STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION COMMISSION

CASE 10,796

COMMISSION HEARING

IN THE MATTER OF:

Application of Manzano Oil Corporation for an unorthodox gas well location, Lea County, New Mexico

TRANSCRIPT OF PROCEEDINGS

BEFORE: WILLIAM J. LEMAY, CHAIRMAN

WILLIAM WEISS, COMMISSIONER

JAMI BAILEY, COMMISSIONER

STATE LAND OFFICE BUILDING

SANTA FE, NEW MEXICO

October 14, 1993

CUMBRE COURT REPORTING
(505) 984-2244

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E X H I B I T S

APPLICANT'S EXHIBITS:

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E X H I B I T S (Continued)

MARATHON EXHIBITS

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WHEREUPON, the following proceedings were had at 10:05 a.m.:

CHAIRMAN LEMAY: We shall continue by calling Case 10,796, which is the Application of Manzano Oil Corporation for an unorthodox gas well location, Lea County, New Mexico.

Call for appearances in Case 10,796.

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

I represent Manzano Oil Corporation and I have three witnesses.

CHAIRMAN LEMAY: Thank you, Mr. Carr.

Additional appearances in Case 10,796?

MR. KELLAHIN: Mr. Chairman, I'm Tom Kellahin of the Santa Fe law firm of Kellahin and Kellahin, appearing in association with Mr. Dow Campbell, a member of the Texas Bar. He's an attorney with Marathon Oil Company in Midland.

We are representing Marathon Oil Company.

I have two witnesses.

CHAIRMAN LEMAY: Thank you, Mr. Kellahin.

Will the five witnesses please stand to be sworn in?

(Thereupon, the witnesses were sworn.)

CHAIRMAN LEMAY: Mr. Carr, you may begin.

MR. CARR: May it please the Commission, I have a brief opening statement.

Manzano Oil Corporation stands before you today seeking approval for an unorthodox well location in the Wolfcamp formation, Lea Wolfcamp Pool.

This well was drilled, as you will see, in an area where there are multiple pays, and it is completed in a relatively small reservoir that we believe consists of only two wells.

Marathon operates the first well in the pool. This is their Jordan "B" 1 Number 1 well in Section 11. It's drilled on a south-half spacing at a standard location and was originally drilled to the Morrow formation.

In 1991 they recompleted in the Wolfcamp and they are on a laydown unit with this well 660 feet off the south line of the unit at a standard location, 660 feet from the Manzano tract.

Earlier this year Manzano drilled its Neuhaus Federal Well Number 2. This well was originally projected to the Strawn. It was drilled at a standard oil well location, and it is 660 feet from the north line of their lease.

While drilling, they encountered problems,

and maybe benefits, as they went through the Wolfcamp formation, because they found an extremely good zone.

But they had problems also in drilling the well. They drilled a couple of hundred feet below that zone and decided to go back and complete in the Wolfcamp. That's a gas well and they had to dedicate 320 acres. So they did, and they have a standup unit.

And although they are as close to Marathon as Marathon is to them, each of them being 660 feet back from the common lease line, our location is unorthodox because we have a standup spacing unit instead of a laydown spacing unit, as to the encroachment toward the Marathon tract.

We found in the Wolfcamp zone it had been drained, that it was being drained at an extremely fast rate, and we determined it was necessary and prudent to complete in that zone. In fact, if we had drilled all the way to the Strawn, we would have come back and had to complete in the Wolfcamp to meet our obligations to other interest owners in the well.

Since that time we obtained temporary testing allowables, and we have produced the well.

I'm going to call first Mr. Ken Barbe. Mr. Barbe is going to review with you in detail the circumstances surrounding the drilling of the well, the

acquisition of temporary testing allowables, and he's going to tell you exactly what they did to produce the well pending the hearing in which before an Examiner they sought an approval of this unorthodox well location.

And after we go through that, we're then going to ask you to turn your attention to what's before you today, because what you have before you today are two wells equidistant from a common lease line. And we're going to provide you the information that you need to enter an order that will protect the correlative rights of the parties involved. And we will also present testimony which will show you that you cannot protect correlative rights if in fact you impose a penalty on the Manzano well.

I will then call a geological witness. This witness will present structure maps, cross-sections, isopachs. And he will show that while the wells are equidistant from a common lease line, the Manzano well has twice the pay of the Marathon well.

He will then present data which will enable the Commission to evaluate what is Manzano's just and equitable share of the reserves in this pool. He will show you how you can determine what is under our tract.

And the bottom line will simply be that no

matter how you look at it, no matter what data you rely on -- and you'll be able to count the feet on the logs and evaluate the technical presentation -- no matter how you count it, as much as 80 percent, perhaps more, of the remaining recoverable reserves will be under the Manzano tract.

We will then call an engineering witness, and he's going to show that by letting these wells produce at unrestricted rates there will not be drainage from the Marathon tract but, in ,fact the contrary would occur. He will show you that no advantage has been gained to Marathon by virtue of this location, which was necessary, in fact, if these reserves under our property were to be produced. And then he will address the penalty calculation.

And when all is said and done, we believe we will have established that this location should be approved and that if you are to do your duty to protect correlative rights no penalty should be imposed on the Manzano well.

CHAIRMAN LEMAY: Thank you, Mr. Carr.

Mr. Kellahin?

MR. KELLAHIN: May it please the Commission, we're here to allocate reservoir share for the remaining gas to be produced in a small Wolfcamp

reservoir. How we get here is interesting. There's lots of substance and interest to the facts of the case.

But when we get through that process, the objective is going to be to allocate remaining gas equitably between the two operators in the pool.

What we have here is a benefit of data that we don't usually have. Manzano has already drilled the encroaching well. The evidence will be interesting how they got there.

You will find out that Marathon drilled its Jordan "B" -- I always get them confused because they were drilled in reverse order -- drilled the Jordan "B" 1 in December of 1991, and it's at a standard 320-acre Wolfcamp gas spacing unit in the south half of Section 11, 660 from the south line, 1980 from the east line. Okay?

In the spring of 1992 -- Let me make sure I get my dates right. By December of 1991, Marathon has got their Wolfcamp well producing.

In January of 1993, then, the evidence will be that Manzano corner-shoots for the Wolfcamp pool out of Section 12. They come in 660 off the common line with a well they permit as a Strawn oil well. They get to the Wolfcamp and they find that it's nonproductive,

they stop.

Then a few months later, in 1993, they come back and use the same strategy for the Neuhaus Number 2, and that's the offending well for which the Examiner imposed the penalty. The Neuhaus Number 2 was permitted as a 40-acre strawn oil well, which would put it at a standard location, 660 from the common line, when in fact for a gas well it should be 1980. It's two-thirds too close.

So they drill the well, they get down to the Wolfcamp. Bingo, they are in the same reservoir with Marathon, and they elect to complete it at that point.

Mr. Carr referenced this as a two-well pool. It's a three-well pool. And there will be substantial disagreement between the technical people over that fact.

The position of the reservoir, as you'll see from the evidence, is going to be adjusted either north or south, based upon the presence or absence of what is called the Jordan "B" Number 2 well, and that's an earlier Wolfcamp well drilled by Marathon, which Marathon's technical people will tell you was in pressure communication with their second Wolfcamp well.

We believe the evidence will show that if you connect those two Jordan wells together and add the

third Manzano well, it dictates some limitations to how you can define the reservoir size and shape.

And when you honor that data you will find, as I think the Examiner found, that approximately 37 percent of the remaining gas, based upon an allocation of acre-feet, belongs to Manzano.

And when you do that, then their share of the remaining recoverable gas from the pool is about 1.23 BCF of gas.

We will present you a geologic witness. Lisa Gholston's testified before the Examiner in this very case. She's back to present your geologic conclusions for you again.

Craig Kent is the reservoir engineer. He's appeared before you many times. He's done the reservoir engineering work on which these cases are based.

It is his conclusion, then, that you can allocate the remaining gas in the pool such that Manzano gets their share of the gas by a penalty formula, and he'll share that with you.

The penalty is such that if you apply a two-thirds restriction on the ability of the Marathon well to -- the Manzano well to produce, then the calculation shows they will get their share of the remaining gas.

There's some interesting engineering points about the four-point test, the different deliverability tests, the various emergency producing rates that were allowed Manzano during the course of trying to get a rate established for the well.

But when we get through all of that, the key component is whether or not you agree with my technical people that the Jordan "B" 2 well to the north is in fact in the same reservoir. And if you believe, as they do, that it is, then that limits the reservoir location. And when you do that, Manzano's reservoir share is 37 percent.

We're going to ask you when this is all said and done to affirm the Examiner Order.

Mr. Catanach has entered an Order through the Division process for a hearing on August 19th. The Order is issued September 21st. He has outlined for you the positions of both companies, and then he gets his own conclusion. We share that with you simply as an outline, because it's the course of presentation we're about to embark on.

Thank you, Mr. Chairman.

CHAIRMAN LEMAY: Thank you, Mr. Kellahin.

Mr. Carr, you may call your first witness.

MR. CARR: Thank you, Mr. LeMay. At this

time we call Mr. Ken Barbe.

KENNETH BARBE, JR.,

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

DIRECT EXAMINATION

BY MR. CARR:

Q. Would you state your name for the record, please?

A. Kenneth Barbe, Jr.

Q. And where do you reside?

A. Roswell, New Mexico.

Q. By whom are you employed?

A. Manzano Oil Corporation.

Q. And what is your current position with Manzano Oil Corporation?

A. I am co-owner and vice president.

Q. Have you previously testified before this Division?

A. No, I have not.

Q. Could you briefly review for the Commission your educational background and review your work experience?

A. I graduated from New Mexico State University in 1976 with a bachelor of accountancy. From that point I went into public accounting in Roswell in 1981.

I became involved in the oil business in 1984.

I co-founded Manzano Oil Corporation and have been involved with Manzano ever since.

Q. As a vice president of Manzano, are you familiar with the Manzano Neuhaus Federal Well Number 2?

A. Yes, I am.

Q. And the circumstances surrounding the drilling of this particular well?

A. Yes, sir.

Q. Are you also familiar with Manzano's efforts to develop the Strawn formation with the Sims well offsetting this property to the east?

A. Yes, sir, I am.

Q. Could you briefly state for the Commission what it is that Manzano seeks with this Application?

A. Manzano seeks approval of an unorthodox gas well location for its Neuhaus Federal Number 2 located 660 feet from the north line and 1650 feet from the east line, Section 14, Township 20 South, Range 35 East, for all formations developed on 320-acre spacing.

We will also present technical witnesses to support our no-penalty recommendation.

Q. When the Neuhaus Federal Number 1 well -- or

Number 2 well, was originally proposed, what was the primary objective in this well?

A. The deepest objective was the Strawn. Our other primary objectives included the Wolfcamp, Bone Springs, Queen Penrose and San Andres.

