STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO

IN THE MATTER OF:

Application of Curry and Thornton for an unorthodox gas well location and a non-standard proration unit, Chaves County, New Mexico. CASE 9617

TRANSCRIPT OF HEARING
AUGUST 17, 1989

BE IT REMEMBERED that on the 17th day of August, 1989, this matter came on for hearing before CHAIRMAN WILLIAM LEMAY, COMMISSIONER WILLIAM HUMPHRIES and PATRICIA O'BRIEN, Certified Shorthand Reporter, of the firm SANTA FE DEPOSITION SERVICE, 1437 Paseo de Peralta, Santa Fe, New Mexico, at the State Land Offices, Morgan Hall, Santa Fe, New Mexico.

* * *

APPEARANCES

FOR THE OCD:	WILLIAM LEMAY, CHAIRMAN WILLIAM HUMPHRIES, COMMISSIONER FLORENE DAVIDSON, STAFF SPECIALIST ROBERT STOVALL, GENERAL COUNSEL
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FOR ENRON OIL & GAS CORP.:	WILLIAM F. CARR, ESQ. CAMPBELL & BLACK, P.A. Attorneys at Law Post Office Box 2208 Santa Fe, New Mexico 87501

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P R O C E E D I N G S

AUGUST 17, 1989

CHAIRMAN LEMAY: Case No. 9617?

MR. STOVALL: Application of Curry and Thornton for an unorthodox oil well location and non-standard proration unit, Chavez County, New Mexico. Applicant requests this case be continued to the September 21st, 1989, Commission Hearing.

CHAIRMAN LEMAY: Without objection, Case No. 9617 will be continued to the Commission Hearing September 21st.

(Whereupon, the hearing in the above matter was concluded.)

* * *

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

REPORTER'S CERTIFICATE

I, Patricia Lou O'Brien, Certified Shorthand Reporter and Notary Public of the firm SANTA FE DEPOSITION SERVICE, do hereby certify that the following transcript is a complete and accurate record of said proceedings as the same were recorded by me or under my supervision.

Dated at SANTA FE, NEW MEXICO, this 7th day of September, 1989.

Patricia O'Brien

Patricia Lou O'Brien
Certified Shorthand Reporter

My Commission Expires:
February 16, 1990

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STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION COMMISSION

COMMISSION HEARING

IN THE MATTER OF: Case 9617

Application of Curry and Thornton for an unorthodox oil well location and a nonstandard proration unit, Chaves County, New Mexico.

(CONSOLIDATED)

IN THE MATTER OF: Case No. 9670

Application of Stevens Operating Corporation to amend Division Order No. R-8917, directional drilling and an unorhodox oil well location, Chaves County, New Mexico.

TRANSCRIPT OF PROCEEDINGS

BEFORE: WILLIAM J. LeMAY, CHAIRMAN
WILLIAM WEISS, COMMISSIONER

STATE LAND OFFICE BUILDING

SANTA FE, NEW MEXICO

OCTOBER 19, 1989

ORIGINAL

CUMBRE COURT REPORTING
(505) 984-2244

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I N D E X

I N D E X (CONTINUED)

I N D E X (CONTINUED)

E X H I B I T S

MR. LeMAY: Good morning. This is the Oil Conservation Commission hearing, and we have three Commissioners. One of the Commissioners is stranded in Truth or Consequences. Commissioner Bill Humphries will not be here for this with us.

For those of you who did not get a chance to meet our new Commissioner, Bill Weiss is our new Commissioner here to my left. My name is Bill LeMay, and we are the Commission of three Bills, two of which are present today.

So with that we will begin by calling --

MR. STOVALL: Mr. Chairman.

MR. LeMAY: Yes.

MR. STOVALL: Before we start, maybe this would be a good time to -- this is off the record.

(Thereupon, a discussion was held off the record.)

MR. LeMay: Thank you, Mr. Stovall.

Case No. 9611.

MR. STOVALL: Application of The Petroleum Corporation of Delaware for an unorthodox gas well location, Eddy County, New Mexico. Applicant has requested this case be dismissed.

MR. LeMAY: Without objection Case No. 9611 will be dismissed.

Case No. 9617.

MR. STOVALL: Application of Curry and Thornton for an unorthodox oil well location and a nonstandard proration unit, Chaves County, New Mexico.

MR. LeMAY: Appearances in the case.

Yes.

MR. CARR: May it please the Commission, my name is William F. Carr with the law firm of Campbell & Black, P.A., of Santa Fe. I represent Curry and Thornton in this matter.

I also represent Stevens Operating Corporation in the following case on the docket and will be involved in the last case on the docket, which is an application of Santa Fe Exploration Company.

I have talked to Mr. Padilla. They may be dismissing the last case. But in any event, I would first request that all three of these cases, or such cases as remain, be consolidated for purposes of hearing.

MR. LeMay: Thank you, Mr. Carr.

Mr. Padilla.

MR. PADILLA: Mr. Chairman, we have no problem with consolidating all three cases. If it's appropriate at this time, I'd like to move for the dismissal of our case, in that Case 9697.

And insofar as we have asked for de novo hearing in Case 9617, we would request that our application for de novo be also dismissed.

And we will simply appear in the de novo case of Curry and Thornton and in the Case of 9670 of Stevens Operating.

MR. LeMAY: Thank you, Mr. Padilla.

Is there anyone else that would object to the consolidation of Cases 9617 and 9670 and the dismissal of Case 9697?

Fine. We'll read now Case 9670.

MR. STOVALL: Application of Stevens Operating Corporation to amend Division Order No. R-8917, directional drilling in an unorthodox oil well location, Chaves County, New Mexico.

MR. LeMAY: At the request of counsel's present Case No. 9670 will be consolidated in with Case 9617.

Case 9697.

MR. STOVALL: Application of Santa Fe Exploration Company for amendment of the special rules and regulations for the North King Camp Devonian Pool, Chaves County, New Mexico.

MR. LeMAY: If there are no objections, Case 9697 will be dismissed.

So now call for appearances in Cases 9617 and 9670.

MR. CARR: May it the please the Commission, in addition to the appearance I have previously entered, I would like to introduce Pattie Matthews, an attorney with Campbell & Black. This is Pattie's first Oil Conservation Commission or Division Hearing. She'll be assisting me today and also assisting me in the other Oil Conservation Commission or Division matters.

MR. LeMAY: Thank you. Welcome to the Commission, Ms. Matthews.

Mr. Padilla.

MR. PADILLA: Mr. Chairman, Ernest L. Padilla, Santa Fe, New Mexico, for Santa Fe Exploration in the Case 9617 and 9670.

MR. LeMAY: Thank you, Mr. Padilla.

Additional appearances?

Mr. Kellahin.

MR. KELLAHIN: Mr. Chairman, my name is Tom Kellahin of the Santa Fe law firm of Kellahin, Kellahin & Aubrey.

I'm appearing on behalf of Exxon Company U.S.A. today. We are in opposition to Curry and Thornton and Stevens Operating Corporation. And we

appear in support of Santa Fe Exploration Company in these two cases.

MR. LeMAY: Thank you. Will you be having any witnesses today, Mr. Kellahin?

MR. KELLAHIN: I anticipate I may. I'm not certain which witnesses to swear at this point. If I might reserve that opportunity for a later time, we can make that judgment later in the hearing.

MR. LeMAY: Thank you.

Addition appearances in the case?

Mr. Cooter.

MR. COOTER: Gentlemen of the Commission, my name is Paul Cooter, and for the reporter, that's C-o-o-t-e-r. I'm with the Rodey law firm here in Santa Fe appearing today on behalf of Armstrong Energy Corporation.

MR. LeMAY: Thank you, Mr. Cooter. Will you be tendering any witnesses for --

MR. COOTER: No, sir.

MR. LeMAY: Statement at the end possibly?

MR. COOTER: Possibly.

MR. LeMAY: Possibly.

MS. DUNGAN: Mr. Commissioner, my name is Deborah Dungan. I'm with the law firm of Montgomery & Andrews here in Santa Fe. I'm here appearing on behalf

of Larry Harrison, a New Mexico oil corporation. I will not have any witnesses but are here to support the position of the Santa Fe Exploration Company.

MR. LeMAY: Thank you. How do you spell your last name, Debbie?

MS. DUNGAN: D-u-n-g-a-n.

MR. LeMAY: Thank you.

Additional appearances in these cases?

How many witnesses do each of you currently have?

MR. CARR: I intend to call three witnesses.

MR. PADILLA: I may call two witnesses, Mr. Chairman.

MR. LeMAY: Do you care to start with opening remarks?

MR. CARR: Yes, sir.

MR. LeMAY: Mr. Carr.

MR. CARR: Mr. Kellahin thinks I should speak from behind the exhibit, but with your permission, may it please the Commission, Curry and Thornton and Stevens Operating Corporation are before you today seeking approval of a nonstandard proration unit in the North King Camp Devonian Pool.

They also seek approval of the directional drilling of their No. 1 Deemar well and approval of an

unorthodox bottom-hole location in this reservoir.

The background facts in the case are not complicated and are really not in dispute.

The North King Camp Devonian Pool is a pool that consists of really one section, Section 9, Township 14 South, Range 29 East.

There are two wells in the pool. The pool was discovered in 1988 when Santa Fe Exploration drilled and completed its Holmstrom Federal No. 1 located in the southeast quarter of this section.

At the time this well was drilled and completed, as the evidence will show, there was seismic information and other information that showed there was a fault that ran approximately at this angle through the west half of this section.

Santa Fe Exploration did not own the rights on the west half of the section and, although available, did not subsequently acquire them.

They did, however, in late 1988 come to the Oil Conservation Division and obtained special pool rules for the pool, which created 160-acre spacing units, and they dedicated the southeast quarter to their Holstrom Federal No. 1 Well.

And it also provided for an allowable, based on the depth of the formation, of 515 barrels of oil

per day. It also provided for 660-foot setbacks from the outer boundary of spacing of proration units.

Well, early this year, 1989, Curry and Thornton and Stevens Operating acquired the rights to develop the reserves under the west half of Section 9.

And they've had two hearings before the Division concerning their plans for the development of this property.

In the first hearing they obtained approval to drill a well at an unorthodox location and to dedicate the east half of the west half as a 160-acre nonstandard spacing or proration unit.

The Division entered an order approving that unit and approving the well location. The location had to be nonstandard because if they were more than 660 feet from the outer boundary of their unit, they would be on the west side of the fault and outside of the reservoir.

But that order imposed a penalty, and the penalty affected the economics of the plans for developing this acreage.

And so they came back to the Division and obtained authority to enter an old wellbore on that property, kick off at about 7,000 feet and directionally drill in an easterly direction, and have

done that and bottomed their well on their lease inside the reservoir at an unorthodox location.

And so we're here today asking you to approve the nonstandard unit and approve this location and approve the actual directional drilling that has taken place on this well.

We were unable to comply with the exact angles and all that were contained in the original directional drilling order, so we have filed an amended application and are asking you to approve that part of what we have done.

And so we're here today asking for an order that will not only do those but will protect correlative rights and prevent waste.

Now, the evidence that we will present will show the Commission that under the property that is leased to Stevens and Curry and Thornton, there are 670,000 barrels of producible reserves.

Now, this is a cross-section obviously; it's two dimensional. But when you take the structure -- this is the line dividing the properties -- and you look at the structure and compare it to what is underlying the west half of the section, 670,000 barrels of producible reservoirs, when you take a look at the producible reserves under the southeast, our

evidence will show that they have 732,000 barrels of producible reserves 670,732. That's what our evidence will show.

We will also show based on prior and currently existing in-place orders of this Division, we are permitted to produce 34 barrels per day.

Under the orders of this Division, as they currently exist, Santa Fe Exploration can produce 515 barrels of oil per day.

Our evidence will show under existing orders, we have the opportunity to produce 6 percent of the pool allowable.

Santa Fe Exploration has an opportunity to produce 94 percent of the pool allowable.

This is a technical case. This is a case that is rooted in the disciplines of geology and petroleum engineering.

But this is not the same case that appeared before the Examiner because we stand before you with new, substantially improved, substantially more engineering and geological information.

Because of the drilling that has taken place, we will show you where the fault is. We now know because we have intersected the fault; we have cut it.

We will show you what the recoverable

reserves are in this pool. We know that. We will show you. We will show you what the recoverable reserves are under the tract under the west half of this section; we know that.

We will show you what the producible reserves are under each of the standard spacing units in the east half of the tract.

And on this new and substantial evidence, we will show you that is practicable to enter an order allocating production between these tracts based on the recoverable reserves.

We will call Jack Ahlen. He will review the structure for you. He will identify the fault, and he will explain the other confining aspects of the structure in the North King Camp Devonian Pool.

But this is also and, perhaps, primarily an engineering case.

We will call Mr. Scott Hickman, who will calculate the reserves under each of the tracts. He will show you how you can allocate those reserves in a fashion that will permit each owner to receive its just and fair share of reserves in the pool.

And he will show you how all of this can be done with no harm to the existing Santa Fe Exploration well in this pool.

We will then call Mr. Hank Gruy. Mr. Gruy is an internationally recognized petroleum engineer and an expert in both the fields of petroleum engineering and geology.

And he will confirm the integrity of the methods we have used. And he will confirm that the calculations and the approaches utilized by Stevens and Curry and Thornton are based on and consistent with sound engineering principles.

So when the evidence is in, we will have shown you that you can enter an order based on recoverable reserves; that you can enter an order that will prevent waste.

We will show you what the reserves are in the pool. We will show you what the reserves are under Santa Fe Exploration's tract.

We will show you what the reserves are under the Stevens, Curry, and Thornton tract, and in so doing, we will tell you what correlative rights are.

And then we are going to ask you to act, to do what the Oil and Gas Act requires and to protect those correlative rights.

MR. LeMAY: Thank you, Mr. Carr.

Mr. Padilla.

MR. PADILLA: Mr. Chairman, this case is a

throwback to the old cases on the Rule of Capture where wells were drilled at random and to try and obtain as much oil without the benefit of conservation.

What Curry and Thornton and Stevens have done in this case is to throw us back and ignore the rules of the Oil Conservation Division.

Our case today is going to be premised on the basis of supporting the order of the Oil Conservation Division in allocating a production rate of 34 barrels per day.

We believe that is as close as possible as you can get to fairness in this case.

It doesn't matter how you cut it; there are still only two wells in the reservoir. The limits of the reservoir cannot be determined by the basis of where that fault may lie.

And so from that aspect our case is going to be grounded on the basis that recoverable reserves at this time cannot be readily defined.

We go back to the historical development of this case. It's true Santa Fe Exploration discovered the pool with their well in the southeast quarter of Section 9.

They have also drilled a well in the northeast quarter of the section to the south. That

was a dry hole. That's indicative of some sort of a limited reservoir in this area.

In any event, it doesn't matter how you cut it. This case, the facts involve the distance to the lease line of Santa Fe Exploration Company.

The Division has calculated that distance to be 78 feet. There never was any permission for Stevens or Curry and Thornton to whipstock to the bottom-hole location of 78 feet away from the lease line. Those facts you could not ignore.

And I think the permeability, the reservoir characteristics that we will present today will show that there indeed is a need to protect the Santa Fe acreage.

It's not -- there's no question that Curry and Thornton and Stevens are entitled to produce their just and fair amount of oil. It's the question of where they're going to produce the oil from.

It's our position and our case will be grounded on the basis that the oil should be produced from their lands strictly and not from an adjoining camp that's within 78 feet from our lease line, that's Santa Fe Exploration, and the other working and the other interest owners in the southeast quarter of Section 9, that's their oil.

And they have the right and it's their correlative rights that are affected, and they should -- those correlative rights should be protected.

So our case is going to require and demonstrate to the Commission that indeed the Commission should protect this situation and not put us back into the Rule of Capture situation where Santa Fe, in order to recover it's fair share of production, based on pool rules that are established by the Division to develop 160 acres so Santa Fe will not have to go drill a second well 78 feet from the line in order to adequately protect the rights.

MR. LeMAY: Thank you, Mr. Padilla.

Mr. Kellahin.

MR. KELLAHIN: Gentlemen of the Commission, I appear before you on behalf of Exxon Company in support of Santa Fe Energy's position.

This is not a new case for us. Perhaps you -- we originally were involved in this case back earlier in the year when Examiner Lyon first heard this initial request by Curry and Thornton.

Let me tell you what I believe the evidence will show you today as it unfolds. If I might use Mr. Carr's display, I can show you some of the things that

he has not yet told you.

You will note that under the pool rules, the Santa Fe Energy well is in fact at a legal location in the pool some distance in excess of being 660 feet from a common line.

They are well within the window for standard well location. They have dedicated the southeast quarter of that section to their well. It's 160 acres, and that is the standard configuration for the spacing unit.

What Mr. Carr did not tell you and what the evidence will show you is that their nonstandard unit is simply stacking four 40-acre tracts, one on top of the other.

Now, why would they do that? The evidence will show you that they've done that in order to attempt not to be subject to a penalty because they do not have a full 160 acres of production to dedicate to the well.

Mr. Carr's red line on his display shows you what some of the evidence will show you, that a significant portion of that spacing unit dedicated to this well is on the west side of the fault line and cannot be produced by the Stevens, Curry, Thornton well, which is now on the east side of the fault.

What Mr. Carr didn't tell you and what the evidence will show you is this bottom-hole location is 78 feet away from the common spacing unit line.

This well is at a depth of in excess of a mile or so. And the distance separating that bottom-hole location from our spacing unit is the length of this room. That is how close they are to us.

Mr. Carr proposes to present to you a case that demonstrates conventional routine engineering work by renown experts. We have our own experts. But I will tell you, gentlemen, the evidence is going to be diametrically opposed with regards to the size and the shape of the reservoir.

The engineers are going to predicate their conclusions based upon how the geologists have interpreted the size and shape of that reservoir, not only for the Santa Fe well, but for how they have attempted to justify the size of the reservoir for the Santa Fe Energy well.

That's not a new argument. Both sides presented that discussion to Mr. Lyon. He rejected it. He says the key material point is the proximity of the encroaching well to the offsetting spacing unit.

He found it was much too speculative to try

to construct and hear and explain a net productive acreage hearing.

Gentlemen, you're about to hear -- 80 percent of this testimony today is going to be a net productive acreage hearing.

You're going to see geologists with diametrically opposed positions on the size, the shape, the thickness, the volume of the reservoir.

And then we're going to have diametrically opposed engineers doing their engineering calculations to tell you what these numbers are.

We say the equity in this case is going to demonstrate to you that you ought to continue to build upon the order Mr. Lion entered in this case and that the only way to reasonably balance the equity between the parties is to affirm the existing orders.

So that you'll have a point of reference, I'd like to share with you copies of the existing orders we have, as well as the August 28, 1989, letter from the Division to Mr. Carr showing him what the actual producing rate is for the well.

With regards to the producing rates of the well, the evidence will demonstrate to you that adoption of the proposed producing level for the Stevens well of 34 barrels a day is still an

appropriate rate; that notwithstanding the maximum allowable for the pool, the 515 barrels a day, the actual mechanics between the two wells, because the Santa Fe Exploration well is only flowing at 200 barrels a day, in order to maintain the equity, the no-flow barrier, if you will, between the two competing wells for these reserves is justifiable in order to offset the encroachment advantage that Curry and Thornton and Stevens will enjoy to maintain the level of production for their well at 34 barrels.

We're not judging them after the fact, Gentlemen. The evidence will demonstrate for you that they went into this transaction with full knowledge of what the penalties were going to be.

They undertook the risks and the expense of directionally drilling these wells to a bottom-hole location so close to my client's property interest that they are effectively impaired unless the penalties are maintained.

Exxon Corporation has a significant interest in the Santa Fe acreage. And we propose to present technical people in support of the position that maintains the current status of the orders as they are now before you.

Thank you.

MR. LeMAY: Thank you, Mr. Kellahin.

Additional opening comments by any of the attorneys?

If not, Mr. Carr, you may begin your case.

MR. STOVALL: Excuse me, Mr. Chairman, I believe we need to swear the witnesses. We have not sworn them.

MR. LeMAY: Will all those planning to give testimony, please stand and raise your right hand.

MR. STOVALL: Any witnesses who may possibly give testimony, please rise.

(Thereupon, the witnesses were duly sworn.)

MR. CARR: May it please the Commission, at this time we call Mr. Ahlen.

MR. LeMAY: Yes.

JACK AHLEN,

having been previously duly sworn, testified upon his oath as follows:

DIRECT EXAMINATION

BY MR. CARR:

Q. Will you state your full name for the record, please.

A. My name is Jack Ahlen.

Q. Mr. Ahlen, where do you reside?

A. Roswell, New Mexico.

Q. What do you do for a living?

A. I am a consulting geologist primarily concerned with oil and gas.

Q. Could you summarize your educational background in the field of geology for the Commission?

A. I received a bachelor of science degree from the University of Wisconsin in 1950, a master's degree from the University of Wisconsin in 1952.

I was employed by Gulf Oil Corporation starting in 1952. I continued in their employment for a little over 20 years, until 1972, at which time I quit and went independent, as an independent consulting geologist.

Q. And you have been doing that since 1972?

A. Yes, sir, I have.

Q. What percentage of your work is involved in the Permian Basin?

A. All of it.

Q. Are you familiar with the Devonian reservoir and the pools in that reservoir in the southeastern portion of New Mexico?

A. Yes, sir, I am.

Q. Do you belong to any professional associations?

A. I am a member of the American Association of Petroleum Geologists, which I joined in 1952. I am a member of the New Mexico Geological Society. I'm a member of the Roswell Geological Society.

I have functioned and been elected treasurer of the New Mexico Geological Society. I have held all of the offices available in the Roswell Geological Society and have been president three times.

Q. Have you had your work published in the field of geology?

A. Yes, sir. I have had -- I am coauthor to an article that was published in the bulletin of the American Association of Petroleum Geologists.

The Roswell Geological Society has published several cross-sections, stratigraphic cross-sections of the New Mexico part of the Permian Basin, for which I was chairman of the stratigraphic committee.

Roswell Geological Society has published five volumes of the Symposium of Oil and Gas Fields of Southeastern New Mexico, and in each of those I have contributed from two to eight separate articles on different fields in Southeastern New Mexico.

Q. Are you familiar with the applications filed in the consolidated cases on behalf of Curry and Thornton and also on behalf of Stevens Operating

Corporation?

A. Yes, sir, I am.

Q. Are you familiar with the North King Camp Devonian Pool?

A. Yes, sir.

Q. Are you familiar with the two wells that are drilled therein?

A. Yes, sir.

Q. Do you have any ownership interest in any of the properties in this pool?

A. I do not.

Q. Have you studied the Devonian formation in this area and prepared certain exhibits for presentation to the Commission today?

A. Yes, I have.

MR. CARR: We tender Mr. Ahlen as an expert witness in the field of petroleum geology.

MR. LeMAY: His qualifications are acceptable.

Q. (BY MR. CARR) Mr. Ahlen, what does Curry and Thornton and Stevens Operating Corporation seek in each of the consolidated applications?

A. First, they seek approval of the nonstandard 160-acre spacing unit, which consists of the east half of the west half of Section 9, in Township 14 South,

Range 29 East.

Secondly, we seek approval of an unorthodox oil well location 1974 feet from the south line and 1988 feet from the west line of Section 9.

Thirdly, we seek approval of the directional drilling of the No. 1 Deemar well.

And, fourthly, we seek the opportunity to produce our fair share of the reserves in the pool.

Q. Mr. Ahlen, would you identify what has been marked as your Exhibit No. 1, identify what that is and review this for the Commission?

A. My Exhibit No. 1 was prepared for the first hearing before this Commission back in February of 89. You'll note the date in the lower right-hand corner in the legend.

This is the same illustration that was used at that application. It was used to illustrate the lease lines, the location of the North King Camp Pool, which is in Section 9 of Township 14 South, 29 East.

It illustrates the proration units that are under consideration in the pool, the southeastern corridor of Section 9, being the proration unit of Santa Fe Exploration, and the east half of the west half of Section 9, being the proration unit for the Stevens well, the Deemar well, as well as the location

of other wells in the vicinity.

(Thereupon, Ahlen Exhibit 1 was identified.)

Q. And you have on this map the proposed location. Is that the proposed location that was actually being sought in the --

A. In the initial hearing.

Q. -- in the February hearing?

A. Yes, sir, that was proposed surface location, the initial well.

Q. And in the east half of the west half of Section 9 is the Philtex Honolulu Federal well?

A. That is a well that was previously drilled in 1961 and abandoned at that time.

Q. And this shows the nonstandard proration unit in the east half of the west half that was approved by the Examiner's order; is that correct?

A. That is correct.

Q. Are you familiar with the Division rules that govern the development of the North King Camp Devonian Pool?

A. Yes, sir, I am.

Q. Can you basically just summarize for the Commission what they provide?

A. One, they provide for a 160-acre spacing

roughly in the form of a square, call for minimum distance from the lease line of 660 feet, as well as a ruling for an allowable of 515 barrels of oil per well.

Q. Mr. Ahlen, were you involved in the decisions to propose the original unorthodox location?

A. For Curry?

Q. For Curry and Thornton.

A. Yes, sir, I was.

Q. Why was this well proposed at an unorthodox as opposed to a standard location?

A. In the first place, the orthodox location has has already been drilled, has a vertical hole to the Devonian, and it was plugged and abandoned because that well tested water in the Devonian formation.

Therefore, it was obvious that the unorthodox location would have to be drilled on the other side of the fault, that is the bounding faults, for the pool.

Q. Were you involved in the decision that was made ultimately to directionally drill this well?

A. Yes, I was.

Q. Why was that decision made?

A. The penalty imposed by the Commission was so onerous it caused significant impact on the economics. And in an attempt to save money, we wanted to reenter the old hole and kick the hole off at 7800 feet and

drill the well directionally to the east to intersect the fault.

Q. Would you refer to what has been marked for identification as your Exhibit No. 2. And I would ask you to first explain to the Commission what this is and then review basically what it shows.

A. Yes, sir. I apologize for the size. First of all, this is an attempt to give you a three-dimensional view of the reservoir and the information that was determined by drilling -- by the drilling of the wells.

You'll note that at the -- in the upper two-thirds of the diagram we have a cross-section. It is an east-west cross-section between the Santa Fe Holmstrom well and the Stevens Operating Deemar well.

The lower one-third of the illustration is a map showing the relative location of the wells on a map.

This is -- these cross-sections are superimposed on a one-inch-by-one-inch graph paper. It's ten divisions per inch in each direction so that each of those small squares is one-tenth of an inch.

Scale of the illustration is 1 inch equals 100 feet. This was also prepared as a true scale illustration such that the vertical dimension is the

same as the horizontal dimension so that there would be no exaggeration of the spatial relationships.

You'll note on the east side of the upper illustration, I diagramed the lower part of the Santa Fe Holmstrom well. And we are essentially looking at that part of the hole below 7500 feet.

The wells in the area TD approximately 9900 feet, plus or minus 100 feet.

I have dropped the Holmstrom well vertically from its surface location, although the deviation surveys suggest it is slightly different than that, being less than the statutory 5 degrees all the way through the drilling of the well.

On the upper, in the middle of the illustration is the centerline of Section 9, or the joint property line, as dropped vertically.

On the left I illustrate the location of three different bottom-hole locations, but one common surface location.

The common surface location is the original surface location of the Philtex Honolulu Federal drilled back in 1961.

You'll note at the top of my illustration there's a zigzag there. That represents the deflection of the well eastward of the old Honolulu Federal well

at a depth of approximately 7700 feet.

You'll note down in the map, in the lower portion, that that represents the point to the northeast of the surface location of the Deemar Federal that is approximately an inch to the right and three-quarters of an inch to the north.

Q. Mr. Ahlen, will you go to this exhibit and review for the Commission in detail exactly what occurred when Stevens attempted to directionally drill the well?

A. Yes, sir. You'll note that the vertical holes on the left is representative of the Philtex Honolulu Federal well.

We did not measure the Philtex below a depth of 8,000 feet; therefore, I dropped it vertically to the total depth of 8995, which that well was drilled to.

At approximately 7950 we kicked the borehole eastward in the old Philtex hole and started increasing the rate of depth at 2 degrees per 100 feet.

We increased the dip to a maximum of 15 degrees at approximately 86 to 8800 feet.

At that point we were targeting for a location 330 feet to the east of the surface location. And we started diminishing the deviation, and we

dropped the hole down to approximately 5 degrees, at which point we intersected the top of the Devonian formation.

That location we were only 30 feet high to the old Philtex well. Samples had no show whatsoever. We were not in the oil column. We had not intersected the fault, and we were not on the high side of the fault.

At that point we plugged back to approximately 8700 feet, set another whipstock, kicked the hole off to the east again.

This time total we continued to build angle to approximately 25 degrees going to the east at approximately 9450 feet.

Samples were suggesting a fractured rock system in the borehole. We could actually spot healed fractures in the samples.

And then, again, approximately 9600 it appeared as though we were passing through a fracture zone.

At that point we decided to turn the well down. And before we could turn the well to a vertical position, we had intersected the Devonian way high on the upside of the fault.

Upon examining the electrical logs, I noted

missing section in our second sidetrack hole at a depth of about 9,460 feet.

Further down the hole, I noted missing section at a depth of 9,585 feet. And then I picked the top of the Devonian formation at a depth of 9715 feet.

We carried the well to a total depth of 9,754 feet, which was 40 feet into the Devonian formation.

There was abundant porosity in evidence in samples. The lithology was dolomite and chert. It appeared to be vuggy and intergranular porosity. It had a very good oil and gas stain. It cut and fluoresced and was a classic show in the Devonian formation.

We stopped the bottom of the hole before we had intersected the top datum in the Holmstrom well. In other words, we were shallower structurally than the top of the Devonian formation in the Holmstrom well by approximately 15 feet after correcting for measured depth versus true vertical depth.

Q. Mr. Ahlen, you were involved with Stevens during the efforts to directionally drill this well, I believe you stated.

A. Yes, I was.

Q. Do you know if the Oil Conservation Division

was kept advised of your changes in plans as you continued to drill?

