I believe it is in proration unit L.

Q. From your data, can you quantify the distance in the fault separation there between these two areas?

A. From the seismic and the velocities derived from the seismic, yes, we can make an estimate of how much throw we think is across that fault.

Q. Have you done that?

A. Yes, I think there's probably 80 to 100 feet of throw across that fault, at the zone -- or the depth interval of the pay zone.

Q. Okay, and the Number 26 well would be on the downthrown side of that fault?

A. That's correct.

Q. Will the presence of that fault -- What would explain the differences in lithology in those two areas? Would that be --

A. If you look at the geologic cross-section, beginning from the left and looking at the lower thick limestone, it's located between shaly limestone A and shaly limestone B.

You can see off on the western flank it's fairly uniform in thickness, and then it thins at the 1 location and is quite thin at the 26 location. I think you've had some reactivation of that fault about the time of deposition. I think some of your carbonate mounds have moved around where they developed. And I think as the fault moved down, you had more deposition within the zone marked between shaly limestone B and C, and that has been leached to become dolomite.

Q. The upper dolomite section in your 26 well, is that nonproductive?

A. Yes, it is nonproductive in that well?

Q. Is that tight or --

A. Yes, it is tight.

Q. Okay. That same zone is being produced in the Number 1 well, though; is that correct?

A. Yes, according to our correlation between those two wells.

Q. What you've got mapped as far as the -- I guess on your Exhibit Number 3 you've got the easternmost point of that fault. Is that your interpretation of that, that that's the easternmost --

A. The easternmost point? With the resolution of the seismic data, I only map it where it is clearly seen. I do believe that below the seismic resolution, that it extends further east and moves a little north.

The color -- the linear color going through the 21 well, the -- sorry, in the Number 1 well, continues off east and turns a little north, I think that is all on the upper -- upthrown side of that fault. But I can't map that fault further than what's indicated on this map here. But on the depth map you can see some evidence of change in the contours to indicate that there is some small evidence of faulting --

Q. Okay.

A. -- through there.

Q. That portion of the Strawn reservoir that's east of the Number 1 well, that continues to the east there, is that productive in your opinion?

A. Yes --

Q. It is productive?

A. -- in my opinion, I believe -- Yes. And we have plans to drill another well. It's included in our development plan.

Q. But you believe that whole area is not connected to the 26 well?

A. Yes.

EXAMINER CATANACH: I have nothing further.

MR. CARROLL: I've got a couple questions.

THE WITNESS: Okay.

EXAMINATION

BY MR. CARROLL:

Q. Mr. Huck, on Exhibit 4, on the Hardy 36 State Number 1, the dolomite is represented by the blue?

A. Well, the seismic is not -- does not have the resolution to distinctively show you the detail that's shown on the geologic cross-section. I believe that the major pay zone is represented by the blue on the seismic line. They're trying to just --

Q. And the green is the top and the red is the --

A. -- base.

Q. -- bottom of the pay zone?

A. Yes.

Q. So that blue would be the dolomite, represented by the pink on Exhibit 5?

A. I think in the blue on the seismic line there's more than just the dolomite shown. I think what's shown in the blue is most of the section colored on the geologic cross-section. The resolution of the seismic is not going to allow you to see 10-foot dolomite in the Number 1 well.

MR. CARROLL: All right, that's all I have.

EXAMINER CATANACH: Okay, the witness may be excused.

MR. KELLAHIN: There's a follow-up question I need to ask about the well-location request.

FURTHER EXAMINATION

BY MR. KELLAHIN:

Q. Conoco had proposed 660-footage outer-bound setbacks in the spacing units and 10-foot interior setbacks?

A. Yes.

Q. Is there a geologic reason to have that type of flexibility within a spacing unit?

A. Yes, there is.

Q. If so, describe for us how.

A. Okay, on Exhibit 3, which is a stratigraphic zone

map, I believe that drilling wells in the yellow-to-green portions of that map will encounter thicker reservoirs, and the current spacing requirements would not allow some of those locations to be drilled in the best position.