Q. So you had multiple zones that you were intending to test when you drilled the well?

A. That's correct.

Q. And from the beginning you knew that the Wolfcamp was a potential pay?

A. Yes, sir.

Q. Could you briefly review for the Commission the history of this well, starting with when you proposed it?

A. Yes, sir. In April of 1993 Manzano purchased a portion of the Osudo prospect from Brad Bennett, Inc., and we took over as operator of the prospect.

We decided to take the prospect because it's in a multi-pay area of Lea County and Manzano strongly believes in having multiple pay zones when drilling a well.

The producing formations in the area include the Queen, the San Andres, the Delaware, the Bone Spring, the Wolfcamp, the Strawn and the Morrow.

Bennett had acquired a lease from Exxon

covering the east half of Section 14 including all depths. He also owned the deep rights under Section 13 to the east. Manzano owned the shallow rights under that section.

Bennett had attempted to gain acreage or support from Mitchell Energy in the west half of Section 14, however he was unsuccessful in doing so.

Manzano spudded the Neuhaus Federal Number 2 as a Strawn well at a standard well location. The well was spudded on June the 3rd, 1993. Manzano drilled 64 feet of the Middle Wolfcamp pay before we ran a drill stem test.

The drill stem test indicated an excellent reservoir, but this reservoir had been partially drained.

We resumed drilling after the DST and drilled another 67 feet of Wolfcamp pay and then continued on for another 102 feet.

The determination was made at that time to cease drilling for the following reasons:

The DST indicated that the bottomhole pressure of the Middle Wolfcamp pay interval in the Neuhaus well was 2129 pounds, which is considerably less than the original reservoir bottomhole pressure.

The hydrostatic pressure in the wellbore was

5467 pounds, which meant that the borehole was overbalanced by 3300 pounds.

The DST indicated the reservoir had high permeability and that it had already undergone significant skin damage.

During the drilling after the DST, the well began to take fluid, and we were losing up to 10 barrels of drilling fluid an hour.

Given that the wellbore was severely overbalanced, yet we had high permeability and we had already undergone skin damage, and also that it would take several days to drill to the Strawn, we were highly concerned about damaging the reservoir beyond recovery.

In addition, we determined that it would not have been prudent to produce the Strawn while Marathon was draining the Wolfcamp reservoir under Manzano's lease.

Q. So you then completed in the Wolfcamp?

A. Yes, sir.

Q. And what did you do at that time? You knew you were at an unorthodox location, did you not?

A. Yes, sir.

Q. And what did you do?

A. Well, we actually filed the completion report

on July 14th in the Wolfcamp formation. At that time we spoke to Mr. Bill LeMay, and he stated that he would grant us a temporary allowable based upon our four-point test while we were obtaining approval of our unorthodox well location.

We ran the initial four-point test on July 15th. We received the results on Friday, July 16th, and I delivered the four-point information to Mr. LeMay in his office Monday morning, July 19th, with an explanation that the four-point test was inaccurate because during the test we were producing at such a low gas rate that we were unable to lift the fluid, and we only drew down the bottomhole reservoir pressure ten pounds. It is my understanding that to have an accurate test, the bottomhole pressure should be reduced at least 25 percent for an accurate test.

Based upon the four-point information, Mr. LeMay by letter dated July 21st then granted Manzano an initial testing allowable of 882 MCF per day, and that was based on one-third of our absolute open flow number of 2,647,000 cubic feet per day.

Mr. LeMay also stated that Manzano could retest the well and supply the corrected information and the allowable would be adjusted based upon the resubmitted four-point test information.

Manzano commenced production on July 25, upon receipt of the allowable letter from Mr. LeMay and the hookup of the gas pipeline by GPM Corporation.

After producing for several days, we realized the original AOF was grossly understated. We were producing approximately 3.1 million cubic feet a day on a 32/64 choke when the initial AOF was only 2.647 MCF per day.

We attempted to contact Mr. LeMay on July 31st and learned that he was tied up at a BLM meeting in Carlsbad. We then had conversations with Jerry Sexton, who is the OCD director in Hobbs, and on that date Mr. Sexton faxed us an oil allowable of 6000 barrels per month.

We have since learned from Mr. LeMay that the allowable granted by Mr. Sexton was for the purpose of selling oil only and not for testing allowable purposes.

Q. Did you understand that at the time you got the oil allowable from Mr. Sexton?

A. No, we did not.

On August the 3rd we retested the well for an AOF of 35,240 MCF per day. The test information was received and submitted by Manzano to Mr. LeMay on August the 6th.

By letter dated August 13th, Mr. LeMay granted us a new testing allowable of 11,740 MCF per day until the hearing of August 19th.

We produced the well at approximately 4.2 million cubic feet per day from August 13th through August 19th.

Our total testing allowable from July 25th, 1993, until August 19th, 1993, was 98,938 MCF. During that period, Manzano produced 91,481 MCF.

The well was shut in August the 20th, as requested by Mr. LeMay, and production information during the testing period was provided to the OCD by letter from Manzano dated August 20th, as was requested by Mr. LeMay in his letter of July 21st.

Manzano received its allowable by OCD order dated September 21st, which stated that Manzano shall retest the well to determine the allowable based upon one-third of the deliverability into the pipeline, as outlined by the OCD.

The new test was run September 27th, with a resulting deliverability of 7.564 million cubic feet per day.

The test was presented to Mr. Sexton the following day, September 28th, at which time Manzano was granted an allowable of 2.521 million cubic feet

per day times the calendar days in the month to be produced at a daily rate of Manzano's choice.

Our current producing rate is approximately 4 million cubic feet a day on a 34/64 choke. We will shut the well in when we reach our monthly allowable.

Q. Since the well was drilled, have you attempted to keep the Oil Conservation Division advised of what was going on with the well in your producing activity at that site?

A. Yes, sir, up to the time that we actually received our allowable order we were in daily contact with Jerry Sexton.

I might also state that during the time Manzano's Neuhaus Federal well was shut in waiting on our allowable order, Marathon made a request to the OCD to remove its tubing and produce through the casing. This request was denied.

However, Marathon did change out its tubing to 3 1/2 inches and commenced producing approximately 6 million cubic feet a day. I believe the current production is approximately 4.9 million cubic feet a day.

Q. In your company, are you an individual who is responsible for dealing with regulatory authorities?

A. Yes, I am.

Q. You're one of those people?

A. Yes, sir.

Q. And you were the person who was actually making contact with Mr. LeMay and the Oil Conservation Division?

A. Yes, myself and Ken Reynolds and Donnie Brown also.

Q. And your attempt was -- At any time, did you intend to be outside what was the authorized producing procedures authorized for this well by the Division?

A. No, sir, we did not.

Q. Now, Mr. Barbe, if this well had been drilled all the way to the Strawn and completed in the Strawn, would you have produced that formation?

A. No, sir, we would not. We believe that it is our duty to our working interest owners as well as our royalty interest owners as a prudent operator to protect our reserves from drainage and protect their correlative rights.

Q. You were present during Mr. Kellahin's opening, I believe?

A. Yes, sir.

Q. He talked about an interesting way that we got here and discussed a well that was earlier projected to the Strawn formation.

Are you familiar with that well and was that drilled to that depth?

A. Yes, sir, I am.

Q. What's the name of that well?

A. That's the Sims State Number 1.

Q. Was that originally projected as a Strawn test?

A. Yes, it is.

Q. And Mr. Kellahin called it a corner shot. Where was it in regard to the Marathon tract?

A. It was directly east of the Marathon tract. I believe it was 660 off of their lease line.

Q. And did you drill to the Strawn?

A. No, sir, we did not.

Q. And would you tell us why not?

A. We drilled it to the Wolfcamp, and up to that point we had seen very little shows in anything. We had a very slight show in the San Andres.

And upon the recommendation of our geologist, he told us that he didn't feel like it was a good idea to continue drilling to the Strawn based on having to set pipe all the way down there. We didn't feel like the reserves would justify running casing, based on the fact that we were running substantially high, and we felt like we might be tight at that point.

Q. And the decision was based on the recommendation of the geologist?

A. Yes, sir.

Q. And it was because you were high when you intersected the Wolfcamp?

A. Yes, sir.

Q. Were you also -- Will Manzano also call geological and engineering witnesses to review the technical aspects of this case?

A. Yes, sir, they will.

MR. CARR: I have nothing further of Mr. Barbe.

CHAIRMAN LEMAY: Thank you, Mr. Kellahin -- I mean Mr. Carr.

(Off the record)

CHAIRMAN LEMAY: Mr. Kellahin, you may proceed.

MR. KELLAHIN: Mr. Chairman, by stipulation with opposing counsel, I have an exhibit which we propose to introduce as Marathon Exhibit Number 1. That exhibit is a compilation of forms and documents, letters, information that were in the Division case file for this matter.

I have numbered each page at the top right corner, starting with 1, and it goes through page 24,

and it's -- These documents, Mr. Carr and I have stipulated, may be admitted at this time.

At this time, Mr. Chairman, I would move the introduction of Marathon Exhibit 1.

MR. CARR: No objection.

CHAIRMAN LEMAY: Without objection, the Exhibit 1 will be admitted into the record.

CROSS-EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Barbe, I apologize for not having a visual illustration of the relationship of the four sections in this area to help illustrate my questions, but perhaps you and I can describe to the Commission where we are.

We've got Section 11, the south half of 11 has got the Marathon Jordan "B" Number 1 well in it, right, sir?

A. Yes, sir.

Q. When we go east of that section, we get into Section 12. The southwest corner of 12 is the one where Manzano attempted the Sims State 1 well?

A. That's correct.

Q. Go south of 12, we've got 13. If you go west of 13, you've got Section 14. And it is the east half of 14 that you have dedicated to the Wolfcamp

production out of the Neuhaus Federal Number 2 well?

A. Yes, sir.

Q. When we look at Section 14, what portion of Section 14 was within the control of Manzano Oil Corporation to determine the orientation of the spacing unit?

A. The east half.

Q. What's the status of the southwest quarter?

A. I believe the southwest -- I believe all of the west half is controlled by Mitchell.

Q. Did you propose to Mitchell that you could form a north-half Wolfcamp spacing unit?

A. I believe that was done, prior to us becoming involved, by Brad Bennett. We purchased the prospect from Mr. Bennett, and those negotiations were performed prior to us becoming involved.

Q. If the spacing unit had been turned north half of Section 14, then the well would be standard as to the dimension between you and Marathon?

A. Yes, sir.

Q. With 660 setback from the side boundary, right?

A. That's correct.

Q. All right. You would have been encroaching on the Section 13, as well as the diagonal Section 12,

with the well if the spacing unit was the north half?

A. That's correct.

Q. Who controls 13 and 12, Section 12 and 13 in the Wolfcamp?

A. The -- Section 12 is controlled by Manzano. Section 13 is a little bit of a question there, because the deep rights that are owned by Brad Bennett are approximately -- I've forgot what the exact depth is.

MICHAEL BROWN: Eleven three.

THE WITNESS: 11,320 feet. And Manzano controls the rights above 11,320, and then it controls the rights below 11,320.

Q. (By Mr. Kellahin) Mr. Barbe, do you have any kind of technical background or experience as an engineer or as a geologist?