A. Yes, sir. We notified the Oil Conservation Commission, and they gave permission to proceed to attempt to cross the fault to the other side in this instance.

Q. I believe you testified there were two missing sections in the logging. Were those indicative of the faults you encountered?

A. Yes, they are.

Q. If I look at this exhibit, it appears there are two faults depicted both in the northern plat and also in the plat to the south; is that correct?

A. That is correct.

(Thereupon, Ahlen Exhibit No. 2 was identified.)

Q. Are both of those faults significant in terms of defining the western boundary of the reservoir?

A. Only one of those faults is significant in determining the western limits of the reservoir.

One fault cut out approximately 40 feet of section. The other well, the other fault cut out approximately 120 to 140 feet of section.

I have classified the one that cut out the most section as the primary fault, the one that cut out

only 40 feet as a secondary fault and is a secondary result of the primary structural deformation in the area.

Q. Now, based on the information you obtained as a result of the drilling of the No. 1 Deemar, are you now more familiar with the reservoir geometry?

A. I most certainly am.

Q. How is that?

A. Primarily because we have drilled two additional holes in the area of the reservoir. We have a significant amount of information available on the electrical logs of the wells. I can locate the point in space where we have intersected two faults.

Also, have information from the Formation MicroScanner log, which is essentially a borehole imaging device where I can see the faults.

I can see evidence of the faults in those logs. I can determine dip and strike of the faults as well as dip and strike of the beds.

And they help significantly in finding the reservoir geometry.

Q. What about the oil-water contact; how did you determine that?

A. The oil-water contact, which I show on this illustration is at a datum of minus 6,055, that datum

is approximately halfway between the lowest producing oil and the highest tested water.

Now, due to the fact that water being produced from the Holmstrom well is probably slightly higher than that, and so I have adjusted the oil-water contact 10 feet higher from the exact midpoint between water measured on the east side of the fault system.

Q. Do you have anything further to present in conjunction with Exhibit No. 2?

A. Yes, sir. The highest water that we have been able to determine on the west side of the fault is a datum of minus 6,080.

Half the distance between minus 6,080 and the datum of the lowest oil, being minus 6,016, would place the oil-water contact significantly higher than I have placed it in this illustration.

The bottom half of this illustration shows some of the parameters that I have determined from the logs that we have run in the well.

Eastman Christensen has provided data as to the location of the wellbores that we drilled.

You'll note in the bottom illustration that that borehole wanders initially to the northeast, then it swings to the northwest, and then it swings back to the northeast.

And then you'll note the point where we kicked off the directional holes.

The deviation of the borehole down to a depth of 5,000 feet was to the major -- that part of the illustration that shows the borehole going to the north where there's a violent twist to the borehole to the east. That's at a depth of approximately 5,000 feet.

And so the borehole went from 5,000 feet to about 7900 feet. It traveled more horizontal distance in that direction than just 3,000 feet than it had traveled in the previous 5,000 feet.

I believe that the borehole was migrating up-dip at that particular time, and probably the bottom-hole location of the old Philtex is somewhat farther to the north and east of the location that we measured.

I show dip and strike symbols on this bottom illustration. In the bottom of our hole, at the top of Devonian formation, and in the Woodford shale immediately above it, we measured bedding dips from 4 degrees to 8 degrees.

And the frequency diagram showed that the dominant direction was 105 degrees azimuth, or slightly to the east southeast.

Dips measured in our well above both faults

are illustrated on the left bottom. Dips measuring from 7 degrees to 15 degrees were seen at average azimuth of 265 degrees azimuth, or slightly south and directly west.

In the fragment of formation between the two faults, there were two principal directions of dip, one at 300 degrees azimuth and the other at 330 degrees azimuth. And the dip varied from 8 degrees to 16 degrees.

We were able to see the faults with the Formation MicroScanner. The primary fault I saw dipping at a -- at 67 to 85 degrees at an average azimuth of 260 degrees.

And the secondary fault I saw dipping at 69 to 90 degrees at an azimuth -- and the strike of that fault was at an azimuth of 220 degrees.

The average bed dip in the reservoir block was approximately 6 degrees where we measured it when we encountered the reservoir block.

And an illustration of that is the dashed line that I show going to the 100 degrees -- 105 degrees east azimuth.

And I have noted where one might contour 5910, 5920, 5930, and so forth, and that is very close to the datum as measured in the Holmstrom well of minus

5956.

I have drawn a 150-foot diameter circle around the Santa Fe well. That would be the total migration of that wellbore if all of the dips were in one direction.

I do not believe that it was an all-in-one direction in that instance. It would be very similar to the way the old Philtex well did. It wandered around initially, and then it probably migrated somewhat to the west.

So I would suggest that the bottom-hole location of the Holmstrom well is somewhat west of the surface location.

Q. Anything further on Exhibit 2?

A. I cannot think of it unless the Commission has some questions.

Q. All right, Mr. Ahlen, let's refer to what has been marked for identification as Ahlen Exhibit No. 3.

That is the exhibit that is on the easel, and however it's easiest for you to work with it -- if you want to work with another copy that I haven't messed up, that's fine.

But I'd like you to first identify for the Commission what this is, how it's constructed, and what it's intended to show.

A. Exhibit No. 3 is an enlargement of a portion of Exhibit 2. It is primarily designed to show the reservoir characteristics and those things that we needed to talk about today concerning reservoir volumes.

This scale here is 1 -- 5 inches to 100 feet rather than the 1 inch to the 100 feet that we had on the previous illustration.

I illustrate the wellbores with electric logs. And I have laid the electric logs on this cross-section at approximately the angle that they are intersecting the earth in this immediate vicinity.

In other words, our sidetrack hole No. 2 is laid in at an angle of 25 degrees.

Our sidetrack hole No. 1 is laid in at approximately 6 degrees.

And I have presumed that there is a slight deviation on the Philtex well and within the limits of the deviation survey on the Holmstrom well as well.

And the index map is located in the center, the upper center, which Mr. Carr drew the fat red line.

We are located in Section 9 of 14 South, 29 East again.

Line of cross-section is illustrated on here

with a W on the left or west, and an E on the right as the east. And the line goes directly through each of the four wells that are present in the area.

The section that I illustrate the faults with a heavy line through the center of the well's log at this position, that's the secondary fault, the upper one. The primary fault is at a depth of 9585.

Had I shown the faults going between the two wells, the section that is missing is located between the depth 9450 and 9500 in the first sidetrack hole.

Second section that is missing is between 9600 and 9740 in the first sidetrack hole.

None of those sediments are present in the second sidetrack hole, and they are completely missing at that particular point.

And I will show you later the traces of those faults as illustrated on what is called a Formation MicroScanner log, which was run by Schlumberger.

I illustrate our casing, which is set on the bottom of the hole. Our perforations are approximately 13 feet thick, 3 feet from the top of the Devonian formation, down to 16 feet below the top of the formation.

(Thereupon, Ahlen Exhibit No. 3 was identified.)

Q. Those are all indicated and drawn on --

A. Heavy lines on the cross-section, yes, sir.

Q. And on the log for the No. 2 sidetrack?

A. Yes, sir. I also indicate on the Holmstrom well, that log, their casing was set 30 feet into the Devonian formation, and cement was circulated.

And they are completed in the open hole below that casing at a depth -- to a depth of -- and I didn't write it on here. I wrote it on this one. To a depth of 9758.

I have illustrated on here also the top of the Devonian formation; I have colored it blue.

In both the old Philtex well, as well as our sidetrack well, the old Philtex well tested water in the Devonian formation quite near the top of the formation.

When we drilled into the Devonian formation in the first sidetrack hole, there were absolutely no shows of oil and gas in those samples.

And so I show water to be present in the Devonian formation in the sidetrack hole No. 2. That is at a datum of minus 6,080.

The Holmstrom well is producing oil down to a datum of minus 6,013.

I have estimated the oil-water contact at

approximately 10 feet higher than half the distance between proven water on the east side of the bounding fault.

The Holmstrom No. 2 well that is illustrated on Exhibit No. 1 was drilled into the Devonian formation at a datum of minus 6113, and it drill-stem tested water in the very top of it.

Q. And that Holmstrom No. 2 is located in the northwest?

A. Directly south of the Holmstrom No. 1 at one legal location.

Q. So it's in the northwest of the northeast of 16?

A. Yes, sir, that is correct.

Now, since the Holmstrom well is currently producing water, and it started producing water in the month of February, I have moved my former estimate of the oil-water contact from minus 6,075 to my current estimate at minus 6,055.

And I think that is a judicious use of that interpretation.

Q. And both wells you're using are in fact on the east side of the faults?

A. Yes, sir.

Now, if I were to choose the halfway mark

between the highest proven water on all sides of the fault, the halfway mark would be 7 feet higher than I currently have made the estimate.

I have colored this illustration also. The water is indicated by the color blue at the oil-water contact.

Immediately above the blue is the proven producing reserves, both in the sidetrack hole No. 2 of the Deemar and in the Holmstrom well. That is the producing interval, the proven reserves.

Q. They're outlined in what appears to be a dark --

A. A dark green color, yes. They are outlined in a dark green color.

They also extend off this cross-section to the east to the wedge edge where the structure contours on top of the Devonian intersect the oil-water contact. And that is suggested by the colors going off of the illustration.

There is a 30-foot section that is not currently producing because casing is set through that interval in the Holmstrom well, and it has not been perforated or treated.

And it is proven reserves that are not yet producing.

Q. That is outlined in what color?

A. That is outlined in a lighter green color.

Above that in this illustration is an interval that I will call attic oil, attic reservoir. It is in the yellow-green color.

It is above the datum of the Holmstrom well, and the Holmstrom well is not capable of producing the oil in that part of the reservoir.

There is also a light yellowish-green color to the west of our second sidetrack hole.

First of all, we perforated 3 feet from the top of the formation so we have proved reserves that we are not producing.

And then that part of the reservoir that extends right up to the fault we cannot produce either.

We would have to drill a well right on the fault itself in order to produce those reserves.

Q. How many feet in the Holmstrom No. 1 are actually behind-the-pipe, not open in the Devonian formation?

A. Thirty feet.

Q. Do you have anything further to add to Exhibit No. 3?

A. I can't think of anything.

Q. Mr. Ahlen, would you now refer to Exhibit No. 4, a smaller exhibit --

A. Yes, sir.

Q. -- and identify the structure. Identify this exhibit and the interval that is mapped, please.

A. This is Exhibit No. 4.

Q. Just a minute. Okay.

A. Exhibit No. 4 is a Devonian structure contour map in the North King Camp Pool.

We are, again, are looking at Section 9 of 1429. The boreholes are illustrated there in a straight line east-west, the surface location of the Philtex well, the bottom-hole location of the sidetrack No. 1, the bottom-hole location of sidetrack No. 2, and the surface location of the Holmstrom well.

On this map I show the Devonian datums in bold print such that the old Philtex well has a datum of minus 6105.

Sidetrack hole has a sub-C datum of 6,080. Sidetrack hole No. 2 has a sub-C datum of minus 5901.

And the Holmstrom well has a sub-C datum of minus 5956.

You will note that we intersected the top of the reservoir 55 feet high to the Holmstrom well.

I've also noted the top of pay in the second

sidetrack hole as minus 9504. And the top of pay in the Holmstrom well, currently producing pay, I would need to add, minus 5986.

That considers the 30 feet of casing that is set into the top of Devonian.

I have also shown on this illustration the oil-water contact at a datum of minus 6,055. And that is my best estimate as to the location of the oil-water contact.

I show the dip as measured by the logs that was used in contouring this map on the fault block as 6 degrees at 105 degrees azimuth.

I show the dip going west as 8 degrees at 265 degrees azimuth.

I show the dip and the strike directions of the primary fault to be 260 degrees measured at the wellbore for the primary fault.

And I am -- and the secondary fault has an azimuth -- the dip has an azimuth of 220 degrees.

(Thereupon, Ahlen Exhibit No. 4 was identified.)

Q. Mr. Ahlen, if I look at your interpretation, the North King Camp Devonian Pool lies between the fault depicted on this exhibit on the west and the oil-water contact on the east; is that correct?

A. That is correct.

Q. Based on your interpretation, is there any proration unit in this pool that would be completely underlying with productive acreage?

A. No, sir.

Q. Would you identify what has been marked as your Exhibit No. 5, please.

A. Yes, sir. Exhibit No. 5 is a Survey Certification Sheet on top from Eastman Christensen, which certifies that Mr. Tim Stephens, who is an employee of Eastman Christensen Company, did on June 23, 1989, do a survey of the borehole.

And he certifies that the calculations were obtained and performed by him according to standards and procedures as set forth by Eastman Christensen, Inc., and is true and correct to the best of his knowledge.

(Thereupon, Ahlen Exhibit No. 5 was identified.)

Q. Is this the actual record of survey that you received from Eastman on the sidetracking of Deemar No. 1 well?

A. Yes, sir, it is.

Q. Okay. And is this the standard survey that you would receive from the actual -- the company that

actually did the drilling for you or the surveying for you?

A. Yes, it is that type of a survey.

Q. What does this confirm?

A. It was used in constructing my Exhibit No. 2 and Exhibit No. 3. And it gives the exact location of the borehole, the geometry of the borehole.

Q. And is this information that you have utilized in preparing prior exhibits?

A. Yes, sir.

Q. Is there anything else you want to review with this exhibit?

A. Yes. I'd like to review some of the things that are covered in this particular survey.

If you'll turn to the third page, this particular page is the page that refers to the first sidetrack hole from the point where the hole was kicked off at approximately 7900 feet to its total depth.

And let me explain the chart in detail then we won't have to do it anymore.

On the far left is a column that shows the measured depth at which these parameters were determined.

The second column is the drift angle. Third column is the drift direction. Third column is the

course length; that's the distance between different determinations.

The next column is true vertical depth, and one can compare true vertical depth versus measured depth in this particular column.

The next two columns are the rectangular coordinates giving the directions from the surface location of the Deemar.

The third column is -- the last column on the extreme right is the dogleg severity.

You will note at the last figure, the deepest recorded figure at 9899 feet measured depth, the true vertical depth was 9874.16 feet, or approximately 15 feet shallower.

And the rectangular coordinates were 34.71 feet north and 352.83 feet east of the surface location.

That's where I have located on our maps and the illustration cross-sections and maps.

The next sheet starts from the surface of the ground, and in 100-foot intervals it gives measured depth and all of the information that I have previously discussed.

I'd like to go to the last page of that and summarize our location.

The last survey taken at a depth of 9739 measured depth was at a true vertical depth of 9,649.47 feet, approximately 90 feet higher datum-wise, at a location that was 26.69 feet south and 577.57 feet east of the surface location.

The method of calculation for Eastman Christensen is utilization of the radius of curvature method for determining their position.

Q. Mr. Ahlen, would you now refer to what has been marked as your Exhibit No. 6 and identify this, please.

A. Exhibit No. 6 is a publication by Schlumberger Oil Well Surveying Corporation.

It is a reprint from The Technical Review, an industry journal, that was published in January of 1989.

I am using this advertisement as an illustration of what a Formation MicroScanner can do.

It is actually a downhole or a borehole imaging system that allows you to get a much better picture of what is going on in the subsurface.

(Thereupon, Ahlen Exhibit No. 6 was marked for identification.)

Q. If you go to the center section of that and then just explain to the Commission basically what a

Formation MicroScanner is and how it works.

A. Yes, sir. First page is actually numbered No. 16, apparently it was page 16 in The Technical Review.

On the left-hand page illustrates two different types of pads that are used for the Formation MicroScanner.

Those little dots that you see there are metallic contacts with the formation.

Current is measured between those spots on a large metallic pad on a caliper arm that is pressed against the formation.

Those dots are approximately 3/8 of an inch across. They make a multitude of electrical measurements between each of the -- each of the dots or each of the spots or the contacts with the formation.

The tool itself consists of four caliper arms with four of these tools attached to them that are pressed against the borehole.

These caliper arms give you a caliper of the hole while these electrical measurements are being made. They also measure the electrical resistivity of the beds in minute detail.

All of this is recorded on magnetic tape and sent to the Schlumberger laboratory where it is put on

the computer.

And images are generated such that you can see the image of the borehole immediately adjacent to these pads.

The coverage of borehole is approximately 40 to 45 percent of the surface of the borehole that's covered in this imaging.

And on the next page you can see an illustration of what might be seen of the borehole. The alternate bands of dark and light are actually beds.

Now, there are better illustrations. The next page, on page No. 19, the presentation is actually in color.

The eye is much better able to discriminate colors than it is black and white. And so the presentation is put up in color on a color TV screen, and the geologist and the Schlumberger engineer together interpret bed contacts.

In the illustration shown here on page 19 in the upper right-hand corner, it is quite simple for a geologist or any knowledgeable technician to pick bed boundaries.

The operator uses a cursor, places a mark on each of the bed boundaries that he decides are

definitive in interpreting the structure in an area.

Those spots are entered into the computer, and dip amount and direction is computed by the machinery on the spot.

And one can make the interpretation, make the calculations in a relatively short period. And you can make a significant number of calculations in a very short period of time.

This system was utilized in arriving at the reservoir parameters we have in this well.

Q. Now, Mr. Ahlen, if you'll go to Exhibit No. 7, this is a set of plots or exhibits that are prepared in the MicroScanner process.

The eye, you stated, is more attuned to color. These are in black in white. There is one color set. Has that been provided to the Commission?

A. Does anyone have a color set?

Q. No. It's in my briefcase.

A. I do not have them here in my briefcase.

MR. CARR: May it please the Commission, following the hearing -- we do have the original color sets of each of these -- and we will make them available to the Commission.

Q. (BY MR. CARR) Utilizing the black and white copies, Mr. Ahlen, would you first identify Exhibit No.

7, and then if we could sort of quickly go through these and explain to the Commission how they were utilized and what they showed?

A. Yes, sir. My Exhibit No. 7 consists of five pages. They are Xerox copies of the colored illustrations that are provided by Schlumberger.

The one on top is the Formation MicroScanner illustration at the top of the Devonian formation and the bottom of the Woodford shale formation.

You will note the places that I have picked the dip and strike and the correlations that I have utilized in arriving at the dip and strike numbers.

The top of the Devonian formation is actually at a depth of 9715.

And the very light colored formation there is the highly resistive part of the Devonian formation.

The dark spots are the conductive or low resistivity parts of Woodford shale. You can see that the Woodford shale is very thinly bedded.

And I have picked tops and bottoms of hard reservoir members -- excuse me -- of hard and soft formation members.

You'll note that the dip, the amount of dip is variable on there, and I have chosen 6 degrees to be the average dip of all of those individual segments.

There is a frequency diagram on the right. The direction of the most frequent dip is 105 degrees.

The second illustration is from above the two faults. You can see where I picked the dip segments there.

You can see the amount of the dip, and you can see the azimuth at each one of those and the frequency diagram that illustrates the most frequent direction of dip being 265 degrees, almost west.

The third page is an illustration of the beds between the two faults. You can see that the dip angle is variable there, all the way from 8 degrees to a maximum of 16 degrees.

You can see that the frequency diagram shows it to be slightly bimodal in that there are two most frequent directions.

The next illustration is the primary fault zone. This is the main fault zone.

You'll notice that there are three correlations there: one at 68; one at 79; and one at 85 degrees dip at an azimuth of 243 degrees, 237, and 288 degrees.

The most frequent direction is approximately 250 degrees. I have chosen 260 as a compromise between the three.

The last page shows four fractures in the upper fracture. The angle of dip is 86, 89, 69, and 90 degrees, in that order, from top to bottom, and the direction is 221, 218, 182, and 220.

That is -- that direction is quite well controlled by the frequency diagram.

(Thereupon, Ahlen Exhibit No. 7 was identified.)

Q. Mr. Ahlen, how was that information utilized by you?

A. I utilized all of the information that I have discussed previously to arrive at what I felt was the best geometry configuration of the reservoir.

Q. How would you characterize the extent of the data that is available on this pool?

A. We have significantly greater information, higher quality information available now than we had the previous hearings, primarily because we've drilled two holes.

We have good borehole data that is objective in nature, and I have applied it in what I feel is a conservative manner to make an interpretation.

Q. In your opinion, do you have sufficient information to make an accurate interpretation of this reservoir within the discipline that you practice in

geology?

A. Yes, sir, I have considerably more data available to me here than I have had in many projects in the past.

Q. What basic conclusions have you reached based on your study of this pool?

A. I have reached a conclusion that Stevens at L have considerable reserves on their part of the reservoir.

Q. In your opinion, will granting the application in each of the two cases that we have consolidated, the one for Curry and Thornton, the other for Stevens -- will granting those applications be in the best interest of conservation and prevention of waste and protection of correlative rights?

A. Yes, sir, it will.

Q. Will Curry and Thornton also call engineering witnesses to discuss the reservoir reserve calculations and other engineering factors?

A. Yes, sir, they will.

Q. Were Exhibits 1 through 3 prepared by you?

A. 1 through 7 were prepared by me.

Q. 4 through 7 of those exhibits are materials that were prepared by service companies employed by you and with whom you work?

A. Yes, sir.

MR. CARR: At this time, may it please the Commission, we will offer into evidence Mr. Ahlen's Exhibits 1 through 7.

(Thereupon, Ahlen Exhibits 1-7 were offered into evidence.)

MR. LeMAY: Without objection Exhibits 1 through 7 will be admitted into evidence.

(Thereupon, Ahlen Exhibit 1-7 were admitted into evidence.)

MR. CARR: That concludes my direct examination of Mr. Ahlen.

MR. LeMAY: We will take a 15-minute break. Be back at quarter to 11:00.

Do you have your crosses coordinated, or are each one of you going to take a shot at it?

MR. KELLAHIN: Mr. Chairman, we've never coordinated anything in our lives. I don't suspect we can start that now.

(Thereupon, a recess was taken.)

MR. LeMAY: We shall reconvene.

Remind the witness he is still under oath.

You're through with the witness, Mr. Carr?

MR. CARR: Yes, I am.

MR. LeMAY: Mr. Padilla, your turn.

CROSS-EXAMINATION

BY MR. PADILLA:

Q. Mr. Ahlen, let's, first of all, turn to your Exhibit No. 2, if you would, please.

A. Yes, sir.

Q. You testified, Mr. Ahlen, of the number of distances. As I understand, you've only testified about the distance horizontally from the Honolulu wellbore to the actual bottom-hole location that was encountered in the second whipstock; is that correct?

A. Yes, sir.

Q. In this Exhibit No. 2, can you tell us what the distance, horizontal distance, between the Honolulu vertical wellbore and the first bottom-hole location?

A. Well, first of all, one has to presume the location of the old Philtex hole. I made the presumption that it dropped vertically from our last survey at approximately 7800 feet.

That's probably in error.

Q. If it would swing, where would it swing, towards the -- toward the fault or away from the fault?

A. It would continue in an east northeasterly direction, as indicated by my map on the lower left of this illustration.

Q. What's your information as to where that

actual bottom-hole location on the vertical hole is?

A. I have no such information because no one has ever measured the bottom of the Philtex hole.

Q. In relation to the property line, do you know what the distance between the property line and the second whipstock is?

A. Yes, sir.

Q. Which whipstock?

A. The first whipstock. One can count it off in squares. That's why I put it on graph paper.

The large squares are 100 feet; the small squares are 10 feet. So I will count that for you, if you would like me to.

Q. Okay.

A. Okay. There's 9 in that first portion going west from the property line, 90 feet. And 190 feet, 290 feet, 300 feet.

We are approximately 300 feet from the property line in the first sidetrack hole. We were aiming at 330 feet, but we missed it.

Q. And on the second whipstock, what is the distance from the property line to the actual bottom-hole location?

A. From the bottom of the hole or to the top of formation?

Q. From the bottom of the hole.

A. From the bottom of the hole, it is 10, 20, 30, 40, 50, 60, approximately 65 to 70 feet.

Q. How does that vary from the standard location of 660 feet from the property line? What is the percentage of closure that you have with regard to the actual bottom-hole location?

A. You mean the percentage of 60 to 660?

Q. Yes, sir.

A. That is about 10 percent.

Q. And the deviation from a standard location is about 90 percent then?

A. If that's what you're interested in.

Q. What significance in terms of the top of the structure does the bottom-hole location on the second whipstock, the actual well that you have now, in terms of structure?

A. I don't understand that question, sir.

Q. In terms of the capability of production from the Devonian formation, how is this well able to recover the fair and equitable share of hydrocarbons for Curry and Thornton and Stevens?

A. Okay. The Devonian formation that was penetrated as porosity in the upper -- well, throughout the 40 feet of penetration, there is good porosity

starting 3 feet from the top to approximately 15 feet from the top of the formation.

Then there's another zone of porosity that we did not perforate that's in the lower part of the hole that was penetrated.

Q. How far down did you go beyond the actual perforations?

A. We drilled 40 feet into the Devonian formation in the hole, and we set casing on bottom.

So the bottom of the hole is approximately 25 feet deeper than we perforated.

Q. You say you have good porosity in this, in the perforations; is that correct?

A. Yes, sir.

Q. Now, going to your Exhibit No. 4, is this No. 4?

A. Yes, sir, it's -- no. It's No. 3.

Q. How will that bottom-hole perforation of the well enable Stevens to recover oil in what you call the attic or the top of structure of Devonian inside the Santa Fe property line?

A. Penetration of the bullets is less than a foot, and so our penetration will go within a foot plus whatever acid treatment. Is that what you're asking?

Q. Yes, sir.

A. Okay. And that will allow us to produce the oil that's in the vicinity of the wellbore.

Q. How far away from the wellbore will you drain? Do you have any idea?

A. We could drain the whole reservoir with that one well just as the Holmstrom well could drain the whole reservoir with one well.

Q. And you're saying the porosity and permeability is good enough to do that?

A. Both wells have that capability.

Q. And you're saying that -- well, you could actually run an interference test and have some reaction if you conducted tests between the two wells?

A. No. I think Santa Fe attempted to do that and illustrate that in the first hearing, and it was said that no barriers were found within 660 feet -- excuse me -- over 1,000 feet.

And that was in error because the fault that we have identified is less than that distance.

Q. And at that time Santa Fe was projecting the fault to be further to the west; isn't that correct?

A. Yes, sir.

Q. And you, yourself, projected that well -- that fault to be further to the west --

A. Yes, sir.

Q. -- when you testified before?
A. I certainly did before on the basis of seismic information.
Q. Have you conducted any further seismic test to corroborate your testimony as to the -- with regard to the imaging data you had that you presented before?
A. We conducted a seismic survey that ran east-west across our property, yes, sir, before we drilled the well.
Q. And did you present any of that data here today?
A. I did not.
Q. What did that data show?
A. It showed a seismic picture. It showed a structural anomaly between which was occupied by the location of the Holmstrom well, as well as terminating very close to the old Deemar well.
And our seismologist interpreted a fault that was located approximately 100 to 200 feet to the east of the old Philtex well.
Q. Was that seismic data used to drill the first whipstock?
A. Yes, sir.
Q. And that seismic data was inaccurate?
A. That is what I am saying, yes, sir.

Q. You really didn't know the location of the fault that you actually drilled?

A. That is absolutely correct.

Q. When you were drilling the second whipstock, you testified that you asked permission from the Oil Conservation Division to go through that fault?

A. Yes, sir.

Q. Who did you ask?

A. The Commission.

Q. Mr. LeMay?

A. Yes, sir. I did not personally; the operator did.

Q. And --

A. The Commission was kept informed at all times as to what we were doing and how we were doing it.

Q. Now, in terms of the first directional drilling permission that you had, you were going to bottom-hole it approximately 165 feet from the property line, were you not?

A. Yes, sir, that was the first hearing. Our surface location, 165 feet straight down, right.

Q. But in requesting a directional drilling permission, you actually were basing your request for directional drilling on the basis that you would bottom-hole at 165 feet from the property line?

A. We made provision for inaccuracy in the seismic surveys.

Q. I said approximate.

A. Yes, sir.

Q. Now, when you take this imaging information, that only reads what's inside the bullhorn, inside the wellbore; isn't that true?

A. That is correct.

Q. How far beyond the wellbore, if any, does this imaging information go?

A. It's an extrapolation no matter which way you do it, depending upon whether you're talking about bed boundaries for dip or fracture analysis, the dip and azimuth of the fractures.

You're only reading the borehole, but it is a good scientific method of extrapolating known data.

You project it to your personal limit of what you think is an acceptable extrapolation.

Q. Let me see --

A. To do otherwise would be rather capricious.

Q. Isn't it capricious not to use other wellbores to actually corroborate your well data to actually confirm your picture as you've drawn, say, on your Exhibit No. 4?

A. It would be capricious not to use other

wellbores, yes, sir.

Are you suggesting that I did not?

Q. Yes, sir, I am. You only used one wellbore; isn't that correct?

A. There is only one wellbore that penetrated the fault.

Q. So that increases the judgment call that you had by using only one that you actually made.

Your interpretation is not corroborated by any other data other than what you actually found inside that wellbore; isn't that true?

A. It's corroborated by an infinite number of data points within the borehole.

Q. But it's confined to what is actually inside a single wellbore is what I'm asking you.

A. Okay. But it's supplemented by the other holes that are drilled in the vicinity.

Q. Which other holes, Mr. --

A. The Holmstrom well, the first sidetrack hole, the Philtex well, as well as the Holmstrom No. 2 well.

Q. Are you saying --

A. All of the data had been integrated utilizing borehole imaging data as a supplement to the wellhead tops.

Q. You actually used the -- did you reenter

Holmstrom No. 2 to scan, to put this tool down the Holmstrom No. 2 to corroborate what you found in the one well?

A. Did you really intend to ask that question, sir?

Q. Yes, sir.

A. That we reentered the Holmstrom 2?

Q. I asked whether you reenterd the --

A. We had no right to enter the Holmstrom well without seeking permission from the operator.

Q. In terms of positioning the fault, how can you actually --

A. There's no evidence of fault in the Holmstrom No. 2 well.

Q. In terms of the limits of the reservoir, how can you define the reservoir limits by entering one well?

A. Utilizing all of the data that's available and my own intuition as to the geometry of reservoirs in this part of Chaves County.