Q. So you either have to file administrative applications for unorthodox locations in order to crowd what is now an interior line?

A. That is true, yes.

Q. And if it's relaxed to 10 feet, then those applications would not have to be filed?

A. That's true.

MR. KELLAHIN: I have nothing else.

EXAMINER CATANACH: Okay.

MR. KELLAHIN: Mr. Catanach, our next witness is Mr. Joe Miller. Mr. Miller is a reservoir engineer. He resides in Midland, Texas.

JOSEPH A. MILLER,

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

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q. For the record, sir, would you please state your name and occupation?

A. My name is Joseph A. Miller, and I'm a reservoir engineer with Conoco.

Q. On prior occasions, have you testified before the Division and qualified as a reservoir engineer?

A. Yes, I have.

Q. Pursuant to your employment by Conoco, have you made a reservoir engineering study of the discovery well we've called the Hardy 26?

A. Yes. Yes, I have done that.

Q. In addition, have you done other work to satisfy you as an engineer that that well is producing in a new reservoir that's not currently being produced?

A. Yes, I believe that's so.

Q. Let's start with your major conclusions, then. Are you able to reach conclusions about the separation between this well and other wells in the Strawn?

A. Yes, with the reservoir and production characteristics, they support the geologic evidence that the pools are separate and act independently of one another.

Q. In addition, were you able to reach engineering conclusions concerning an appropriate size spacing unit and an appropriate maximum oil allowable?

A. Yes, I was. From the pressure buildup information and PVT information we collected, I am confident that 160 acres is the appropriate spacing, and also from production testing over a full year of production

history, that 600 barrels a day allowable is appropriate for this pool.

MR. KELLAHIN: Mr. Examiner, I tender Mr. Miller as an expert witness.

EXAMINER CATANACH: He is so qualified.

Q. (By Mr. Kellahin) Let's talk about the displays that illustrate your major conclusions, Mr. Miller. Let's start with the first one. What type of data did you utilize to satisfy yourself that the Hardy 26 well is separated from those wells producing in the South Cass-Strawn Pool?

A. A combination of a pressure-buildup, extended pressure-buildup test, PVT data which I used for some material-balance simulation, and the production history of the well.

Q. When we look at Exhibit 6, are we looking at your summary exhibit that shows the differences between the discovery well and the existing wells?

A. Yes.

Q. Lead us through your major conclusions, starting with the pressure buildup analysis.

A. Okay, the pressure buildup analysis results -- I ran a pressure buildup on both the Hardy 36-26 and the Hardy 36 State Number 1 wellbores at about the same date, one day apart. Both were done early in the life of the new

completions.

The durations of the buildup were what we consider extended buildups, seven days for the Number 26 and about 16 days for the Hardy 36 State Number 1.

And the conclusion is that the reservoir pressure is -- that the pools are isolated, the reservoir pressures were significantly different, and it shows some form of boundary.

Also, the pressure buildup indicates that the flow capacity of the two pools -- or the two wellbores -- is quite different, with the Hardy 36 State Number 26 being a much more prolific capacity to flow.

Q. At this depth, what would you expect to be virgin pressure of a discovery well in the Strawn?

A. It should be 3300 p.s.i. This reservoir pressure of 2808 was taken after 30,000 barrels of oil was produced in the first 34 days.

Q. Had there been communication with the existing wells in the South Cass Strawn, you would be surprised to see the pressure in the 26 as high as it was?

A. Can you ask that --

Q. Yes, sir. When you look at the pressure, is that enough difference to satisfy you of separation?

A. Yes, it is.

Q. Let's look at the producing characteristics. Are

there any characteristics of production that separate out the 26 well from the other wells in the South Cass Pool?