A. No, sir, I do not.

Q. When you look at the choice of a north-half spacing unit, did Manzano or anyone else to your knowledge attempt to force-pool Mitchell's northwest quarter so that you could form a standard gas spacing unit of 320 acres for the north half of that section?

A. To my knowledge, that was not done.

Q. If you had done that, the share of production would at least have been divided in half, would it not? Between Mitchell and the interest owners that are

involved in your well in the northeast quarter?

A. That's correct.

Q. Would that reduce your interest, to have a north-half spacing unit, as opposed to the east-half spacing unit that you selected?

A. Yes, it would.

Q. If you'll turn with me to Marathon Exhibit Number 1, the first page is the APD for the Neuhaus Number 2 well. If you'll find towards the middle of that form, it says the proposed depth, 12,400. That would have been a depth sufficient enough to test a Strawn oil well?

A. Yes, sir, I believe that's correct.

Q. Okay. And that is the permit you received for the drilling of this well?

A. Yes, sir.

Q. When you look at potential Strawn oil targets, how far do you have to go away from Section 14 before you find your first Strawn oil well?

A. Well, not being a geologist, I'm not exactly sure, but I believe there is Strawn production in the Osudo-Wolfcamp, approximately four miles away.

We also felt like there was Strawn potential in the Jordan "B" 1 well, that has not been attempted to complete.

Q. When you're looking for the closest control point in the Wolfcamp, that control point is just north of you in the Marathon Jordan "B" Number 1, isn't it?

A. Yes sir. We have several control points in the Wolfcamp.

Q. If you'll turn with me to page 4 of Marathon Exhibit 1, this is the authority for transportation of hydrocarbons. It at least represents that the well was completed on July 14th of 1993 as a Wolfcamp gas well; is that not correct, sir?

A. Yes, sir.

Q. Turn with me to the next page, and let's go to page number -- I apologize, my copy is a little difficult to read, but I believe it's page number 5. It's the one that has the APD for the Sims well.

A. Yes, sir.

Q. Are you with me?

A. Uh-huh.

Q. The Sims well is the first attempt by Marathon -- Manzano in this area to find either Strawn or Wolfcamp production, right?

A. Along with other zones, that's correct.

Q. Okay. The Sims well is permitted as a Strawn oil well also, is it not?

A. Yes, sir.

Q. And under 40-acre Strawn oil spacing, it would be at a standard location where it was produced?

A. That is correct.

Q. But for Wolfcamp gas, it is not at a standard location, at least as to one dimension, depending upon how you turn the spacing unit?

A. Right.

Q. Was it your decision to stop drilling the Sims Number 1 well after you had encountered the Wolfcamp zone?

A. It was a management decision, yes, it was.

Q. And you make management decisions?

A. I am involved in that, yes, based upon geologic recommendations.

Q. Did the geologic recommendations come to you so that you had information about what the Wolfcamp portion of this Sims well looked like at this time?

A. Yes, we did.

Q. What did it look like?

A. It did not look productive at that time. I don't remember the exact details as far as -- We knew we were running high, and we knew we were running tight.

Q. Okay. How long after you terminated your efforts on the Sims 1 well did you commence to drill

the Neuhaus Number 2 well? Approximately how long?

A. I'd have to go back and check the dates. I don't recall.

Q. Within a couple of months, my recollection? It's demonstrated on the APDs, is it not?

A. Let's see, it looks like we were approved on what? January 21st, 1993, for the Sims?

Q. Uh-huh.

A. And I'm not sure -- We spud the Neuhaus June 3rd, so what is that? Five to six months, I guess.

Q. Okay, let's talk about some of the producing allowables, the chronology that you and Mr. Carr discussed a while ago when we talked about the Neuhaus Number 2 well.

A. Okay.

Q. If you'll turn to page 11 of Exhibit -- Marathon Exhibit 1, this is a copy of the Division Director's letter to you, you referred to, in which, based upon an open-hole potential --

A. Yes, sir.

Q. -- the Director allows you a testing rate of 882 MCF a day, okay?

A. That's correct.

Q. Okay. And then if we go to page 14, this is a copy of the Division letter approving a test

allowable that's now increased to 11.7 million a day?

A. Yes, sir.

Q. And that is predicated on an absolute open flow potential taken of the well taken, showing 35 million a day?

A. Yes, sir, that's correct.

Q. Okay. Did you have examined the integrity of the absolute open flow potential test that resulted in the 35-million-a-day number?

A. I personally did not, no.

Q. Who conducted that test for you?

A. I believe that was Tefteller.

Q. Did you have any employees or representatives of your company on site for that test?

A. I would have to defer to our engineers on -- I'm sure that we had our -- at least our field foreman on location for that.

Q. Do you know whether it is physically possible to flow that volume of gas at this reservoir pressure with the size of tubing you had in that well, in order to get 35 million a day?

A. Into -- to flow it to the atmosphere or --

Q. Yes, sir, on a test?

A. Yes, that number is an extrapolated number.

Q. Have you since tried to determine whether or

not that was a valid test?

A. We have not rerun another four-point test, if that is your question.

Q. The next test that's run is a deliverability test that was run based upon Examiner Catanach's Order?

A. That is correct.

Q. That four-point test is found starting on page 22 of Marathon Exhibit 1. If you look down at the bottom of the test it says, 7.564 million a day?

A. That's correct.

Q. And that is the test you referred to a while ago?

A. Yes, sir. I might add, that number is based on deliverability as opposed to absolute open flow.

Q. Yes, sir, I'm aware of that.

A. Okay.

Q. Did you or any of your employees actually participate or witness this deliverability test?

A. Yes, sir.

Q. Okay, which one?

A. It's again the field foreman. I don't know -- I'm not involved directly in that, so...

Q. Did Mr. Donnie Brown witness those tests?

A. Yes, he did.

Q. When the Director provided a temporary

allowable based upon the footage encroachment -- I'm looking at the July letter, the July 21st letter.

A. Okay.

Q. The Director provides, in effect, a two-thirds reduction in the test results, so that you can produce at 882 MCF a day?

A. That's correct.

Q. All right? If you'll turn over, now, to page number 18 with me, there's a tabulation of production. Do you find that, Mr. Barbe?

A. Yes, sir.

Q. All right. And that's an attachment to a letter submitted over your signature to the Division, dated August 20th of 1993?

A. Yes, sir.

Q. All right? If you'll look on the tabulation of gas produced on a daily basis, starting with July 25 --

A. Uh-huh.

Q. -- what number do you get?

A. On the production column?

Q. Yes, sir.

A. 3.178 million.

Q. The letter from Mr. LeMay authorized you to produce only 882 MCF a day?

A. That's correct. That's when we contacted Mr. LeMay, on July 31, realizing that our absolute open flow number was totally understated.

Q. And that continued, then, until August 13th, and then on August 13th, the Division increased the limitation on the rate up to 11.7 million a day?

A. That's correct.

Q. So during that period of time, you're -- What? Three and a half times over the approval rate authorized to you by the Director?

A. No, if you look at the cums, you can see we're actually under-produced.

Q. On a daily basis --

A. On --

Q. -- it is three and a half times over, isn't it?

A. On the total basis.

MR. KELLAHIN: Yes, sir.

No further questions, Mr. Chairman.

CHAIRMAN LEMAY: Thank you, Mr. Kellahin.

Mr. Carr?

MR. CARR: Just a couple.

REDIRECT EXAMINATION

BY MR. CARR:

Q. Manzano has working-interest partners in the

Neuhaus Federal Number 2 well, do they not?

A. Yes, sir, they do.

Q. If you had put together a north-half unit, just looking at Manzano's interests, what would that have done to Manzano's interest in this well?

A. It would have cut our interests in half.

Q. It would have?

A. Yes, sir.

Q. Do you have a working-interest position in any of the other properties in that section?

A. No, we do not.

Q. If Manzano is drilling wells for multiple pay zones in this particular area, are you producing any well from a zone other than the Strawn -- or -- the Strawn or the Lea Wolfcamp zone?

A. Yes, sir, to the east we are producing a Queen Penrose well in Section 13.

MR. CARR: That's all I have.

CHAIRMAN LEMAY: Thank you, Mr. Carr.

Additional questions of the witness? Commissioner Bailey?

COMMISSIONER BAILEY: No questions.

CHAIRMAN LEMAY: Commissioner Weiss?

COMMISSIONER WEISS: I have no questions.

CHAIRMAN LEMAY: I have one, Mr. Barbe.

THE WITNESS: Yes, sir.

EXAMINATION

BY CHAIRMAN LEMAY:

Q. Is Manzano familiar with Commission and Division precedent whereby unorthodox locations that are objected to generally carry a penalty factor?

A. Yes, sir, but I had been told and understood that it was based on correlative rights and operators draining or gaining an advantage on another operator.

Q. In discussing your -- the location of the Sims State Number 1 before you drilled it, do you recall of any conversation that said that if we complete this in the Wolfcamp that there may be a penalty, or was that a consideration in picking the location for the Sims State?

A. Yes, sir, we realized that if we had completed a well in the Wolfcamp we would have to come to the Commission and receive an approval for our unorthodox location.

Q. In both the Sims State and the Neuhaus wells, so --

A. Yes, sir.

Q. -- that was a consideration in picking a location?

A. Yes, sir.

CHAIRMAN LEMAY: Okay. I have no other questions. The witness may be excused. Thank you.

MR. CARR: May it please the Commission, at this time we would call Michael Brown.

CHARLES MICHAEL BROWN,

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

DIRECT EXAMINATION

BY MR. CARR:

Q. Would you state your name for the record, please?

A. Charles Michael Brown.

Q. And where do you reside?

A. Roswell, New Mexico.

Q. By whom are you employed?

A. I'm employed by Manzano Oil Corporation.

Q. And what is your current position with Manzano?

A. A geologist.

Q. Have you previously testified before the Oil Conservation Commission?

A. No, I have not.

Q. Would you briefly summarize your educational background and review your work experience?

A. Okay. I have a bachelor's degree in geology

from Baylor University in 1981, I have a master's degree in geology from the University of Oklahoma in 1983, I have an MBA in finance from the University of Texas at Dallas in 1989.

I have ten years of experience in the oil and gas industry. I worked for Exxon Corporation in Andrews, Texas, working in the Permian Basin. I worked for Texas Oil and Gas in Shreveport, Louisiana, and for the last two and a half years I've been employed by Manzano Oil Corporation.

Q. Are you familiar with the Application filed in this case?

A. Yes, I am.

Q. And are you familiar with the Manzano Neuhaus Federal Number 2 well?

A. Yes, I am.

Q. Have you made a geological study of the area surrounding this well in the Lea Wolfcamp Pool?

A. Yes, I have.

MR. CARR: We tender Mr. Brown as an expert witness in petroleum geology.

CHAIRMAN LEMAY: His qualifications are acceptable.

Q. (By Mr. Carr) Mr. Brown, have you prepared certain exhibits for presentation here today?

A. Yes, I have.

Q. Let's go to what has been marked -- Maybe if I pass out the exhibits, that will make it easier.

CHAIRMAN LEMAY: That would help, Mr. Carr, give us something to look at.