Q. What other reservoirs did you take into consideration?

A. I have studied all of the reservoirs in Chaves County in the Devonian formation.

Q. Are those large reservoirs?

A. No, sir, they're small.

Q. Now, let me refer you to your Exhibit No. 4 and ask you, sir, how you drew those contour lines to the east. What data did you use to draw those lines?

A. We have a seismic map, the interpretation of our seismologist that worked our seismic information, as well as our previous exhibits, as well as the exhibits submitted by Santa Fe Imaging -- Exploration. Excuse me.

Q. You have no well control to the north, do you?

A. No, sir, not for several miles.

Q. Is this exhibit drawn to scale, Mr. Ahlen?

A. It is intended to be, if it isn't. Yes, sir, it is to scale, except for the wellbores.

If the spots on here were to true scale, you couldn't see them.

Q. If the spots were to true scale, in fact, you probably have that wellbore very close to the property line, wouldn't you?

A. Off 65 feet.

Q. But on this particular scale it would be almost superimposed on the property line, wouldn't it?

A. Depends on how wide you draw the lines.

Q. Well --

A. No, sir, this is to scale on this map.
Q. I don't want to quibble with you, Mr. Ahlen. I'm just simply asking that if the wellbore is not to scale and given the small distances with the size of this exhibit, it would be shown almost right on the property line, wouldn't it?
A. That's where it is.
Q. Well, I see it halfway between the fault and the property line more or less.
A. All right.
Q. Now, going to your Exhibit No. 1, isn't that also true in terms of where the actual proposed bottom-hole location is? In other words --
A. This one is not -- is not to scale. It's not meant to be a to-scale drawing that small a distance.
Q. And this was submitted at the very first hearing; is that correct?
A. Yes, sir.
Q. This exhibit hasn't been changed from the first hearing?
A. That is correct.
Q. Now, in terms of your oil-water contact line, Mr. Ahlen, you've used some averages on your Exhibit No. 2. I'd like for you to explain how you arrived at those averages. I'm not sure that I completely

understood how you arrived at those averages.

A. I just -- eyeballing.

Q. Eyeballing what, Mr. Ahlen?

A. The dimensions on here, the number at the grid squares.

Q. And where is the information taken from?

A. This cross-section. That is the intersection at this cross-section.

Q. And how do you know in terms of your well where the oil-water contact line is?

A. The oil-water contact is placed, on my best estimate, to the location of the oil-water contact based on water being produced in the Holmstrom No. 1 well, water being drill stem tested in the Holmstrom No. 2, no show of oil whatsoever, and good abundant porosity in our first sidetrack hole at a datum of minus 6,080, and the drill-stem test of water in the Philtex well at a datum of minus 61 -- whatever it was -- 6105.

Q. You really don't know looking at Exhibit No. 2 and looking at where you have a line drawn with an arrow down here that shows the number 150 feet average -- you really don't know where that well water contact is in relation to the actual -- to that particular area or formation?

A. We did not penetrate water in our well on purpose. We did not want to do any coning or have any excuse for water coning into our wells.

So we did not on purpose drill our well to intersect the oil-water contact.

Q. So, therefore, you don't have an actual -- you don't have -- you can only guess as to where that oil-water contact is?

A. I think I have testified to that.

Q. Now, let me ask you about your Exhibit No. 6. That just simply is an advertisement, as you indicated, as to what that was?

A. Yes, sir, that is correct. It's an advertisement, as well as a reprint from The Technical Review, a trade magazine.

Q. You don't have any independent knowledge as to whether the information in here is correct or not?

A. My experience consists of running what was recommended in this pamphlet in our well, and I was extremely impressed by the quality of the data.

Q. And you simply accepted the data as being true, but you have no independent knowledge as to whether that data is actually true; you think that it's reliable?

A. In my professional opinion, I consider this

much more reliable than a conventional Dipmeter survey.

Q. But, again, you didn't run the test; you didn't actually do any of this?

A. I was present while it was running, while it was being run. I saw the configuration of the pads, and the system was explained to me as on the location while the two were being run.

And I observed the logs while they were being run, the monitor logs.

Q. And you believe this information contained in here will give you a very accurate picture as to what's inside a particular wellbore?

A. Yes, I do believe that.

Q. In terms of the actual bottom-hole location, did this information or this scanner help to determine that?

A. Not -- the Eastman Christensen data was utilized to determine the bottom-hole location.

Q. Okay. So the Eastman survey actually determined where the bottom-hole location and how far away you were from the lease line and that sort of thing.

This determined -- what did this data show then?

A. This data was utilized to show bed dip and

fault, strike, and dip.

Q. And this information you say defined the limits of the reservoir?

A. It helps to define the limits of the reservoir. The defining of the limits is my professional opinion as to the limits based on all of the data available.

Q. In terms of dip or in terms of the faulting and all that, what did you actually map as being the limits of the reservoir?

A. The reservoir limits is limited on the west by the primary fault that has 140-degree cut out of section.

It strikes north approximately 10 degrees west of straight north, the strike of the fault.

The bed, the top of the reservoir, is defined by the top of the Devonian formation.

It dips off to the east at approximately 105 degrees azimuth at a rate of about 6 degrees dip, and that is corroborated by the datum of the Devonian formation in the No. 1 Holmstrom well.

Q. Isn't it true that the entire effect of showing where the fault is now is that it actually moved the fault further east and therefore --

A. I don't understand your question.

Q. Doesn't all this information, this much better information you say you have now, doesn't that really just push the fault further east?

A. Yes. It places the fault farther east than we had originally mapped it on the basis of the seismic alone.

Q. And so doesn't that, in effect, even reduce your productive acreage or data showing that you have a smaller reservoir or smaller share of the reservoir?

A. The geometry of the reservoir is defined by the parameters that I have presented here.

The basic fabric and framework of the reservoirs defined by the formation tops in the wells, as well as the well information, which is the Formation MicroScanner, the electrical logs, the logs that show the cut of the fault in the reservoir, the additional section that one can see in the first sidetrack hole versus the second sidetrack hole, all of those things help to define the reservoir geometry.

Q. Now, when you talk about reservoir geometry, are you talking about volume, or what are you talking about?

A. I'm talking about the physical outline, like the geometric figure. Say you took an apple and you cut it in half, the geometry is half of a sphere.

Q. And you're saying that all of that, all of what you defined is reservoir is productive?

A. Yes, sir. That part of the reservoir east of the fault and above the oil-water contact at its intersection with the top of the Devonian formation.

Q. And you would recommend drilling the well anywhere in here where you've defined the limits of the reservoir?

A. Yes, sir. Well, no, within certain limits. One needs to stay within a reasonable location that has a sufficient column of oil to be productive.

I would not recommend a location at east of the Holmstrom No. 1, for instance. The thickness of the reservoir diminishes rapidly to the east.

Q. What limits a reservoir to the east?

A. The intersection of the oil-water contact with the top of Devonian formation.

Q. And you base that upon dip of the formation; is that what you're saying?

A. Yes, sir.

Q. And you're saying that you have a thicker part of the formation, or what are you saying?

A. We obviously have a thicker part of the reservoir on our lease.

We have approximately 150 feet average at the

location of this cross-section; whereas, the Holmstrom No. 1 well has only approximately 800 feet.

As you move eastward, the thickness of the reservoir diminishes to zero before you get to the east line of Section 9.

Q. But you don't have any well control over there, do you?

A. I'm projecting the data is available that is -- and this is just normal procedure for a geologist. Similar experience in this particular field would quite likely show the same configuration.

Q. And you're doing that out of one wellbore?

A. No, sir. I'm doing it out of five wellbores.

Q. You're basing your information on seismic information?

A. As well as seismic information, as well as experience in the area with other similar fields producing from the same formation.

Q. In terms of the share of the reservoir, Mr. Ahlen, when you take that little sliver up here that is marked by Mr. Carr's yellow or red line, I just failed to understand how even on a surface basis or, as you say, on an eyeball basis that you have a greater share of the reservoir when you don't have most of that long formation unit as being on the west side of the fault?

A. Our engineering witness will testify to planimetering the geometry of the reservoir and the results of that data.

MR. PADILLA: Well, I think I'll give Mr. Kellahin a turn at this and have him --

MR. LeMAY: Mr. Kellahin.

CROSS-EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Ahlen, when you testified back in March of 1989 concerning the location and orientation of the primary fault in the west half of the section, am I correct in recalling that that interpretation of the location of the fault was based upon having the following data available interpreting:

First, that there was an east-west seismic line running through the location of the Philtex well, and that represented the farthest northeast-west cross-section seismic line that was available for either you or anyone else to examine; is that true?

A. Yes, sir.

Q. That in addition there was a north-south seismic line that approximately bisected the section in halves vertically, and we had available that seismic line to interpret; is that correct?

A. I think it was running north-south through

the proposed location of the Holmstrom well, yes, sir.

Q. That there was a third seismic line that ran generally northwest to southeast approximately through the section that was also used to help interpret what I will identify as the secondary faulting through the section; you have a secondary line in one of your displays?

A. I do not recall that northwesterly one other than I did not have it available to me for interpretation, nor did I have available to me the north-south seismic line.

Q. You had available to you then in locating the fault the east-west line --

A. Yes, sir.

Q. -- that ran through the Philtex well. And that's the only east-west line we had through the section; is that not true?

A. Correct.

Q. In addition you had the geologic data, the logs available from the Santa Fe Holmstrom well, did you not?

A. Both Holmstrom wells.

Q. Holmstrom wells. And we had what was available from the Philtex well?

A. Yes, sir.

Q. Based upon that interpretation then --
A. Also had available the data that was public information from the hearing setting the allowables and the pool roots.
Q. I see. That subsequent to that interpretation, then, the only additional data we had available to work with is the data derived from the two sidetracks of the reentry of the Philtex well?
A. That's the additional information available, yes, sir.
Q. And one of the pieces of information is the wellbore imagery generated from the wellbore in the second reentry of the Philtex well that you've talked at length about this morning?
A. Yes, sir.
Q. When we examined your interpretation of the location of the primary fault back in March of 1989, am I correct in remembering that you had that fault located west of where you now locate the primary fault?
A. Oh, yes.
Q. Can you tell us how far west it is from the current interpretation of the primary fault?
A. Probably 200 to 300 feet.
Q. The objective or goal that you had in developing the reserves within the 160-acre nonstandard

proration unit was to the east of the fault?

A. Yes.

Q. When we now see the current status with regards to the reservoir as you have interpreted it, the best location to produce your spacing unit would be farther north than the current wellbore, would it not?

A. Yes, probably.

Q. And back in March of 1989, that was still true, was it not, that the best place to produce your share of the reserves and your spacing unit was farther north than the Philtex well?

A. That was an interpretation of data at the time based on one cut of the fault.

Q. You do not have available to you, sir, any further seismic runs going east and west through the northern portion of the section, do you?

A. That is correct.

Q. And we don't have any more wellbore imagery to examine for any log of a well north of the reentry of the Philtex well, do we?

A. That is correct.

Q. So what you have done is taken the data available from the Philtex reentry and interpreted and extrapolated the orientation of the primary fault as it moves to the north?

A. Not -- the fault did not ever intersect the Philtex well. It did not intersect our first sidetrack hole either.

It intersected only the second sidetrack hole.

Q. The second sidetrack hole information at the location where it's derived is the view of the formation in about less than 8 inches?

A. Seven and seven-eighths inches.

Q. That's what we're looking at the reservoir?

A. That is correct.

Q. From that perspective at that location in the section, then, you have determined the orientation and the location of the fault as it moves to the north of that point?

A. That is correct.

Q. What parameters did you provide to the engineers to determine the reservoir limits for the Devonian reservoir that's defined on your Exhibit No. 4?

A. I provided Exhibit No. 4.

Q. Did you provide any isopachs?

A. Yes, sir, I did.

Q. Were those isopachs utilized by the engineers, to the best of your knowledge, in

determining the net productive acres?

A. Yes, sir.

Q. Did you help them and assist them in developing a net productive acreage map?

A. I left that to them solely.

Q. And that net pay productive acreage map is generated out of the isopachs you provided?

A. Primarily out of a structure map I provided and the location of the oil-water contact.

Q. So to what way does the isopach of the Devonian change the information that's presented in terms of the structure on Exhibit No. 4?

A. No change.

Q. The interpretation of the structure particularly in the eastern portion of the section is predicated on an examination of the available data from the Holmstrom well that Santa Fe operates, is it not?

A. Yes, sir, as well as the seismic information that we have available from our own survey.

Q. What have you used as the surface location of the Santa Fe well by which then to draw the structure?

A. I have used the official documents that have been submitted to the Commission.

Q. When I examined the distance where you have placed the Santa Fe Holmstrom well from the common

spacing unit boundary with Mr. Stevens' spacing unit, what is that distance that you've used?

A. 660 feet.

Q. When we look at the bottom-hole location of the second reentry on the Philtex well --

A. Yes, sir.

Q. -- am I correct in understanding that that well is 78 feet from the common spacing unit boundary with the Santa Fe spacing unit?

A. Yes, sir.

Q. Let me show you, Mr. Ahlen, a copy of Division Order R-8917-A, and I want to direct your attention on page 2 to what is paragraph No. 4.

Now, this is the order entered in May of 89 by the Division for the Stevens Operating Corporation that provided the downhole target for the reentry of the Philtex well, did it not?

A. Excuse me.

Q. All right, sir.

A. Will you allow me to finish reading the paragraph?

Q. I'm sorry. Please.

A. That's a very complicated sentence.

Q. I know.

A. I'm having extreme difficulty understanding

it.

Q. Let's go to the last few lines of the paragraph, and let me get you there by suggesting that --

A. Okay. I think what we had drawn on that particular map was a line at 165 feet to the west of the common boundary, and then we inscribed a circle with 500 feet diameter.

Q. Exactly right.

A. Okay.

Q. And this paragraph No. 4 then gives you the bottom-hole target or window to be a distance of at least 165 feet from the common spacing unit with the Santa Fe property?

A. That is correct.

Q. And inscribed a semicircle then that had a radius of 500 feet as we went to the west?

A. Yes, sir.

Q. That was your target?

A. Yes, sir. And we succeeded in the first sidetrack hole including exactly that.

Q. When we look at page 3 of the same order --

A. Yes, sir.

Q. -- if you look at the last paragraph of page 3, it says, "Provided, however, that prior to

commencing directional drilling operations into said wellbore, the applicant shall establish the location of the kickoff point by means of a directional survey acceptable to the Division."

Was that done, Mr. Ahlen?

A. To the best of my knowledge, that was done, yes, sir.

Q. And what was the kickoff point established then by which you would hit the bottom-hole target?

A. We kicked off at approximately 7850 feet.

Q. You drilled the first reentry and stayed within the drilling window provided by the order, did you not?

A. Yes, sir.

Q. The second reentry is the one now that takes us to outside that drilling window at a location 78 feet from the common line?

A. Yes, sir.

Q. I understand from your questions from Mr. Carr that either you or the operator obtained some type of verbal approval for the Division to exceed the limits of the drilling window; did I understand that testimony correctly?

A. Yes, sir, you did.

Q. Did the Division tell you that you were doing

so at the operator's risk?

A. Yes, sir, as well as subject to this hearing.

Q. But you continued to have to abide by the Division rules and orders that apply to this particular case?

A. And we have to this point.

Q. Okay. So the operator recognized the risk of leaving the window allowed in the prior order?

A. Yes, sir.

Q. Now, the prior order establishes a penalty factor based upon a location of a fault that is some 200 feet farther to the west than you now interpret it?

A. Yes, sir.

Q. If the location of the Santa Fe Holmstrom well in the southeast quarter of the section is not as you have depicted it, will that make your interpretation of the structure wrong?

A. Not much.

Q. Will it change the location of the water well contact?

A. No, sir.

Q. Will it change the way you have mapped the structure in the northeast quarter of the section?

A. I don't think so.

Q. We've had a discussion in past hearings about

the location of the oil-water contact within the section, have we not, Mr. Ahlen?

A. Yes, sir.

Q. Have you changed in any material way the approximation of that oil-water contact from past hearings to what you've testified your interpretation of that point is for today?

A. Oh, yes, sir, I certainly have.

Q. And that's moved approximately --

A. Twenty feet up-hole.

Q. All right, sir.

A. My previous testimony was 6,075. I am testifying today as to 6,055.

MR. KELLAHIN: Thank you, Gentlemen.

MR. LeMAY: Thank you, Mr. Kellahin.

Additional questions of the witness?

Mr. Ahlen, I just have a couple quick questions.

EXAMINATION

BY MR. LeMAY:

Q. Were you on the well doing well site geology when the second sidetrack penetrated the faults?

A. Yes, sir.

Q. Was the bed jumping, the bed torque and bite that you see in some fractured situations?

A. I was not on the derrick itself. I was in the immediate vicinity. I did not notice that there was any bouncing and torquing that had been induced by the fracture.

As a matter of fact, I deduced the fracture on the basis of the sample examination in which I could see specific grains of the sample that had been cut by a fracture and healed.

Calcium carbonate healing material was between two rocks of similar types. And I saw perhaps five or six fragments of that in the sample immediately below the zone that I had suspected the faulting in.

Q. Did you see any evidence in the geolograph that followed?

A. I did not.

Q. Were you also on the location when they penetrated the Devonian?

A. I was sleeping at that time. It came unexpectedly soon that morning. I went immediately to the well when they record a drilling break.

Q. Is it your interpretation that the Devonian is also fractured in this area?

A. No, not in our well. We see very little evidence of fracturing in the Formation MicroScanner log. It appears to be primarily vuggy porosity.

Q. And your evidence for the oil-water contact, as you testified, was an extrapolation between known points of oil and known points of water.

Beyond that you don't have any indication on how to fine-tune that any better?

A. No, sir, I do not.

Q. Your Exhibit No. 4, I just had one or two questions on that. You've testified that you have looked at Devonian structures in Chaves County, and I think it was your testimony that they are small structures.

Just comparing your two maps, the ones submitted at the previous hearing and the one submitted here, it looks like you're wrapping the contours around a little more into that fault as compared to leaving them pretty much open into the fault on your most recent interpretation.

Is there any reason for that?

A. Yes, sir, a significant difference. Primarily on the basis of the data in the wellbore.

The Formation MicroScanner does not show any turnover or rollover into the fault. Therefore, I show no rollover into the fault in the southern part of that reservoir.

My experience still tells me, though, that in

most instances I should expect some. So that's why I show it in the north half.

Q. So if this was a typical Devonian field, you would expect some rollover into the fault or at least some additional --

A. At least a suggestion of it, yes, sir.

MR. LeMAY: That's all the questions I have. Additional direct?

MR. CARR: No additional direct.

MR. LeMAY: Additional questions?

You may be excused, Mr. Ahlen.

Try another witness. We'll take a late lunch. Let's get on with it and try one more.

MR. CARR: At this time I call Mr. Hickman.

MR. LeMAY: You may proceed, Mr. Carr.

T. SCOTT HICKMAN,

having been previously duly sworn, testified upon his oath as follows:

DIRECT EXAMINATION

BY MR. CARR:

Q. Will you state your full name for the record, please.

A. Troy Scott Hickman.

Q. Mr. Hickman, where do you reside?

A. Midland, Texas.

Q. What do you do for a living?

A. Consulting petroleum engineer.

Q. Have you been employed by Curry and Thornton and Stevens Operating Corporation as a consulting engineer in this matter?

A. Yes, I have.

Q. What basically have you been asked to do?

A. To form a reservoir study of the reservoir in question and furnish technical information and support in preparation of this presentation.

Q. Would you briefly review for the Commission your educational background and summarize your work experience.

A. I have a BS degree in petroleum engineering from Texas Tech University. I have an MS degree in petroleum engineering from Louisiana Tech.

Upon graduation from Texas Tech in 57, I went to work for Texaco as a petroleum engineer.

I worked for Texaco for 11 and-a-half years in various locations and various engineering positions, primarily as a reservoir engineer.

I moved to Midland, Texas, in late 1968 with a consulting firm as a reservoir engineer.

In 1973 I established my own practice and practiced in Midland as a consulting reservoir

engineer.

Q. Are you a Registered Petroleum Engineer?

A. I'm registered in the states of Texas and Louisiana.

Q. Are you a member of any professional associations?

A. I'm a member of the Society of Petroleum Engineers, Society of Petroleum Evaluation Engineers, Society of Independent Petroleum Earth Sciences. I think that covers them.

Q. Are you familiar with the applications filed in these consolidated cases?

A. Yes, sir.

Q. Are you familiar with the wells that are currently drilled into the North King Camp Devonian Pool?

A. Yes.

Q. Do you own an interest in any of these properties?

A. I do not.

Q. Are you familiar with the Devonian formation in southeastern New Mexico?

A. Yes, sir.

Q. In preparation for today's presentation, have you made a study of this pool and prepared certain

exhibits for presentation?

A. I have.

MR. CARR: We tender Mr. Hickman as an expert witness in the field of petroleum engineering.

MR. LeMAY: His qualifications are acceptable.

Q. (BY MR. CARR) Mr. Hickman, initially I'd like to direct your attention to certain questions that are going to focus, I hope, on reservoir performance.

I'd like you first to identify for the Commission what has been marked as Hickman Exhibit No. 8; would you identify this, please?

A. This is a tabulation of various well tests and pressure data from the North King Camp Devonian Reservoir.

(Thereupon, Hickman Exhibit No. 8 was identified.)

Q. Could you review what this exhibit is designed to show?

A. This exhibit is designed to give indication of actual reservoir performance from the standpoint of production capability and pressure.

On the top portion, which covers bottom hole pressure data, there's two pressures listed on the Holmstrom well, one being a drill-stem test pressure,

at which time there was zero voidage from the reservoir.

September 88, a buildup pressure was conducted. The three pressures shown here have all been corrected to the datum of minus 6,000.

At that time there was only, I'm estimating, about 4,000 barrels of voidage or production from the reservoir. Pressure was 3963 PSIG.

And the third pressure shown was taken recently, in August of this year, on the Stevens well. It was also a bottom hole pressure buildup survey.

It was 3955 at that time. There have been approximately 88,000 barrels of oil produced from the reservoir.

Q. Now, what does this information tell you about the reservoir or the wells therein?

A. Well, this indicates to me the difference between the drill-stem pressure and the first buildup pressure.

I can't explain other than it has something to do with the gauges employed because the initial buildup conducted by Santa Fe was at a time when there was nearly zero voidage of the reservoir.

So it should be measuring the virgin reservoir pressure.

And virtually a year later after fairly significant voidages from the reservoir, we measure again through the bottom-hole pressure buildup, we measure essentially the same pressures.

So it would appear we're having pressure maintenance by water encroachment, which would be quite common for the Devonian reservoir in this area.

Q. Is that also supported by the pressure from the Deemar Federal No. 1?

A. Yes, sir.

Q. What does the well test information in the bottom part of this exhibit tell you?

A. Again, it verifies that this is a highly permeable reservoir, vuggy, contains fractures, you have high well productivity.

The Stevens Deemar Federal well for a four-and-a-half-hour period of time was actually tested at the rate of 955 barrels a day.

In conjunction with the bottom-hole pressure survey that was run recently on the Deemar well, the productivity index was calculated to be 2.3 barrels per day PSI. That's from only 11 feet of perforation.

So it indicates a high productivity, which is consistent with these types of Devonian reservoirs. They tend to be fairly small, but they're highly

productive, and they have effective water drive.

And the performance data here would support that conclusion.

Q. Could you now go to Hickman Exhibit No. 9. Identify this, please.

A. This is a rate time draft of actual production with the fluid production being shown in average barrels per day.

The average is derived by taking the monthly production abiding the calendar days of the month.

This is a logarithmic scale. This is a vertical scale. It's logarithmic so your eye tends to play tricks on you as to the actual differences we're seeing here.

The bottom scale is time and month. See, that the Holmstrom well has produced the rate up as high as 270 barrels a day, averaging somewhere around 250 or 240 a day through August.

That was the last official production data I had on this well. It's my understanding it has continued to produce at about that rate.

Also, they began to report water production in February of this year at a rate of about 10 barrels a day, and that has continued through the last reporting period.

The Deemar Federal production is shown by a very short dash line.

During August of 89 they had a, I believe, a 3600-barrel test allowable, and it was reduced during August of that period.

(Thereupon, Hickman Exhibit No. 9 was identified.)

Q. Now, if we were actually to place the current producing rate on this graph for the Deemar well, where approximately would it be located?

A. Well, 34 barrels a day would, of course, be way down a little above the 10-barrel-a-day water that's indicated there.

Q. Because of the logarithmic scale that, the water production, is actually only about 1/20 of the oil in terms of actual barrels; isn't that right?

A. That is correct, yes, sir.

Q. Let's move on to Exhibit No. 10.

But before we do that, I would like you to just simply summarize what conclusions you can make in a general way about the characteristics and performance of this reservoir.

A. Well, this reservoir is, I would say, typical for a Devonian reservoir on the shale for the -- or the Central Basin platform area.

It's small in size, highly productive, underlined by an effective water drive, and has low gas and solution, I'm estimating about 40 cubic feet per barrel.

So the primary producing mechanism that comes from the water drive.

Q. Now, let's go to focus on the recoverable reserve aspect of this case, and I'd ask you to identify what has been marked as Exhibit No. 10.

A. Exhibit 10 is a structure map that has already been introduced by Jack Ahlen. This is his structural interpretation, which he's testified to this morning.

I have imposed on that some additional contours and have them labeled. These are primarily are in relation to tops and bottoms of producing intervals and tops and bottoms of zones.

These are needed in my methodology of determining reserves and reservoir volumes.

(Thereupon, Hickman Exhibit No. 10 was identified.)

Q. Are these utilized in modeling that you have done subsequently or the results?

A. Yes, also utilized for that purpose.

Q. Based on your experience as a petroleum

engineer, is this a geological interpretation which in your opinion gives you a reasonable basis to establish the relationship to the tracks in the pool?

A. Yes, sir, it does.

Q. Would you identify what has been marked as Exhibit No. 11.

A. Exhibit No. 11 is a gross interval isopach map. And this is an isopach map that I drew.

It's not one that was furnished by Mr. Ahlen; however, it is strictly -- being a gross interval map, it's strictly structured control.

We started at the estimated oil-water contact; that's a zero-to-zero line. I came up to 69 feet, which is the top of the producing interval in the Holmstrom well. I needed a contour at that point for my approach.

Structurally that would be -- you would take the minus 6055 oil-water contact, strike 69 feet from it, and this contour would overlay that particular structural contour.

So it's strictly a structured control gross interval map. That needs to be understood.

(Thereupon, Hickman Exhibit No. 11 was identified.)

Q. Was this exhibit prepared and the isopach

prepared for use in the subsequent work that you were doing on the reservoir?

A. Yes, it was. We have taken this exhibit and planimetered the areas between the contours using recognized industry methods.

We have done this from the standpoint of three tracts: the southeast corner of the section, which is the proration unit for the -- it's enclosed by the proration unit for the Holmstrom well; the east half of the west half of the section, which is enclosed by the proration unit for the Stevens Deemar well; and then the northeast corner, which is an undrilled tract.

And we planimetered each of these separately and did calculations separately on each of these three tracts.

Q. Each of these spacing units that you have identified have acreage in them that would not be productive; isn't that correct?

A. That is correct.

Q. Now, let's go on to the volumetric calculations, which are set forth on Exhibit No. 12. And it may be useful to you to refer to Exhibit No. 3, which is on the easel, to just basically explain what you're going to be talking about when you get into

these calculations' factors.

A. In arriving at reserves or producible formation and in arriving at calculations of producible formation and recoverable oil, it's necessary to divide the reservoir up, depending upon the structural location of the producing intervals.

If I can access this exhibit without destroying it. For example, this represents a cross-section through the Stevens tract through their well going toward the Holmstrom well.

And the top of their producing interval is at minus 6004, along about here.

Everything from the estimated water contact upward currently is producible reserves, producible reservoir volumes. They can recover from this area.

(Thereupon, Hickman Exhibit No. 12 was identified.)

Q. In that particular well?

A. In that particular well.

They have a 3-foot interval from the top of the perforation to the top of the zone. It's done behind-pipe.

This is oil, assuming effective water drive, that they would not recover without perforating that additional 3 feet. So that would be a behind-pipe

situation.

Then we have a wedge area. In the Gulf Coast they refer to that as attic oil. That's oil from the top of the zone in the well to the high structural point on the tract.

Again, assuming an effective water drive, this is oil that could not be produced by any well now existing on this tract.

Similarly, on the Holmstrom tract, from the water contact up to the top of this current producing interval, is an area that is an area that is currently producible to the existing completion.

They have a fairly large behind-pipe, a 30-foot interval, behind-pipe from the top of their producing interval to the top of the zone that could be -- they could get that by going back in and perforating that up.

And they also have an attic situation from the top of the zone in the well to the highest point structurally on their lease.

This is oil that they cannot recover from their existing well on that lease.

Q. Let's go to Exhibit No. 12, and I'd ask you to simply start with the various factors that you've displayed on this exhibit and review them for the

Commission.

A. I have listed in tabular method the various classifications of acreage, reservoir volume, oil in place, and reserves.

And I have shown that for each of the three tracts which I've determined, and I've totaled those three to give a reservoir total.

The first is productive acreage. That's the acreage enclosed by the zero contour, or the water-oil contact contour.

On the Santa Fe Holmstrom it's 80.9. On the Deemar it's 38.8. On the undrilled section it's 87.8.

So I'm coming up with 207.5 acres productive within the reservoir areas displayed.

Gross reservoir volume, Holmstrom is 5270. Deemar is 4524. Undrilled section is 6088, for nearly 16,000 total for the reservoir.

Q. Mr. Hickman, we've got a large difference between the relative comparison of the each of these tracts when we look at productive acres and at the gross reservoir volume.

Could you explain what that is?

A. Yes, sir. That has to do with the average thicknesses on these tracts.

The Stevens tract is located -- most of it is

located at the maximum structural position in the reservoir.

