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. 10,530
CASE 10,530 BEING REOPENED PURSUANT TO THE PROVISIONS OF ORDER NOS. R-9722 AND R-9722-A	)	

REPORTER'S TRANSCRIPT OF PROCEEDINGS

EXAMINER HEARING

ORIGINAL

BEFORE: MICHAEL E. STOGNER, Hearing Examiner

January 19th, 1995

Santa Fe, New Mexico

This matter came on for hearing before the Oil Conservation Division on Thursday, January 19th, 1995, at the New Mexico Energy, Minerals and Natural Resources Department, Porter Hall, 2040 South Pacheco, Santa Fe, New Mexico, before Steven T. Brenner, Certified Court Reporter No. 7 for the State of New Mexico.

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January 19th, 1995
Examiner Hearing
CASE NO. 10,530

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A P P E A R A N C E S

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* * *

WHEREUPON, the following proceedings were had at 8:38 a.m.:

EXAMINER STOGNER: At this time we'll call next case, 10,530.

MR. CARROLL: In the matter of Case Number 10,530 being reopened pursuant to the provisions of Order Numbers R-9722 and R-9722-A, which promulgated special rules and regulations for the West Lovington-Strawn Pool including a provision for 80-acre spacing.

EXAMINER STOGNER: At this time I'll call for appearances.

MR. BRUCE: Mr. Examiner, Jim Bruce from the Hinkle law firm in Santa Fe, representing Charles B. Gillespie, Jr.

I have two witnesses to be sworn.

EXAMINER STOGNER: Call for any other appearances.

MR. KELLAHIN: Mr. Examiner, I'm Tom Kellahin of the Santa Fe law firm of Kellahin and Kellahin, appearing today on behalf of Snyder Ranches, Inc., and Larry Squires. Those parties are mineral interest owners within the area that's subject to this special pool rules and regulations.

We do not propose to have a witness. We are here in support of Mr. Bruce's client's continuation of 80-acre spacing.

EXAMINER STOGNER: Thank you. Any other appearances?

MR. CARR: May it please the Examiner, my name is William F. Carr with the Santa Fe law firm Campbell, Carr, Berge and Sheridan.

We represent David Petroleum Corporation, a working interest owner in the pool, and we likewise support the adoption on a permanent basis of 80-acre spacing rules. We do not intend to call a witness.

EXAMINER STOGNER: Any other appearances in this matter?

Mr. Bruce, you may continue -- or proceed, rather.

MR. CARROLL: Swear the witnesses?

EXAMINER STOGNER: Oh, yeah, I'm sorry. Would the witnesses please stand to be sworn at this time?

(Thereupon, the witnesses were sworn.)

KEVIN WIDNER,

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

DIRECT EXAMINATION

BY MR. BRUCE:

Q. Would you please state your name and city of residence for the record?

A. Yes, my name is Kevin Widner. I'm from Midland,

Texas.

Q. Who do you work for and in what capacity?

A. I'm the production manager for Charles Gillespie, Jr.

Q. Have you previously testified before the Division?

A. No, I have not.

Q. Would you please outline for the Examiner your educational and employment background?

A. I have a bachelor of science degree in petroleum engineering from Texas A&M University in 1982.

I was employed with North American Royalties in Midland, Texas, for 11 years, and I've been employed by Mr. Charles Gillespie for the past year and a half.

Q. What are your duties for Mr. Gillespie?

A. I am the production manager in charge of the operations.

Q. Okay. And your past experience has all been in the Permian Basin?

A. Yes, it has.

Q. And are you familiar with the engineering matters applicable to the West Lovington-Strawn Pool?

A. Yes.

Q. And have you prepared a package of exhibits for presentation today on the -- with respect to the spacing of

this pool?

A. Yes, I have.

MR. BRUCE: Mr. Examiner, I tender Mr. Widner as an expert petroleum engineer.

EXAMINER STOGNER: Mr. Widner is so qualified.