(Off the record)

Q. (By Mr. Carr) Mr. Brown, would you refer to what has been marked Exhibit Number 1 and identify this for the Commission, please?

A. Exhibit 1 is a structure map on top of the Wolfcamp formation. I've used 25-foot contour intervals.

This shows the location of the Jordan "B" 1, and you'll see that in the southeast quarter of Section 11.

The Neuhaus Federal is shown in the northeast quarter of Section 14.

Both wells are 660 feet from the common lease line.

I've also shown the east-half spacing unit that we are asking approval for.

You'll note that the Neuhaus Federal Number 2 is 21 feet high to the Jordan "B" 1 on the top of the Wolfcamp.

Q. How does this relate to the top of the pay

interval?

A. On the top of the pay -- and we'll see this in a minute -- we're over 60 feet high.

Q. Was this map constructed strictly from well-control information?

A. Yes, it is.

Q. You did not integrate any seismic information into this exhibit?

A. No, we did not.

Q. What are the well location requirements in this area?

A. For a gas well it's 660 feet from the side boundary and 1980 feet from the end boundary.

Q. Now, Mr. Brown, by way of background, perhaps you could just review the ownership surrounding the Manzano well?

A. In Section 11, I believe that entire section is controlled by Marathon.

The south half of Section 12 is controlled by Manzano.

The rights above 11,320 in Section 13 is controlled by Manzano. The deep rights are controlled by Brad Bennett. And say here I believe that Manzano controls the Wolfcamp; it should all remain above 11,320.

The east half of Section 14 is controlled by Manzano.

Q. What's the status of the royalty ownership under Section 14?

A. Section 14 is a federal lease.

Q. And what about Section 11?

A. And Section 11 is, at least in major portion, fee.

Q. You've dedicated a standup unit in the east half of 14 to the well?

A. Yes, I have.

Q. What is the productive status of the southwest quarter of Section 14?

A. For the Wolfcamp, I deem it unproductive.

Q. And what about the northwest?

A. Quarter of 14?

Q. Yes.

A. Also nonproductive.

Q. So both the northwest and the southeast quarter wold be nonproductive?

A. That's correct.

Q. Anything else on Exhibit Number 1?

A. I would say that I also deem the southwest quarter of Section 11 is unproductive.

I would also like to state here -- And maybe

Mr. Barbe misunderstood your first question when you asked whether Manzano's interests would be halved if we had formed a north-half unit. Currently, yes, that would be the case.

But when the project came to us, my recommendation to management was that we take a five- to ten-percent working interest, regardless. So had it been a north-half unit, we would have had the same working interest as we do currently.

Q. Let's go to Exhibit Number 2. Could you identify that, please?

A. Exhibit 2 is a structure map on the base of the Middle Wolfcamp pay interval.

Q. Okay. Now, what does this tell us?

A. Basically, if we look at the Jordan "B" 1 and the Neuhaus Federal Number 2, you will see that the base of the Middle Wolfcamp pay is seven feet low in the Neuhaus Federal Number 1. The trend of your contouring, it just reflects the overall regional trend. Structure dips to the west southwest, and you'll see that in numerous of the different horizons.

If you follow the 7800 contour, you'll see that you go through the Jordan "B" 1, around the Neuhaus Federal Number 2. You have to deflect the contour due to the Neuhaus Federal Number 1, which is

located in the northeast quarter of the southeast quarter of Section 14.

What you end up with is a nice little deflection that is centered in and around the Neuhaus Federal Number 2.

There are no structural anomalies that you see all in Section 11. All the structural deflection occurs in Section 14.

If you continue the contour around, you move south, and 1980 feet south of the Section 14 line is a field called the Osudo-Wolfcamp Southwest. It is a well established carbonate buildup.

It also shows the same deflection pattern. If we were just looking at the deflection, you could make a case that the likely depo center of any buildup would be to the southeast. There's no evidence at all, based on this map, that you could extend anything in a northern direction as far as east of the Jordan "B" 1.

This structure map neither supports nor condemns carbonate mound versus debris flow, which we'll get into great detail.

However, as I stated under both models the likely depo center would be southeast of the Neuhaus Federal Number 2, where that deflection occurs.

Q. This is the base of the zone of interest

we're discussing here today in this area?

A. Yes, sir.

Q. All right. Let's move now to Exhibit Number 3. Could you identify that exhibit for the Commissioner, please?

A. This is a structural cross-section I've labeled A to A'. It runs north-south.

And if you could look at the index map you'll see that to your left on the A, you have the Marathon Jordan "B" 2.

You move then to the Jordan "B" 1.

The third well from the left is the Neuhaus Federal Number 2.

You then go to the Neuhaus Federal Number 1.

And then lastly, on the right, is the well I was referring to in the Osudo-Wolfcamp Southwest field, and that is the Byers, the BTA Byers Number 1.

I have shown some different colors on the map. Let me tell you what they are.

I've got dolomite, less than 30 API, shown in purple. Less than that is shown in brown, and it infers ratty or shaley carbonate deposition.

The blue is limestone. Where I have two-color tracts on the gamma-ray, it will infer that it's not pure. It's either -- say on the limestone, it's a

limey-dolomite versus a dolomitic lime. But...

Porosity is shown in orange, and that's greater than four percent neutron, just for convention's sake.

We will look at a more detailed cross-section in a minute that's just between the Neuhaus Federal Number 1 and the Jordan "B" Number 1.

I've picked the top of the Wolfcamp, and this is a pick that Marathon used. It's a nomenclatural pick. I have no objection one way or the other to them calling that top of the Wolfcamp.

My top of the Wolfcamp, and I know that of Amoco to the south, is shown as top Wolfcamp Number 2.

The top of the Middle Wolfcamp pay interval is your third line down.

The base of the Middle Wolfcamp pay interval is your last line.

And I hung this cross-section on the base of the Middle Wolfcamp pay interval.

Q. All right. Now, what does this show you about the Wolfcamp in this general area?

A. Okay, if we move to the left side of the cross-section, let's look at the Jordan "B" 2.

The Jordan "B" 2 had 39 feet of the Middle Wolfcamp pay interval. And as we'll see here, not all

of the Middle Wolfcamp pay interval is actually pay. We're looking at the dolomite -- try to look at the dolomite only, the clean dolomite.

If you look at the porosity -- Well, first, if you look at the gamma-ray section, you'll see it's pretty ratty and it's very, very thin. As a matter of fact, only seven percent of it is actually deemed pay.

During testimony, Marathon called that a dolomite. I'm not sure what data they were using. When you cross-plot all of it, it appears to be a lime. But just for the sake of not arguing I've shown it as a dolomite.

It produced from this Middle Wolfcamp pay interval, starting in 1985. It came on flowing 175 barrels of oil, 15 barrels of water, 1500 MCF.

It produced for six years, and in that six years it only cum'd 28,000 barrels of oil and 159 million cubic feet of gas, and watered out.

And I find that interesting in that the base of the perfs on the Jordan "B" 2 -- and we'll see this on another cross-section -- is 24 feet high to the base of the perfs in the Jordan "B" 1, yet this well watered out, and yet Marathon is calling it in the same reservoir.

The Jordan "B" 1, the second well from the

left, had 63 feet of the Middle Wolfcamp pay interval, of which 39 feet of it was clean dolomite pay. You see it as alternating clean dolomite versus shaley or -- it's a ratty carbonate.

It began producing in 1992 -- or it was recompleted in 1992, for 566 barrels of oil, 5.26 million cubic feet of gas a day. It has cum'd, as of June, 2.5 BCF of gas, 255 million barrels of oil and 75 million barrels of water. And as of June it was produced at 4.4 million cubic feet of gas a day, 388 barrels of oil a day, and 153 barrels of water per day, which comes out to a 28-percent water cut.

Moving to the Neuhaus Federal Number 2, you will see that it has 131 feet of Middle Wolfcamp pay, of which 115 feet of that is clean dolomite.

It has a very nice porosity profile that appears to be a buildup, substantial buildup.

It was completed in July of 1993.

The Neuhaus Federal Number 1 had 85 feet of the Middle Wolfcamp pay interval. However, it was very limey, had some portions that you'd call a dolomitic lime, but for practical sake it really was more a limestone.

It did DST the Wolfcamp and recovered oil, however it was deemed to be too tight and was

noncommercial.

The BTA Byers Number 1 on your far right, as I said, is in the Osudo-Wolfcamp field. It is a very substantial buildup, it's 219 feet thick. Over 125 feet of that is clean.

It appears to be a limestone. However, if you look at the PE curve there's a good portion of it that falls into the dolomite realm. So you can call it a dolomitic lime or a limey dolomite; it really doesn't make any difference to me.

It started producing in 1986 and produced -- Let's see, its initial production -- 467 barrels of oil and 824 million cubic -- or MCF of gas per day. And it has cum'd 849 million cubic feet of gas, 153 million barrels -- or thousand barrels of oil and 791,000 barrels of water.

If you move up to the next horizon above the Middle Wolfcamp pay, I want you to notice that in the "B" 2 you have 136 feet of very ratty carbonate. That same section thins to 108 feet when you move to the Jordan "B" 2 [*sic*]. Move over to the crest of the structure or the mound, it's 67 feet.

Above that you have the strata that's between the two Wolfcamp picks, and it's essentially flat. It runs 94 to 99 feet in thickness.

When you look at the top of the Middle Wolfcamp pay -- this cross-section is a little bit deceiving because it's not to true vertical scale -- if you take the actual slope at the top of the Wolfcamp pay, you would have to terminate the top of that pay before -- between the "B" 1 and -- I'm talking about the "B" 1 and the "B" -- you would terminate that top before you got to the Jordan "B" 2, and then you could begin again.

And I'll show here in a minute, we've got a stick diagram that shows that well, and it's actually to true vertical scale.

Q. Mr. Brown, the BTA Oil Producer well on the right or southern portion of the cross-section, what -- what pool was that completed in?

A. That's in the Osudo-Wolfcamp South well.

Q. And generally what are the characteristics of that particular pool?

A. If you look both above the base of the Middle Wolfcamp pay and below, what you'll see is a very large, very thick, carbonate buildup. It's well established in the literature. It's been argued many times before this board, and the data was always presented as a carbonate buildup.

Q. In terms of the dolomite in the wells that

are of primary interest, the Jordan "B" 1 and the Neuhaus Number 2, how do they compare?

A. They're not as thick. It does not seem to be as substantial a buildup.

However, like the Byers 1, which is a very clean section -- you can see it very, very clean, very little ratty dolomite -- the Neuhaus Federal Number 2 looks very similar. It's also very, very clean.

The Jordan "B" 1, on the other hand, does not appear to be like the Byers. It appears to me to be some kind of debris or on the flanks of a buildup.

The Jordan "B" 2, as I stated before, Marathon contends it's dolomite. It doesn't appear to be on the logs. It could -- I don't think, very strongly do not think that it's in the same reservoir.