A. Yes, there are several. First off, this is just the elevation of the top of the Strawn, showing that there is not -- At the top of the Strawn there is not a large structural change. Stabilized initial producing GOR for the Number 26 well was only 980 standard cubic feet per barrel, whereas in the Hardy 36 State Number 1, it was nearly twice that.

The current producing GOR is also significantly different, with about the same range, the Number 26 well producing below 1000 and the Number 1 well producing above 2000.

Additional evidence, or differences, is the API gravity of the two crudes, 40 degrees versus 43.6 is fairly significant. Also, the flow capacity is listed, not only on the peak production rate obtained on the Hardy 36 Number 26 of 1570 barrels of oil per day, versus the 316 barrels a day from the Number 1. Gas production is also similar.

And also at current production rates, we still have the Number 26 restricted at about a 600-barrel-a-day test rate. The Number 1 is on a very steep decline, producing at about 20 barrels a day on pump.

Q. Are the production characteristics of the 36 State 1 well, which is in the South Cass Pool, are those

typical of the other -- what do you have? Three more wells in that pool still producing?

A. Yes.

Q. How does that well compare to the other three?

A. The Hardy 36 State Number 1 is one of the poorer producers of the four, although all four wells are -- you could not drill commercial wells for those four wells. They are poorer producers, especially compared to the Number 26 well.

Q. What kind of range of oil production on a daily basis do you get from the other three wells?

A. The other wells produce between 20 and 40 barrels of oil a day.

Q. Let's turn to Exhibit 7 and have you identify this display. What are we looking at here?

A. This is a summary of the basic well and reservoir data for the discovery well, the Number 26 well. The reservoir data collected for characterization included both the pressure buildup and PVT data from downhole sampling.

The combination of this data, the production data and a material balance simulation tells us what type of drive this reservoir is.

Q. And what conclusion have you reached?

A. We believe this is a solution gas drive reservoir.

Q. When we look at Exhibit 8, what are we seeing on Exhibit 8?

A. Exhibit 8 is a summary of the production data and a buildup analysis. This exhibit shows the excellent -- the flow capacity of the well, not only under initial testing but also today. And also is a summary of the modeling results of the pressure buildup, which supports the 160-acre spacing as appropriate for this pool.

Q. When you look at the Roman numeral II entry on this exhibit -- it says "Pressure Build-Up Analysis Results" -- read down, the last entry deals with a drainage area. You have calculated for this particular well a drainage area of 190 acres?

A. Yes.

Q. How did you do that?

A. The pressure buildup analysis, the model used was a type-curve analysis, and the initial and boundary conditions for the model were modeled as a heterogeneous naturally-fractured system with negative skin, and a closed rectangular boundary with the dimensions of 1800 feet by 4600 feet. That 1800 by 4600 is 190 acres.

Q. Let's look at your Exhibit 9, your boundary illustration, and summarize for us what you're doing here for the Examiner. What's happening in the top part of the display?

A. Okay, this is a type-curve analysis off the buildup. It's a graphical representation of the theoretical solutions of the radial-flow equations, and with specific initial and boundary conditions. Each curve, with different conditions, has a different shape and slope.

The actual data that we read from our production buildup is plotted as squares. This is change in pressure versus change in time. There's also a derivative curve, the change in pressure with respect to time versus time.

The actual data is plotted as a square. The derivative of that data is a circle. And then our best-fit line are placed through the raw data.

Q. What's the methodology used to determine your ultimate conclusion that it has a best-fit rectangular drainage area within a size of approximately 190 acres?

A. Yeah, each family of curves has a different shape and slope, and our best fit of the data indicates a rectangular drainage area, and with these dimensions, a permeability and this given skin factor.

Q. If we size this reservoir at less than 160 acres, then there's an opportunity here to drill unnecessary wells, would there not be?

A. That's correct.

Q. All right, let's turn to Exhibit Number 10. Identify and describe this display.

A. This is simply a production graph of oil, gas and GOR versus time.

The important conclusions from this graph is that in general, over a full year's worth of production, our GOR has not substantially increased. It is basically a flat GOR curve. But within the general nature of this curve, each time we increase our oil-production rate, we will actually see a decrease in the producing GOR.