These other two tracts taper down to a zero contour. And you can by --

Q. Are those figures set out on this exhibit?

A. Yes, sir. By dividing the productive acres on tracts through the gross reservoir volume, you can come up with these. This is the average thickness for the tracts.

For the Santa Fe -- and these numbers have been put in red in the bottom here -- but the Holmstrom is 65.1 feet; whereas, the Deemar is 116.1, and the undrilled section is 69.3.

The reservoir, as a whole, averaged about 76 feet.

Q. So what you do is you take the productive areas times the average thickness, and that's what accounts for the gross reservoir volume figures?

A. That is correct.

Q. All right. Let's go on to the current producing reservoir volume.

A. The current producing reservoir volume, again, is the volume from the oil-water contact up to the top of the existing producing interval.

3974 on the Holmstrom versus 4431 on the

Deemar. And, of course, zero on the undrilled tract since there is not a wellbore and producing section in that tract at this time.

Producible reservoir volume behind-pipe is that, as I've explained, is the section that could be perforated and produced between the top of the current interval and the top of the zone.

That's fairly significant in the Holmstrom well, 864, and these are acre feet numbers, versus only 29 in the Deemar.

Undeveloped reservoir volume, assuming a regular location -- that would apply only to the undrilled section, that would be about 5700-acre feet that would be producible from the oil-water contact to the top of the zone based on, in a regular location, based on the structural interpretation that was used.

Then the total producible reservoir volume would be the summation of these three different categories.

And so we have, again, in acre feet 4838 for the Holmstrom; 4460 for the Deemar Federal; and 5706 for the undrilled section.

And then the attic oil areas, 432 for the Holmstrom; 64 for the Deemar; and 382 for the undrilled section.

I then took those reservoir volumes and applied average porosity and water saturation numbers to them and the formation volume factor to come up with original oil in place, the oil that would exist under these tracts prior to any production.

Again, these numbers are 2278 for the Holmstrom; 1955 for the Deemar; and 2631 for the undrilled section.

I then broke these reserves. I then went to producible reserves.

I utilized a recovery factor of 35 percent of the original oil in place, and I broke these down into three categories, which are industry recognized: proved, developed, producing, which are oil reserves which can currently be produced under existing conditions; proved, developed, behind-pipe, which are those that require additional perforation; and then proved, undeveloped.

Proved, developed, producing is -- and these are in thousands of barrels -- are 601 for the Holmstrom, 670 for the Deemar Federal, and, of course, none for the undrilled sections. It does not have a well.

Behind-pipe, 131,000 barrels for the Holmstrom, only 4,000 for the Deemar, and, again, none

for the undrilled section.

And the proved, undevoped reserves then refers only to the undrilled section; that's 863,000 barrels.

The ultimate total recoverable reserves in the proved category then would be the summation of these three, which is 732,000 for the Holmstrom; 674,000 for the Deemar Federal; 863,000 for the undrilled section. Reservoir total of 2,268,000.

I've also shown, using the 35 percent recovery factor, the amount of -- I'll call it recoverable oil; if you can't produce it, I don't know it can be recoverable oil, but using the 35 percent factor, what's in these attic areas.

I've also shown an estimation of cumulative production as of October 1 of this year: 93,000 for the Holmstrom and -- 93,100 for the Holmstrom and 3,600 for the Deemar Federal.

Q. Now, Mr. Hickman, on the bottom of this exhibit, you've set forth the basic parameters that you have utilized in making these calculations?

A. Yes, sir, I have.

Q. Are these all standard figures that are utilized in making calculations of this character?

A. Well, the parameters -- not the value of the

parameters -- the parameters used are the standard parameters.

The values are those values derived from my study of this reservoir.

Q. If some of these values, like, say, a recovery factor of 35 percent was changed, what impact would that have on the basic calculations?

A. Well, it would -- if you raise the recovery factor, it would raise the reserves. If you lowered, it would lower the reserves.

But it would not change the proportionality between a tract's percent of the total.

That's true whether you're looking at total producible reservoir volumes, whether you're looking at oil in place in that producible volume, or whether you're looking at reserves.

The proportion, so long as these parameters remain the same, the proportion -- well, even if with changing the parameters, since they're applied average across the reservoir, the proportion of each tract's share the total remains unchanged.

Q. Let me ask you this. When we talk about the total produced reserves in the Stevens, Curry, and Thornton tract as compared to the Holmstrom tract, when we talk about total produced reserves, are you

including just this bottom section that is cut the same as Stevens, or are you also including the section above that?

A. No. I'm including the section above that also.

Q. You're including the reserves that lie in those two portions?

A. Yes, sir.

Q. And over here, it would also include just a tiny fraction there?

A. 4,000 barrels in that little sliver at the top.

Q. Do you have anything else to present from Exhibit No. 12?

A. No, sir.

Q. Let's move to Exhibit No. 13, and I'd ask you to identify that, please.

A. Exhibit 13 is a -- shows in tabular form a calculation of, in what in my opinion is, an equitable distribution of allowables for this reservoir.

(Thereupon, Hickman Exhibit No. 13 was identified.)

Q. Would you review those numbers for the Commission, please.

A. Yes, sir. We list the total reserves, which

come from the prior exhibit, by the three tracts. Next column shows their percent of the total.

The next column is the total standard allowable for 160-acre proration unit for this depth bracket is 515 barrels per day.

And then the final column on the right-hand side would be taking the total allowable for the reservoir assuming the three wells, which is 1545, and multiplying by each tract's percent of the total reserves.

And so on that basis you get an allowable for the Holmstrom of 499 barrels per day, for the undrilled section of 587 barrels per day, and for the Deemar of 459 barrels per day.

Q. In your opinion, if these allowables rates were set for wells on each of these units, what would be the bottom line, the end result of that?

A. These rates would give each tract, the owner of each tract, the opportunity to recover an amount of oil from the oil reservoir that's in proportion to the original reserves under their tract.

Q. Now, Mr. Hickman, if the Holmstrom No. 1 isn't producing at the top allowable rate, how does that impact what you've just said?

A. Well, they are -- it denies them the

opportunity to recover an equitable share of the reserves in proportion to the reserves they have under their tract.

It also has a detrimental -- for what portion they are able to recover, it has a detrimental effect economically in that low producing rates you string out your economics, and you get into the present where you've got continued operating costs which do not necessarily go down.

You've got much lower revenue and you string it out over a long period of time --

Q. Mr. Hickman, my question was what impact would the fact that the Holmstrom well is not producing at top allowable -- what impact would that have on the allocation of allowables that you have recommended?

A. The Holmstrom well?

Q. Yes, sir.

A. I misunderstood your question.

Q. Yes, sir.

A. The Holmstrom well, the decision not to produce the Holmstrom well at the top -- it currently has an allowable of 515 barrels a day.

The decision not to produce at that rate is a company decision.

I do not know, without having access to

current well tests, if this well can produce at that rate at its current interval.

But I am of that opinion that with that 30 feet of pay behind-pipes, some of which contains high porosity streaks, they can perforate that and certainly make a water-free 515-barrel-a-day completion, if they so choose.

Q. Now, if the producing rates that you've testified to were reduced for the well that is owned by Stevens, Curry, and Thornton, what would be the impact on them on an allowable rate produced below what you have recommended?

A. Now, you're referring back to the allowable I'm recommending?

Q. Yes, sir.

A. If they had not been given that allowable --

Q. If the Deemar is restricted below what you have recommended, what would be the impact on the owners of the oil in the west half of this section?

A. Well, as I prematurely testified to a few minutes ago, it would deny them, you know, assuming that their well has a capacity to 515 barrels a day, which it does have, a much lower allowable would deny them, first of all, the opportunity to recover a share of oil from the total reservoir that is equivalent or

reasonably equivalent to the oil that's under their tract.

And, secondly, it would impact economically. The extent of that impact would depend on the allowable we're discussing. But what oil they are allowed to produce would come over a longer period of time.

You would have continued operating costs, so you would have less of a profit margin, and you have the present worth of money.

It would -- depending on the allowable, it would make the whole transaction economically unattractive.

Q. Mr. Hickman, aside from the fact that the unorthodox location or an unorthodox location is necessary to penetrate the reservoir, is any advantage gained on the owners of the east half of this section by virtue of the well location of the No. 1 Deemar?

A. Well, first of all, accept the fact that it takes an unorthodox location for the Deemar tract for a wellbore to penetrate the producing reservoir on the Deemar tract.

Then there is no advantage gained from this that would not be gained by a well anyplace in the reservoir. And that definition can be elaborated on, I think.

With an effective water drive, each barrel of oil that is produced will be replaced from the bottom by a barrel of water.

Well, you can actually have an effective water drive with not 100 percent replacement, but if you replace most of it, and this will occur -- this replacement will occur, whether it be a second well in the reservoir is located here, or where it is, or located way up to the north, or located over in that undrilled northeast quarter.

With the exception of local coning situation that might arise, the rate of rise of the oil-water contact is a function of cumulative production.

And so there is no advantage from that standpoint by this well being located where it is other than it is necessary to get into the reservoir to drill in an unorthodox location.

Q. Other than the way the oil-water contact will rise, is there -- would that be damage to -- would that result in damage to the Holmstrom well?

A. No, sir. The production from the Deemar well will not damage the productivity of the Holmstrom well.

Again, whether the Deemar well is located where it is or whether it's located in the undrilled

northeast quarter, it will contribute, by its authority as a reservoir, it will contribute to the rise of the water level.

And at some point in the future, the Holmstrom well will water out. But this would happen whether this well was drilled there or whether way up in the north end.

Q. In your opinion, does the restricted allowable that is set forth on Exhibit No. 13 for the Deemar No. 1 well represent a penalty on that well's ability to produce?

A. Would you state that again, sir?

Q. Does the allowable as set forth on Exhibit No. 13 for the Deemar No. 1 actually represent a penalty on that well?

A. Yes, sir, it is, since the top allowable for this 160-acre unit is 515, and I'm recommending 459. And this well does have the capacity to water-free at 515 barrels a day.

Q. Do you recommend this approach to a penalty be employed by the Division in allocating reserves in this pool?

A. Yes, sir, I think it's a reasonable approach.

Q. If the producing rates on the Deemar restricted below this -- be sure we're clear now --

what impact does it have on Stevens, Curry, and Thornton if we go back below the 469?

A. What impact it has on Stevens?

Q. Yes.

A. Well, Deemar well, assuming that -- well, that would depend on where all the allowables in the reservoir were set, but assuming they maintain the 515 and the other operators had the opportunity, if they so choose, to produce at 515, then there would be -- they would not have -- Stevens would not have the full opportunity to recover reserves from the reservoir that are equivalent to the reserves under his tract.

And it would also degrade the economics of their situation.

Q. Do you have an opinion as to whether or not a well at this unorthodox location is necessary because of the structure in this pool?

A. Yes, sir. This well, fortunately, is located near the crest of the structure. Without this well, there would be significant recoverable oil that could not be recovered in this pool.

In fact, whether it was this well or any other well, you would have to be at an unorthodox location to efficiently drain this pool, whether it be on the Deemar tract or the Holmstrom tract or the

undrilled quarter section.

It would take a very serious unorthodox location to efficiently drain the reserves that cover oil in this pool.

Q. Are you familiar with the penalty formula, that penalty formula that has previously been imposed on the Deemar well by the New Mexico Oil Conservation Division?

A. Well, I've seen the calculations that went into it, yes.

Q. In your opinion, does basing a penalty only on proximity to the offsetting property line in this reservoir have anything to do with the geometry of the reservoir?

A. Would you repeat that? I have a little trouble following.

Q. I'll try. You're familiar with this formula generally?

A. Yes, sir.

Q. You've testified to that. Does basing a formula only on proximity to the offsetting tract in this reservoir make sense?

A. In this particular case I do not think it's a logical approach.

Q. And why is that?

A. Because, as I've testified, it does not give that particular tract the opportunity to recover its share of the oil.

Q. I'd like you now to move to what's been marked as Hickman Exhibit No. 14, and I'd ask to you identify that, please.

A. This compares as a function of time the cumulative oil from two different allowable rates, being the 34-barrel-a-day, which is now assigned to the Deemar well, and the top allowable for the reservoir of 515.

Granted, this is a rather simplistic exhibit, but it shows quite graphically after ten years of production if the Deemar well was allowed to produce only 34 barrels a day after ten years of production, it will have produced only a fracture of its reserves.

And this would hardly be an economic situation; whereas, a well producing at the top allowable gains tremendous volume of reserves very rapidly.

(Thereupon, Hickman Exhibit No. 14 was identified.)

Q. Mr. Hickman, would you now refer to what's been marked as your Exhibit No. 15 and identify this for the Commission.

A. Yes, sir, 15 is a brief description of the numeric simulator that I utilized to do some modeling for a very limited purpose.

(Thereupon, Hickman Exhibit No. 15 was identified.)

Q. What was the specific purpose for which you modeled?

A. That was to look at the compensating drainage that would occur in a highly permeable reservoir, both horizontally and vertically, that has an effective water drive.

Q. Do you prefer to review the factors set forth on the exhibit with the Commission? Are they --

A. I will go through some of them very rapidly. And the Commissioners are certainly capable knowing if they want to hear more from me.

This is a three-dimensional black oil model that handles three phases. It's implicit pressure, explicit saturation.

It has a capability of simulating oil recovery by several different methods, including water drive and gravity drainage.

We dimension the individual grids as 330-by-330, which is 2.5 acres. We constructed six layers, the top five of which represent the oil

reservoir and is equivalent in vertical thickness to the height from the water level up to the top of the producing interval in the Deemar well. Those thicknesses are shown there.

Layer 6 is our aquifer. It was made very thick and contains a very large volume of water so we have sufficient expansion of water to furnish effective water drive.

The reservoir properties, you can see, I list them or list the source of them there.

The volumetrics of the model are 6.74 million barrels of oil. This agrees -- the volumetric number I came up with was 6.84. This agrees closely.

The aquifer volume is 1.9 billion barrels of water, which is a sufficient aquifer to give us the expansion needed.

Q. All right. Mr. Hickman, let's now review Exhibit 16.

A. Exhibit 16 is the same structure map that's already been introduced in evidence, and overlaid on that is the grids that were used.

The largest-sized grid, the 7-by-16 grid represents -- of course, this is a top view. We're looking down on it now -- represents the dimensions of the layer 6, the aquifer.

And then this is built much like a layer cake, each -- as we come up, layer 6, 5, 4, so forth, as we come up, each layer is smaller in its horizontal and width dimensions.

And the color codes, the red shows the extreme of layer 5; the gray, layer 4; the blue, layer 3; the green, layer 2; and the yellow, layer 1.

This is more readily seen by three-dimensional view there.

(Thereupon, Hickman Exhibit No. 16 was identified.)

Q. That's on Exhibit 17?

A. 17. You're getting ahead of me, Counselor.

Q. All right. Let's take a look at Exhibit 17.

A. Three-dimensional view of the reservoir, the horizontal scale is 1/10 of the vertical scale, so it's exaggerated. But it does, I think, help visualize the model in which we're trying to roughly approximate the shape of the reservoir.

We have on the flat surfaces that are colored in yellow, we have imposed contour lines off of the structure map to allow you to make that relationship, form that visual image of the situation.

You can see at the top of the aquifer, that corresponds to the oil-water contact of sub-C 6055.

Layer 5, which is 39 feet, represents the distance from the oil-water contact to the bottom of the producing interval in the Holmstrom well.

The 30-foot interval, which is layer 4, represents the distance from the bottom of the producing interval to the top of the producing interval in the Holmstrom.

Layer 3, the 30-foot interval, again, represents the behind-pipe interval in the Holmstrom.

Layer 2, the 41 feet, represents the distance from the top of the Holmstrom to the bottom of the producing interval in the Deemar well.

And in Layer 1, the 11-foot layer, represents the producing interval in the Deemar well.

If your eyesight is real good, you can look on there and see a couple of black dots, and these represent where the well locations are in the model.

(Thereupon, Hickman Exhibit No. 17 was identified.)

Q. Mr. Hickman, there are also a couple of red lines on this exhibit, if your eyesight is real good.

Could you explain what those actually show?

A. Yes, sir. There's one red line that's running primarily over the top of layer 1 that's a little bit diagonal. That is the lease line, the

east-most lease line of the Deemar tract.

Then there's a line that comes down the stairs running, going out to the west, that's the lease line -- may not be a lease line -- the line between the existing proration unit in the north.

In the southeast quarter of the section where the Holmstrom produces and the undrilled section to the northeast.

Q. What does this exhibit basically show?

A. Well, it allows you to kind of visualize the reservoir and our representation of it.

It also shows, I think quite graphically, why with relatively smaller productive acres that the Deemar lease has both reservoir volume and reserves almost equivalent to the Holmstrom and the undrilled tract because you can see the thickness.

That particular tract is up against the fault and covers all the thickest part of the reservoir.

Q. So what we're looking at is a triangular piece that's sort of at the top of the model, that's the Deemar tract.

The portion of it that's forward actually, as you look at the model at the red line, that's the southeast quarter. And above the red line stepping down the model is the northeast; isn't that correct?

A. That is correct.

Q. Would you identify Exhibit No. 18, please.

A. Exhibit 18 is a rate time showing the total producing rate utilized in the model, both for oil and water.

And 420 days we have a line marked at the top, history one way and forecast the other. From zero, 420 days we actually duplicated the producing rates and averaging them for that total period that actually existed.

The step up at about 320 or 30 days, a short step up there, is when the Deemar went on production. And then you can see at 420 days that's equivalent to, on real time, to November 1, which is a couple of days beyond us here.

At that time we assumed that the Holstrom well would be recompleted in the behind-pipe section and increased the rate on both wells to 515 barrels per day.

So we've got -- you've got the total reservoir producing at 1,030 barrels per day beyond 420 days.

(Thereupon, Hickman Exhibit No. 18 was identified.)

Q. Bottom dash line shows water production?

A. Shows water production. Again, this is average. They did not report water production initially, but this is the average over the 420 days.

The model actually -- we didn't -- we had it showing 2 or 3 barrels a day. I think the actual water production is more like 10 now.

And then when the Holmstrom was recompleted, it went to zero waters. And then later the water production began again.

Q. And, again, this is on a logarithmic scale?

A. This is on a logarithmic scale, so if you're not used to dealing with those, you have to stop and think a minute.

Q. All right. Let's go to Exhibit 19, and I'd ask you to review that.

A. Exhibit 19 --

Q. Mr. Hickman, first, I think there is a figure we need to correct in the second portion of this. It may already have been corrected on some copies. But it's the fourth line down.

It's average behind-pipe, PSI, there's a number there. It was originally printed 3920; that should be 3970?

A. DHP is not behind-pipe pressure; that's bottom-hole pressure.

Q. That's right.

MR. WEISS: What did you change?

THE WITNESS: I believe it's probably changed. This is in the second sequence, time, day, 420, in the fourth layer, coming over to the average bottom hole pressure.

It was misprinted originally as 3920; it should be 3970.

Q. (BY MR. CARR) All right. Mr. Hickman, would you review the exhibit, please?

A. For four times, discrete time periods, this gives the results of the model.

We have schematically shown for each of these periods the layers, their proportion and thickness. We have shown the layer interval from which the two wells are producing from.

We've shown the cumulative production by layer and by the reservoir that the model indicates.

We're showing the average bottom-hole pressure from that layer, the average water saturation from that layer.

At times zero, of course, is cumulative production. The average bottom-hole pressure, you can see there, that will on a weighted average basis come out close to what these bottom-hole pressure surveys

are showing us.

The average water saturation, although it increases by depth -- this is a function of the model -- it's gravitational adjustments.

The weighted average of the water would be 25 percent for all the layers.

Then at 420 days, which in real time would be just a few days from now, the model has indicated cumulative oil production of 109 barrels, which would be very close to what it's actually going to be.

Water, 1,000 barrels -- actually, the water production would be several thousand barrels at that point by actual count.

Average bottom-hole pressure is being well maintained at this point, even though we've had fairly significant voidage.

Average water saturation is not changing. It's desaturated a little bit in the fourth layer, but the fifth layer is the big layer volumetrically.

And you can see there there's been an increase in that water saturation.

And then time, day, and at this point -- this is the point in time which we assume after 420 days we change the completion in the Holmstrom from layer 4 to layer 3, which is the behind-pipe, assume layer 4 is

shut off.

Then at 570 days, the model indicates total production from the reservoir of 260,000 barrels, 2,000 barrels of water.

And, again, you see that the bottom-hole pressure is being fairly well maintained in each layer and that the water saturation is stabilized except we see the effect of bottom water encroachment in the bottom layer. The saturation is increasing.

And then the last time step shown is 750 days. At that point we're up to 403,000 barrels and 15,000 barrels of water.

Again, the bottom-hole pressure is being maintained within a few pounds. Water saturation is about the same, except there's significant influx of water in the bottom layer.

(Thereupon, Hickman Exhibit No. 19 was identified.)

Q. Based on your study what conclusions have you reached about this reservoir?

A. Well, this reservoir, to put it in the layman's vernacular, comes about as close as any you'll find in which there's a common drainage that each well is sharing from -- can drain throughout the reservoir.

So they're sharing a common pool of oil, so

you have compensating drainage. And although they might be and will be a lease boundary, it means nothing to Mother Nature. That's just political boundary installed by man.

A reservoir exists because of various physical forces that act in the past, and it has no -- political boundaries have no relationship.

So there's movement of the oil throughout the reservoir, the prime movement being the upward flow of the oil and the replacement by the bottom water.

Q. If the current wells in this pool are produced and restricted as you recommended, in your opinion will any advantage be gained by Curry and Thornton, and Stevens on the properties that are operated by Santa Fe to the east?

A. It will afford -- it will afford the owners on Deemar to have the opportunity to recover volume of oil that's equivalent to the oil under their lease at this time.

Q. Under these producing rates, will it also afford to the owners of the properties in the east half of this section an opportunity to produce their fair share of the reserves?

A. Yes, sir, it would.

Q. In your opinion is a nonstandard proration

unit necessary for the development of this pool?

A. Yes, sir, it is.

Q. And why is that?

A. Because it's necessary for protecting correlative rights. Without it the Deemar tract could not recover the substantial amount of reserves that are under it.

It's important from a waste consideration without a -- abnormal location, they're structurally high, there's a significant amount of oil that could not be recovered in the reservoir.

Q. To recover that, would additional wells have to be drilled if the unit was not approved?

A. Yes, sir.

Q. In your opinion are recoverable reserves an appropriate way based on this information to allocate production in this pool?

A. In this pool, with the data that's available at this time, it is an appropriate method.

Q. Do you believe there is sufficient data available to make a reasonable call within normal engineering and geological parameters to allocate on this basis?

A. Yes, sir.

Q. In your opinion, if that is done, will waste

be prevented?
A. Yes, sir.
Q. Will correlative rights be protected?
A. Yes, sir.
Q. Were Exhibits 8 through 19 prepared by you, Mr. Hickman?
A. They were.
MR. CARR: At this time I move the admission of Hickman Exhibits 8 through 19.
(Thereupon, Hickman Exhibits 8-19 were offered into evidence.)
MR. LeMAY: Without objection those exhibits will be admitted into the record.
(Thereupon, Hickman Exhibit Nos. 8-19 were admitted into evidence.)
Is that all, Mr. Carr?
MR. CARR: Yes, sir.
MR. LeMAY: Thank you.
We'll take a break and return at 1:30.
(Thereupon, the proceedings were recessed for lunch.)
MR. LeMAY: I think we were to begin with cross-examination of Mr. Hickman.
I'll remind you you're still under oath.
Mr. Padilla.

CROSS-EXAMINATION

BY MR. PADILLA:

Q. Mr. Hickman, in your Exhibit No. 11, you took that straight from Mr. Ahlen's maps; isn't that correct?

A. I'll make sure I have this. I can -- Exhibit 11 is the gross interval isopach. Are we on the right group of exhibits?

Q. Yes, sir.

A. I constructed that based on his structural map.

Q. And his structure map is essentially your Exhibit 10?

A. Yes, sir.

Q. If Mr. Ahlen is incorrect in his interpretation of the structure, then your information is also incorrect; is that correct?

A. Well, whether it's any significant variance would depend on the degree of the nature of -- or the change that was required in his work.

Q. But you essentially took his information and changed it very little, and on that basis you then made your models and your computations regarding productive acreages and reserves?

A. Yes, sir. I did not change his structural

interpretation at all.

Q. You accepted those without changing them?

A. That is correct, yes, sir.

Q. Let me refer you to the Exhibit No. 12, which is the next one, and you added on that exhibit average net pay thickness. Why was that done?

A. I think it helps eliminate the process, better understanding why you go from a productive acre situation.

The proportionality between the various production acres changes greatly when you start looking at reservoir volume, reservoir reserve.

Of course, it's the matter of thickness, the average thicknesses underneath these various tracts. And this helps illustrate that.

Q. Do you know the exact thickness of the structure to the north of the Deemar well or the north Santa Fe well?

A. Do I know the exact?

Q. Yes, sir.

A. What context?

Q. In terms of exactness, or you just, as I understand, you're just simply taking an interpretation and giving some value of thickness of that; is that correct?

A. No, sir. I'm using -- I'm doing what is always done in industry work in constructing isopach.

I'm taking a structural interpretation, utilizing that to construct an isopach. That's the standard procedure.

If you mean do I have wellbores all over this area, obviously I do not.

Q. In your computations did you use gross or net pay figures?

A. I used gross interval as net pay.

Q. Are you saying there's no difference between gross and net pay?

A. I'm applying a porosity, an average porosity, that is average for the gross interval.

Q. Well, I still have a hard time understanding what's the difference between gross pay and net pay as you used it in your exhibits?

A. There is no difference as I'm utilizing it. The method I used, there's no difference between gross and net pay.

Q. Let's go on now to your Exhibit 14. Let me refer you to the bottom line there, the 10-year line.

Assuming the Deemer well is allowed to produce at a rate close to 515 barrels a day, you essentially arrive at a figure of 1880, same as --

which is the top allowable line or figure on the last column; isn't that correct?

A. A rate -- or a rate of 515 barrels a day everyday for 10 years will give you 1,880,000 barrels.

Q. How does that relate to the figure of 670 that you have attributed to the Stevens tract?

A. There's no relation. This is not tied to reserves or future projections of productivity of a particular well or anything. It's just a computation of years times the rate.

Q. You're asking for top allowable in this pool, aren't you? You're recommending a top allowable, or at least --

A. No, sir.

Q. -- very close to the top allowable?

A. I'm not recommending the top allowable. I'm recommending a reduced allowable.

Q. What is the reduced allowable you're recommending?

A. 459 barrels a day.

Q. That 459 barrels, you're going to approximate the 1880 figure to some extent, aren't you, over a 10-year period?

A. No, sir.

Q. If you multiply 459, or whatever it is, on a

daily rate over a 10-year period, what do you get?

A. 1880.

Q. And isn't that what the production from your well or the Stevens well is going to be over a 10-year period?

A. No, sir.

Q. What will it be?

A. I do not know.

Q. Assuming, Mr. Hickman, that you produced this well at 459 barrels over a 10-year period on a daily rate of 459, you're going to exceed the 690,000 barrels, are you not, or 670,000 barrels?

A. If the well produced for ten years at that rate, which it will not, yes, you would see that, and if it went for 20 years, you would double that.

Q. In your model did you consider the life of the reserves over the life of the reservoir, or did you consider the production from each well over the life of the reservoir?

A. No, sir, I did not run the model that long.

Q. Why did you not do that?

A. Because I did not have time to do that.

Q. Aren't your calculations based on essentially total recoverable reserves and shouldn't you take that into consideration in formulating your model?

A. You build your model to represent the original oil in place.

And then if the model can be reasonably, accurately constructed to duplicate reservoir mechanism, et cetera, then you can get from that reserves. That's one way to approach reserves.

Q. What parameters, then, did you use in making your model?

A. Well, parameters are shown on Exhibit -- whatever -- Exhibit 15, sir.

Q. Do your calculations show anywhere how long this reservoir is going to last at a producing rate at the top allowable?

A. For which well producing at top allowable?

Q. Well, we have two wells in the reservoir. Now, you're asked, assuming you're allowed to produce the well at which you're recommending and also considering what the Santa Fe well is producing at now or even at the top allowable, did you make any calculations as to the life of the reservoir based on withdrawal rates from both of those wells?

A. I ran the model to, as shown on Exhibit 16 -- no, not at 16. Exhibit 19. As shown, I ran the model out 750 days.

At that point the Deemar was still capable,

according to the model, was still capable of 515 barrels a day.

I also -- we also made a projection, assuming 515 barrels a day, and assume -- and just made the assumption that the well would flow and produce at the top rate for half the reserve life, the 670,000 barrels reserve.

And at that point, start making water go and pump and flow at the top rate, and I forget the decline, it's a fairly steep decline, to use up the reserves by economic limit.

And I cannot recall, sir, the life that this gives me, but I did make that calculation.

It was based on assumptions as to how long it would flow and not a calculation.

Q. How did you make those assumptions?

A. That was just an engineering judgment, just based on very general experience, saying, "Okay, these wells probably get half the reserves out. This well has got a good structural location, might get half the reserves out before you get off your top rate."

And from that point on, you'll have to probably start pumping it some and start going down in rate to capacity until you deplete it.

Q. How long will it take to reach the half-life

of the reservoir?

A. Well, 670, half of that is 335,000 barrels divided by 188. 515 barrels a day, you produce 188,000 barrels.

So it would take you less than two years to reach that half reserve life.

Q. Well, on your 750-day model, you're still showing a full rate at 515 barrels?

A. That's right.

Q. Is the model inflexible as far as being able to attribute actual production figures, or don't you simply have any information as far as that is concerned?

A. No. What I said, we made a projection and just made the assumption that it would produce top allowable half reserve life; that was just an assumption we made.

The modeling we did, which was not done specifically for that purpose but does serve some insight, showed that, what, 750 days is 2-1/2 years approximately, or a little less, at that point the well was still capable of 515.