Q. Anything else with Exhibit Number 3?

A. I'll go ahead and point it out now -- I'll also point it out again in a little while -- that if you look at the isopach interval between the base of the Middle Wolfcamp pay interval and the top of the Wolfcamp 1, you'll see as you move across from the "B" 2 on your left to the Neuhaus Federal Number 2, the overall isopach thickness really doesn't change. It's basically the same.

When you move down to the top of the Wolfcamp

2 interval, there is a slight difference. The Jordan "B" 2 is slightly thinner -- or the overall is slightly thinner. However, the interval below that marker is extremely thick.

And we'll come back to this in a minute, and I'll show that this is a characteristic of a carbonate mound.

Q. Are you ready to go to your next exhibits?

A. I sure am.

Q. Let's go to Exhibit Number 4, your schematic or -- your schematic or stick diagram, and I'd ask you to first explain --

A. This is a schematic of a typical channelized turbidite or a debris flow, density debris flow model, and this is the depositional model employed by Marathon to explain the reservoir distribution that they show for the Lea Wolfcamp Pool.

In a debris flow, sediment is carried by gravity, and it fills in paleotopographic lows.

So if you look at the base of horizon A, you'll see that you have a topographic low. It is a negative feature. Horizon A, since it's gravity-driven, it can only fill in the low. And that's what it does, it fills it in. And it is much thicker in, say, position 3, well 3, than it would be in position

1.

As you move up the section to horizons B, C and D, they're roughly flat. There's no more paleotopographic low. So you have just gentle deposition across what is now a reasonably flat surface.

So if you look at the isopach thickness in a debris flow from the base of horizon A to the top of horizon D, what you would see is well 1 would be considerably thin, well 2 would be thicker, and it's directly proportional to the amount of section A that you have, or horizon A.

If you move to well 3, you have an extremely thick section. It would be the thickest.

Q. All right. Let's go now to Exhibit Number 5, and I'd ask you again to identify and review this.

A. This is a schematic of a typical carbonate mound buildup.

In this model you have a relatively flat base, maybe a slope, but there is no paleotopographical low.

What you see is, horizon A builds in position 3. As you move off the flanks you decrease thickness. And in position 2 it's 70 feet thick. As you move off position 1, it's considerably thinner.

The next horizon up, B -- and we see it, it's in a shaley, ratty carbonate -- all it's doing is filling in lows. It is not a buildup. Horizon B is just simply there, and it works by gravity as well. It fills in the lows.

You would expect it to be very thin on top. You would expect as you move from position 3 to position 1 that you would see a wedging.

If B is in a substantial thickness, by the time you get to horizon C you would expect horizon C to be roughly flat, or roughly parallel. If B was of limited duration, you might see some thickening similar to B on the C horizon.

I'm showing by the time you get to horizon D, that basically your deposition is equal.

If you look at an isopach interval from -- once again, from the base of A to the top of D, in well position 1, what you would expect to see in a carbonate buildup is essentially equal isopach thicknesses across the entire feature.

You will have some difference due to compaction of horizons, B, C and D. They're shaley, they're water -- have a lot of water in them, they will dewater. So you might see a little bit of fluctuation.

But for the most part, it will be grossly

parallel and it will not in any way equal the difference in thickness that was experienced in the A, in horizon A.

Q. So basically you wouldn't experience the variations with a carbonate mound buildup that you see when you're talking about a debris flow, you wouldn't see the variation in the gross isopach interval?

A. That is correct.

Q. Let's go back to Exhibit Number 3, and could you explain what sort of a formation we appear to be dealing with here?

A. If we look at Neuhaus Federal, the Neuhaus Federal Number 2, what you see is, we had 131 feet of gross thickness. It decreases to 63 in the Jordan "B" Number 1, 39 in the Jordan "B" Number 2. So you see something that appears to be a buildup.

When you look at the next horizon up, the Neuhaus Federal Number 2 only has 67 feet. As you move towards the Jordan "B" 1, that thickens to 108. As you move to the Jordan "B" 2, that thickens to 136. So you see a very pronounced wedge.

It is very consistent with the carbonate mound model that we are proposing. It is totally inconsistent with the debris flow model that was earlier proposed by Marathon.

And if you'd also look to the Byers well on the east side, you also see that also appears to be -- or looks to be a carbonate buildup.

And that is why Manzano is going to strongly contend that the carbonate mound model should be the one that we use for the Lea Wolfcamp Pool.

Q. And in using this model, how does that impact the "B" 1 as compared to the "B" 2?

A. I think that would be easier to show on the next exhibit.

Q. All right, let's go to Exhibit Number 6. Would you identify this, please?

A. This is a basic stick diagram prepared by J.R. Butler, using the picks that I presented to them that come from Exhibit 3, so they're using my picks there. This is to true vertical scale.

What was done is that the slope from the Neuhaus Federal Number 2, the Jordan "B" 1, is shown. And once we're at true vertical scale, you can take a ruler, go through the two wells, you can see that based on this slope, that you would terminate the dolomite mound that you see, the Neuhaus Federal Number 2, before you get to the Jordan "B" -- on the Jordan "B" 1 -- before you get to the Jordan "B" 2.

At the Jordan "B" 2 location you have a very

small and what basically turns out to be an insignificant buildup.

This model is the one that we are going with, and the one that we believe to be truly indicative of the reservoir. We're going to present a great deal of evidence on engineering that the Jordan "B" 2 should be left out.

One thing you can note on this is that the Jordan "B" 2 watered out, the base of its perfs were minus 7767, top was minus 7757. The well completely watered out.

If you extend that level over to the "B" 2, you would see that applying that kind of water level would infer that the Jordan "B" 1 should be a very wet well, with the majority of its pay at or below the water level. That is not the case. It only produces 28 percent water.

It also shows that pay in the Neuhaus Federal should be below this water level, and that is also not the case. We're producing 90 percent water.

Q. Now, Mr. Brown, in your experience is it common for those carbonate mounds to have these more symmetric shapes as they're depicted on this particular exhibit?

A. That is the common way of drawing them, and

unless you have strong evidence to apply a skew one way or the other, it should be mapped as a basically symmetrical feature.

Q. Will Manzano also call an engineering witness to review other aspects of this particular exhibit?

A. Yes, we will.

Q. Let's move to Exhibit Number 7. Would you identify this exhibit for the Commission and then review the information contained on it?

A. This is a line of section that runs north-south from the Jordan "B" 1 to your left, to the Neuhaus Federal Number 2 on your right.

Q. Okay. Basically, what do the color codes show?

A. Okay, this is a structural cross-section. It is shown -- It is hung on a minus 7650 subsea datum.

What I've shown on here is -- Let's first look at the structure. I picked the top of the Wolfcamp. It's a very, very good pick. That's the first line down.

The second line, significant line, is on the top of the Middle Wolfcamp pay interval. And the third line is the base of the Middle Wolfcamp pay interval.

If you look at the structure first, on the top of the Wolfcamp the Neuhaus Federal Number 2 is 21

feet high to the Jordan "B" 1.

On the top of the Neuhaus -- On the top of the Middle Wolfcamp pay, the Neuhaus well is 60 feet high to the "B" 1.

On the base of the Middle Wolfcamp pay interval, as we saw before, the Neuhaus is 7 feet low.

I've shown a bunch of different colors here. Let's work first on the gamma ray track.

On the Jordan "B" 1, what I have colored is clean dolomite less than 30 API, is colored purple. Less than that -- or greater than that is colored brown.

The limestone that is less than 30 API is colored blue.

Looking at the gamma ray track alone, if we look at the Neuhaus Federal Number 2, what we have is a 131-foot-thick section of very clean dolomite. In fact, we have 126 feet of dolomite greater than 30 API -- or less than 30 API.

As you move northward on to the Jordan "B" 1 track, what you notice is that that thickness decreases dramatically. It goes from -- I said 131 feet thick to only 63 feet thick. In addition, it is not as clean a section; it's much rattier. They have only 40 feet of clean dolomite, whereas the Manzano well has 126 feet.

When we look next at the porosity curves, porosity track, what I've colored is neutron greater than four percent porosity in orange, density greater than four percent in yellow.

The true porosity would be a cross-plot between the two, either taken from a *Dresser Atlas* book, cross-plot book, or you can even use the cross-plot curve that is shown in the Neuhaus Federal Number 2, which does that for you, and that's essentially just the cross-plot chart that *Dresser* has in a computer model.

Looking at the porosity, the first thing that struck me was, if you look at the Neuhaus Federal Number 2, it has a tremendous amount more porosity than the Jordan "B" 1. In fact, if you look at density porosity alone -- and that's what's colored yellow -- in the Jordan "B" 1, you have just a few spikes that even get to four percent porosity, over four percent porosity, and some of those are probably due to washouts.

When you go to the Neuhaus well, we have a tremendous section of density greater than four percent.

So it's very significant porosity difference between the two wells.

When we look at the different parameters, porosity parameters that we use, the first one that I choose to look at was porosity greater than four percent, gamma ray less than 30 API, and that is the same criteria that Marathon used for their maps, and what they admitted -- or said during their original testimony.

So we agree on that point.

When you look at porosity greater than four percent, gamma ray less than 30, and you look at the Marathon Jordan "B" 1, I find it to have 39 feet. Marathon in their earlier testimony, earlier hearing, also agreed they had 39 feet.

When you move to the Neuhaus Federal Number 2, I show that we have 115 feet. I welcome this body to look at the log itself and count it to make sure that you agree with 115 feet of pay.

Q. You're talking about greater than four percent?

A. The criteria that we used and what we've both agreed to was porosity greater than four percent, gamma ray less than 30 API.

Q. And we're talking about the interval that runs from what you have shown as the top of the area in which the orange-shaded portion is --

A. Right.

Q. -- on your log, down to the base of the Middle Wolfcamp pay interval?

A. Yes, sir, and both Marathon and Manzano agree with the base pick and the top pick.

When you move to other porosity parameters -- say, for example, if we look at 10 percent porosity, greater-than-10-percent-porosity rock, Manzano well has 43 feet of greater than 10 percent, while the Marathon well has 11 feet. So nearly four times the pay on greater than 10 percent.

Greater than 15 percent porosity, we have 21 feet and the Marathon well has only four feet. So we're over five times the pay on the higher porosity levels.

Looking at ϕh, porosity feet, if you look at the Marathon Jordan "B" 1, they had 5.3 ϕh. In the Manzano well we have 11.6 ϕh.

When you apply an RW of .032 -- and I used numerous different ones and came up with the same answer -- the hydrocarbon porosity feet is 10.3 in the Manzano well and 4.6 in the Marathon well.

During the earlier hearing Ms. Gholston did not like porosity feet because she said it would include shaley and tight zones which they did not feel

was pay.

So I'm going to present my maps, my porosity feet maps, as greater than four porosity feet, greater than four percent porosity, and gamma ray less than 30. That will eliminate any confusion or argument that we would have as far as what should be included and what should not.