Q. When you made your comparison of the producing oil-gas ratios between the Cass Pool and the discovery well, you saw a substantial difference, did you not?

A. Yes, about double.

Q. When we look at information on Exhibit 10, show us on this display what you've described to be the desire of this well to produce more efficiently at rates above what would otherwise be the 427-barrel-a-day allowable for 160-acre spacing.

A. Yes, you can see that in May of 1998, August of 1998 and also November of 1998, that as we were doing some testing of the well to try to find the most efficient producing GOR, at those three times when we increased the rate over a month, we got a decrease in producing GOR.

Q. Turn to Exhibit 11 and identify this display.

A. This display is taking all -- This is a graph of daily oil rate versus producing GOR, using all the test

data that we have, a full year's worth of test data. And it indicates that the producing GOR is lower at the higher production rates.

Q. Let's turn to a specific plot of the test data. If you'll turn to Exhibit 12, what are we seeing here?

A. This is the same data that we have been plotting. This is a tabular tabulation of all the production data for the discovery well.

Q. For the production shown for this well, you've been operating under the requirements for 187 barrels a day for 40-acre oil spacing?

A. That's correct, even though these test rates are higher, the monthly allowable of 187 barrels a day, we produce the well at around 600 barrels a day for the first ten days of the month, and then shut the well in because we've made our allowable for the month.

Q. Okay, have you received permission from the District Office to run various tests?

A. Yes, we have.

Q. Let's look at some of the data points. Are there places in the data sheet where you can demonstrate where you've tried to restrict this well to 427 barrels a day to see what would happen?

A. Yes, there is.

Q. Where would we find those?

A. I have noted those places with an asterisk on this first sheet, Exhibit 12. Under initial completion we attempted to go to 10/64 choke to produce at lower rates. The well loaded up and would not flow. We opened it up to a 14/64-inch choke and it initiated flow again.

Q. Then we can see from your producing GOR and some of the other testing plots that a maximum allowable of 600 barrels a day is a rate that allows you to produce this well at its most efficient?

A. That's correct.

Q. The final display, Exhibit Number 13, is what, Mr. Miller?

A. The final exhibit is just the Rule 505.A depth bracket allowables, indicating that at our depth of 7000 to 7999 feet, we -- under 160 acres would be producing 427 barrels of oil per day.

Q. And you've also calculated the discovery oil allowable?

A. Yes, the oil discovery allowable under 509.A and 509.F would be an additional 52 barrels of oil per day.

Q. In your opinion, Mr. Miller, would approval of this Application be in the best interests of conservation, the prevention of waste and the protection of correlative rights?

A. Yes.

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

We move the introduction of his exhibits, which are numbered 6 through 13.

EXAMINER CATANACH: Exhibits 6 through 13 will be admitted as evidence.

EXAMINATION

BY EXAMINER CATANACH:

Q. Mr. Miller, I misunderstood. Are you asking for a discovery allowable in addition to the special allowable?

A. Yeah, the --

MR. KELLAHIN: We are not certain, Mr. Examiner, if the District has already accomplished that for us. Mr. Carlisle had checked. He had thought they had issued the nomenclature information to give us a new pool and a discovery allowable.

When Mr. Stogner was preparing the docket he called me and said he was unable to verify that, so I'm not sure where that issue stands.

EXAMINER CATANACH: I'm a bit confused. This well has been producing from what pool, for the past year?

MR. KELLAHIN: I assume it's been temporarily assigned to the South Cass-Strawn Pool. I think those are the rules we've had to operate under.

EXAMINER CATANACH: So the Cass-Strawn has been

extended?

MR. KELLAHIN: I don't know if they've physically extended it, but because we were within a mile of that pool we've been asked to operate under those rules. And the District has been waiting for us to tell them we had sufficient data to separate it out from the South Cass Pool.