Q. (By Mr. Bruce) Mr. Widner, what is Mr. Gillespie's recommendation regarding spacing for the pool?

A. That the current 80-acre ruling be made permanent.

Q. Okay. If you would refer to your Exhibit 1, which is a package of exhibits -- the pages have been numbered -- would you turn to page 1 and describe the contents of that page for the Examiner?

A. Page 1 is a brief history of the West Lovington-Strawn field. It was discovered in May of 1992 by Charles Gillespie.

There are currently nine producing wells within the pool. They are on an 80-acre spacing.

The production, current production, is approximately 24,000 barrels of oil and 38,000 MCF a month.

The cumulative production to date, as of January 1st, is approximately 1.2 million barrels of oil and 2.4 BCF.

The initial reservoir pressure of the field was 4392. The current reservoir pressure is 3384. And the

bubble-point pressure for the reservoir is calculated as being 4130.

By a volumetric type of calculation, the original oil in place was calculated at being approximately 12.5 million barrels.

Q. Now, you mentioned nine wells in the pool. Who operates those wells?

A. Charles Gillespie, Jr.

Q. Would you please turn to page 2 and just briefly identify what that shows?

A. Page 2 is a chronological history of the field, the completion date and the potential of each well within the field.

Q. Next move on to page 3 and discuss the pressure data from this pool.

A. Page 3 is also a -- is in chronological order. It shows the bottomhole pressure measurement of the reservoir for individual wells, not necessarily in any particular order but they are in chronological order, and how that bottomhole pressure was obtained, whether by drill stem test or bottomhole pressure buildup.

Q. And does this show a pretty continuous decline in pressure in the pool?

A. Yes, it does, from the initial completion date of the discovery well, the Hamilton Federal Number 1, in May

of 1992, as you can see, the pressure decreases with time all the way down to our last pressure measurement in January of 1995.

Q. What conclusion do you draw from this pressure data?

A. That the entire pool, reservoir, is communicated.

Q. Now, would you please move on to page 4 and discuss permeability in the pool?

A. Page 4 illustrates the calculated permeability to oil for various wells and the type of test that -- to obtain information for the permeability calculations.

Q. Are the permeability figures set forth on page 4 considered high for the Permian Basin?

A. Yes, they are.

Q. And does this permeability data also support the need for maintaining 80-acre spacing?

A. Yes, it does.

Q. What are Exhibits -- or, excuse me, pages 5 through 22?

A. Pages 5 through 22 show a graphical and tabular representation of the field's production history by total field and by individual leases within the field.

Q. And that's just submitted for informational purposes?

A. Correct.

Q. In your opinion, is the continuation of 80-acre spacing in the interests of conservation and the prevention of waste?

A. Yes, it is.

Q. And was Exhibit 1 prepared by you or under your direction?

A. Yes, it was.

MR. BRUCE: Mr. Examiner, I move the admission of Gillespie Exhibit Number 1.

EXAMINER STOGNER: Exhibit Number 1 will be admitted into evidence at this time.

Mr. Kellahin -- I'm sorry, are you through, Mr. Bruce?

MR. BRUCE: I'm through.

EXAMINER STOGNER: Mr. Kellahin, your witness.

MR. KELLAHIN: Thank you, Mr. Examiner.

EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Wagner (*sic*), describe for me, sir, what it is that you do for Mr. Gillespie as the production manager?

A. I'm in charge of all the field operations and engineering done for Mr. Gillespie.

Q. Do your responsibilities as the production manager include reservoir engineering aspects for the West Lovington-Strawn Pool?

A. To a certain extent.

Q. To what extent is that, sir?

A. We have had an expert reservoir engineer do some of the more difficult reservoir engineering calculations that I do not have the capability of doing.

Q. Have your responsibilities as the production manager included all of the production from the initial data discovery back in May of 1992 for this pool?

A. No, sir, it does not.

Q. When did you first commence that responsibility?

A. In May of 1993.

Q. As part of your current responsibilities, have you reviewed the historical production for this pool?

A. Yes, I have.

Q. Describe for me the reservoir, if you will, Mr. Wagner. When the first well was discovered in the Strawn Pool, what kind of reservoir are we dealing with?