Q. Did you use any data from other Devonian reservoirs to make your assumption?

A. Nothing specific, just general experience

with Devonian reservoirs in the Permian Basin.

Q. Mr. Hickman, in Exhibit No. 15 you've given the permeability at 1,000 millidarcies, that's vertically and horizontally.

Can you tell me how far will this well drain the Deemar -- the Stevens well?

A. This well is capable of draining the total reservoir.

Q. And yet you say there's no relation to proximity to lease lines or insofar as the spacing rules of well locations are concerned?

A. I'm afraid I do not follow your question.

Q. Well, you're basing your figures strictly on productive acreage or reserves, isn't that correct, and, therefore, you're saying that, therefore, Stevens ought to be able to produce at the full rate?

A. Well, at the recommended rate, 459 barrels a day.

Q. And it's your opinion that proximity to lease lines shouldn't have anything to do in this case; isn't that correct?

A. Yes, sir, in this particular reservoir, that is true.

Q. Have you ever been involved in other situations where proximity to the lease lines are

important?

A. I, through the years, I've been involved in a number of regulatory hearings that involved well spacing and whatnot.

I'm hard-pressed to point out specific instances on the spur of the moment, but I have been involved in those processes before.

Q. From a conservation standpoint and for protection of correlative rights, you would agree with me that rules were made for a definite purpose as far as well locations; isn't that correct?

A. In some instances they are.

Q. Would you agree with me in most instances they are?

A. I think in most instances the rules are applied for a reasonable purpose.

Q. There is some general scheme to spacing wells in accordance with spacing rules from a general standpoint?

A. From a very broad standpoint, yes.

Q. I think I have one further question.

With regard to your permeability figure, that's very good permeability in an oil reservoir, isn't that?

A. Yes, sir.

MR. PADILLA: I believe that's all I have.

MR. LeMAY: Thank you, Mr. Padilla.

Mr. Kellahin.

CROSS-EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Hickman, when were you first retained as a consulting engineer for presentation of this case?

A. I believe it was late July of the year.

Q. In your preparation did you review any of the prior transcripts or exhibits that were presented by either parties in any of the prior cases that are now integrated into this case?

A. I had.

Q. Do you know our reservoir engineering expert, Mr. Buddy Sipes?

A. Yes, sir, I do.

Q. How do you know him, sir?

A. We were schoolmates together. His wife was a dietician at my dormitory.

When I left major company employment, I went to work for a firm that he was an associate in. We worked together for several years. We've maintained contact and friendship for a long time.

Q. What is your opinion of his professional expertise as a reservoir engineer?

A. I think Mr. Sipes is a good reservoir engineer.

Q. Let me ask you if the presumption is made that Mr. Ahlen's geology, principally his structure map, is absolutely 100 percent correct, that there is just no range of reason for doubt about his interpretation of that structure, if you make that assumption, what degree of confidence do you have as an engineer that your work based upon that structure map is accurate?

A. I would have a high degree of confidence in that reserve work.

Q. Let's do it in terms of a percentage, if you will, with me, Mr. Hickman. If we take as our starting point the interpretation of the structure by Mr. Ahlen, then we integrate your work where you have volumetrically estimated the reserves and plus by a computer simulation also come up with some results, within that work that you have performed, you have selected certain parameters and made certain judgments as an engineer, there's a range of choice for you, is there not?

A. There is, sir.

Q. In terms of a percentage then, with regard to your work, 100 percent being absolutely perfect, what

degree of certainty do you have that your performance of your activity is accurate?

A. I don't think it can be quantified in that -- in quite those terms.

There are two wellbore penetrations, partial penetrations of the reservoir. Based on this, we can analyze the logs to get a determination of porosity over that interval to come up with an average porosity of 7.8 percent.

That definitely falls within what I consider to be a reasonable range for this type of reservoir. That's a number I'm comfortable with.

What degree of actual accuracy that number represents, I cannot say. It's a very reasonable number. I'm more than willing to do reserve work and sign my name to reserve work based on that number.

Q. When you calculate the reserves that are to be producible within Mr. Stevens' share of the section for the Devonian, you have calculated based upon these various estimates a total recoverable reserve as 670,000 barrels of oil?

A. Yes, sir, that's a volumetric reserve calculation under that tract.

Q. But it represents an estimate as opposed to an absolute?

A. Yes, sir. We can set that on record right now. Until you produce that last barrel of oil, reserves are always estimates.

Q. If you'll turn with me to your Exhibit No. 10, which is the Devonian structure map that you presented in your direct testimony, when you compare that to Mr. Ahlen's Exhibit No. 4, which is his structure map, am I correct in understanding that you see no material difference between the two?

A. We took his structure map and created this one.

Q. All right. Let's use yours then. When we look at the structure relationship between the Deemar well and Santa Fe's Holmstrom well --

A. Yes, sir.

Q. -- the Deemar well has approximately 55 feet of structural advantage over the Holmstrom well, does it not?

A. Correct, sir.

Q. When you come up with your estimated total ultimate oil recovery out of that block in the Devonian that is west of the midpoint of the section and yet east of the primary fault, the 670,000 barrels of oil, what portion of that is produced above the 5900-foot contour line?

A. Above the 5900-foot contour line?
Q. Yes, sir.
A. None of it, sir.
Q. Okay. When we look at the relationship structurally of one well to another, we get the Holmstrom well at a minus 5956?
A. Yes, sir.
Q. That represents the top of the Devonian?
A. Yes, sir.
Q. Am I correct in understanding that based upon your study, the Deemar well is going to produce all those Devonian oil reserves that are higher in structural position than that contour line?
A. How do you reach that conclusion, sir?
Q. Well, because the oil is going to migrate up-structure to the producing Deemar well and is not going to go down-structure to my client's well.
A. What assumption you're making as to, what, will be another well drilled and the undrilled --
Q. I make no assumptions at all. I'm asking you, sir, as a reservoir engineer, is it not a correct conclusion to say that the Deemar well is going to drain the oil reserves on the east side of the centerline of the section: Yes, no?
A. Going to drain the oil reserves? Talking

about the total reserves, no, sir.

Q. The Deemar well as it produces that oil is going to honor the political section line that separates the east half from the west half?

A. No, sir.

Q. It's going to follow contour line, isn't it?

A. Follow a contour line?

Q. Yes, sir.

A. I'm not sure I follow your question, sir.

Q. The oil that underlies on this structural display that's in place in the southeast quarter that is above the point minus 9556, where is that oil going to go?

A. That oil will be produced by any well in the reservoir that is structurally higher than the Holmstrom well.

Q. And if there is no other well than the Deemar well, the Deemar well gets it?

A. That is correct, sir.

Q. What is the volume of oil within that area that is in the southeast quarter that is above the minus 5956 contour lines?

A. 65,000 barrels recoverable oil is our estimate of reserves.

Q. Do you have that on some display that --

A. That is Exhibit 12, sir.

Q. Is that the area that's represented in the yellowish-green portion on Exhibit No. 3?

A. Yes, sir, that's the wedge-shaped area in the kind of sicky-green color.

Q. When we look at the section and divide it into quarter sections, and perhaps the best point of reference is your Exhibit No. 10, Mr. Hickman.

A. Okay, sir.

Q. When we look at the southwest quarter of that section, what approximate percentage of that southwest quarter lies east of the fault and yet within that portion of the spacing unit?

A. I'm sorry. I'm haven't quite followed you, sir.

Q. All right. I'm looking at standard size spacing units for the pool. If we take the section and divide it into four standard 160-acre quarter sections, I want to examine with you --

A. Are you speaking of standard size or standard shape?

Q. Standard shape. Southeast quarter represents a standard shape. If we look at the southwest quarter, that would represent a standard shape by which your client would have the option to dedicate his well.

What I'm looking for within the southwest quarter is what portion of the southwest quarter is productive by this well at its location from the Devonian?

A. It would be a very small percentage.

Q. When we look at the northwest quarter, what portion of the northwest quarter of a standard shaped spacing unit is going to be east of the fault line and potentially contribute production for that quarter section?

A. Supposed to be about -- looks to be about 25 percent. I'm sorry, sir. Which quarter?

Q. Northwest.

A. Northwest?

Q. Yes, sir.

A. Okay. 25 percent.

Q. If we're going to attempt to share the Devonian reservoir from the section between only two wells, let's assume a nonstandard size unit as your clients propose for the east half of the west half, but let's also presume that Mr. McAlpine in Santa Fe reconfigured their spacing unit, stack them four 40's on top of each other and dedicate the west half of the east half so now we have the same size and shape competing nonstandard units for the two wells. Okay?

A. Okay, sir.

Q. What portion of the reservoir in terms of your volume would be assigned to the east half of the west half?

A. The east half of the west half, which is the Deemar tract -- forgive me, I'm a little slow. I'm trying to visualize these.

From a reservoir, producible reservoir volume and a reserve basis, it would be 29.7 percent.

Q. That number remains unchanged on your Exhibit No. 13?

A. Correct, sir.

Q. When we look now at the west half of the east half now, so that we've established a spacing unit of the same size and shape as Mr. Stevens' spacing unit, what is the total recoverable reserves assigned to a spacing unit of that configuration?

A. 70.3 percent.

Q. Am I correct in understanding that you as an engineer have concluded that at the rate the wells are produced is not going to make a difference in total ultimate recovery for either well?

A. No, sir, I don't think I've stated that position.

Q. Let me make sure I understand your conclusion

with regards to the rate. You have not proposed a portion of the penalty based upon the proximity of one well to another to the common spacing line; is that true?

A. That is correct, sir.

Q. Maybe I misunderstood, but I thought in context of your discussions with Mr. Carr, you've indicated that you do not expect any rate relationship to influence the drainage areas between the two wells; do I misunderstand that?

A. I believe I stated that producing the Deemar well at the recommended allowable rate would not affect the form or the productivity of the Holmstrom well.

Only to the extent that any withdrawal from that reservoir causes a rise in the water level and whether it was the Deemar well producing or well drilled on the undrilled quarter, it would be the same results as far as the rise of the water table.

Q. From that statement, then, I may have drawn an incorrect conclusion or inference.

I had assumed that by increasing the rate on the Deemar well to the proposed rate that you have suggested of 459 barrels, in order to prevent waste and protect correlative rights and all those wonderful things, that you would thereby not affect the ability

of the Holmstrom well to produce its share of the oil?

A. That is correct. So long as allowables are assigned, it allows opportunity of each operator to recover from the pool reserves equivalent to the reserves under their tract.

Then there is no advantage gained, there's no harm done to the Holmstrom well or its position. It's at a particular structural level right now.

With an effective water drive that well will eventually water out at some point in time. It's got producible reserves under its tract.

It's controlled by its location. That cannot be changed. That has nothing to do with where the Deemar is or isn't.

And so long as you allow the opportunity to produce ratably, then you've protected correlative rights, you've prevented waste, and there's no damage.

Q. Ratably. Therein lies my question, Mr. Hickman, is that if you increase the ratable withdrawals or the withdrawals from the Deemar well from 34 barrels to 459 barrels, some 13-1/2 times greater than currently permitted, you're going to cause that oil, that water encroachment down-structure in the southeast portion to move 13-1/2 times faster as it migrates up through the southeast quarter, are you not?

A. The water rights, excepting local coning conditions in response to cumulative production, so the faster you draw out the oil, the faster the water rises to replace it.

Q. If the Commission in its wisdom then decides to maintain a low producing rate for the Deemar well of 34 barrels of oil, it is, therefore, not going to cause your ultimate oil recovery to be diminished?

A. Yes, it will.

Q. Well, you've told me you're going to get the 679,000 barrels regardless of the rate.

A. If I told you that, then I misspoke because that was not my intention, sir.

I believe I testified earlier today on direct to the contrary of that, sir.

Q. In order to protect itself from the migration of the oil out of the east half into the west half of the section, there appears to be no solution for Santa Fe but to drill a replacement well 78 feet from the common line in order to put the two producing wells in balance in this reservoir; is that not true?

A. No, sir, that's not necessarily true.

Q. Well, you've told us one well at the highest point in the structure is going to drain the whole Devonian reservoir, and that's your client's well?

A. No, sir, I did not say that.

Q. You've told us one well will deplete the entire Devonian reservoir.

A. I said one well structurally high, located structurally high in position, can drain the reservoir. I did not say it was going to drain the reservoir, sir.

Q. Which other well in the pool is in a position like the Deemar well?

A. At this time there is none.

Q. So in order for Santa Fe to protect its correlative rights and keep this oil from migrating out of the east half, they're going to have to drill a well that is structurally comparable to your well?

A. No, sir. There's -- my reserves numbers indicate there's 65,000 barrels in that attic.

So if they drill right on the lease line to preserve that 65,000 barrels, that will not seem to be an economic decision or a wise decision.

Q. We're looking at recovering the remaining reserves in the reservoir in the east half of the section from the total recoverable reserves in Exhibit No. 13 as a combination of 732,000 and the 400 -- the 863,000 in the northeast quarter.

Would it be a correct statement that the best

place to produce those reserves is going to be at the highest structural position in the east half of the section?

A. That would be the optimum position to get the maximum barrels, yes, sir.

MR. KELLAHIN: Thank you, Mr. Chairman.

MR. LeMAY: Thank you, Mr. Kellahin.

Additional questions?

Yes, sir, Mr. Cooter.

MR. COOTER: May I impose upon the Commission and just ask for three minutes, since I'm sitting back here, to talk with them before I ask him a question?

MR. LeMAY: Sure.

MR. COOTER: I have no questions.

MR. LeMAY: Additional questions of the witness?

Mr. Weiss. Commissioner Weiss.

EXAMINATION

BY MR. WEISS:

Q. The 1,000 millidarcies permeability, I notice there was some DST's, the way they are interpreted?

A. The DST run on the Holmstrom No. 1 was interpreted, I believe that was the Halliburton test. I believe Halliburton interpreted it.

I believe the permeability that they

calculate from that was 1,875, I believe, millidarcies.

Q. Millidarcy feet or millidarcies?

A. Millidarcies, I believe.

Q. And you know many times people will run a materials balance to try and support their volumetric estimates.

It's difficult at this time; did you try it?

A. No, sir. With the effective water drive, it would be very difficult.

Q. Is it a water drive or water expansion? I've heard two terms.

A. Well, it's one in the same actually. It's expansion of the water in the aquifer.

Q. That's just impressability?

A. That's impressability, yes, sir.

Q. You don't see any water pushing down and having higher pressure?

A. No, I'm not aware of any kind of hydrostatic type of situation, no, sir.

Q. Well, one other comment here. Has anybody estimated a maximum efficient rate to prevent coning? Has that been looked at?

A. We have not. In the course of modeling -- you know, we observe some things about coning, but we were not modeling for that purpose.

We were modeling more or less not much more than just a simple tank model really is what we did.

And so we did not specifically explore the coning mechanism.

It does occur in the Devonian reservoirs, as you're aware, sir.

Q. Now, I understand that the Holmstrom well, I thought someone said, was making 200 barrels of water a day; is that right?

A. No, sir. It's being reported about 10 barrels a day.

Q. Okay.

A. Produces on the order of about 200 to 300 barrels a month.

Q. Well, do you think there were uniqueness problems with your model? Do you think you could have done this in another manner and gotten the same type of performance that you got here, such as on Exhibit --

A. Yes, sir. I think you could have plugged in a wide range of factors here in trying to duplicate a highly permeable reservoir with bottom water, and you'd have gotten about the same results as far as showing it encroaches from the bottom, supports the pressure.

Q. It's not edge water; it's bottom water?

A. It's bottom water, yes, sir.

Q. Then the purpose of the model was to support the volumetrics?

A. Well, the purpose of the model actually was to show the bottom encroachment of waters that does occur, the increased saturation.

The lower level, as you void in the other levels and you maintain your pressure in those levels, it's indicating that there's no -- you've got, as far as those other levels are concerned, you've got -- you've got no uncompensated net migration of oil across any kind of boundaries or anything.

Q. You have no migration? You don't think the oil migrates across these boundaries?

A. There is movement both vertically and horizontally, but the net uncompensated migration is zero.

It all washes out because it's being supported from the bottom and the pressure maintains.

MR. WEISS: That's the only questions I have.

MR. LeMAY: Thank you, Commissioner Weiss.

EXAMINATION

BY MR. LeMAY:

Q. Mr. Hickman, let me ask you something. If you owned the entire field, how would you produce it?

A. If I was not worried about -- if I had common royalty interest also and common working interest?

Q. You own everything.

A. Own everything. I would produce the Holmstrom well at what I consider a maximum rate and then would do some tests, see if it's making some water now, see if I increased the rate, does it pull in water.

In fact, I would probably at this point in time, assuming that I can't go up to 515 barrels a day on that well without getting a large volume of water, which well may be the case, I do not know, but assuming it's making 10 now at 250 a day, it may well make a large volume at 515, I would plug back the current zone, open the behind-pipe interval. I would produce both the Holmstrom and the Deemar at, assuming I had the top allowables at 515 barrels a day, to get the maximum rate.

Eventually there will be water appear in the Holmstrom first, at which time you'll have to start cutting your rates back.

And at some point the Holmstrom will water out and then Deemar will water out.

The Deemar's high structural position will allow you to ultimately recover nearly all the reserves

within this reservoir.

Q. From the Deemar well, is that correct, just the one well itself -- I thought I got from Mr. Ahlen's testimony that one well definitely would drain the reservoir including the Holmstrom well.

A. Well, you could, yes, sir. Based on my concept of this reservoir, this high permeability and the effective water drive from the bottom, you could shut in the Holmstrom well and produce only the Deemar. And eventually over a period of time you would pretty well produce the reservoir out.

But you would, you know, if I was the operator, I wouldn't want to do that in that matter because economically I would want the biggest volume I could get.

And it would not, by producing the Holmstrom, it would not lower the recovery any.

Q. Assuming no coning, of course, once you got coning, then you might vary the allowables or vary your production rates --

A. Yes, sir.

Q. -- according to the coning.

Now, this is a real world. We have correlative rights, and we have spacing units here.

If you were Santa Fe Energy, in order to

protect your correlative rights, assuming that your recommendation was adopted by the Commission, would you drill a well 78 feet from that line?

A. I would -- I would go to the -- now, I don't know the ownership situation and whatnot, you know, but assuming that was not a problem, I would go to the undrilled northeast section, and I would move up-dip in that corner as high as I could -- the Commission would let me -- and drill a well.

Q. When you say that the correlative rights of Santa Fe would not be protected, however, in the current situation, let's say, did offset that well or something else was done to effectively unitize that field?

A. In relation that's one thing that comes to mind in most engineers that aren't broiled up in the economics and ownership problem and whatnot, it would make sense to unitize.

You know, they've got that -- Santa Fe has that undrilled quarter section; it's their option to drill.

Definitely, if they do not drill it, then the Holmstrom well and the Deemar well will eventually drain the oil out from under that.

What share each of them gets really depends

on the allowables and the rates that those wells are produced.

Q. I guess that's my next question. Is there a straight line relationship between the allowables and recoverable reserves?

A. There is a straight line relationship between the proportionality of allowables, not in absolute amounts.

If we set a top allowable and then were to proportion that allowable in the method such as I suggest on my Exhibit 14, I believe it is, or 13, then your main thing, you're relatively between the tracts and the recovery would be unchanged.

Now, if you were to swing at where the allowable in one well or allowable in the wells were not in some proportion to the reserves under their tracts, well, then, yes, sir, that does affect, very definitely, the ultimate recovery from the various wells.

Q. Not even allowables. Let's say productive rates because I think that we visualize this as the reservoir goes on that the down-dip wells -- in this case the Holmstrom well -- will water out or start producing large enough volumes of water so it's operational practice to cut back the flow rates.

Maybe that's what's being done now; we'll find that out with later testimony. But 515 barrels a day allowable doesn't do you any good if you bring in more water and prematurely drain this well, does it?

A. No, sir, it does not.

Of course, at this point in time, the Deemar is capable of 515 without water. And it's been my testimony that they have the option to plug back the Holmstrom and make it water-free and capable of 515.

So it's kind of an option with the operator.

Q. But ultimately, even though they plugged it back, wouldn't the normal course of producing a well in time start cutting some water and therefore --

A. Yes, sir, the water tables continually rise.

Q. Comes up?

A. And eventually all good things must come to an end.

Q. Or does it come to an end slowly? Do they cut back on the productive capability of that well so that they extend the life of it normally?

A. Yes, sir, in these vertically fractured reservoirs, which I believe is the case here and has been in prior hearings, there's been some testimony to that effect.

Depending on various physical factors, there

is a relationship you get within a certain -- the water level gets within a certain distance of the producing interval and coning can take place, which is just a localized rise of water above the common water table. And it's rate sensitive in most instances.

And so you can lower that. By lowering your rate, you can lower the volume of water. And in some cases you can lower it to the point where the water quits until the table rises higher.

And in other instances, it proves not to be rate sensitive.

I think in most instances the fractured Devonian proves to be rate sensitive to the coning effect.

MR. LeMAY: Thank you very much.

Additional questions of the witness?

MR. KELLAHIN: Mr. Chairman.

MR. LeMAY: Yes, sir.

MR. KELLAHIN: There are clarifying questions I wanted to ask the witness.

FURTHER CROSS-EXAMINATION

BY MR. KELLAHIN:

Q. If you'll go to Exhibit No. 10, Mr. Hickman.

A. Yes, sir. I have it, sir.

Q. Am I correct in understanding that the way

you have approached analysis of the reservoir assumes that this primary fault is truly vertical?

A. That is correct. The cross-section that -- not this one, but the one in the exhibit -- I forget the number -- actually shows the dip of the fault to the west.

So it would actually increase a little bit the productive area under the Deemar tract because it's wider at the bottom than it is at the top.

We used the top here, and it's not significant.

Q. That was the point of my question. There was dip Mr. Ahlen testified to, and I wanted to know in terms of your estimating the oil reserves if you had taken into consideration the dip?

A. No. I'm assuming this represents the trace of the fault in the top of structure, and that's what we used and --

Q. And it goes vertical?

A. Yes, sir.

MR. KELLAHIN: Thank you.

MR. LeMAY: Additional questions?

If not, the witness may be excused.

You may call your next witness.

MR. CARR: May it please the Commission, at

this time I call Henry J. Gruy.

HENRY J. GRUY,

having been previously duly sworn, testified upon his oath as follows:

DIRECT EXAMINATION

BY MR. CARR:

Q. Will you state your full name for the record, please.

A. My full name is Henry J. Gruy, G-r-u-y.

Q. Mr. Gruy, where do you reside?

A. I live in Houston, Texas.

Q. What do you do for a living?

A. I'm a consultant in petroleum and geological engineering.

Q. Are you a Registered Petroleum Engineer?

A. Yes, sir, I am.

Q. In what state?

A. Texas.

Q. Are you also a Certified Petroleum Geologist?

A. I'm a Certified Petroleum Geologist by the American Association of Petroleum Geologists.

Q. Where did you go to college, and what degrees did you receive?

A. I went to Texas A & M. I received a BS degree in petroleum engineering in 1937. I later

received a professional degree based on work done in the industry and submission of a thesis.

Q. Could you briefly summarize for the Commission your work experience since graduation?

A. I went to work originally for the Standard Oil Company of Texas in West Texas. I worked for them as field engineer.

And in the spring of 1938, the chief engineer for the California -- Standard of California came to West Texas and got all the engineers together and said any of us that hadn't gone to Stanford University had no future with the company, so I quit.

March 1, 1938, I went to work for Shell Oil Company. I worked for Shell Oil Company at what they called at that time an exploitation engineer -- that's before that was a bad word -- until the fall of 1945 when I worked on a number of areas for Shell and was district engineer when I quit.

And went to work for the Guardian McNaulton as a consulting petroleum engineer and geologist. I worked for them for five years, worked in most of the oil producing areas in the world.

I started my own business in 1950 in Fort Worth. 1956 I moved it to Dallas.

In 1960 I opened a Houston office. And 1972

I moved to Houston personally. I had two other companies: I had Gruy Petroleum Property Management, which I formed in 1960 to operate wells -- drill and operate and complete wells for other people on a fee basis.

I was president and chairman of that until 1972, at which time I got a president and remained chairman. And I remained chairman of that until I sold the company in December 31, 1986.

In 1972 I formed a company called Gruy Petroleum Technology. That's when DOE had a big budget, and I did a lot of research work for DOE and Gruy Petroleum Technology until last year when I dissolved that company.

And I now just have Gruy Engineering Corporation of which I'm now the cochairman.

Q. Are you a member of any professional associations?

A. Yes. I'm a member of the Society of Petroleum Engineers, which I was president in 1968, the Society of Petroleum Evaluation Engineers, of which I was president in 1964.

I belong to the American Association of Petroleum Geologists. I was the Dallas District representative in 1960-something-or-other for two

years.

And I belong to the IPAA and the API.

Q. Are you a member of the National Academy of Engineering?

A. I've been elected to the National Academy of Engineering, yes.

Q. What other special awards or recognition have you received for your work as an engineer and geologist?

A. Well, I'm a distinguished member of the SPE -- an honorary member of both SPE and the AIM, which is the highest award they can give.

I got the award for Engineer of the Year in Dallas from the National Society of Professional Engineers in 1964.

I got the DeGuille medal from the SPE in 1984. I got a medal for Distinguished Engineering Alumnus of Texas A & M University in 1985.

Q. Have you in the course of your career been called upon to testify before government bodies on oil and gas matters?

A. Yes, I've testified before the Conservation Commissions of most of the states.

Q. Have you testified in New Mexico before?

A. Yes, sir, I've testified in New Mexico. I've

testified before the Atomic Energy Commission, the Federal Power Commission, and the Securities and Exchange Commission.

Q. Have you had experience in the course of your professional career in allocating reserves in oil and gas fields?

A. I have.

Q. Have you been involved in efforts to allocate unitization projects?

A. I have.

Q. Have you done those in the United States and other places?

A. I have.

Q. Are you familiar with the principles involved in the allocation of reserves to wells and tracts in reservoirs in the primary producing states in this country?

A. Yes, sir.

Q. Are you familiar with the applications involved in this case and what's being sought in this hearing?

A. Yes, sir.

MR. CARR: I tender Mr. Gruy as an expert witness in petroleum engineering and in petroleum geology as well.

MR. LeMAY: Mr. Gruy is so qualified.

Q. (BY MR. CARR) Mr. Gruy, have you been retained in this case by Stevens Operating and Curry and Thornton Corporation?

A. Yes, sir.

Q. By Stevens Operating Corporation and by Curry and Thornton?

A. I've been retained by Stevens Operating Company. I don't know anything about Curry and Thornton.

Q. What were you asked to do when you were retained?

A. I was asked to review the work that Mr. Hickman did and to see if it was reasonable.

Q. And have you reviewed the data that's available on this pool and been present at this hearing?

A. Yes, sir, I have.

Q. Do you have an opinion as to whether or not that data is sufficient to calculate the total reserves in the pool?

A. Yes, sir, I do.

Q. And what is that opinion?

A. My opinion is that it's reasonably good data and that you can make a reasonable estimation of the

oil in place and recoverable oil.

Of course, the recoverable oil by tracts depends upon the relative producing rates that they're allowed.

Q. Were you present for Mr. Ahlen's testimony?

A. I was.

Q. And did you hear his testimony concerning the placement of an oil-water contact in this reservoir?

A. Yes, I did.

Q. In your experience as a petroleum geologist, are the methods that were employed by Mr. Ahlen consistent with sound engineering practice?

A. Well, that's what's usually done when you don't know; you guess in between what you know and what you don't know.

Q. In your opinion was this a reasonable selection for an oil-water contact?

A. I thought it was reasonable. I think it's possibly higher than that based on the early water production from the wells, but I think it's reasonable.

Q. Were you also present for Mr. Hickman's testimony?

A. Yes, sir, I was.

Q. In your opinion, is there sufficient data available to calculate the recoverable reserves in this

pool?

A. Yes, sir.

Q. Can those calculations also be made on a tract basis in the pool?

A. The recoverable reserves that originally underlie the tracts can be estimated.

How much they're actually going to recover will again depend on the relative rates they're allowed to produce.

Q. In your opinion were the methods employed by Mr. Hickman consistent with standard industry practice?

A. Yes, sir.

Q. What would be the effect on Mr. Hickman's calculations if certain factors, like, say, the recovery factor were changed?

A. The recovery factor doesn't make any difference if you used the same recovery factor for the whole field.

What's really important is the gross volume of rock that's under the various tracts and just getting it down to the recoverable oil.

If you're wrong on those factors, if the recovery is 60 percent instead of 35, it won't change the relative position of the tracts with regard to the necessary allowable or producing rate to allow them to

recover the oil that's originally in place, recoverable under their tract.

Q. Were you present for the cross-examination of Mr. Hickman when he was asked if he had exact figures and precise numbers as to the reserves under these tracts?

A. Yes, sir.

Q. When you use the disciplines or sciences of engineering and geology, do you get exact and precise numbers like that?

A. We get exact and precise numbers on very few things. I don't even know how much I weigh. It depends on how long it's been since I had a drink of water.

Q. But within general and accepted engineering principles and standards, has the data that has been presented, in your judgment, been sufficient to allocate reserves in this reservoir?

A. In my opinion, it is.

Q. In your opinion, will approval of a nonstandard proration unit comprised of the east half of the west half of Section 9 prevent waste?

A. Yes, because it will prevent the drilling of unnecessary wells.

Q. In your opinion, will the No. 1 Deemar drain

the reserves that are under that spacing or proration unit?

A. If allowed to produce at something that's a reasonable rate, it will. It won't drain it at 23 barrels a day.

Q. Mr. Gruy, there's been a lot of talk in the proceeding about the allocation or the penalties being imposed on wells because of proximity to the property boundaries, questions Mr. Hickman responded stating that no advantage would be gained by virtue of this location.

Do you concur with Mr. Hickman's statement that no advantage will be gained from the Deemar location?

A. Yes. If you have two straws in a Coke bottle, how much you get depends on how fast each straw sucks.

The position of the bottom of those straws in the Coke bottle doesn't make any difference.