Q. Anything further with this exhibit?

A. No, there's not.

Q. All right, let's move now to Manzano Exhibit Number 8.

First of all, Mr. Brown, would you identify this, please?

A. This is the map, the porosity map, that was presented by Marathon in the August 19th Oil and Gas -- Oil Conservation Division hearing.

Q. Now, why is it included in your exhibit material today?

COMMISSIONER WEISS: Is this 8? It says 6.

MR. CARR: I'm sorry, the number on the --

THE WITNESS: That was the original 6.

MR. CARR: The number on the bottom, it was original, in the original hearing, Exhibit Number 6.

COMMISSIONER WEISS: All right, thanks. I see it now.

MR. CARR: Okay.

THE WITNESS: This was the only net pay, porosity foot, any kind of map, used by Marathon in the original hearing. No other data was presented as far porosity -- the reservoir porosity was concerned.

This map was the total basis for Marathon's calculation of reserves present under both the Marathon and the Manzano tract.

Q. (By Mr. Carr) Basically, what does this exhibit show us in the context of today's hearing?

A. I think it defines quite clearly the difference between the way Marathon and Manzano view this hearing and how geologic data should be presented.

Q. And specifically what are you talking about?

A. First let's look at just basic contour style.

Now, on the Manzano tract Marathon chose to contour with very, very tight contour intervals. And conveniently, as you move northward onto Marathon's tract those intervals get much greater.

And very confusingly to me, the 80-foot contour for no apparent reason is extended eastward -- I mean northward, up into the Marathon tract. And essentially their contention was, moving a little bit east they would go from 39 feet to 80 feet of net porosity -- net dolomite porosity greater than four

percent.

MR. KELLAHIN: Mr. Chairman, I'm going to object to the argumentative choice of words by this witness. We'll present to you a complete geological picture. But I've been patient in not objecting, and many of the things he's said are quite frankly argumentative, and it would make the process go faster if he would confine himself to his geologic conclusions rather than those kinds of inflammatory opinions he's expressing.

CHAIRMAN LEMAY: Thank you, Mr. Kellahin.

Mr. Brown, just be more scientific with your presentation. You can present the same information.

Q. (By Mr. Carr) Mr. Brown, how many feet of pay was used in the construction of this map, to your understanding?

A. The Marathon Jordan "B" 2 was shown to have seven feet. The Jordan "B" Number 1 was shown to have 39 feet. The Neuhaus Federal Number 2 was shown to have 90 feet.

Q. Now, how many feet of pay does your interpretation show exist in the Neuhaus Number 2 well?

A. I show that we have 115 feet, and I would welcome the Commission to check that for me.

Q. If you apply 115 feet instead of the 90 feet

shown on the Neuhaus Number 2, and you as a geologist then with that 115-foot interval are trying to draw these contours, what happens to those contours?

A. They are forced, because -- They are forced to move southward. You would have to put a 100 -- at least a 100 contour south of the Neuhaus Federal Number 2.

The whole thing would move south and you would eliminate pay on the Marathon tract, you would add pay to the Manzano tract.

Q. By using only 90 feet instead of 115, what does this do, in your opinion as a geologist, to the valuation of the acre-feet in this reservoir?

A. To put -- If you truly honor 115 feet as pay, once again you are forced to move the entire feature in a southerly direction. All the contours would move in that direction.

And based on volumetrics used, you can't bring the 80-foot contour that high. As a matter of fact, if you were to do so you would exceed the volumetrics that you are constrained by on this map.

Q. This map also included the "B" 2 in the reservoir, and you would not; is that right?

A. It includes the "B" 2, yes. And I think we show pretty good engineering evidence that it should

not be in there.

Q. All right, let's go to --

MR. KELLAHIN: Mr. Chairman, I wish he'd confine himself to his discipline and not have these asides to the Commission about what the engineering evidence is supposed to do.

MR. CARR: We will save the engineering evidence, which will show they shouldn't be in the reservoir, for the engineer.

CHAIRMAN LEMAY: All right, that's certainly what we're looking for. Engineering testimony concerns engineering.

Q. (By Mr. Carr) All right. Let's look at Exhibit Number 9. Can you tell me what this is?

A. Exhibit Number 9 is a net porosity greater than four percent, gamma ray less than 30 API map, essentially what we just saw from Marathon.

And in this case, the oil and gas in place was based on a P/Z that includes both the Jordan "B" 1 and "B" 2 and the Neuhaus Federal Number 2.

We have original oil and gas in place of 6.85 BCF. The acre-feet is shown to be 7831, based on 875 MCF gas per acre-foot.

I -- The "B" 2 is included under this case, but I strongly disagree that it's in the reservoir.

But if it is, I feel this map would be an accurate -- would accurately reflect the reservoir volume.

Q. Now, could you have drawn this in a more favorable fashion to Manzano?

A. Yes, I could have. If I placed both the Neuhaus Federal Number 2, Jordan "B" 1, and Jordan "B" 2 on an axis and called the depo center in line with those two wells, this entire feature would move in a southwest direction, giving more pay on Manzano.

Q. Now, this is your Case 2, that's what you've styled this?

A. This is Case 2, yes, sir.

Q. Using this, your Case 2, how would you allocate the acre-feet in the reservoir to the -- between the Manzano and the Marathon tracts?

A. On my -- Let me answer this first.

What I have attempted to do is to draw very symmetrical contour spacing, approximately the same on both sides, giving no credence one way or the other as far as how to get more reservoir on our side. I did it very symmetrically. The depo center was shown in green as greater than 80 feet, just an arbitrary choice.

Based on this model, and including the "B" 2, you show the Marathon -- I mean the Manzano tract as having 5404 acre-feet, which is 69 percent of the

reservoir. The Marathon tract would have 2378 acre-feet, 31 percent of the reservoir.

Q. All right. Let's go to the next exhibit. This is also Case 2, is it not?

A. It is.

Q. And how does this differ from the preceding exhibit?

A. This is a porosity feet, ϕh, map of porosity greater than four percent, gamma ray less than 30 API.

The reason I really think that we need to concentrate on ϕh -- and I hope I don't -- don't step on your toes a little, but I'd like to explain just a little bit on why ϕh is important.

If you have two wells that are both 100 feet -- have a 100 feet thick and have greater than four percent porosity, on a net porosity -- net pay map greater than four percent, you would show both wells at 100 feet, and you'd have contours running between them.

If one of the wells has only four percent porosity, that hundred feet would only generate porosity, ϕh, of 4, 4.0.

If the next well over has porosity of 20 percent, the ϕh would be 20.

Now, what we're saying is, we're taking away the rock, leaving just the volume, and this is what

we're talking in this hearing about, is the reservoir itself.

So whereas in the net pay greater than four percent you would have both wells equal, under ϕh, since we're looking at the reservoir itself, the well that has 20 percent porosity would be deemed as having more reservoirs that -- that has only four percent porosity.

And it really does more accurately represent the two-reservoir picture, and that is what we're trying to get to in this hearing.

This map -- Using this criteria, the Manzano well has 10.9 porosity feet, the Marathon Jordan "B" 1 has 3.3, and the Jordan "B" 2 has 0.7.

If we throw out the bottom 15 feet -- and that's basically the contention Marathon had originally proposed, the bottom 15, whether or not it's pay -- if that is thrown out, the Manzano ϕh is reduced from 10.9 to only 10.4 and does not adversely affect this model.

What I've drawn, once again, is very symmetrical contouring, giving no credence to increasing or decreasing in any advantageous way on either one side or the other.

Q. Basically what this exhibit shows is there's over three times as much pay on the Manzano tract as on

the Marathon; is that right?

A. Yes, sir, it's not noted on the map, but polymetering -- that we did have 71 percent on the Manzano tract, 29 percent on the Marathon tract.

Q. All right. Let's go to Exhibit Number 11. This is styled "Case 1". Why is that?

A. This is the case that we agree with, that we have a carbonate buildup. The Jordan "B" 2 is not included in the reservoir. The oil -- The oil and gas in place is based on a P/Z of just the Jordan "B" 1 and the Neuhaus Federal Number 2. Under this scenario the oil and gas in place is seen to be 7.1 BCF, which gives you an acre-feet of 9267, based on 766 MCF gas per acre-feet.

What this shows, if we look, the Manzano well, once again, has 115 feet of greater than four-percent porosity, gamma ray less than 30 API. The Jordan "B" 1 has 39, the "B" 2 has 7.

Once again, I chose to symmetrically contour and applied the same parameters on both sides.

The depo center, or what I feel is the depo center, is noted in green, and that's greater than 100 feet of pay.

Using this criteria, it's shown Manzano has 82 percent of the reservoir, 7728 acre-feet, while the

Marathon tract only has 18 percent of the reservoir, 1689 acre-feet.

Q. All right, Mr. Brown, let's go to your last Exhibit, Exhibit 12, which is the porosity feet map for Case 1. Would you review this, please?

A. Okay, this is ϕh based on the parameters that we have established. Once again, we have Manzano Federal Number 2 with 10.9 ϕh, the Marathon Jordan "B" 1 at 3.3 and the Jordan "B" 2 at 0.7.

Once again, if we -- Well, I'll just go ahead. I chose to contour symmetrically, contour intervals is consistent.

Using this criteria, Manzano once again shows to have 82 percent of the reservoir, and Marathon only 18 percent.

Q. Mr. Brown, from your geological study of the area, what conclusions have you been able to reach?

A. I conclude that the Lea Wolfcamp Pool is a carbonate buildup and is not a debris flow. It is limited in size and it covers a very small area.

I contend the Jordan "B" 2 is not in this reservoir.

The -- Marathon's original geologic interpretation -- and this is that interpretation upon which Marathon calculated the reserves present under

each tract -- in my opinion, is based on inaccurate and distorted geological and engineering parameters, and it fails to honor the data points that are clearly evident.

Q. What about a comparison of the reserves in the reservoir as they fall in the respective tracts?

A. Our case, the case that we feel is most consistent with what we see, is the carbonate mound model, not including the Jordan "B" 2. Under this case we have 82 percent of the reservoir under Manzano, and only 18 percent under the Marathon tract.

Even if we include the Jordan "B" 2, as we did in Case 2, only 68 percent of the reservoir is found -- or 68 percent is found under Manzano, and 32 is found under Marathon.

Both of these reservoir percentages are consistent with the fact that if you simply go back to the two wells, the Manzano well has almost -- has three and sometimes as much as four times the pay of the Marathon Jordan "B" 1.

Q. Were Exhibits 1 through 12 either prepared by your or compiled under your direction?

A. Yes, they were.

MR. CARR: At this time, may it please the Commission, we move the admission of Manzano Exhibits 1

through 12.

CHAIRMAN LEMAY: Without objection, Exhibits 1 through 12 will be admitted into the record.

MR. CARR: And that concludes my direct examination of this witness.

CHAIRMAN LEMAY: Thank you, Mr. Carr.

Want to take just a stretch break here, before we cross?

MR. KELLAHIN: Fine.

CHAIRMAN LEMAY: Let's take about a two- or three-minute break. Don't go too far. We'd like to finish up the witness before lunch, and then we'll break.