EXAMINER CATANACH: Okay, I don't see -- Without the creation of a new pool, I don't see how you could have been assigned a discovery allowable. I'll see if I can --

MR. KELLAHIN: And it may not have happened, and if so, we would like to have the discovery allowable authorized.

Q. (By Examiner Catanach) Mr. Miller, is it too early to tell in the life of this field whether the additional wells that you drill are going to exhibit the same kind of producing characteristics or encounter the same kind of geologic properties as this well?

A. I believe that Joe Huck, the geologist that spoke earlier, feels that we are in the same zone, that things look similar to the north and to the east. But from any additional reservoir information, without additional well control, I don't know that.

Q. Okay, the approach you took to calculating the drainage area, it was done that way because you don't have

a decline on this well; is that essentially why we did it that way?

A. That's correct.

Q. Is that well currently capable of producing more than 600 a day?

A. Oh, yes, it is. At a small choke setting of 17/64 it still will produce at around 600 barrels of oil a day.

In fact, the 1570-barrel-a-day peak rate was still only at a very small choke setting and facility-limited.

Q. So it's capable of in excess of that?

A. Yes, sir.

Q. Do you feel like we have enough data from this one well to go with permanent 160 spacing?

A. The -- It was my understanding that the outline of the new pool that we are trying to create is only the 60 for the Number 26 well.

MR. KELLAHIN: I don't think you -- You're not answering the question asked. The question is whether he should make this temporary for a period of time, or is there enough data to establish permanent rules for your discovery well?

THE WITNESS: I feel it would be more appropriate to go with the temporary period of time, in the 18-months

to two-year period.

Q. (By Examiner Catanach) Is there any way of telling at this point whether this well in that time period might start declining to a point where you could determine something that way?

A. Yes, the volumetric estimate for reserves and the material balance estimate for reserves both come up with about the same reserve number.

With the production rate at over 600 barrels of oil per day, we should see this well go on decline prior to that two-year -- to a two-year period.

Q. What number do your volumetrics come up with?

A. Our volumetrics are around in the half-a-million-barrel range. The material balance is slightly less than that for this well.

Q. Have you estimated how much of that may be recoverable?

A. My estimate is a 20- to 25-percent recovery factor.

Q. Was the initial reservoir pressure in the South Cass, was that at 3300?

A. It also was at 3300.

Q. And so you would have expected this to come in at 3300, something similar to that, right?

A. Yes.

Q. But you did produce 30,000 barrels of oil before you did this buildup test?

A. That's correct.

Q. Cumulative production from the 26 well is 12 barrels of water?

A. That's correct, and that is most likely load water from an acid stimulation. That cum is also only through March 26th of 1999. The additional tabular data is up through May 10th.

Q. If you get the additional 51- or 52-barrel discovery allowable, is that going to change your opinion on the best efficient rate to produce this reservoir? You would then have an allowable of 650. Is that going to make a difference?

A. No, that is still within the range I think is the most efficient way to produce this well. We likely would produce the well at 652 barrels a day, that range.

EXAMINER CATANACH: I have nothing further, Mr. Kellahin.

MR. KELLAHIN: Mr. Examiner, Exhibit 14 is our certificate of notice to the six operators of wells within a mile of the proposed pool. To the best of my knowledge, there's no objection. We would move the introduction of Exhibit 14.

EXAMINER CATANACH: Exhibit 14 will be admitted

as evidence.

Anything further?

MR. KELLAHIN: No, sir.

EXAMINER CATANACH: All right, there being nothing further, Case 12,182 will be taken under advisement.

(Thereupon, these proceedings were concluded at 11:16. a.m.)

* * *

I hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 12182, heard by me on May 13 1995.

David 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 May 16th, 1999.

STEVEN T. BRENNER
CCR No. 7

My commission expires: October 14, 2002