Q. If Mr. Stevens' straw is on the edge of the Coke bottle and Santa Fe's is in the center, will that affect the amount that they each can receive?

A. No, sir.

Q. If Mr. Stevens owns a quarter of the Coke in the bottle, and his straw is on the boundary, and Santa

Fe owns three-quarters, and they're in the middle, and he's permitted to suck one-quarter as much or as strong, will that afford him an opportunity to get his share?

A. Yes, sir, regardless of where the bottom of the straw is.

Q. Will that deny the other guy the opportunity to get his?

A. No, sir.

Q. In your opinion, should the Deemar No. 1 well be penalized beyond what Mr. Hickman recommended?

A. It ought to be penalized only to the amount of reserves is less than the other.

Q. Do you agree with the recommended allocation made by Mr. Hickman that the Deemar well will gain an advantage on other acreage in the pool?

A. It won't gain any advantage. It's how much oil Deemar well will recover is strictly dependent on its relative rate of productions vis-a-vis other wells in the reservoir.

Q. What is the impact? Are you familiar with the restrictions that have been imposed on the producing rate on the Deemar well?

A. I understand it was restricted to 23 barrels a day, or something ridiculous like that.

Q. In your opinion, if that is maintained, will it give the Deemar well the opportunity to produce the reserves under that tract dedicated to that well?

A. In my opinion, it will not.

Q. In your opinion, is allocation of reserves in the North King Camp Devonian Pool based on reserves practicable?

A. Yes, sir.

Q. And on this kind of data, has it been done in your experience and have reserves been allocated in units based on this kind of data?

A. Yes, sir, in many places.

Q. On data that is no more sufficient than this, have reserves been allocated between tracts in other reservoirs in other jurisdictions?

A. Yes, sir.

MR. CARR: Thank you. I have nothing further.

MR. LeMAY: Thank you.

Cross-examination.

CROSS-EXAMINATION

BY MR. PADILLA:

Q. Mr. Gruy, when were you hired by Stevens?

A. About two weeks ago.

Q. How much time have you spent reviewing the

information in this case?

A. All of yesterday afternoon and a few hours in my office based on data they sent me.

Q. Did you review the prior orders of the Division?

A. No, sir.

Q. Did you review the letter restricting -- applying the penalty on the Deemar well?

A. No, sir.

Q. Would it surprise you to know that's 34 barrels and not 23 barrels?

A. No, sir.

MR. PADILLA: I think that's all I have.

MR. LeMAY: Thank you, Mr. Padilla.

Mr. Kellahin.

CROSS-EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Gruy, let me examine your Coke bottle with you.

A. Yes, sir.

Q. Your response to Mr. Carr presumed the Coke was contained within the bottle and that each straw was of comparable length?

A. Yes, sir.

Q. And that as applied to this reservoir within

the range of reason and the mechanics of the reservoir, Mr. Stevens and Mr. McAlpine can each suck till they're content on their respective straws?

A. Yes, sir.

Q. Let's take the bottom out of your Coke bottle and introduce a water drive into your Coke bottle.

A. Yes, sir.

Q. And let's take Mr. Stevens' straw and make it the short straw.

A. Yes, sir.

Q. And if we introduce a water drive into your Coke bottle, there is going to be a point in time in which Mr. McAlpine is sucking water and not Coke and Mr. Stevens is still getting his Coke?

A. That's correct.

Q. Based upon your vast experience -- and I'm impressed, and it's not often we have someone before us with your background, sir -- I assume, and perhaps it's a presumption, but I assume in the years of your experience, you have been involved in one side or another of a case or perhaps had to decide a case in which geologic experts, each of whom you knew personally and had tremendous respect, had taken similar data and come to significant, material, substantial differences in their interpretation of that

geology?

A. That's correct.

Q. Mr. Hickman's work as an engineer is predicated on what Mr. Ahlen has determined to be the gross reservoir volume for the Devonian, is it not?

A. That's correct.

MR. KELLAHIN: No further questions.

MR. LeMAY: Thank you, Mr. Kellahin.

Additional questions of the witness?

MR. CARR: Well, I can't resist the temptation.

MR. KELLAHIN: You leave my Coke bottle alone.

MR. CARR: I'd like to go back to your Coke bottle. I think it's going to be the one thing we remember two days from today.

REDIRECT EXAMINATION

BY MR. CARR:

Q. Could Mr. McAlpine continue to suck Coke with Mr. Stevens if he put another shorter straw in that bottle?

A. If he put a shorter straw in there, he could, yes.

Q. Do you know of anything in your knowledge that would preclude that?

A. It would depend upon whether he's allowed to put another straw in.

Q. But you don't know if he has the opportunity or not?

A. I don't know.

MR. CARR: That's all.

MR. LeMAY: Thank you, Mr. Carr.

Commissioner Weiss.

EXAMINATION

BY MR. WEISS:

Q. Do you think that the pressures will remain equal, or is there -- let me put it this way. Is there a rate we can set these two wells at where the pressure will remain equal across the lease line?

A. I don't think it makes any difference whether it does or not.

Q. Do you think it will flow across the lease?

A. It doesn't make any difference if it flows across the lease line. What we're talking about here is net uncompensated drainage.

There's going to be some flow across that lease line there, but there's going to be flow the other way across the lease line up at the other end.

That is a tank just like that Coke bottle, and it doesn't really make any difference. Some oil is

going to flow across that lease line toward --

Q. The low pressure side?

A. Well, it doesn't make any difference whether the pressure is lower or not; there's going to be some flow across there.

But what we're talking about is recovering the fair share based on what was originally under the tract.

Everybody -- in my understanding of it, everybody should be given the opportunity to recover the recoverable oil originally underlying their lease.

And some of the laws say that which drains there naturally too. But --

MR. WEISS: Thank you.

MR. LeMAY: Mr. Gruy, I, too, am impressed by your credentials.

THE WITNESS: I tell you it's just because I've lived longer than anybody else. Everybody else my age and my experience is retired out on the ranch somewhere, and I'm still working.

MR. LeMAY: Well, I promised not to tell any Aggie jokes; that's not something you appreciate.

If you owned this entire field, how would you produce it?

THE WITNESS: If I owned this entire field, I

would produce the two wells that are there until the lower one watered out, and then I would produce the higher one as long as I could, till it watered out.

And I think those two wells would effectively drain this reservoir.

MR. LeMAY: And you would not drill additional wells?

THE WITNESS: I don't think I would unless the price of oil got to where I wanted to increase my income.

MR. LeMAY: Thank you very much.

Additional questions of the witness?

If not, you may be excused.

THE WITNESS: Thank you, sir.

MR. LeMAY: Thank you, sir.

MR. LeMAY: Any more witnesses?

MR. CARR: We have nothing further on direct.

Let's take a break, 15 minutes. Come back at 3:00, and we'll hear the other side.

(Thereupon, a recess was taken.)

MR. LeMAY: We shall resume.

Mr. Padilla.

MR. PADILLA: Mr. Chairman, at this time we'll call Chuck Holmstrom.

CHARLES HOLMSTROM,

having been previously duly sworn, testified upon his oath as follows:

DIRECT EXAMINATION

BY MR. PADILLA:

Q. Mr. Holmstrom, would you state for the record your full name, please.

A. Charles Holmstrom.

Q. Where are you from, Mr. Holmstrom?

A. Midland, Texas.

Q. What do you do for a living?

A. I'm a consulting geophysicist.

Q. Have you testified at the Oil Conservation Division in connection with this hearing before?

A. Yes.

Q. Can you briefly go through your educational background in your profession?

A. I have a bachelor's of science degree in geology from the University of Oklahoma. I worked eight years for seismic contractors.

Q. For whom did you work?

A. Republic Exploration and GSI. Following my employment with GSI, I worked for Union Texas Petroleum for eight years in Midland, and I was district geophysicist when I left that job.

And since that time, I've been consulting.

Q. How long have you been consulting?

A. Twelve years.

Q. Did you consult in the drilling of the Santa Fe well?

A. Yes.

Q. Tell us about that. What studies did you make in order to consult with regard to that well?

A. I made studies of the seismic data we first looked at when they were taking an interest in the well.

And then following that Santa Fe Exploration, shot two additional seismic lines, and those were included in the map before the first well was drilled.

Q. Mr. Holmstrom, did you recommend the drilling of the initial well?

A. Yes.

Q. As a result of your studies?

A. Yes.

Q. Have you prepared certain exhibits for introduction here today?

A. Yes.

Q. How many?

A. One.

Q. One.

MR. PADILLA: Mr. Chairman, we tender Mr. Holmstrom as an expert witness.

MR. LeMAY: His qualifications are acceptable.

Q. (BY MR. PADILLA) Mr. Holmstrom, let me hand you --

A. I have one. Thank you.

Q. -- what we have labeled as Exhibit No. 1. Would you tell the Commission what that exhibit is?

A. Exhibit No. 1 is the exact same exhibit that I used last time I talked to you fellows, except I have two new pieces of information, the two sidetrack holes that Mr. Stevens drilled.

The change I made on the map, I've spotted his bottom-hole locations on as accurately as I could. I ran the fault through -- between wells, and that's the -- and also I've added a minus 6100-foot contour line between his first sidetrack hole and the Honolulu Federal.

(Thereupon, Holmstrom Exhibit No. 1 was identified.)

Q. Mr. Holmstrom, what was the first item you mentioned that you changed?

A. The location of the fault.

Q. Well, why did you change the location of the

fault?

A. Well, they crossed the fault with their second sidetrack hole, and that well is upwards.

So between those two wells, we know that location where the fault is.

Q. What's the second thing you changed?

A. The second thing I changed was adding a contour, a minus 6100-foot contour between the first sidetrack hole and the Honolulu Federal.

Q. Now, why did you do that?

A. The first sidetrack hole was roughly 25 feet high structurally to the Honolulu well.

Q. What's the effect, the net effect, of the changes you have made on this exhibit?

A. The net effect is that the part, the up-thrown part of the structure on the west half of the section is smaller.

Q. Would that have the effect of reducing productive acreage or reserves on the Stevens tract?

A. Yes.

Q. In terms of the reservoir limits, does this exhibit help us in determining what those limits are?

A. Excuse me?

Q. Does this exhibit help us in deciding what the limits of the reservoir are?

A. Yes, I would judge it to help.
Q. And how would that help?
A. It shows the shape of the structure --
Q. Let me hand you --
A. -- and the limits.
Q. -- Mr. Holmstrom, what we have marked, what has been marked as Exhibit 4, and this is the exhibit that Mr. Ahlen used in his testimony.

Can you, please, tell the Commission what the difference is between the two, your interpretation of the structure and Mr. Ahlen's interpretation of the structure?

A. The primary difference, in my opinion, of these two maps, on the map I constructed for Santa Fe Exploration, we have a seismic line marked SF2.

It's marked in the north part of Section 21, the north-south line.

That line displays north dip from shot point 180 just north of the half line in Section 9 to the north end of the section.

And Mr. Ahlen's map tends to open that up, and he's showing mostly east dip in there.

And if I were to use his minus 6,055 contour, his estimated oil-water contact, it cuts off about midway up through the north half of the Section 9.

And the way he has it drawn, it goes clear to the north end of the section.

Q. Now, Mr. Holmstrom, you're relying on the actual shot point on the seismic data?

A. I'm relying on the seismic data that we have, and Mr. Ahlen doesn't have any.

Q. Is your approach, in your opinion, more prudent, Mr. Holmstrom?

A. Well, I think I have -- I think I have information that shows we have north dip.

Q. And that shows the limit of the reservoir?

A. Yes, it shows the north limit of it.

Q. Okay. And what does that do to productive acreage?

A. Well, it would make it less.

Q. If you did what Mr. Hickman did, you would wind up with less of a reservoir essentially; is that what happens?

A. I'm sure you would.

Q. Mr. Holmstrom, on an eyeball basis, what is the difference between the two maps in terms of percentages?

I don't want to pin you down to any significant percentage or particular percentage, but can you tell us generally what the difference is as far

as productive acreage is concerned?

A. I don't know. I honestly haven't made that calculation to tell you that. And it's probably 10 percent less, anyway.

Q. Okay. Do you have anything further concerning your testimony on Exhibit No. 1, Mr. Holmstrom?

A. No.

MR. PADILLA: I believe that's all I have for this witness, Mr. Chairman.

MR. LeMAY: Thank you, Mr. Padilla.

Do you want to do the direct?

MR. KELLAHIN: Let me ask Mr. Carr.

MR. CARR: It's fine if they want to both do direct. We voted on my side, and I'm going to do cross.

MR. LeMAY: I assumed that.

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Holmstrom, do you have before you Mr. Ahlen's structural interpretation?

A. Yes.

Q. And you have also your exhibit before you?

A. Yes.

Q. When we look at the well water contact that

Mr. Ahlen has located on his display, he shows an oil-water contact, which he shows to be at 6,055 estimated?

A. Yes.

Q. Do you and he have a disagreement about the structural position of the oil to the water in the Devonian in this section?

A. If we use the same oil-water contact on the map that I've drawn, there would be a difference, yes.

Q. I didn't make myself clear. What, in your opinion as a geologist, is the oil-water contact in the section?

A. I have no idea what the oil-water contact is.

Q. If you take Mr. Ahlen's pick of the oil-water contact and then use your structure map, what is the effect of that oil-water contact using your contour lines as we move into the west half of the section?

A. The amount of petroleum reserves becomes less.

Q. As compared to what Mr. Ahlen has interpreted?

A. Yes, sir.

Q. There is a difference then between the two geologists about how you have contoured the contour lines through the northeast quarter of the section and

integrated them back into the fault?

A. That's right.

Q. When we look at Mr. Ahlen's display, we see a particular way of mapping the contour lines, and yet in contrast you have done something different?

A. (Witness nodded.)

Q. What have you done that's different from Mr. Ahlen?

A. I've used seismic data to make the dip, the north dip, that is shown on my map, which I point 180 to the north edge of the section.

Q. When we look at your display, I see shot point 180; that is the seismic information that you have interpreted to cause you to take those contour lines and wrap them back into the fault?

A. Yes.

Q. What tells you by looking at that information that's how you should interpret the data?

Do you look at something and it shows you as a geologist that's how you ought to contour?

A. You look at the seismic data and make a calculation after you get the data.

Q. And that is an interpretation and a selection of a way to contour through this portion of the section that you presented at earlier hearings in these cases?

A. This has not been changed. This is the same map that I used last time.

Q. You have sat through Mr. Ahlen's presentation and looked at his interpretation, have you not, sir?

A. Yes.

Q. Has anything he has said with regards to how these lines are contoured caused you to change your opinion?

A. No.

Q. When we look at the fault, what is the available data that you have utilized that causes you to conclude geologically that the fault is more perpendicular north-south and closer to the centerline of the section than Mr. Ahlen obviously has done in his display?

A. I base the fault location in a similar -- the technique was the same as I did the last time.

There's a fault cut on the line that's shown as GS1282 that runs east-west through the middle of Sections 17, 16, 15, 14.

And I interpret that as the same fault as it's shown between the two Stevens wells.

And what I've done on this map is drawn a straight line between those two fault cuts.

Q. You're familiar with the wellbore imagery

that Mr. Ahlen talked about that he utilized in, I believe, the second reentry of the well?

A. Yes.

Q. You've had an opportunity to look at that information?

A. (Witness nodded.)

Q. Describe for us what your opinions and conclusions are with regards to that information?

A. Well, I'm primarily a geophysicist. And that's a logging technique, and it's a very new technique. I'm sure it's very powerful technology and --

Q. Have you had the opportunity to utilize it on any of your wells?

A. I had seen it on one well, yes, sir, but I don't consider myself as an expert on the Formation MicroScanner.

Q. When we look at the way you have contoured the structure, does it make a difference to you as to what the location is of the Holmstrom well in the southeast quarter?

A. I don't --

Q. When we look at the Holmstrom well as shown on your display --

A. Okay. No. 1 well?

Q. Yes, sir, you know, the one that --
A. The producing well.
Q. The producing well.
A. All right.
Q. Mr. McAlpine's producing well, that well. What have you used as the location of that well by which then you have contoured your structure lines?
Where is that well located physically within the southeast quarter?
A. 1980 from the south and east.
Q. What is the location of that well to the common boundary between the two properties, meaning the Stevens' spacing unit and Santa Fe Exploration's spacing unit?
A. It's the legal location within that lease lot.
Q. When we interpret your structure map for the well at that location, do you and Mr. Ahlen have agreement or disagreement about the structural relationship of the top of the Devonian and the Stevens well versus the McAlpine well?
A. No, I don't think we have.
Q. You both find that the top of the Devonian in the respective wells is approximately 55 feet apart?
A. Yes.

MR. KELLAHIN: Thank you, sir.

MR. LeMAY: Thank you, Mr. Kellahin.

Mr. Carr.

MR. CARR: Anyone else want to do direct?

CROSS-EXAMINATION

BY MR. CARR:

Q. Mr. Holmstrom, you testified you were involved at the time the original well was drilled, the Holmstrom Federal No. 1; is that correct?

A. Yes.

Q. At the time that well was drilled, based on the seismic data and other information you had available, you were aware there was a fault in the area; is that not correct?

A. Yes.

Q. You were aware that fault was on the west half of Section 9; is that correct?

A. Yes.

Q. You were aware there were reserves over there. Did you have any information concerning the ownership of Section 9 at that time?

A. (Witness shook head.)

Q. But you did know there was a fault on the west half of the section; is that right?

A. That's right.

Q. And there were reserves over there at the time you drilled the well?
A. (Witness nodded.)
Q. Is that right?
A. That's right.
Q. When you look at the seismic work that you have in this area, do you have a reflection in the seismic on the Devonian -- is that what it's called? Is that how you see the Devonian?
A. I interpret it as a reflection on the Devonian, yes.
Q. Is it clearly identifiable in the area of the fault?
A. No. It's interfering with the noise from the fault.
Q. Now, when you --
A. How close to the fault are you talking about?
Q. Well, I mean with what we have as I look at the three plats that you have presented in the last hearings is that in all cases we have a fault and basically they have moved from hearing to hearing.
A. (Witness nodded.)
Q. And my question is, how accurate is the seismic in this area?

A. Well, in this case I moved the fault 200 feet to the east according to my scale.

And I don't feel like 200 feet -- I feel like 200 feet is within the limits of what I'm able to do.

Q. Could it be that the fault could be 200 feet, say, even with this data to the west of where you placed it right now?

A. No. Then the Stevens No. 1 sidetrack would have been up from it.

Q. What about in the northern portion of Section 9, say, in the northeast of the northwest? Could it be 200 feet in that area; would that be within the reason?

A. It could be within 200 feet.

Q. If it's 200 feet to the west up there, wouldn't you have less of a north dip and more of an east dip in the formation?

If you take the fault in the northern portion of Section 9, move it 200 feet to the west, wouldn't that tend to in fact make the dip more easterly and less northerly?

A. I don't see how you're changing the dip on the contours by moving the fault if you don't change the contours.

Q. But you move the fault and honor that information, wouldn't you also have to adjust the

contour?

A. I didn't adjust contours on this map.

Q. In terms of the seismic data you have available to you at this time, is there anything new that you didn't have available to you a year ago in the pool rule hearings?

A. We have the information on these two wells.

Q. Do you have additional seismic work?

A. No.

Q. But basically your interpretation is these two new wells and the preexisting seismic data?

A. Yes.

Q. And it was based, if we look at the information that you're utilizing to project the dip in the northeast of 9, that's the line that is labeled SF2; isn't that right?

A. Yes.

Q. Do you also integrate information from line SF1 that runs east-west across the area?

A. Yes.

Q. Isn't that the very same seismic information that you would have utilized to have previously placed the fault to the west of where you're placing it today?

A. It is the exact same data.

Q. And so the only new data that you've utilized

to move this is in fact the information from the two, the sidetrack wells, that were drilled by Stevens?

A. Yes.

Q. I believe you stated you had not had access to the information from the Formation MicroScanner; isn't that correct?

A. That's correct.

Q. And that information provides you with information on the dip and the strike of the fault; isn't that right?

A. That's interpretive.

Q. But if you had information that you could interpret dip and strike of the fault, wouldn't that be something that you would also be able to utilize in further refining this information?

A. Possibly.

Q. And that's information you haven't had; isn't that right?

A. That's right.

Q. Now, if we look at the seismic lines, the SF No. 2 and SF No. 1, that's the only seismic information that could have been utilized to in fact drill the first sidetrack hole drilled by the Stevens and the Deemar earlier this year; isn't that correct?

A. Yes.

Q. That resulted in a dry hole, didn't it?
A. Yes.
Q. The fault wasn't where it was projected; isn't that right?
A. That's right.
Q. It's also the very same seismic information that you utilized in picking the location for your Holmstrom No. 2; isn't that right?
A. That's right.
Q. That was a dry hole?
A. That's correct.
MR. CARR: That's all I have. Thank you.
MR. LeMAY: Thank you, Mr. Carr.
Additional questions of the witness?
Yes, sir, Mr. Padilla.

REDIRECT EXAMINATION

BY MR. PADILLA:
Q. Mr. Holmstrom, in reviewing the imaging information that was presented by Stevens this morning, did that have any effect in your interpretation of the fault or the contour lines?
A. No.
Q. No influence at all?
A. No.
MR. PADILLA: That's all.

MR. LeMAY: Just one here, Mr. Holmstrom.

EXAMINATION

BY MR. LeMAY:

Q. On your map it's -- the scale that we're talking about -- a couple hundred feet isn't much?

A. It's about the width of the fault line, yes, sir.

Q. That's what it looks like to me. My concern is on your line SF2 and SF1, are those pretty accurately located in relationship to the various footages in there?

I mean is it -- it's not just eyeball line, is it?

A. No, sir. That's as accurately as I can -- the survey in the field was made to this same scale, 1 inch to 2,000.

And that surveyor's plat was used to locate these shot points on the map.

Q. So we can assume that even though the scale is --

A. They're as accurately as I can get them on a to-scale map.

Q. And the other indication, you show an additional fault where I think Mr. Ahlen shows just one fault.

He takes a curve in that fault, and you show two faults separating that dry hole, that No. 2 well.

You were able to see on the record down there a fault?

A. The second fault is not as clear as the fault on the west side. It's more interpretive than the large fault, the structure-forming fault on the west side.

But I feel there is some evidence for fault on the north-south line.

MR. LeMAY: Thank you.

Additional questions?

If not, you may be excused. Thank you, sir.

L. D. SIPES, Jr.,

having been previously duly sworn, testified upon his oath as follows:

DIRECT EXAMINATION

BY MR. PADILLA:

Q. Mr. Sipes, please state your name.

A. L. D. Sipes, Jr.

Q. Where do you live, Mr. Sipes?

A. I live at 1400 Princeton, Midland, Texas.

Q. Are you a petroleum consulting engineer?

A. I am a petroleum engineer, yes.

Q. And you're a consultant to Santa Fe

Exploration in this case?

A. Yes, I am.

Q. Can you tell us about where you received your education in petroleum engineering?

A. I received my bachelor of science degree in petroleum engineering from Texas Tech University in 1957.

Q. And what have you done since you received that degree, Mr. Sipes?

A. Well, for the next ten years, with some time out to go to school and to the Army twice, I worked for four laboratories, mostly in the research lab and in their engineering consulting department.

Q. And for how long did you do that?

A. Until 1966. And in 1966 I went to work for a local consulting firm in Midland, Texas. In 1969 we purchased that firm, employee's did. And that firm has been in existence since that time.

For about 25 years I was in the consulting business.

Q. What was the name of that firm?

A. Sipes, Williamson & Associates.

Q. Are you still a consultant engineer, a consulting engineering?

A. I do consulting on occasion, yes, sir.

Q. And you're with that firm still, or you're no longer with that firm?

A. I'm still associated with that firm, although I'm not an active consultant in that firm.

Q. Now, you testified in connection in the first hearing on the matter; isn't that correct?

A. Yes, I did.

Q. Have you prepared for introduction exhibits for today's hearing?

A. Yes, I have.

MR. PADILLA: Mr. Chairman, we tender Mr. Sipes as an expert in petroleum engineering.

MR. LeMAY: His qualifications are acceptable.

Q. (BY MR. PADILLA) Mr. Sipes, let's get into Exhibit No. 2 and have you identify that for the Commission.

A. Exhibit No. 2 is a structure map on the top of the Devonian formation in the North King Camp Field, Chaves County, New Mexico.

On that I have attempted to honor the well cuts and datum which you see listed there.

And then I have also tried to honor the dip, which was established by Mr. Holmstrom on his maps, regarding the north dip and east dip in the portions of

the reservoir where we have no well information.

(Thereupon, Sipes Exhibit No. 2 was identified.)

Q. Now, you essentially did the same thing that Mr. Hickman did with regard to Mr. Ahlen's maps; is that essentially what you've done in making Exhibit No. 2?

A. Essentially, so although you'll notice that the shape of the contour may not be precise because this was not done as an overlay; it was done to honor the dips and the specific distances that I know are there.

Q. Why is it important to honor the dips in this case?

A. We have to project the top of the Devonian where it intersects the oil-water contact in order to describe the entire area of the reservoir and the volume.

Q. Where do you establish the oil-water contact?

A. The oil-water contact, we don't have any data on which to establish that contact in this field.

We know that the highest known water that's been measured on the east side of the fault has been at a minus 6,107.

Q. You're looking now at Exhibit No. 3; is that

correct?

A. I'm looking at Exhibit No. 3 to get the exact numbers.

The lowest known oil in the reservoir at this time is a minus 6,016.

Q. How is the oil-water contact important insofar as determining reserves in this case?

A. The oil-water contact is extremely important in this field because it determines -- because it is a water drive reservoir, it determines the volume of reserves which you will ultimately recover from this field and also how those reserves will be shared as the cumulative production in the field goes up.

Q. As you produce the reservoir, what happens to the water drive mechanism? How does that affect producing rates?

A. Well, in a water drive reservoir, what you have is a similar analogy to Mr. Gruy's Coke bottle; only whenever it is expanded to the extent of the additions which Mr. Kellahin gave it, which was the bottom water drive, when you start putting water into it.

The amount of reserves that would be produced as the oil-water contact moves up in a water drive reservoir will be shared proportional to the amount of

rate or oil that is produced from each well that is capable of producing.

Q. Now, you've heard the testimony this morning from Mr. Hickman, and he wants to produce both wells at essentially even rates.

What do Exhibits 1 and 2 show in relation to producing rates on the basis of top allowable?

A. Well, if you take Exhibit 2, and I took Exhibit 2 and I planimetered the information, the areas and volumes on Exhibit 2, from which I prepared Exhibit 3.

Exhibit 3 is simply a depiction of the reservoir dip sub-C on the left and then the cumulative reservoir volume at that depth and drew a graph of that information so we would have something graphically that we could look at and understand what's happening in that reservoir.

Now, using Exhibit 3 I have shown on here the perforated interval in the Deemar Federal No. 1 and also the open hole section of the Holmstrom Federal No. 1.

If you look at this, and I would just eyeball this, but at an oil-water contact, which Mr. Ahlen suggested might be at 6,055 feet, then there's probably 11,000, 11,500 acre feet of productive reservoir in

this structure in my opinion.

I agree with Mr. Gruy that probably the oil-water contact is slightly above that because of the performance of the Holmstrom Federal No. 1

(Thereupon, Sipes Exhibit No. 3 was identified.)

Q. In other words, by virtue of cumulative production on that well, the oil-water contact has risen?

A. Yes. It will rise in the entire reservoir because of the good permeability within the reservoir.

And at -- with each successive level of movement of that oil-water contact, the reserves will be shared by the relative amounts of production that's taken from each well.

And there will be drainage across lease lines within this reservoir.

Q. Because of the proximity of the Deemar well to the property line, or how -- would you explain your last remark, please?

A. Well, the last remark was simply made and it assumes that there would be some, as you had indicated earlier, some parity between the producing rates between the Deemar and the Holmstrom.

For example, if the oil-water contact moved

up and there was 100,000 barrels of oil produced in this reservoir, with that movement of the oil-water contact, and each well produced at 500 barrels a day during that period of time, then they would share reserves fifty-fifty.

Q. Now, let me show you what we have marked as Exhibit No. 4. Please identify that for the record.

A. This is a letter from the Oil Conservation Division dated August 28, 1989. It's addressed to Campbell & Black, P.A., Santa Fe, New Mexico, attention Mr. William F. Carr.

(Thereupon, Sipes Exhibit No. 4 was identified.)

Q. What's the bottom line of that letter? I realize the letter speaks for itself, but that letter sets an allowable restriction, doesn't it?

A. According to this letter, the application of the penalty, which is written into the Commission order, to the Deemar Federal No. 1 would give an allowable of 34.04 barrels per day.

Q. Have you in your exhibits made an independent evaluation of how this figure relates to an appropriate penalty for the Deemar No. 1 well?

A. Well, in some of my work, I have taken the amount of reservoir volume, which is west of the lease

line or in the west half of Section 9, and compared that to the total reservoir.

And at a sub-C depth of 6,055 for the oil-water contact, the proportion of reserves, in my opinion, that lie west of that lease line and on Mr. Stevens' lease is approximately 10 percent.

Q. And in applying, how do you apply that 10 percent to the top allowable of the pool?

A. If you assume that the total withdrawals from the pool are 500 barrels a day, then the Deemar Federal should be allowed to produce 10 percent of that, or 50 barrels.

Q. Fifty barrels. So your estimate is that based on that 10 percent that you ought to have an increase of 34 barrels, as stated in this Exhibit 4, from 34 to about 50?

A. No, sir, not exactly. The Holmstrom Federal No. 1 right now is producing slightly over 200 barrels of oil per day.

And if you apply that 10 percent, then it would equate to about 21 barrels a day for their 10 percent withdrawal from the reservoir.

Q. In effect, so you're saying you should not apply it against the top allowable, but the actual producing rate of Santa Fe well?

A. I think that would put it in fairness and would be equitable based on their proportion of the reservoir above the oil-water contact.

Q. Mr. Sipes, do you have anything further concerning Exhibits 1, 2, 3, or 4?

A. I don't believe so.

MR. PADILLA: Pass the witness, Mr. Chairman.