(Thereupon, a recess was taken at 11:40 a.m.)

(The following proceedings had at 11:45 a.m.)

CHAIRMAN LEMAY: I think we're ready to resume.

Your witness, Mr. Kellahin.

MR. KELLAHIN: Thank you, Mr. Chairman.

CROSS-EXAMINATION

BY MR. KELLAHIN:

Q. Perhaps we ought to start, Mr. Brown, with the cross-section that displays the relationship between the Jordan "B" 1 and the Neuhaus 2. One of those does that, and help me with the numbers.

A. Exhibit 7.

Q. Yes, sir, 7. I wanted to illustrate -- What I want to get clear for myself, Mr. Brown, is the points of difference between you and Ms. Gholston.

A. Okay.

Q. And if we look at the cross-section, I want to be able to make sure I'm making comparable comparisons when I look at the isopach map that is of the zone that's producing in both wells, and it's the one we're fussing about, okay?

In the Jordan "B" 1, the interval, the top of which is just below the minus 7736 where the yellow and orange shading starts -- Okay?

A. Just the top -- Just the top of the Middle Wolfcamp pay?

Q. That's right. Okay, that's the top marker for the isopach?

A. I didn't create -- That is the top of the interval in which I chose and Miss Gholston also chose.

Q. And when we take that reservoir thickness and reduce it to an isopach, this is the interval we're talking about, right?

A. Yes, sir.

Q. Okay, that's the top part of it?

A. Well, it's from top to bottom.

Q. Yes, sir. And as we move down that log and you get down to just below minus 7800 where the orange shading stops, then the portion we've mapped is stopped.

A. All right.

Q. Okay? The Marathon well, the "B" 1, do you as a geologist see any additional opportunities for perforations within that interval of interest?

A. No, I do not.

Q. Looks like they got it all there?

A. Yes, sir.

Q. Okay. When we go over to the Manzano well, the Neuhaus 2, there would appear to be some opportunities just below the lowest existing perforations where you could add deliverability to the well?

A. I don't think you can add deliverability at all. As we saw before, the Jordan "B" 1 has a 28-percent water cut, and I believe that's even higher now.

I think the bottom portion of their log very well could be wet --

Q. All right. So --

A. -- or partially so. So I see no reason to even attempt to add pay down there. I think you see it

all. It's a vertically communicated reservoir.

Q. My point is, as we continue with the rest of the hearing, I want to make sure that the deliverabilities we're dealing with for these wells are not going to change by adding additional perforations.

A. Will not change --

Q. Okay, this is --

A. -- in my interpretation of it.

Q. All right, and that was the purpose of my question, to see if you thought there was additional chances for adding perforations to the interval.

A. No, sir.

Q. All right. Perhaps we can use Exhibit 9 to illustrate a way for me to ask you some more questions.

A. Okay.

Q. And perhaps now is a good enough chance to also pull out Exhibit 11. Let's look at Exhibit 11 and 9 together. They're your Case 1 and your Case 2 examples. All right, sir, are you with me?

A. Yes, sir.

Q. I want to find out whether or not you and Ms. Gholston are using all of the appropriate control points for this portion of the Wolfcamp pay, all right?

When I look at the four-section plats, either one of them --

A. Yes, sir.

Q. -- am I looking at all the available log data within those four sections that's going to give us information about the size and shape of the Wolfcamp here?

A. Yes, you are.

Q. If the reservoir engineer's challenge is to see where the points of withdrawal might be for this reservoir, and he's looking for wells that may have affected pressure, okay? within the four sections, which wells on this map would have affected the Wolfcamp pressure?

A. The Neuhaus Federal Number 2.

Q. Okay.

A. The Jordan "B" 1.

Q. Okay.

A. The Jordan "B" 2. But I will also add here that it has not been established whether or not there is communication with the field to the south.

Q. Yeah, that wasn't my question.

A. Right.

Q. My question is, I want to find the points of pressure change in any well in the Wolfcamp, and then we'll talk about whether they're connected.

A. So the points of control are the Jordan "B"

2, the Jordan "B" 1, the Neuhaus Federal, and the field to the south has to be considered.

Q. Okay --

A. It started producing at the same time as the Jordan "B" Number 2.

Q. The field to the south, you're talking about that Osudo-Wolfcamp --

A. Osudo-Wolfcamp Southwest, producing in the Middle Wolfcamp pay interval. A lot of people try to draw that as one continuous reservoir. To do so, you drag the contours even more onto Manzano's tract.

Q. Okay. You have not chosen to do that here in any of your displays?

A. No, I have not.

Q. Okay. We look at Exhibit 9, and we look at Section 14, and out to the southwest we've got a dry hole?

A. Yes, sir.

Q. To the south we've got another dry hole?

A. Yes, sir.

Q. How far south do we have to go from Section 14 before we pick up Wolfcamp gas production?

A. It is 1980 off that line.

Q. Okay. The interpretation you have advanced here has not connected the Neuhaus Wolfcamp reservoir

to the Osudo-Wolfcamp Pool to the south?

A. No, it has not.

Q. If we're looking at the Jordan "B" 2 well --

A. Yes, sir.

Q. -- is there any geologic connection with that well and anything to the north, farther north?

A. There are additional fields, not in this township but north of this township, that also produce from the Middle Wolfcamp pay interval. You've got production both to the south -- You have two fields to the south, right on top of each other.

Q. None of the wells in 13 or 12 have affected pressure in the Wolfcamp, have they?

A. That is correct.

Q. Am I correct in understanding it's your geologic conclusion that the Jordan "B" 2 well is in its own separate reservoir, not connected with the Neuhaus 2 and the Jordan "B" 1?

A. Yes, sir, it is.

Q. Okay. Your distribution of reservoir on Exhibit 11, we've got a net porosity of greater than four percent and a gamma ray of less than 30 API?

A. That's correct.

Q. Is that the standard you want to apply for the map and to allocate reservoir share?

A. I would prefer to use ϕh, but I will not contend too much with using net porosity greater than 4, gamma ray less than 30 if it is consistent with a ϕh map. If it's inconsistent, then I do not agree with it.

Q. Let's use the ϕh map. Which is that exhibit number?

A. That would be the one greater than each one of those, so 10 and 12.

Q. All right. On Exhibit 12, then --

A. Okay.

Q. -- what is the original gas-in-place number that you're using?

A. I'll have to go back to 11. The number that was used is 7.1 BCF.

Q. Okay. At the Examiner hearing you were using 6.46?

A. Right.

Q. Okay. This map that we're looking at now, the Exhibit 12, you're matching or trying to match based upon gas in place of 7.1 BCF?

A. That is correct.

Q. Okay. When we take the 7.1, what number did your engineer give you for the acre-foot number?

A. 9267.

Q. And that's for a total reservoir within this shape?

A. Yes, sir.

Q. Nine thousand --

A. With -- total reservoir with -- excluding the "B" 2 from both the P/Z curve and excluding it from the geologic contouring.

Q. Yes, sir.

A. So they're both excluded on both cases.

Q. Right.

A. Okay.

Q. Exhibit 12, then, I've got 7.1 BCF of gas. The acre-feet for that pod, that shape, is 9267 acre-feet? That's the number you gave me?

A. Yes, sir.

Q. All right. Under your analysis, give me the acre-feet within the east half of 14.

A. On which exhibit?

Q. Exhibit 12 still.

A. Exhibit 12? We have -- Okay, now we've got it in net porosity feet. The total field would be 820 net porosity feet.

Under Marathon you would have 147 net porosity feet, and Manzano 673 net porosity feet.

Q. Have you done the same -- a similar

calculation to get me acre-feet?

A. Yes, it's just a straight equation that converts that, so...

Q. Okay. When we go to Exhibit 10, which is Case 2, where you have tied the Jordan "B" 2 into the pod --

A. Yes, sir.

Q. -- and have recontoured, are you still using the same gas-in-place number for this display?

A. You cannot use the same. On the first exhibit, your P/Z is based on just the Neuhaus Federal Number 2 and the Jordan "B" 1.

On this exhibit you have to include all the pressures of the Jordan "B" 2, its production, to calculate acre-feet and --

Q. Well, to get gas in place?

A. To get gas in place.

Q. So what's the gas in place number?

A. Okay, that's on Exhibit 9. Gas in place of 6.85 BCF.

Q. All right. And on Exhibit 10, if I'm working with 6.85 gas in place, convert that for me to the acre-feet in the reservoir.

A. Total field, 688 net porosity feet.

Q. Okay.

A. Marathon would have 200 net porosity feet.

Q. Wait, you're going too fast for me, Mr. Brown.

A. I'm sorry.

Q. When we allocate reservoir share on this map, Marathon's got what?

A. 200 net porosity feet.

Q. Okay, and Manzano has what?

A. 488 net porosity feet.

Q. Okay. At the Examiner hearing, we were working with some Manzano acre-feet numbers --

A. Yes, sir.

Q. -- of 9.9 --

A. Right.

Q. -- 9942 acre-feet?

A. That was based on the pressures that we had at that time.

Q. Okay.

A. We had additional pressures presented by Marathon which allowed us to redefine the original gas in place.

Q. Okay. In analyzing the information to do your work, Mr. Brown, did you look at any samples from any of the wells?

A. Well, of course I was -- I've seen samples on

the Neuhaus Federal Number 1, the Sims State and the Neuhaus Federal Number 2. I was present during the drilling of both the Neuhaus Federal Number 2 and the Sims State Number 1.

Q. All right. Were you personally involved as a geologist in drilling any of the other wells?

A. No, I was not.

Q. And have you seen samples of any of the other wells?

A. No, I have not.

MR. KELLAHIN: Thank you, Mr. Chairman.

CHAIRMAN LEMAY: Thank you, Mr. Kellahin.

Commissioner Bailey?

EXAMINATION

BY COMMISSIONER BAILEY:

Q. Did I understand correctly, there's no Wolfcamp production to the sections in the north?

A. There is, but not the direct section north of --

Q. Okay, so --

A. -- either 11 or 12, either 1 or 2. There was a well proposed by Marathon in Section 1 at one point. I don't think it was ever recompleted, but...

Q. Okay, so you can't use it.

What evidence for faulting do you see within

the Neuhaus Federal?

A. The -- ?

Q. For faulting.

A. No faulting.

Q. None at all?

A. And that's consistent with what you see in the other horizons. There is a major fault east a couple miles.

COMMISSIONER BAILEY: Okay. That's about all I have.

CHAIRMAN LEMAY: Thank you.

Commissioner Weiss?

COMMISSIONER WEISS: I have one.

EXAMINATION

BY COMMISSIONER WEISS:

Q. There is enough control points here to do contours at all?

A. It is very difficult, and there is a lot of leeway that you can do. The only thing you're constrained by, you either have two wells or you have three wells, to which -- You have to honor those data points. Those are the only data points that we have.

You're also constrained by original gas in place. And those are the things that you've got. And you look at your model, geologic model, make sure that

what you've got is consistent.