A. It is a -- and I might want to let our geologist answer that question, but it is a Strawn reservoir. It's an algal-mound-type reef reservoir with -- typically have very high permeability and typically are very small in this area.

Q. When the reservoir was first discovered, the initial reservoir pressure shown on page 1 of your exhibit was about 4400 pounds, p.s.i.?

A. Correct.

Q. And that is -- And how was that measure determined?

A. That initially was determined from a drill stem test, from when they drilled the original discovery well.

Q. All right. In this reservoir prior to the first withdrawals of hydrocarbons in the reservoir, what was the composition of the fluids and gases?

A. I don't quite understand your question.

Q. Was this initially a reservoir that was completely full of oil, with the gas in solution in that oil?

A. It was a saturated reservoir.

Q. All right. At initial discovery, was there any indication that there was any kind of gas cap in the reservoir?

A. No, sir, not that I'm aware of.

Q. Did you at initial discovery see any free gas in the reservoir?

A. No, sir.

Q. At initial discovery, was there a water component in the reservoir?

A. Not from the initial discovery, no, sir.

Q. The last entry on page 1 says an original oil in place calculated volumetrically?

A. Uh-huh.

Q. To do that, an engineer has got to have a geologist give him the size and the shape of that container, do you not?

A. Correct.

Q. All right. How was this done for this pool?

A. I am not sure at this time how that number was derived. I was not employed at that time.

Q. All right. That doesn't represent your work --

A. No, sir --

Q. -- and you haven't studied it?

A. -- it does not.

Q. How did you determine the bubble-point pressure? How was that -- Not necessarily you, sir, but how was that determined?

A. It was determined through what they call PVT analysis of the reservoir fluids. Through various laboratory work and information you calculate the bubble-point pressure of the reservoir.

Q. Do you know what wells the fluid samples were taken so that the PVT data could be analyzed?

A. Yes, sir, it was the Hamilton Federal Number 1.

Q. Did you have any other wells that you had PVT data on?

A. No, sir.

Q. Did you see in the Hamilton well sample any problems with the protocol on which that sample was taken so that you would have a reliable sample to be analyzed?

A. At one time we did.

Q. What was that?

A. We -- Initially, it was felt that the samples were not taken properly, they were taken off of a -- from the tank battery at the wrong point.

We went back and did the analysis again, getting these samples from a different spot within the tank battery, and in fact did a third time, and came up with the same bubble-point pressure, relatively close, twice.

Q. What's the degree of your engineering confidence, then, in the reliability and accuracy of the bubble-point pressure being 4130 p.s.i.?

A. It's fairly -- fairly good.

Q. Can you use that PVT data for anything else?

A. It's mainly used for bubble-point pressure calculations.

Q. Can you use that to get yourself the initial oil formation volume factor?

A. Yes, you can.

Q. Do you know what it is for this reservoir?

A. I -- Not off the top of my head, I do not know that.

Q. Okay. But we could get it off that PVT study, right?

A. Yes.

Q. And how about the current oil formation volume factor? The same way, right?

A. Yes.

Q. What is the current reservoir pressure? It shows on page 1 to be what, sir?

A. 3384.

Q. And how do you get that number?

A. That was derived from a bottomhole pressure buildup in January of 1995.

Q. On which well?

A. The Hamilton Number 1, I believe. Yes. That is a field average.

Q. You have recommended the continuation of 80-acre spacing?

A. Yes.

Q. Do you see any pressure gradients in this reservoir?

A. What do you mean by "pressure gradients"?

Q. Some type of barrier restriction, usually impermeability?

A. We have not been able to calculate a barrier at this time.

Q. All right. You see no indication that if I went into this reservoir and took a current pressure, bottomhole, it would be anything other than the current 3384 at any point in the reservoir?