MR. LeMAY: Thank you, Mr. Padilla.

Mr. Kellahin.

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Sipes, you were present in the hearing room today during the course of Mr. Ahlen's presentation testimony, and you have seen and looked at his exhibits?

A. Yes, I have.

Q. Were you also present in the hearing room when Mr. Hickman testified and had an opportunity to hear his testimony and review his exhibits with him as he made his presentation?

A. Yes.

Q. Would you buy and sell reserves within this section based upon Mr. Ahlen's and Mr. Hickman's cumulative study of the estimated oil recovery within

the section?

A. No, sir.

Q. Why not?

A. In my opinion the oil-water contact is higher than than they have assumed, that's number one, that would reduce the overall reserves.

And, number two, from the information I had, I calculated Mr. Hickman's arrived at about 431 barrels of oil in place per acre foot.

And I questioned whether or not we have enough information on which to make that kind of -- that kind of judgment, sir.

We have not penetrated the entire reservoir, and we do not have logs and other information that would tell us what those properties are below the bottom of the holes which have been drilled.

Q. In your opinion, as a reservoir engineer -- well, let me ask you this.

If available technical data is supplied to you in which you have confidence, are you able in certain areas to determine within a reasonable degree of probability the net productive acres within a particular tract?

A. Yes.

Q. Do we have, in your opinion as a reservoir

engineer, sufficient data within this area to make that determination in this case?

A. In my opinion, yes.

Q. When we look at the oil-water contact, what information do we have with regards to the oil-water contact?

A. Three pieces, three or four pieces of information.

On the west side -- on the east side of the fault, which describes the western boundary of this particular reservoir, we know these facts:

The Deemar Federal was completed and did not produce any water; therefore, the oil contact is below those perforations.

We know that the Holmstrom Federal No. 1 that upon initial completion down to a minus 6,016 that it produced water-free.

We know that the Holmstrom Federal No. 2, again on the east side of the fault, tested water at a sub-C depth of minus 6,107 feet.

Those are the only facts we have other than the water which had been produced after some period of time from the Holmstrom No. 1.

Q. In examining Mr. Hickman's methodology, he made volumetric calculations of recoverable reserves;

then he ran a computer simulation to give him additional information.

That is not a unique methodology to apply in order to come up with an estimate of ultimate oil recovery in a reservoir, is it?

A. No, it isn't. And I might point out that Mr. Hickman, given the configuration of the reservoir in which he was working and the permeability which he used in that reservoir, could have probably done the same thing by constructing a graph such as I did, Exhibit No. 3 here.

Q. Is it a correct statement that your work and Mr. Hickman's work is going to be founded and predicated upon the geology?

A. Yes, it is.

Q. And that if there is a material difference in the information given to you or to Mr. Hickman as an engineer with regards to the size and the shape of that reservoir, then in applying your particular calculations to that information, you can each come up with materially different ultimate oil recoveries?

A. Yes, we can.

Q. Now, you said awhile ago that you believed -- well, first of all, you would not buy and sell properties in this section based upon Mr. Ahlen's and

Mr. Hickman's conclusions; that was true?

A. Yes.

Q. But you've also told me, in your opinion as a reservoir engineer, that you and Mr. Holmstrom had sufficient data by which you could with a reasonable degree of engineering probability come up with estimates of reserves?

A. I don't believe I testified that we could come up with reserves. I work strictly with reservoir volumes.

And as has been pointed out here earlier today, the factors which you apply to those reservoir volumes, because we don't know anything different, are going to be uniform across the field.

So any proportionality that you want to be discussing can be done strictly off of reservoir volumes.

And you don't have to put in other uncertain factors to get down to recoverable reserves.

Q. Mr. Hickman has given a different reservoir volume than you have?

A. Yes, he has.

Q. In examining the choices you make as a reservoir engineer and which information to utilize to come up with reservoir volumes, which would you select?

A. I would select the one that I used. And the primary difference appears to be the north dip in the east half of Section 9, which is predicated upon seismic information.

And Mr. Hickman and Ahlen did not have access to that information, and, therefore, they have moved those contours further north and opened them up and increased the volume of the reservoir.

And there's no information up there on which to make those judgments.

Q. If the Commission makes the judgment that they are going to adopt some type of volume equity in establishing a producing rate for the Deemar well, how would we accomplish that?

A. In my opinion, they should go back and look at the volumes which I've calculated and testified that the west half of the section has approximately 10 percent of the productive growth volume of the reservoir.

And they should allocate approximately 10 percent of the reservoir withdrawals to the Deemar No. 1.

Q. If we do that, then, how do we peg the producing rate upon which we fix the 10 percent?

Is it going to be the productivity or the

deliverability of the Deemar well?

Will it be the allowable?

Will it be the current producing rate of Holmstrom well or the Deemar well?

What, in your opinion, should be the mechanics by which that relationship is reduced to a producing rate?

A. It should be based primarily upon a 10 percent of withdrawals, and that is not necessarily top allowable. Now --

Q. You're talking about 10 percent of the withdrawals from the reservoir?

A. Yes, I am. Now, Mr. --

Q. Explain to me how that would work.

A. Mr. Hickman earlier had testified that there are additional reserves behind-pipe, I believe, in Holmstrom No. 1 that have not perforated.

Mr. Hickman perhaps did not know that that section of the borehole had been drill-stem tested and was found to be tight.

Q. In your opinion, is it necessary to introduce an additional factor into the producing rate calculation for the Deemar well that takes into account the physical location -- we have discussed a factor to bring equity to the various interest owners by

establishing a parameter for the producing rate that has a relationship to reservoir volume.

I want to discuss with you now whether or not, in your opinion as an engineer, you feel it necessary to recommend to the Commission that they also utilize a factor to consider the relationship of the bottom-hole location of the Deemar well 78 feet from the common line versus the fact that the offsetting Holmstrom well is at least a standard well location?

A. I believe that the Commission could use either methodology but not both.

Q. Which, in your opinion, is the methodology that gives you the greatest comfort as a reservoir engineer in attempting to establish an equity for uncompensated drainage as the two wells compete for the reserves in the pool?

A. In my opinion, the approach that the Division has already taken in their order very adequately compensates and sets the allowables that would be reasonable in this pool.

Q. And that current producing rate, in your opinion, can be justified based upon a volumetric parity between the east half of the section and the west half of the section?

A. Yes.

MR. KELLAHIN: Thank you, Mr. Chairman.

MR. LeMAY: Thank you, Mr. Kellahin.

Mr. Padilla.

MR. PADILLA: Mr. Chairman, let me move the admission of our Exhibits 1 through 4. I don't believe I did that. And we won't be using Exhibit No. 5, which I did distribute to the Commission.

(Thereupon, Sipes Exhibits 1-4 were offered into evidence.)

MR. LeMAY: Thank you.

Without objection, Exhibits 1 through 4 will be admitted into the record.

(Thereupon, Sipes Exhibits 1-4 were admitted into evidence.)

Thank you, sir.

Mr. Carr.

CROSS-EXAMINATION

BY MR. CARR:

Q. Mr. Sipes, I did not clear my first question with Mr. Hickman, but do you know Mr. Hickman?

A. Mr. Hickman I know.

Q. Is he a friend of yours?

A. Yes.

Q. Have you had the opportunity to review his work?

A. Yes.

Q. Do you consider him to be a competent consulting petroleum engineer?

A. Yes.

Q. I'm glad your answers were that because I have to go and see Mr. Hickman after the hearing.

In your work reviewing the wells in the North King Camp Devonian Pool, have you come across any testing data concerning fluctuations in the rate on the Holmstrom Federal No. 1 to determine what impact that changing the rate may in fact have on water production in that well?

A. No.

Q. Are you aware of any such tests having been run?

A. No, I'm not.

Q. I'd like to go to your, I guess, Exhibit No. 2. We'll start with that.

The contours that you have placed on this exhibit, if I understand them, are based on the seismic work from Mr. Holmstrom; is that correct?

A. That's basically correct, yes.

Q. As you curve the contours across the northeast quarter of Section 9 and off to the west, this also tends to reduce the reserves that would be

under the northeast quarter at the same time it reduces those that are under the west half; isn't that correct?

A. That is correct.

Q. Now, did I understand your testimony to be that based on your calculations, approximately 10 percent of the total reserves is all that is under the west half of this section?

A. That's right.

Q. Now, if I understood your recommendation, your recommendation was not that -- was that we be entitled to produce 10 percent of something. I'm going to ask you some questions to try and find out what that was.

Was it 10 percent of the total pool allowable?

A. No, Mr. Carr. I think I was -- I don't think there's a misunderstanding here because I was very plain. I said 10 percent of the reservoir withdrawals.

Q. I'm sorry?

A. Ten percent of the reservoir withdrawals.

Q. Now, that would be 10 percent of whatever the Santa Fe decides to produce?

A. Ten percent of whatever is produced from the reservoir whether it's from the two wells that are there or how many ever afterwards.

Q. And at the present time there are only two wells?

A. There are only two wells.

Q. And if Santa Fe shuts down for a month, does that mean we get nothing for a month?

A. I would anticipate that would not be the way it works.

Q. Well, if Santa Fe comes in and reworks their well and gets the 515, does that mean we get 51 a month?

A. Yes.

Q. If they go and drill an additional well and get 515 in the northeast, does that mean we then get an additional 10 percent of whatever their well will make?

A. Yes.

Q. Are you aware of any situation where an allowable is assigned to a well based on what an offsetting well makes?

A. Mr. Carr, if you will go back and recall my testimony, I did not recommend that. I said that that was one way of achieving equity.

Q. Are you not recommending that?

A. I'm not recommending that.

If you recall, in my discussion with Mr. Kellahin, that he asked if -- what I would recommend, I

said the -- what the Commission has done up to this point I think has adequately taken care of the equity calculations.

Q. Now, let me ask you this. In terms of the equity calculation, do you think it would be unequitable to let the owners of 10 percent of the reserves have 10 percent of the pool allowable; isn't that correct?

A. Under a water drive situation, even with the -- with a 10 percent of the total pool allowable and with the structural position which you have, ultimately that well is going to produce more than 10 percent of the reserves in that well.

Q. And that doesn't have any relationship to whether we produce 10 barrels a day or 515 barrels a day, does it?

Ultimately the higher structural well will recover more from the reservoir; isn't that right?

A. Yes, sir, that's true, if there's not another well put in there 78 feet off of your line somewhere to compete with you at the top of the reservoir. That is what would happen.

Q. And the owners of the offsetting tracts would have an opportunity to come place a well at that location, would they not?

A. I really couldn't say. That would be up to this Commission, Mr. Carr.

Q. Do you know of anything that would prevent an operator from offsetting at that kind of a location?

A. I know they'd have to come before this body.

Q. Are you recommending that we not be allowed 10 percent of the total pool allowable?

Is that a correct statement of what you would recommend?

A. Try that again.

Q. What I'm trying to do is you said we have 10 percent of the pool allowable. My question to you is are you saying we shouldn't have an opportunity to produce at a rate that is equal to 10 percent of the total pool allowable?

A. No, I did not say that.

Q. And wouldn't it be appropriate, if we're looking at total pool allowable, to include the top allowable for each of the three prorations?

A. Not necessarily, no, sir.

Q. Why would that not be?

A. Because in my opinion that would not represent equity because in my previous discussion I said 10 percent of reservoir withdrawals, not 10 percent of the allowables.

Q. Mr. Sipes, are you familiar with the definition of correlative rights?

A. Yes.

Q. Do you understand that to be an opportunity to produce your just and fair share of the reserves?

A. That is correct.

Q. And the man who drills the well has availed himself of that opportunity; isn't that right?

A. That is correct.

Q. And the man who doesn't drill a well hasn't availed himself of that opportunity; isn't that right?

A. Generally speaking.

Q. And the man who doesn't drill a well in the northeast quarter hasn't availed himself of an opportunity to produce those reserves, has he?

A. He hasn't at this current time, no.

Q. And because he hasn't done that, is that any reason to penalize the man in the west half who has availed himself of the opportunity and drilled a well?

A. I don't have an opinion on that.

Q. If I understand your testimony concerning Exhibit 2, you're concerned about drainage of production from the east half to the west half because of the location of Deemar well; is that right?

A. I don't think I've testified to that, Mr.

Carr.

Q. That is not a concern?

A. That is not a concern if they are limited to 10 percent of the reservoir withdrawals.

Q. But if they are permitted to produce as Mr. Hickman recommends, is that one of your concerns and the reason you're recommending 10 percent?

A. Yes, it is.

Q. Now, suppose we restrict the Deemar well to 34 barrels a day and we let the Santa Fe well produce a top allowable, 515, and we let that go on, and I'm not going to take it ten years, but we let it go on for, say, three or four, in that situation isn't it possible that there could be some drainage from the northwest across the lease line toward the Santa Fe well?

A. With the assumption which you've given, yes.

Q. If the drainage in the reservoir east to west is offset or compensated for with drainage from west to east, each owner, even though there is migration across the lease line, does have a share, an opportunity to produce their share; isn't that right?

A. If you have the exactly equal offsetting drainage.

Q. Now, let's go to your Exhibit No. 3. Where is the top of the Devonian in the Holmstrom Federal No.

1 well?
A. Top of the Devonian?
Q. Yes, sir.
A. Minus 5956, I believe. 57.
Q. 5957. Now, when you say on this exhibit that you're assuming the reservoir has 200 feet of thickness, what do you mean by 200 feet of thickness?
Is that the portion of the reservoir that contains oil, or does that include a portion of it that is water saturated?
A. That assumes that is entirely oil saturated down to the assumed oil-water contact and that it is thick enough to where that 150 or so feet would all contain oil.
Q. All contain oil. So if we look at the Holmstrom Federal No. 1, that is currently making some water, is it not?
A. Yes, it is.
Q. I think you stated that you wouldn't buy and sell reserves based on Mr. Hickman's and Mr. Ahlen's data. And if that's a wrong statement, correct me.
A. I said it.
Q. Didn't you also --
A. That is the case right now.
Q. Didn't you say that in your opinion the

oil-water contact was in fact somewhat higher than what Mr. Ahlen had indicated?

A. In my opinion, it is, yes.

Q. If the oil-water contact is actually higher, that would tend to reduce the reserves under the Santa Fe Exploration tract, would it not?

A. Yes, as well as the Stevens tract.

Q. As well as the Stevens tract. But to that extent it would have a more immediate impact on this tract, would it not, off the Santa Fe tract?

A. At that depth, Mr. Carr, it's about proportional.

Q. If the oil-water contact -- have you picked an oil-water contact here, Mr. Sipes?

A. No, I have not.

Q. Mr. Ahlen picked one at 6107; does that seem right?

A. No.

Q. 6055. And you think it's higher than that?

A. Yes, I do.

Q. I'm having trouble with, if the oil-water contact is above 6055 in the Holmstrom Federal No. 1 and the top of the Devonian is at 5957, understanding how you assume the reservoir has 200 feet of thickness at saturated oil?

A. I didn't make that assumption. I said that the thickness down to the oil-water contact is saturated with oil. That's all I said.

Q. All right.

A. And I assume there's a maximum of 200 or more feet so that I can construct the entire portion of this graph, and then I can interpret this graph.

Q. And I'm just misreading it then? When you say assuming the reservoir has 200-plus feet of thickness, what does that mean?

A. Well, it means that if the oil-water contact went down to minus 6100, that it would have to have 200 feet of thickness in order to have only 2,000 acre feet in it.

Q. And it's your testimony in your opinion it's substantially above that?

A. Yes, it is.

Q. Do you have any information as to whether or not it would be possible to complete the Holmstrom Federal No. 1 higher in the section and thereby increase its producing capabilities?

A. There is a -- there was a portion of that hole just into the Devonian formation that was drill-stem tested, and it tested very poor.

We do not have the same quality of reservoir

in that portion of the hole in my opinion.

Q. So in your opinion the upper portion of the Holmstrom No. 1 does not have comparable reservoir quality of the lower section?

A. It does not appear to be.

Q. Now, in the course of your work as a consulting petroleum engineer, you've been called upon to allocate reserves among tracts, have you not?

A. Yes, I have.

Q. Have you been able to do that in the past with less data than is available in this case?

A. I don't think so.

MR. CARR: That's all I have.

MR. LeMAY: Thank you, Mr. Carr.

Additional questions of the witness?

Mr. Padilla.

REDIRECT EXAMINATION

BY MR. PADILLA:

Q. Mr. Sipes, Mr. Carr gave you the definition of correlative rights, and he asked you some questions on correlative rights.

The question I have for you is if the Stevens well is allowed to produce a top allowable, how does Santa Fe Exploration protect its correlative rights given the proximity of the Stevens well to the lease

line?

A. The only way, in my opinion, to do so would be to move up directly offsetting that well and drill another well.

MR. PADILLA: That's all I have.

MR. LeMAY: Thank you.

Are you going to have any more witnesses, Mr. Padilla?

MR. PADILLA: This is him.

MR. LeMAY: Your last witness.

MR. PADILLA: This is my last witness.

MR. LeMAY: Are you going to call any witnesses, Mr. Kellahin?

MR. KELLAHIN: I'm not sure. I need to take a minute.

MR. LeMAY: Additional questions of the witness?

Commissioner Weiss.

EXAMINATION

BY MR. WEISS:

Q. What do you estimate the KHKV? I believe we heard 1,000 millidarcies earlier. What's your estimate?

A. I believe that the Santa Fe well showed that the total reservoir capacity was something over 3,000

millidarcy feet.

And my calculations, using data that was supplied from the Deemar Federal No. 1, I calculated approximately 4500 millidarcy feet.

Q. And what do you think, could a material balance equation application in this situation, would it be helpful?

A. No, sir.

Q. One other question. How does Texas handle a forced unitization? I'm new to this.

A. I had an experience some time ago, Mr. Weiss, in the Brian Woodbine field. And the way the Commission ultimately solved that problem was to reduce everyone's allowable down to the point it hurt so bad they had to get together.

Q. I understand that's done in Wyoming also.

A. It's done, yes, sir.

MR. WEISS: No more questions. Thank you.

THE WITNESS: Thank you.

MR. LeMAY: Mr. Sipes, can I ask you a couple more?

THE WITNESS: I'm sorry.

EXAMINATION

BY MR. LeMAY:

Q. Is that a recommendation of yours, for this

Commission to reduce the allowables to the point where the Santa Fe and the Stevens have to get together on some kind of unitization?

A. No, sir, I'm not ready for the lynch mob.

Q. If you owned the field, would you just produce the one well, the Deemar No. 1 well, or would you produce both wells?

A. No, sir. If I owned the entire field, I'd produce, as has been testified here today, I'd produce both wells until the Holmstrom Federal watered out.

And then I would produce the Deemar Federal at a maximum efficient rate that would not come to water.

Q. I see. You made some testimony as to the fact there's a drill-stem test in the upper interval, and we don't have any data on that.

Are you referring to a drill-stem test that's not on Exhibit No. 3 that Mr. Ahlen submitted?

A. I believe so, yes.

Q. I assume that was a tight well and that was drill-stem tested.

We don't have any information on it; isn't that correct?

A. It may well be.

Q. There was a drill-stem test. We had quite a

bit of oil lower down?

A. Lower down, that's true, but after they drilled into the top of the Devonian, they did take a top of the drill-stem test.

And it showed that portion of the reservoir to be relatively tight.

Q. Do you want to -- have you done some work with that, analyzing logs?

A. No, I haven't, sir.

Q. Could you supply the Commission or ask the operator to supply the Commission with that drill-stem test?

A. Of course.

Q. I'd like to have that data. It's not in our files.

What about the log? Just eyeballing the log, it looks like there's porosity all the way to the top.

Is that just an eyeball situation? Is that your impression of that well too?

A. Porosity is pretty low up there, although it's not as poor as the drill stem test would indicate.

Q. We're having a problem trying to come to grips with some rather wide recommendations from two maps that aren't that much apart.

You can swing that fault a little bit. That will affect the Stevens acreage quite a bit. If you close in the contours on the north dip relative to both tracts, you're not going to lose that much proportion.

You're all in fairly well agreement on the oil-water contact, if you're going to raise it. When you say a little bit, how much is a little? Five feet, ten feet?

A. In my opinion, I just picked the figure of 6,040 feet.

Q. 6,040?

A. Minus 6,040.

Q. Okay.

A. But I believe that changing those contours has a more marked effect than you might realize.

Q. That could be.

A. That seems to be the principal difference between the two maps.

Q. Well, even given that, we're talking about, what, 10 percent to 30 percent, that's the range we're arguing as far as productive acreage, percentage of relative productive acreage in the field?

I thought previous testimony, Mr. Hickman indicated that 29 percent, or something like that, of the productive volume of rock was under the Stevens

acreage. That leaves about 70 for Santa Fe Energy.

You're saying maybe 10 and 90, and yet you're both recommending such a wide variation of allowables. You want to keep this thing at 34, and I think are Mr. Hickman wanted to go up to something like 450.

That doesn't seem to -- and yet you say you agree on pretty much everything else within this range of variation.

Can you help the Commission kind of come to grips with why this wide variation in allowable recommendations?

A. I think, Mr. LeMay, it's a matter of when you do change those contours on the north end, it makes that kind of difference in volumes of productive reservoir on that west half, number one.

Number two is Mr. Hickman is assuming that the Holmstrom Federal No. 1 can be reworked and go to 515 barrels allowable, which I'm not sure it can do without coning a lot of water.

And that goes to the heart of the maximum efficient rate in my opinion.

Q. Do you have a recommendation for a maximum efficient rate for that well?

A. We have not done any coning calculations, which I think is what would ultimately be required to

come to those numbers, Mr. LeMay.

Q. Is there a maximum efficient rate for the Stevens well?

A. I think you can produce the Stevens well, given what I know about it at this point, at whatever rate you wanted to, whatever it will physically produce. It will not hurt at this point.

But down the road it will cone water and cause waste.

Q. So there is some point at which an allowable could be set, especially when you're getting water close to it that is an efficient rate that will maximize the recovery from that well and not cone water; is that kind of what you're saying?

A. That is correct.

Q. But that rate we don't know?

A. We don't know where that level is, and we have not run any test that would optimize that producing rate in the Holmstrom wells.

MR. LeMAY: That's all the questions I have.

Additional questions of the witness?

If not, he may be excused.

MR. KELLAHIN: Mr. Chairman, I will tell you what my witness was prepared to discuss, and I'll be happy to put her on.

There is, in my opinion, a material difference between the location of the fault line and the two geologic interpretations.

I propose to call a geologist that will talk about the MicroScanner images used by Mr. Ahlen and how she believes that his orientation of that fault is not correct.

That being the hour, I think I can do that in 20 minutes, if you want to hear that testimony. That is -- that's the extent of our presentation.

I don't believe Mr. Carr has any other witnesses, and I certainly don't think we do.

If you'll indulge me, we'll do that as quickly as possible.

MR. LeMAY: Why don't we take a five-minute break so the court reporter can get set up for the end of it.

(Thereupon, a recess was taken.)

MR. LeMAY: We're going to recall a witness. We have that prerogative.

Buddy Sipes, where are you? I really want to ask you a couple more, if you don't mind. We instituted a Commission policy, we can recall witnesses after they're all through so we can ask a few more questions that might become clearer after we hear a lot

of testimony.

THE WITNESS: May I come up without my coat?

MR. LeMAY: You come any way you want.

L. D. SIPES,

having been previously duly sworn, testified further upon his oath as follows:

FURTHER EXAMINATION

BY MR. LeMAY:

Q. Going back to your Exhibit No. 3 --

A. Yes, sir.

Q. -- can you take us through that exhibit. And it has cumulative reserve volumes and acre feet at the bottom. And your vertical scale is a sub-C scale.

Does that mean in using that map you could take any sub-C number, like minus 6,000 feet?

A. Yes.

Q. Take that over to -- I don't know how you got this curve here.

A. I planimetered those volumes in the reservoir down to that particular contour.

Q. So you take 6,000 over here, which would be -- you planimetered -- I'm trying to find out, maybe, 5,000 volume?

A. 5,000 acre feet.

Q. 5,000 acre feet?

A. Right.

Q. Is this what is under the -- is the amount of volume of rock within the 6 -- minus 6,000 contour line?

A. Yes, that's correct.

Q. So then after taking all that, this was the line that prevailed after you did the planimeter work; is that right?

A. Yes, it is.

MR. LeMAY: Mr. Weiss has got a question here.

FURTHER EXAMINATION

BY MR. WEISS:

Q. Can you read there and tell me on Exhibit 12 of Mr. Hickman's what he calls gross reservoir volume -- can you pick off your gross, your estimates of gross reservoir volume?

A. At a particular sub-C elevation or by location? He's got it by location.

Q. He has it by location.

A. I do not have it on that map or on that figure there, but I did go in and planimeter that portion of the reservoir that is on the west half of the section.

And I did it the same way and thereby was

able to construct another curve of reservoir volume versus depth in that west half.

Then relating those two at each sub-C elevation, I came to the fact that if the oil-water contact is a certain level, then that east -- that west sliver has a certain portion of the total productive rock volume in the reservoir.

Q. As I recall, you said the total productive rock volume might be 11,000 acre feet?

A. If the oil-water contact is minus 6,055. I could be more precise.

Q. And the west half contains what portion of that 11,000?

A. Approximately 10 percent. I could give you better numbers than that by getting my data, sir. Be between 9 and 10.

MR. LeMAY: Thank you very much.

MR. SIPES: Okay.

MR. LeMAY: I'd like to recall, too, Mr. Hickman just for a minute and have his comments on Mr. Sipes.

MR. HICKMAN: Do I need to bring my exhibits with me?

MR. STOVALL: I can hand you some if you need them.

MR. HICKMAN: Thank you, sir.

MR. LeMAY: Just Exhibit 3 on Buddy Sipes' presentation, that's all.

T. SCOTT HICKMAN,

having been previously duly sworn, testified further upon his oath as follows:

FURTHER EXAMINATION

BY MR. LeMAY:

Q. Looking at that, is that also an acceptable way to -- we're assuming that you accept the geologic parameters as shown by the other side?

A. Okay, sir.

Q. Assuming those parameters, do you agree with this method of calculation of reservoir volume?

A. Yes, of reservoir volume only, not of producible reservoir volume.

And the 10 percent number Mr. Sipes came up with is a different -- is based on a different approach than the 29.-something percent that I came up with.

Q. Maybe it's the approaches I'm trying to come to grips with. How are the approaches different?

Aren't we all taking volumes within that reservoir?

A. If I understood Mr. Sipes' testimony, and if I haven't, either his lawyer will correct me or when I

get back to Midland, Buddy will correct me.

He first did, using gross interval, he did this integration approach, which is a good approach to get total gross reservoir volume in any particular sub-C.

I've got no argument with that, assuming the geological interpretation is one that I accepted.

Then I think he said this -- now, again, trying not to misquote him -- that he then took the west side, the Deemar lease, and constructed virtually the same curve for it by planimetering that lease.

And then that that worked out to be, based on that part, came up with that volume was about 10 percent of that total volume.

That's an entirely different approach than what I used.

What I did was to, if I can step down here a moment, I worked with individual tracts. And as I went through earlier, much earlier today, you know, we had the producing, the current producing volume, on this tract is here.

What I call behind-pipe volume is here, and the attic is here. Same way on this tract and the same way on the undrilled tract.

MR. STOVALL: May I, to make a record, since

the Commission is asking the questions, would you identify the exhibit you're referring to now.

MR. CARR: This is Ahlen Exhibit 3.

THE WITNESS: Ahlen Exhibit 3.

And so my comparison, whether you do it on the reservoir volume or reservoir volume, you get the same proportion. That 29.-something percent, comes from totaling the total producible volume on this tract, total producible volume on this tract, and total producible volume, assuming a regular location, on this tract.

Q. (BY MR. LeMAY) When you say "this tract," for the record, we're referring to the three proration units.

A. Well, two proration units plus the undrilled tract.

And then what's significant here then is if this water level is at minus 6040, rather than at a 55, at what we assumed, if this behind-pipe area is tight, as has been suggested by a drill-stem test I'm not familiar with, then you've greatly reduced the producible, both the producible volume, i.e., the producible reserves on this tract.

MR. CARR: Which tract is that?

THE WITNESS: I apologize. On the Holmstrom

tract and to some degree by the higher water level on all three -- higher water level affects all three tracts.

Its effect is greatest for its remaining reserves. Reduction of remaining reserves is greatest on tracts that have the lowest structural position.

And so the Stevens tract comes out ahead then by raising the water level.

As far as the proportion of remaining reserves, it keeps gaining because it's got that high structural position.

Q. (BY MR. LeMAY) I understand. You say that the relative ratios would remain the same with your method and with Mr. Sipes' method, assuming the same geological parameters?

A. No, they don't. They're different, again, because he's comparing -- on the Stevens lease the well is located up near the very top. There's just a little bit of attic there. We figure about 4,000 barrels in the attic. I wouldn't argue whether it was 3 or 7 in that order of magnitude.

And so the gross interval there is representative of its total producing interval and representative of its reserves.

On the other tract, on the Holmstrom tract,

where that well is located lower structurally, its gross interval is not representative of its producible reserves or producible reservoir volume, whichever you choose to use.

So I would question the 10 percent number if it was refigured just on producible reservoir volume as opposed to gross reservoir volume.

I appear to have muddied the water further.

Q. Yes. We're trying to get to the bottom of this. If you're looking at volume for volume, if you're going to run a planimeter on this map, this map being Santa Fe's Exhibit No. 2, their structural parameters, their geological parameters, and you're taking the volume under this sliver compared to the volume of rock, taking the oil-water contact, under the Holmstrom, the Santa Fe Energy productive acreage, aren't we going to come up with two different volumes of rock that will be just about the same as was done by your method?

A. No, sir. Now, if you refer to my Exhibit 12, which I believe is the tabular -- is the tabulation of data, in the second line, the gross reserve volume, if you worked out that proportion that each of the three tracts have to the total, reservoir total, you would find that that proportion is different than the

proportion you get if you drop down to the line about the one, two, three -- about the sixth line entitled, "Total Producible Reservoir Volume."