A. No, sir.

Q. All right. So we could look at a well on the fringe, we could look at a well in the middle, and we're going to get the same pressure?

A. Yes, sir.

Q. That helps support 80-acre spacing, doesn't it?

A. Correct.

Q. What is the maximum oil allowable on 80-acre spacing for this pool?

A. I believe it's 454 barrels a day, or 455.

MR. CROW: 445.

THE WITNESS: 445.

Q. (By Mr. Kellahin) 445, that means you're --

A. Yes.

Q. -- between 11,000 and 12,000 on 80-acre spacing?

A. Correct.

Q. Okay. Do you have wells that have the capacity to produce 445 a day?

A. Yes, we do.

Q. Are you seeing any problem with producing wells at that rate?

A. Current -- Well, we have not produced wells at that rate for some time.

Q. Why not?

A. We are trying to maintain the reservoir pressure at this time, so we're in the process of unitizing the field.

Q. Is there a gas cap present now in the reservoir?

A. That we cannot definitely say.

Q. Are you having upstructure wells that have increasing gas-oil ratios?

A. Yes, we are.

Q. Which one are those?

A. The Speight Fee Number 1.

Q. And that Speight Fee Number 1 is at the highest point in the structure of the pool, is it not?

A. Yes, it is.

Q. And what is its current GOR?

A. It is approximately about 2200.

Q. We've got a 2000-to-1 GOR in the pool?

A. Correct, in that particular well, not in the total field.

Q. As a production manager, are you concerned that the withdrawal rates of the wells are causing the preferential production of greater volumes of gas than might be prudent?

A. I don't quite understand the way you put that question.

Q. Is the reservoir rate-sensitive to gas withdrawal?

A. Yes, it is.

Q. Tell me how.

A. The -- By producing the wells at top allowable or at 400 to 500 barrels a day, you are decreasing your reservoir pressure.

As the reservoir pressure decreases, gas comes out of solution, and you neither -- If you produce the wells high enough, that gas will either go in the wellbore, or if you produce the wells at a lower rate you get a chance for the gas to create a gas cap within the reservoir.

Q. We're going to leave oil behind, right? At higher rates you're going to produce the gas in preference to the oil, and you're going to get less oil per recovery than you might otherwise at some lower rate?

A. Eventually.

Q. All right. Do you know what the approximate gas-oil contact is in this reservoir at this point?

A. No, sir.

Q. Is there a water component in the reservoir now?

A. We feel there might be one.

Q. Why do you feel that?

A. The law of calculations from the Wiley Fee, a well up to the north, gave indication that there is a water table.

Q. Is this water that's migrating from below up into the structure?

A. No, sir, we don't feel the water is mobile.

Q. Okay. The water is already in the reservoir, and the water is not recharging the reservoir?

A. Correct.

Q. This is no -- We don't have a water-drive component to the reservoir?

A. No, not at all.

Q. Do you as the production manager have any information with regards to what the current free gas saturation is in the oil zone?

A. No, sir, I do not.

Q. How about the remaining oil saturation in this gas portion of the reservoir?

A. No, we do not, I do not.

Q. Other than the pressure information to show that withdrawals at one point in the reservoir are being seen or affecting other portions of the reservoir --

A. Uh-huh.

Q. -- have you done any type of drainage

calculations?

A. No, we have not at this time.

Q. Have you attempted to simulate the reservoir performance of the wells by computer simulation?

A. Yes, we have.

Q. Okay. With what results, sir?

A. At one time not very accurate, but more recently we have been able to fairly accurately predict the performance of the reservoir as a pressure of the reservoir versus production in that regard.

Q. Do you have a forecast as an engineer of what percentage of the original oil in place you anticipate to be recovered from the pool?

A. At this time we do.

Q. Do you have?

A. Yes.

Q. And what is it?

A. Well, I want to refrain that. We really do not know at this time what a recovery factor might be due to the way that we're trying to produce the reservoir.

We -- From our predictions it may vary anywhere from 10 percent to 60 percent. At this time we just don't know.

Q. Have you attempted to set up a criteria that will tell you under different ways of operation what your

ultimate recovery percentage might be?

A. Yes.

Q. If it's on straight depletion as we have it now with the 80-acre spacing from the absence of pressure maintenance --

A. Uh-huh.

Q. -- what is that percentage?

A. It would be certainly much lower than 60 percent. It might be somewhere in the 10-to-30-percent range.

Q. And if the pressure maintenance concept is approved, what then do you expect to be the recovered percentage?

A. We were hoping -- We don't really know, we can't accurately predict that, but we were hoping anywhere from a 40- to 60-percent rate.

Q. In terms of management of the reservoir, give us a quick summary of what you're at least conceptually considering for the pressure maintenance project.

A. What we are considering is turning the Speight Fee Number 1 into a gas injection well.

Q. Speight Fee is the one high in the structure?

A. Yes.

Q. That would be the gas injection well?

A. Correct.

Q. Why would you do that?

A. To try and create a gas cap for the reservoir.

Q. Maintains pressure?

A. Maintains pressure.

Q. Then what would you do?

A. And produce the remaining wells in the field, not at a higher rate but at a rate of approximately -- again, we're not sure right now, somewhere around a 150-barrel-a-day range, probably, in order to allow time for gas that does break out of solution to possibly help form a gas cap also.

Q. In terms of further drilling in the pool, are there plans, either current or in the future, for additional wells?

A. Yes.

Q. And where will those wells be drilled?

A. Right now we are drilling a Snyder Number 2 well. There will possibly also be a well up in the northern part of the field and a well back in the northwest part of the field.

Q. Where is the Snyder 2 well located?

A. Directly due south of the Snyder Number 1 well.

Q. It's in the southwest southwest of 34?

A. Correct.

Q. What's the purpose of that well?

A. As a -- continuing as a development well.

Q. What would be the purpose of additional drilling on the north edge of the pool?

A. They would also be development wells drilled on the flanks of the reservoir.

Q. Do you see any reason in this reservoir to go to 40-acre spacing?

A. No, sir.

Q. Those would be unnecessary wells, would they not?

A. Correct.

Q. Because current 80-acre spacing then would provide an efficient number of wells that could drain spacing units of that size?

A. Correct.

MR. KELLAHIN: Thank you, Mr. Examiner.

EXAMINER STOGNER: Thank you, Mr. Kellahin.

Mr. Carr?

MR. CARR: No questions.

EXAMINER STOGNER: Mr. Bruce, any redirect?

MR. BRUCE: Just a couple.

REDIRECT EXAMINATION

BY MR. BRUCE:

Q. Mr. Widner, you said the wells were choked back at this time. What are they producing at?

A. Approximately 100 barrels a day each, approximately.

Q. And perhaps -- You mentioned about three additional development wells, and with that injection well that, at least at this time, is what you see as necessary for the full development of the field?

A. Correct.

MR. BRUCE: Nothing further, Mr. Examiner.

EXAMINATION

BY EXAMINER STOGNER:

Q. You said you had a choke-back of 100 barrels of oil per day?

A. Yes, sir.

Q. How many wells are you having to choke back to that --

A. All nine wells.

Q. All nine wells?

A. Yes, sir.

Q. Would you give me a summary of what the completion technique on these wells are?

A. These wells are perforated under balance. They come in naturally. There is no stimulation whatsoever for any of the wells.

Q. So the wellbore is just perforated?

A. Yes, sir.

EXAMINER STOGNER: Mr. Bruce, I can see now why Mr. Nutter wanted to call this pool the Patience Pool.

I have no other questions of this witness. He may be excused.

MR. BRUCE: Call Mr. Crow to the stand.

WILLIAM CROW,

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

DIRECT EXAMINATION

BY MR. BRUCE:

Q. Will you please state your name for the record?

A. William Crow.

Q. And who do you work for and in what capacity?

A. Charles Gillespie, and I'm exploration manager.

EXAMINER STOGNER: Mr. Crow, you're going to have to speak up a little bit. The acoustics in our new hearing room is not up to par.