I don't have my calculator handy or my slide rule, but --

Q. Well, now we're getting to the -- why should that be different? I guess that's my question.

A. Because they are non -- on the Holmstrom lease, there is a fairly significant nonproducible volume by that Holmstrom well because it's not located on the highest point of that lease.

It's located down-dip with the encroaching water level. There will be oil recovery.

And indeed, as Mr. Sipes' testimony -- well, it's accurate, but if his interpretation that behind-pipe zone is tight and the water level is higher, then they have even less producible volume than what I've shown.

Q. I guess I'm just not grasping the concept between total producible reservoir volume and gross reservoir volume in acre feet that those relationships should be difference percentage-wise.

If we're taking a planimeter of the productive acreage under each contour using the wells only for control, geologic control, then we should have

comparable ratios, shouldn't we?

A. No, sir. I'm referring again to Ahlen Exhibit 3. And I think this is to scale, is it not, Jack?

MR. AHLEN: Roughly. Within the context of the lines.

THE WITNESS: What I planimetered as producible reservoir volume, as shown on the Exhibit 12, for the Holmstrom lease is this rectangular area from our estimated water level out off the deal to where the contour intersects the water level back -- well, back up to here. I included behind-pipe.

MR. CARR: Where is "here"?

THE WITNESS: Back to the top of the zone in the Holmstrom No. 1 well. And there is a pretty significant wedge area here that because of this well structure location it cannot recover this oil.

It cannot really recover this oil, whether my client has a well here or not, it doesn't control it.

On this one you can see that this is -- this is the Stevens tract -- it's been a long day, I'll tell you -- and the producible area goes almost all the way up to the top of the lease.

There's just a little tiny wedge there. You can see in comparing the gross area, gross total

section on the Holmstrom lease to the producible section would give you a different proportion in comparing it on the Stevens lease.

Q. (BY MR. LeMAY) Thank you, Mr. Hickman. I'm a little bit dense. It finally occurred to me you're talking about the attic oil that would not be recovered by the Holmstrom well?

A. Yes.

MR. LeMAY: Thank you, sir, I appreciate it.

MR. LeMAY: Mr. Kellahin.

MR. KELLAHIN: Mr. Chairman, while Ms. Sullivan is getting to the witness stand, she is a geophysicist and a geologist employed by Exxon Company, and her name is Cynthia Sullivan.

CYNTHIA SULLIVAN,

having been previously duly sworn, testified upon her oath as follows:

DIRECT EXAMINATION,

BY MR. KELLAHIN:

Q. Ms. Sullivan, would you, please, state your name and occupation.

A. My name is Cynthia Black Sullivan. I'm a geophysicist, senior geophysicist with Exxon.

Q. Would you give us a brief summary of your educational background and your employment experience

as a geologist and as a geophysicist?

A. Yes. I got my bachelor's of science at the University of Aberdeen in Scotland.

Q. In what year?

A. 1980. I then went on to acquire a master of science degree at Texas A & M University. I was awarded that degree in 1983.

I began working for Exxon in Midland, Texas, in December of 82, and I've been employed with them since that date.

Q. Prior to today's hearing have you examined the seismic information Mr. Holmstrom utilized in constructing his structure map and his location in interpretation of the primary fault that is shown on his Exhibit No. 1?

A. Yes, sir.

Q. And have you sat through the presentation today and heard Mr. Ahlen's testimony and reviewed his exhibits concerning his location of the primary fault line on his Exhibit No. 4?

A. Yes, sir.

Q. Do you have both those displays before you?

A. Yes, I do.

MR. KELLAHIN: At this time, Mr. Chairman, we tender Mrs. Sullivan as an expert geologist and

geophysicist.

MR. LeMAY: She is so qualified.

Q. (BY MR. KELLAHIN) In the sake of time, Mrs. Sullivan, let me ask you to focus, first of all, on the Formation MicroScanner information that Mr. Ahlen had utilized, and I believe that has been introduced as his Exhibit No. 7?

A. Yes.

Q. I'm sure Mr. Carr will correct me if I misspeak, but my recollection many hours ago of Mr. Ahlen's point with regard to the MicroScanner information that one of the things he was able to utilize that information for was to give him the azimuth or the direction with regards to how he interpreted the primary fault as he moved through the well that that information was taken and got to the northern end of his primary fault?

A. That's correct.

Q. Now, you have had an opportunity to look at each of the displays stapled together as Exhibit No. 7 Mr. Ahlen used?

A. Yes, I have.

Q. Let's start with page 1.

A. Okay.

Q. What's going on?

A. What's going on here is that they're showing the image of the four pads, and these things are being displayed on a computer screen.

The Schlumberger engineer is working -- probably working with the geologist in order to assist him in correlating the low and high, relatively low, relatively high, resistive layers within the bed.

Q. This is a device that scans the wellbore in something less than an 8-inch diameter, some 9,000 feet below surface?

A. The pads are in contact with the inner walls of the borehole which --

Q. As it moves up and down through the various formations, it registers various --

A. It's recording resistivity.

Q. All right. What happens with the first page of Exhibit No. 7?

A. It appears in this, if you look at the scale, the depth scale on the left-hand side of this display, you see that it's marked off in 9702, 9704, and so forth, so you're looking at a very fine scale of depth.

You're seeing very thin beds. They are apparently very well organized beds because it's easy for the interpreter to correlate across there with his

cursor and make these correlations, if you will, from pad-to-pad, image-to-image.

Q. When we look at the first page of Exhibit No. 7, am I correct in understanding, in your opinion, that's a simple, easy correlation to make for that particular point?

A. I would say it is, yes.

Q. Let's go on to page 2. In fact, let's look at 7, in terms of the page numbers, and identify for us the pages of Exhibit 7 that in your opinion are critical in terms of a judgment about this fault.

A. Okay. So I'm going to go on to the -- start with this second page, or do you want me to go --

Q. No, ma'am. Let's go to the keyboards.

A. Okay. I considered the key information with respect to the orientation of the fault on Mr. Ahlen's map as being on the second-to-last page.

In this particular diagram, again, you see the image of the pads. Along the top you see in degrees the orientation of that pad. And you're to key in on the map view of the borehole over here.

You might note that three dips have been processed for this plot, which accounts for the fact that there's very few samples here plotted.

If you'll compare the correlations on this

particular diagram with the correlations on the first page, I think you can realize that there is quite a bit of latitude for interpretation for correlating these beds.

In fact, I tried to do a little correlation of my own, and I came up with something different.

Q. Within the range of interpretation, as shown on that portion of the display, can you as a geologist interpret that information and give yourself a conclusion that is significantly different than the conclusion Mr. Ahlen has reached?

A. No, sir.

Q. Let's go to the next information. What's the next critical portion of that display?

A. This display is imaging the secondary fault, which is on Mr. Ahlen's map, and it's critical in the sense, again, he gets the same orientation for the fault, or close to the same orientation that you can see on his Exhibit No. 3.

Q. Let's take a moment. In terms of the page numbers, which is that portion of the display that shows the secondary fault?

A. They're not numbered, and it's the last page.

Q. The last page is the secondary --

A. That's right.

Q. -- fault information. Which one is the primary fault information?

A. It's on the second-to-the-last page.

Q. Let's turn to the second-to-the-last page. We've not yet discussed that.

A. That was the one I thought I was discussing before.

Q. I was on a different page. That's why we needed to number the pages.

When we look at that page, that is the one that shows the information for the primary fault?

A. That's correct. On the right-hand side is the main fault zone dipping to the west.

And the depth on the left-hand side coincides with the depth on the cross-section.

Q. Taking that information would you construct the location of the fault as it moves north, the primary fault, north to the end of the northern edge of Section 9?

Would you construct that in agreement with what Mr. Ahlen has done, or would you do it as Mr. Holmstrom has done?

A. If this were the only piece of information I had, I might have extrapolated as Mr. Ahlen had done.

However, I have two, actually I have three

seismic lines where I've also determined the fault cut.

In addition, I have the subsurface information and now this information. In doing that, by connecting those fault cuts, I have to conclude that the fault is oriented in the north-south orientation rather than a more northwest-southeast orientation.

Q. The judgment the Commission must make based upon the location of that fault has considerable impact on all parties because that helps determine the reservoir volume within the west half of the section, does it not?

A. That's correct.

Q. All right. What degree of confidence that you have as to which of these gentlemen is correct in their interpretation?

A. With the data I have available to me, I would say that Mr. Holstrom's interpretation is more correct.

MR. KELLAHIN: No further questions. Thank you.

MR. LeMAY: Thank you, Mr. Kellahin.

Mr. Padilla.

MR. PADILLA: I have no questions.

MR. LeMAY: Mr. Carr.

CROSS-EXAMINATION

BY MR. CARR:

Q. Mrs. Sullivan, the seismic lines you're talking about are the seismic lines that Mr. Holmstrom was; is that correct?

A. That's correct.

Q. Do you have any information as to the location from the seismic lines, the exact location of the formation as we go across the north line of Section 9?

A. Are you asking me where the Devonian surface is on the seismic line?

Q. Do you have anything that would show the location of the fault of the northern boundary of Section 9?

A. No, I do not.

Q. But what you're doing is taking the information from the Formation MicroScanner and applying that to the seismic information that Mr. Holmstrom had, and then you are concurring with his interpretation?

A. I am using it as a single data point, which is what it is.

Q. The information from the MicroScanner?

A. From the MicroScanner.

Q. And that's at the wellbore down here towards the center of Section 9?

A. That's correct.

Q. And you have nothing that would identify the exact location across the northern point, the northern line of the section?

A. That's correct.

Q. And you're utilizing just the seismic information, the same seismic information that was available to Mr. Holmstrom?

A. That's correct.

Q. And the same seismic information that resulted in drilling a dry hole in the center of 9 and a dry hole in the north of 16?

A. There was a producing well --

Q. Initially a dry hole.

A. -- in Section 9.

Q. The initial hole was dry, was it not?

A. That is correct.

MR. CARR: That's all I have.

THE WITNESS: That's right. It's the same data.

REDIRECT EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Carr has succeeded in confusing me, and

perhaps I'm the only one confused.

Am I correct in understanding that the MicroScanner information in using the Exhibit No. 7 that you, within the range of the available data, can interpret that data and still find the fault line to be as Mr. Holmstrom has placed it on his exhibit?

A. Yes, I can.

MR. KELLAHIN: No more questions.

MR. LeMAY: Mr. Carr.

MR. CARR: I would ask the same questions again on cross, but I'm sure I'll get the same answers, and I won't.

MR. LeMAY: Will you give the same answers if I ask the question?

THE WITNESS: Depends on how you phrase the question.

MR. LeMAY: Additional questions of the witness?

Thank you. You may be excused.

We'll take closing arguments. And are there any more witnesses on either side?

Mr. Cooter, Do you want to make a statement after the closing arguments?

MR. COOTER: Yes, sir. I'd like to make a closing statement.

MR. LeMAY: All right. Closing arguments.

Do you want to reverse the procedure?

MR. PADILLA: May it please the Commission, this morning I had a little problem with my opening statement because I felt that to some extent I was making an argument that was going to be my closing argument in terms of what we were going to show and what we were not going to show as far as supporting the previous Division order.

I think the case has turned out to be pretty much what I had talked about this morning in terms of the Rule of Capture, in terms of changing the established rules of the Division and of the Commission in placing wells in accordance with spacing rules and well locations.

By allowing Stevens to drill this well at 78 or -- 78 feet, as the Division has calculated, or between 60 and 70 feet as Mr. Ahlen has calculated, then we have placed ourselves in a situation where any corner shot is going to be a valid shot from now on.

With this kind of precedent, I think the Commission is placing itself in a situation where we're going to be arguing this type of case, and it probably is going to be great for lawyers is all I can say.

In terms of, for example, we look at this

exhibit here, Exhibit No. 3 of Mr. Ahlen, and he has made or categorized oil there that is in the attic.

The only one who can recover that oil now is going to be the Stevens well. That forces Santa Fe to drill a well as an offset to the Stevens well.

That's the only way that that is going to be able -- or that Santa Fe is going to be able to recover their fair share of the production from there.

The same exists with the second tier of oil that's shown by Mr. Ahlen. In that second tier, Santa Fe is going to have to perforate its well. And we don't know now whether or not that can be adequately done given the tightness that Mr. Sipes talked about.

In that connection we will give you the drill-stem test to establish that. But overall I think this is a policy case. I don't want to get into the evidence because I think we've hashed over that sufficiently today.

The overall policy that we are establishing here is that we can make cases, twist the circumstances, and show recoverable reserves or show volume or show whatever it is that we are able to show to disguise the nature of where this well is placed.

Stevens came here to the Division and asked for a directional drilling authority. They said that

based upon where the fault is we will cross that, and we will be able to bottom-hole within a certain window down there. And we will be able to establish our production and recover our fair share of production.

They whipstock it down there. They decide that they actually drilled a dry hole, so they tried again. "Let's do it again."

And this time they yanked it over further to the east, and we wound up where we are now, and we have a nice juicy well.

But I don't think that it takes a lot of expertise in this area to show that the drainage is going to come directly from the Santa Fe property.

Now, we are told that we will be able to drain all the way from the north line of the section and recover reserves in that manner.

But I think we all know that probably the drainage is going to be circular in nature. And with the well bottom hole at 70 feet, or whatever the distance is, it's going to be coming out of Santa Fe property.

The alternative, the only alternative that Santa Fe has under this circumstance -- and I don't want -- I can't emphasize that enough, I should say -- is that an offset well is going to have to be drilled

in order to protect the reserves, if Stevens is allowed to operate their well at 515, top allowable.

Already the Santa Fe well is being restricted and has always been restricted because of the nature of the coning or the fear of coning too much water into the wellbore.

So you have one operator here who has drilled a well at its own risk, a new full well that they were encroaching on the property line of Santa Fe. They continued going that way. They knew that the Division had already established an allowable restriction, and they, nonetheless, continued.

Whether or not you're going to allow the camel in the tent in this case, and at 515 barrels it remains to be seen, but it just seems from a policy standpoint that the Commission should enforce its rules, allow Stevens to operate, and to recover their fair share of production, but not at the rate of 515 barrels, especially in view of the 200 that is being produced currently by the Santa Fe well.

So I cannot emphasize the importance of those rules, and I can only point to the recent experience here with the Oil Conservation Division, that unorthodox locations are treated much more harshly and they're viewed that way.

That policy has been established by the general existing orders. And if you take the distance to the lease line, which I don't necessarily agree with, on that kind of a basis, it's 10 percent; it's 90 percent penalty. That's according to Mr. Ahlen's own testimony this morning on cross-examination.

If you take Mr. Sipes' figures, you come down with the same approximate amount, 10 percent. And that is what the allowable ought to be set and established in that regard, somewhere in there, in the nature of what the Division has done.

And I think that the previous order issued by Mr. Lyon is an adequate order that protects the correlative rights of Santa Fe, and it allows Stevens to produce their fair share of production.

It does not restrict Stevens from producing oil and obtaining eventually their fair share of production. What Stevens ignores entirely is that their well is -- that the fault is even further east than what it was estimated to be. That can only reduce the recoverable reserves under their tract.

So it seems inconsistent to argue today that somehow despite the fact that the fault is further east than what was originally anticipated, that the reserves are actually increased.

I'll stop at this point. I think that the Division, again, should protect the correlative rights of Santa Fe and and do fairness in this case.

MR. LeMAY: Thank you, Mr. Padilla.

Mr. Kellahin.

MR. KELLAHIN: Gentlemen, this series of cases have an interesting history. Began sometime last spring. I would invite you to read through the various findings made by first Examiner Lyon and then subsequently by Mr. Stogner in his order.

It's interesting to note that Mr. Lyon, after hearing this very case, found and concluded that there was inadequate data at that time to estimate reserves with sufficient precision upon which a penalty could be assessed.

He did that at a time when only two additional things have occurred. Certainly nothing has occurred in the east half of the section to change that.

The testimony we presented today is no different than the testimony we gave Mr. Lyon by which he concluded it was too speculative.

The things that have changed is that in that original hearing it was thought to be among all the technical people on both sides that the approximate

location of that fault was some 200 feet farther west.

We had a case where there was pretty good agreement about the orientation and location of that fault.

And despite having that information, it was acknowledged by the hearing examiner that there was a great deal of discomfort, speculation about coming up with a penalty formula based upon the geologic interpretations.

Since then what we have, what he also found is -- he says that the likely productive interval within the west half of the section is only some 60 acres stacked vertically.

It's interesting to see what the opposition has attempted to do to maximize their ability to produce what we contend will be a significant portion of the reserves in the east half of the section for which they're not entitled.

Look at the shape of the nonstandard unit. That should have been denied, I contend. The standard sized shape is the southeast quarter to which the McAlpine Santa Fe well is located.

Admittedly, everyone agrees the fault condemns a significant portion of the west half. And what do they do?

Well, rather than dedicate the southwest quarter to this well and recognize that there's going to be a significant penalty for nonproductive acres, they figure out a way to stack these 4-acre tracts, one on top of another, to attempt to mitigate and reduce the potential for that type of penalty.

What else has happened? Well, they've, knowing the risk of the penalty order, the mechanics of the order from the Curry and Thornton to the Stevens order is the same, they came back in.

Mr. Stevens decides to directionally drill. He knew the deal before he got into it. He knew how the penalty was to be constructed.

The evidence at that hearing, he planned to be 165 feet from a common line from our property. And he was given a drilling window with a radius of 500 feet to the west. Tried that once and failed.

He found the fault was 200 feet farther to the east. He's got a little sliver of the reservoir, and he wants his share. And he's going to end up with his share and our share.

We might as well forget the whole process because it looks to me like the only way you protect yourself is to have Mr. McAlpine come in on an equivalent structural position in the east half where

we have the same ownership and drill a well 78 feet from the common line.

And that's how we're going to have to protect ourselves. We're going to have to come back in here and amend our case and ask for a nonstandard proration unit that consists of the acreage stacked 40 acres on top of each other and dedicate the west half of the east half so we can balance all these numbers that are given to us on reservoir volumes.

Look at the reservoir volumes. Everybody has acknowledged on both sides that those numbers are predicated and founded solely and substantially on the geology for which there is a material difference of opinion.

And the opinion is different but -- subtle, but very important. Look, first of all, at the orientation of the fault. Mr. Ahlen has it slightly turned to the west. And because of the thickness of the reservoir in the structural position, he has maximized his reservoir volume by a slight adjustment of that fault.

We believe that was inappropriate. It doesn't honor the data as we interpret it. But there is a material difference between the technical people upon the orientation of the fault.

Look at the other critical thing about the geology. Note how they have contoured the structure. Mr. Holmstrom takes that, and he wraps his contour lines back into the fault.

Mr. Ahlen takes it and he's more generalized in how he rolls those contour lines back. You can see when you're calculating reservoir volume that is going to make a significant difference.

We think this case is not any different from the kinds of cases Mr. Carr and I used to bring to you on the Shipp-Strawn.

He and I have argued about integrating either for or against net productive acreage factors in a penalty formula for years.

Last time I was before this Commission on this kind of case, you told us not to do this anymore. It was too speculative. It wasted your time and energy.

And you thought it was better and more direct to come up with a penalty factor based upon location of the well to the common line.

Isn't it interesting how well that worked for Mr. Lyon's formula because he also rejected the net productive acreage argument. So did Mr. Stogner; he rejected it.

Isn't it interesting how well it fits into Mr. Sipes' volumetric calculation of the reservoir. It gets you down to the 10 percent.

Sometimes the most direct approach is the best approach. And we don't think that Mr. Stevens or Stevens Operating Company ought to receive a windfall of some 459 barrels of oil a day from this reservoir when we think we can't even produce ours in excess of 200. It's absolutely inherently unfair.

We think when you sift through all this stuff, you get down to the point where, in all fairness, the basic orders are those that you ought to approve.

And if you don't, then we're going to have to come do net productive acreage hearings for you till you change your mind again. And the reason you haven't accepted them before and why you shouldn't now is there too speculative.

Any of these competent geologists and engineers can take the existing data and come up with materially different volumes. It's not a good way to run the railroad, and we don't think it's a good way to run this deal.

And we would suggest you approve the Examiner orders as you have applied them and to reject the

effort now, after the fact, to have Mr. Stevens change the rules of the game after he's played the game.

He knew before he went into the first reentry what the penalty calculation and procedure was to be. He knew when the second reentry was going on what he was exposed to. He took the risk; he ought to pay the price.

MR. LeMAY: Thank you, Mr. Kellahin.

Mr. Carr.

MR. CARR: May it please the Commission, we've heard a lot of lawyers practicing engineering today, and I for a minute would like to try and practice law.

We are not here before you asking you to do anything that is new or unique. We are here asking you to do what the Oil and Gas Act instructs you to do.

The New Mexico Supreme Court in Continental v. Oil Conservation correctly noted that "The Oil Conservation Commission is a creature of statute, and its powers are expressly defined and limited by the Oil and Gas Act."

We come before you with a case that falls squarely within the Oil and Gas Act. And we're being accused of a corner shot, running back to the Rule of Capture, and all we're asking you to do is enforce the

law.

And I think it's important when we start talking about the law to go to it and read it. And I want you to bear with me because I think when we talk about correlative rights, we forget what the law in New Mexico is on those things.

The law on waste, the statute defines it as: "The spacing, drilling, producing, among other things, of any well in a matter which tends to reduce the total quality of crude petroleum oil recovered from a pool."

And when you take us and restrict us to 34 barrels a day, when no matter how you count anybody's calculations in here we've got a heck of a lot more than 6 percent of the reserves, you are not letting us produce this according to the statute because we cannot produce it in a manner that let's us produce the quantity of oil that we could produce if we could get out from regulatory arbitrary restrictions.

That's what this shows. But more than that, we have to go to correlative rights because we built a case for you to present today that is based on the definition of correlative rights, and it is this.

Correlative rights means: "The opportunity afforded, so far as it is practicable to do so, to the owner of each property in a pool to produce without

waste his just and equitable share of oil or gas or both in the pool."

And then it defines that as being "An amount so far as can be practicably determined and so far as can be practicably obtained without waste substantially in the proportion that the quality of recoverable oil or gas or both bear under the property bear to the total recoverable oil or gas in the pool."

Now, there are key words there, and I want to go through them. Correlative rights in New Mexico means opportunity.

When we drill a well into the top of a structure under a tract that is ours, we have availed ourselves of the opportunity.

When Mr. McAlpine drills a well into the structure, down here lower on the structure, he has availed himself of the opportunity to produce what he can recover.

Recover is a key word in the statute. And the attic isn't something that with this well he can recover.

And that's why when Mr. Hickman comes before you, unlike Mr. Sipes, he says I'm talking about recoverable reserves because he is talking about correlative rights as it's defined in the statute and

is defined as a matter that you are directed to protect.

It talks about the owner under each property. We come before you with a formula that is based on sound engineering and geological principles no matter what everybody else says. You know that.

Mr. Gruy doesn't get paid to come in here to say something because he needs the money. It's not because he's old; it's because he knows what he's doing. He hasn't just outlived all of us in this room.

He is in here and he has told you the truth. And we have come forward with the formula that will let us get ours and let them get theirs.

It's consistent with the definition of correlative rights. It gives the owner of each property the opportunity, if they take care of it.

All of the clever attorneys in the room -- and I guess I'm not one of them -- wants to torque that and say that it means more than just the opportunity they availed themselves of.

Somehow we have to give them more because they're down-structure, because they've got a tight formation, because the water contact is up, or because they cannot possibly produce the attic without another

well.

The fact of the matter is there's one way to avail yourself of that opportunity, to get that attic, and that is to drill a well.

And they somehow think there's something wrong with the fact that we suggest they have to avail themselves of an opportunity before you are supposed to act to protect it.

We're talking about a just an equitable share. A just an equitable share for Stevens is what is under this pie-shaped piece, what is under his tract.

It doesn't make any difference if it moves from east -- from the east southeast quarter or if it comes straight down as long as what he has an opportunity to get is just what is there.

And that's why we propose to you restricting the allowables based, as the statute tells us to, on recoverable reserves.

That's what we did. We've come before you not asking for something new, not saying we're going to change the way the world is going to be run.

We're coming before you following the statute. Another key word in the definition of correlative rights is the word "practicable."

What does that mean? Does that mean, as Mr. Kellahin or Mr. Padilla would suggest, it has to be exact? No. It's defined in Black's Dictionary as "that which may be done," that which may be done.

You're to protect correlative rights to the extent that that may be done. Well, take anybody's testimony in the room, and I will tell you right now that on a different record, not like this, Mr. Lyon entered an order that may have been fine then, but as the data has developed, it doesn't protect correlative rights.

And now we're asking you to do that which may be done and give us that the opportunity.

But there's another interesting thing about the laws and the rules and the way this Commission is structured, and that is they have asked you to be the trier of fact in cases involving oil and gas matters.

And that's not an accident. It is technical. And that's why they have an engineer sitting on the Commission, to the listen the engineers.

That's why they have a geologist sitting on Commission, to listen to the geologists.

And that is why we all know, while we scream about getting to the last barrel, that what we're

talking about is the relative values to the -- to be assessed to each of these tracts and to allocate those reasonably and fairly to the extent that that may be reasonably done within your discipline as a geologist and your discipline as petroleum engineer.

They're not -- we're not marching back to the Rule of Capture. They're throwing that as a smoke screen while they're asking you to ignore the very field you're experts in.

They're asking us to come in here and talk about just the proximity of our wellbore to the adjoining tract. That was known before the Rule of Capture, how close you were to your neighbor when you drilled, I guess, a water well next to his pond or outhouse -- I don't know.

But the fact of the matter is they're acting like things stopped at that point. We've come forward with a thorough, detailed engineering presentation. It is sound; it is extensive.

And we're bringing it to you and entrusting you with making a decision, based on this record, that is consistent with these statutes.

And the most absurd thing that's been advanced today is the fact that somehow Mr. Stevens' rights are contingent upon how Mr. McAlpine is going to

produce his well.

Everytime he says, "Well, we only produce 200," I ask you to remember that they're saying that on the very day they dismissed their case to reduce the allowable in this pool.

We think what we've got is a case that was tailored to act, that is sound from a engineering point of view, that is sound from a geological view.

And when you take your expertise and apply it to the statutes which control your activity, you will see it may not be easy, but this is a case, unlike the Jalmat case, where you can't hide by the word "practicable."

You have the data now before you to make a decision, a reasonable decision, and now do what the statute tells you to do: Protect correlative rights and do it in a fashion that won't require drilling unnecessary wells.

And don't let yourself be put into a position where you are somehow supposed to adjust our rights because we have a thick narrow section and they have a long thin one that is being rapidly gobbled up by water.

MR.LeMAY: Thank you, Mr. Carr.

Additional statements in the case?

Yes, sir, Mr. Cooter.

MR. COOTER: I'll be very brief. Once again, for the record, my name is Paul Cooter, and I represent Armstrong Energy Corporation.

So that there will be no question in anyone's minds, Armstrong Energy Corporation is an interest owner with Santa Fe in its well in the southeast quarter of Section 9.

I'm not going to cover what has been so eloquently covered by the other attorneys, but I would like to make four points.

The first the Chairman asked about these different percentages being tossed back and forth; that it appeared that Stevens had some 29 percent of reserves but was asking for a larger percentage as its share of the allowable.

That's because they used different figures. They've asked for 459-barrel allowable based upon the fact that the 670,000 figure is some 89 percent of the 732,000 figure.

But by doing that they have completely failed to cover the 863,000 barrels of recoverable reserves in the northeast quarter.

Admittedly, that 670 is 89 percent of 515, and that's how they come up with the 459. It is some

29 percent of the recoverable reserves, or the proven reserves, in the entire pool.

Why do they want that larger figure? Well, that, again, is quite obvious, and this is my second point. The sooner that that production can be obtained from those two wells, the water level will rise, and which well is going to be watered out first?

Well, it's the Santa Fe well. So that will leave then the Stevens well as the only well in the field.

It's obvious that oil from no further than just the end of the room is going to be sucked into the Stevens well quicker than oil that is some 3,000 feet to the north. So it's just common sense that's going to occur.

Well, then they say, "Drill a third well," but in response to the questions asked by the chairman of all of the experts, even mentioned by Mr. Carr in his closing argument was, "That's economic waste. Produce the two wells."

So it depends upon what is said and when it's said as to whether or not Santa Fe could certainly go drill a well in the northeast quarter, but everyone agrees that is economic waste.

What will happen when the Santa Fe well is

watered out, absent the commission of economic waste, is that Mr. Stevens will recover substantially more than the 670,000 because, one, he'll recover if there's anything behind that tight behind-the-pipe in that tight formation, he will recover it.

That little pipe-shaped feature up above the top of the Devonian in that well he will recover. And since there's no other well in the pool, he'll recover the balance of the 863,000 barrels that migrate from the northeast.

And everyone's in accord, one well could drain the whole pool. Two wells certainly can. And not a one, anyone here today, recommended the drilling of a third well.

With that I close. Thank you very much for your consideration.

MR. LeMAY: Thank you, Mr. Cooter.

Mr. Dungan, or Ms., I should say. I'm sorry.

MS. DUNGAN: That's all right.

The New Mexico Oil Corporation has a working interest in the Holmstrom well along with the Santa Fe Exploration Company and wants to again voice its support for the position of the Santa Fe Exploration Company.

And we believe theirs is the only position

which truly protects our correlative rights and prevents waste.

Thank you.

MR. LeMAY: Thank you very much.

Additional statements in the case?

If not, we shall take the case under advisement.

Thank you, gentlemen, ladies.

(Thereupon, the proceedings were concluded.)

CERTIFICATE OF REPORTER

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

I, Debbie Vestal, Certified Shorthand Reporter and Notary Public, HEREBY CERTIFY that the foregoing transcript of proceedings before the Commission of the Oil Conservation Division was reported by me; that I caused my notes to be transcribed under my personal supervision; 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 29, 1989.

Debbie Vestal
CSR No. 400