THE WITNESS: Okay. I'm exploration manager for Charles Gillespie.

Q. (By Mr. Bruce) And by profession are you a geologist?

A. I'm a geologist.

Q. Have you previously testified before the OCD as an expert petroleum geologist?

A. Yes, sir. As a geologist, yes, yes, I have.

Q. And are you familiar with the geology involved in the West Lovington-Strawn Pool?

A. Yes, I am.

MR. BRUCE: Mr. Examiner, I tender Mr. Crow as an expert geologist.

EXAMINER STOGNER: Are there any objections?

MR. KELLAHIN: No, sir.

EXAMINER STOGNER: Mr. Crow is so qualified.

Q. (By Mr. Bruce) Mr. Crow, we've got two geological exhibits, Exhibit Number 2, the structure map, and Exhibit 3, the isopach.

Would you go through those briefly and discuss the geology in this pool?

A. Okay. Exhibit 2 is a structure map of the West Lovington-Strawn Pool.

It's contoured on top of the Strawn limestone, and all it -- It's just a map of the area of the pool, and it just shows regional dip to the north northeast, with a slight structural nosing in a northwestward direction.

Q. And the Speight Number 1 well is the highest well currently in the pool, is it not?

A. The Speight Number 1 well is the highest well in the pool as -- concerning porosity. Actually, the Earnestine Number 1, which is due east of it, is the highest well in the field for the top of the Strawn formation.

Q. Would you then move on to Exhibit 3 and discuss

the extent of the pool?

A. Okay, Exhibit 3 is a net porosity isopach of the West Lovington-Strawn Pool.

It was mapped utilizing a three-percent porosity cutoff with a PHI density porosity using an 85-percent cutoff there.

Q. And the outlines of the pool have been pretty well verified by your development and drilling of the pool, have they not?

A. Yes, sir, with our nine wells that we've drilled, and we were offset once to the west by Amerind, and then there was well control to the east, and so there's pretty good well control for this isopach map.

Q. In your opinion, is the continuation of 80-acre spacing in this pool in the interests of conservation and the prevention of waste?

A. Yes, it is.

Q. And were Exhibits 2 and 3 prepared by you?

A. Yes, they were.

MR. BRUCE: Mr. Examiner, I tender Exhibits 2 and 3.

EXAMINER STOGNER: Exhibits 2 and 3 will be admitted into evidence at this time.

Mr. Kellahin, your witness.

MR. KELLAHIN: Thank you, Mr. Examiner.

EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Crow, if you'll turn with me, sir, to Exhibit 3, it's the last one we were looking at. It's the net pay porosity map.

A. Yes, sir.

Q. Describe for me, sir, why you have chosen to use a three-percent porosity cutoff.

A. We cored two wells, we took a core out of the Earnestine Number 2 well and out of the Hamilton Number 3 well, and upon analysis of that cored information and compared to -- with the permeability and data from that, we decided that oil would be moveable and would be productive down to three-percent porosity.

Q. Sometimes in reservoirs the geologist has a range from which to make a choice on porosity cutoff?

A. That is correct.

Q. If other geologists were to look at this, do you think there's going to be a point of disagreement with you individuals professionally on using three percent?

A. If they just -- If they didn't have the core information, some geologists might want to use four percent.

Q. The core information is more definitive and therefore more accurate in determining a porosity cutoff

value for you?

A. It's information that, if it's available, would be -- it's certainly another tool to utilize to determine cutoff and what might be moveable.

Q. And a geologist like you that's looking to try to determine that value as accurately as possible is going to want the core data that's available?

A. If it's available, yes.

Q. All right, sir. Let's talk about the shape. I'm looking at the area around the shape.

A. Uh-huh.

Q. I assume you derive that by taking all the geologic information known to you in the area --

A. Yes.

Q. -- and then making some decisions about how to define the shape?

A. Yes, sir.

Q. When we look at Section 34 in the east half, there's the Bridge Culp Julia Number 2 well. Do you see that?

A. Yes, sir.

Q. What's the basis for a zero value for that well?

A. The well -- From electric log calculations, the well had zero porosity.

Q. Was there a drill stem test on that well?

A. I believe there was, yes, sir.

Q. And do you remember what it showed?

A. The well was tight, no permeability, and produced no hydrocarbons, very little fluid.

Q. Pretty good control, then, for you as a geologist to say that that zero line for the reservoir has got to be some distance west of the Culp Julia Number 2?

A. Yes, sir.

Q. When we look at the northern boundary, what is your control basis for determining where the zero line is for the northern boundary of the pool?

A. The zero line depicted there to the north was determined using 3-D seismic data interpretation.

Q. How did that help you determine where that zero line was?

A. With seismic data, we feel we can depict the reef and see the actual porosity, and we attempt as best we can to follow that porosity signature out until it pinches out, and that was where we determined the zero line was.

Q. All right. You can use the 3-D seismic information to tell you when you're low enough on the structure, you're beyond the porosity that will contribute to production in the reservoir?

A. Yes, sir. The porosity, though, will pinch out in all directions, regardless of structure. But you can,

from the seismic, determine the porosity pinchout and structural position, yes, sir.

Q. Another geologist is not going to quibble with you about how that was done?

A. It's -- When you get into seismic, it is interpretive, and three different geophysicists might have two or three different interpretations.

Q. Is the -- How well does the 3-D seismic information correlate to the conventional log information that you have as a geologist? Is --

A. Very well, all the wells tie. Once we shot that 3-D survey, all the wells tie very well. And from modeling those you can definitely determine where the porosity was at and how thick it is.

Q. Did you have any mis-ties?

A. No, sir.

Q. Anything in there to give you a problem in correlating the conventional geologic information back with the 3-D seismic work?

A. No, sir.

Q. So we --

A. The well is drilled out just pretty much like we expected.

Q. Okay. So we got good control, in your opinion, on what the northern boundary is?

A. Yes, sir.

Q. Show me the western boundary. How did you get that boundary?

A. The western boundary, as far as toward the south part where Amerind drilled their well, we have well control there. That well was drilled, electric logs were interpreted and there was no porosity or reef in that well either.

Q. Was there any drill stem tests on --

A. No, it was such a poor -- I wasn't on location, but obviously they didn't get any shows or anything. They didn't --

Q. So poor they didn't even try?

A. Yes, sir.

Q. Pretty good control there in the southwest then?

A. Yes, sir.

Q. How did you then handle the western boundary north of the Amerind well?

A. With 3-D seismic, as we did --

Q. Again?

A. Uh-huh.

Q. So the northern west boundary is seismically defined?

A. Yes, sir.

Q. All right. And the north boundary is seismically

defined?

A. Yes, sir.

Q. And the southern boundary, how did you determine the southern limits of the pool?

A. Again, it is seismically defined, and that is the back of the reef, and it's very steep, very abrupt, and it's quite easy to detect.

Q. Mr. Wagner, in his presentation, gave us a calculated original oil in place of 12.5 --

A. Yes, sir.

Q. -- million barrels of oil, volumetrically calculated?

A. Yes, sir.

Q. All right. Did you assist in helping the engineer determine a geologic map from which that volumetric calculation could be made?

A. Yes, sir, to a point. These isopachs and structure maps were used to create a hydrocarbon four-foot map, and then that hydrocarbon four-foot map was used by the engineers to do the volumetrics.

Q. If we took the net pay, this porosity map, Exhibit 3 --

A. Uh-huh.

Q. -- to what extent does it change to get you the phi h map?

A. The phi h map or the hydrocarbon four-feet map was determined by using a software package that has been created by Geographics and Schlumberger together, and it's called QLA2 software. It's a log-analysis program, and the log analysis was done by computer to calculate porosity, cross-plot porosity, and do water saturation down to every half foot, and then -- That's where these net feet numbers come from.

And then from that -- The hydrocarbon four-foot figure was given, and then it was just isopached in the same manner. And the only difference, really, is, once you get north downstructure, you have to take into account the area that calculates wet with water.

Q. What's your degree of geologic confidence in the accuracy of the distribution of pore volume in the reservoir using that process?

A. We feel very good, I feel very confident that it's going to drill out and -- the pool is mapped fairly accurately.

Q. From a geologic perspective, what's your opinion about 80-acre spacing?

A. I believe it's sufficient to drain the reservoir.

Q. Give us a quick summary of this Strawn algal mound in terms of its geologic characteristics.

A. The Strawn reef out in this area in Lovington and

Lea County is an algal mound. It's a mud-mound buildup, where mud was trapped, as the reef was growing, in algal material. And then after sea levels dropped the algal material was leached away out of the mud and created very high vugular porosity and permeability.

Q. If you were to make a cross-section of wells through the pay interval in the pool, would the log signatures be similar when we look at the logs?

A. Yes, sir. One thing we do notice is flank wells have lower porosity. In the crest of the reef where most of the reef material was originally, you're going to have -- you have higher porosity and more fractured.

Q. But you can use a three-percent porosity cutoff and look at a cross-section and see continuity of the reservoir --

A. Yes, sir.

Q. -- from well to well?

A. Yes, sir.

Q. Is this any different than the Shipp-Strawn and the Casey-Strawn and these other algal-mound --

A. No, sir.

Q. -- pools down there?

A. No, sir, just a much larger --

Q. Same kind of creature?

A. -- of the same creature, yes, sir.

MR. KELLAHIN: Thank you, Mr. Examiner.

EXAMINER STOGNER: Thank you, Mr. Kellahin.

Mr. Carr, your witness.

MR. CARR: I have no questions.

EXAMINER STOGNER: Mr. Bruce, any redirect?

MR. BRUCE: No, sir.

EXAMINATION

BY EXAMINER STOGNER:

Q. Are there any other planned wellbores at this time?

A. Planned wellbores?

Q. Yeah.

A. Yes, sir. Currently we're drilling a Snyder S Com Number 2 in the southwest quarter of the southwest quarter of Section 34.

We're working on getting a well started with some of our working interest partners in the northwest quarter of the northeast quarter of Section 33.

And those two wells -- Well, one is drilling now, the Snyder well, and the well up in the northeast quarter of 33, being the Klein Number 1 well, we hope will spud within 30 days.

Q. And the discovery well was the Hamilton Federal Number 1; is that correct?

A. Yes, sir.

EXAMINER STOGNER: I have no other questions of Mr. Crow.

Do you have anything?

MR. CARROLL: (Shakes head)

MR. BRUCE: Nothing further.

EXAMINER STOGNER: Any other questions of this witness?

MR. KELLAHIN: No, sir.

EXAMINER STOGNER: He may be excused.

Mr. Bruce, anything further in this case?

MR. BRUCE: No, sir.

EXAMINER STOGNER: Does anybody else have anything further in Case Number 10,530, the reopened portion of it?

If not, then this case will be taken under advisement.

(Thereupon, these proceedings were concluded at 9:15 a.m.)

* * *

CERTIFICATE OF REPORTER

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

I, Steven T. Brenner, Certified Court Reporter and Notary Public, HEREBY CERTIFY that the foregoing transcript of proceedings before the Oil Conservation Division was reported by me; that I transcribed my notes; and that the foregoing is a true and accurate record of the proceedings.

I FURTHER CERTIFY that I am not a relative or employee of any of the parties or attorneys involved in this matter and that I have no personal interest in the final disposition of this matter.

WITNESS MY HAND AND SEAL January 20th, 1995.

STEVEN T. BRENNER
CCR No. 7

My commission expires: October 14, 1998

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 10530 (Reopened) heard by me on 19 January 1995.

, Examiner
Oil Conservation Division