But you can do some more things. I could have made this much larger or more in Manzano's favor very easily.

COMMISSIONER WEISS: Thank you. That was my only question.

EXAMINATION

BY CHAIRMAN LEMAY:

Q. Following up a little on Mr. Kellahin's questions, you say you did look at the samples on the Neuhaus Federal Number 2?

A. I was there during the drilling.

Q. How would you describe them?

A. It was some of the cleanest dolomite I've ever seen.

Q. Any evidence of fossilization?

A. I didn't see any. Saw a few dolomite rhombs. There were some allochems. I'm not sure what they were. They've been dolomitized pretty severely.

Q. Fractured reservoir?

A. There were some indications of fracturing, not as much as I thought.

Q. Any pyrite in the samples?

A. No, sir, it was clean dolomite through and through.

Q. Calcite crystals?

A. I don't remember seeing any.

Q. But you would describe that as a clean dolomite without any evidence of fossilization?

A. Right, a very clean dolomite.

Q. Your model of a carbonate mound reef, would you expect fossilization initially in a clean carbonate mound reef or a mound, carbonate mound?

A. In an original mound -- If you look at the angles, we're only talking about a slope of maybe five degrees, ten degrees, so it's not a reef in what you think of off the Florida keys. It's more just a gentle mounding, and that mounding continues over time because it's in the best photo zone for the development of carbonate. Once it begins, it will continue in the same spot.

I've done a lot of work with Wolfcamp. Matter of fact, my thesis was Wolfcamp, my original work with Exxon was Wolfcamp mounds, and I've looked at many cores.

And the Wolfcamp, as I understand it, are mounds, and it's not really a very strong framework-building organism. They're probably a red algae of some kind, has some framework capability but not enough to build a sheer cliff. So the original was probably,

I would guess, red algae, but it has been secondarily dolomitized.

Q. So in your model you do assume a limestone mound, fossiliferous --

A. Yes, sir.

Q. -- because that's the framework, completely dolomitized to the point of eliminating any evidence of fossilization or any limestone in that?

A. Yes, sir.

Q. And then in your model you used clean dolomite, I assume, with the assumption that -- because you didn't look at all the samples -- the clean dolomite had the lowest radioactive reading. And as you got more limey and more shaley, you increase the gamma ray count?

A. Right, it --

Q. That's your sole criteria for differentiating a dolomite from a limestone from a shaley limestone?

A. Well, the limestone -- I know on the Neuhaus Federal Number 2 what was lime and what wasn't. So I incurred that. I had the samples.

You can also tell by the cross-plot porosity where the lime would be, the clean lime. It will plot limestone.

I'm sorry, I've lost my train of thought.

Q. Well, I'm just trying to get a picture of the rock. I mean, you --

A. Okay.

Q. -- and what criteria you used to differentiate various type of rock within your model.

A. Where I have the information and had -- had mud log or other, I would use it.

Where I did not, I used cross-plot porosity and a little bit -- You have to use a little common sense too. Sometimes when you have washouts, your density will read too high. It will pull it up and look like maybe it's a limestone. You've got to apply a little bit of --

Q. Is there a hydrocarbon log available on any of the wells in your cross-section?

A. As in mud log?

Q. Mud log?

A. Yes, sir. Not -- I'm not sure I brought any into this room, but I --

Q. Which logs? Do you remember?

A. I have the Neuhaus Federal Number 2, the Number 1, and the Sims State.

Q. So you had a mud logger on both your wells?

A. Yes, sir.

Q. And the Sims also?

A. Yes, sir.

Q. Okay.

A. Well, no, I wasn't on the -- There was a mud logger on the Neuhaus Federal Number 1, right. I was not there, no.

Q. You don't know if there was one on the Jordan "B" 1 or "B" 2?

A. I've tried for years to get those --

Q. They're tight --

A. -- mud logs and never been able to get them.

Q. But to your knowledge, there is mud logs available if they're tight?

A. Yes, sir, I know there's mud logs. I know the geologist who was on the "B" Number 1.

Q. Your interpretation assumes maybe -- Well, let me ask, does it include any interfingering of clean limestone with what might be considered shaley lime as a -- In other words, you visualize an interfingering relationship, or a very smooth contact there?

A. Oh, it would be an interfingering relationship. It probably would be pretty sharp, abrupt at the top where you have the cessation of the carbonate mound buildup. Usually that happens by a rise in sea level. It quickly -- terminates it pretty quickly.

As you move off to the side, of course, you would start interfingering with ratty or shaley -- whatever is a prominent deposition generally in the area. So you would have some interfingering in.

And it's possible you could have had one finger shoot out, but it would not have been very thick and --

Q. Why? Why wouldn't it be very thick?

A. I saw this much in the Wolfcamp on the Central Basin Platform. There was a lot of activity in the Wolfcamp for storms, different types of hydrogeologic events.

If you have a storm, frameworks built of red algae will be pushed back by the force of the storm. But since it was the best place to deposit the first time, it would re-establish itself and begin to build up.

So you do a little -- occasionally will see small amounts of things going out. But it was not -- The mound orientation you would not anticipate would be something that looked like a wedge or something. It would probably be pretty much just convex, and maybe a little interfingering here and there.

Q. Your Exhibit Number 6, I take that to assume there is an interfingering relationship, the way you

show the dolomite buildup there?

A. Which one is 6? Oh, here? Basically --

Q. You have limestone and dolomite contact here as an interfingering relationship.

A. Right. If you take the structural top of the Neuhaus Federal Number 2 and the structural top of the Jordan "B" 1, put a straight line to it, that's how you get where we're saying the termination of this mound would be. And that's just maintaining the slope that we know is there, between the Neuhaus Federal Number 2 and the Jordan "B" 1. They're just continuing it on northward. It's consistent.

Q. Well, let me in that regard, refer to your Exhibit Number 3 --

A. Right.

Q. -- on your interpretation, I guess, of the TXO -- it's really Marathon Number 1 Jordan "B" --

A. Uh-huh.

Q. -- where you show those shaley streaks along with what you consider, I guess, clean dolomite. Isn't that an interfingering relationship within the pay zone of --

A. Between -- which?

Q. I'm sorry, the other well in the pod, the Marathon Number 1 Jordan "B" --

A. Right.

Q. -- you show those shaley streaks on the gamma ray side. Isn't that an interfingering relationship between overlying dense rock, we'll say, or shaley limestone and carbonate mound?

A. Right, and I think that's very consistent with a mounding model.

Q. So there is an interfingering relationship with a mounding model?

A. Right.

Q. Okay. Is it possible that Jordan Number 2 would be either a platform to that mound or an extension of the interfingering relationship up in that area?

A. It is possible, but you can't show any other fields that have that kind of characteristic.

The thing that, to me -- and the engineering witness will get into it, once again -- is that you only have seven feet of pay, shown as dolomite, most likely lime.

The well produced six years and watered out, so it was a very -- It only produced 28,000 barrels of oil and 1/10 of a BCF of gas. And their -- Marathon's contention is that it's tied into what we know is a very prolific reservoir.

If it is tied in, there's very little pay around it.

And what really struck me is, if the base of the perfs are 24 feet high to the base of the perfs in the "B" 1, yet the "B" 2 waters out, the "B" 1 does not --

Q. I assume --

A. -- that's not inconsistent.

Q. I assume the engineering witness will get into some of the fluid characteristics of the reservoir?

A. Yes, sir.

Q. Just one additional question. In your attempt to draw an isovolume map, an isovol map, so to speak, and taking the net pay, has it been your experience in a carbonate mound that we're dealing with a homogeneous reservoir or heterogeneous reservoir?

A. In the mound itself, it would be -- I think all carbonates are somewhat heterogeneous; that's just the nature of carbonate deposition.

However, the dolomitization here has allowed the permeability to be very consistent across the wells. There's no way for us to tell at this point where the high-permeability streaks are versus low-permeability streaks within each of the two wells we're

looking at.

But the two wells appear to be acting as one reservoir. So you know there's a great amount of continuity between those two wells.

Q. What would you attribute the permeability to if you didn't see fractures in there?

A. Well, we had fracturing in ours, but we also had rock that was -- For dolomite, greater than 15 percent porosity is an awful lot, and we had -- It was on the other map, but whatever it was, 21 feet.

Q. Would that be intercrystalline-type porosity that would allow you to have permeability within that porosity?

A. It was a -- Dolomitized probably would be intercrystalline.

And there was fracture indications, and we could see fracture indications based on our DST. We saw the reservoir, the "B" 2. The "B" Number 1 was in on a DST. Even though we were a little higher up in the section -- we didn't drill the entire 1 -- we saw the exact pressure that they were at.

Q. Yeah, and --

A. It's an extreme amount of permeability.

Q. Well, I'm trying to get back to your model again.

Being somewhat heterogeneous, having good permeability, being a carbonate mound and having relatively -- Well, you say five-degree dip --

A. Uh-huh.

Q. -- is what you just project between those two wells, is it, on the top of the mound?

A. That would be five or ten.

Q. But that would be a direct line. That would be almost minimum dip, wouldn't it, if you had another geographical configuration like you show? In any kind of north-south configuration, you'd increase the dip, wouldn't you?

A. I'm not sure I'm understanding.

Q. Well, if you have two wells, aren't you assuming the five degrees that you're going -- that you're progressing, one well to the other? There's no interpretation there showing a greater buildup than that?

A. Right, and one thing that I didn't point out was the Byers well, the one that's in the Osudo-Wolfcamp southwest. It's 219 feet thick.

I've only assumed on my model that we're at the crest of this feature at 131 feet. There easily could be a well -- We could drill a well that had equal thickness to the Byers well. There may be a 200-foot

contour out there.

Q. And if that was the case, you would be dealing with dip far in excess of five degrees, wouldn't you?

A. It depends on -- I think the depo center is to the southeast. And if you take that gradient, you probably could project out -- easily could project out something in that realm, 200 -- at least greater than 131 feet, just following a straight line between the "B" 2, the "B" 1, the Neuhaus Federal, project it up and then crest it off. You could do that very easily.

Q. Again, your model, it's not quite a circle. When you're dealing with a mound, you tend to show a little bit of a north-south orientation to the mound?

A. Right. I did that based on -- one was the base of the Middle Wolfcamp pay, map the structure, the one we saw, Exhibit 2. That's the general regional trend that we see out there.

You start looking at the wells -- other wells that are east, there's a platform to the east, so that you figure there was some kind of a platform orientation, and does somewhat constrain what you would -- how you would orient it.

I would think it would be parallel to the platform.

Q. Is that the configuration, basically, of the mound down in the Osudo-Wolfcamp field to the south?

A. Yes, sir, it is.

Q. There's a north-south orientation to that?

A. Yes, sir.

CHAIRMAN LEMAY: Thank you.

Any other questions of the witness?

Commissioner Weiss?

FURTHER EXAMINATION

BY COMMISSIONER WEISS:

Q. When you were reviewing the Wolfcamp, what's the typical life of a Wolfcamp gas well?

A. The Byers -- Let's look at the Byers well. That's kind of an interesting story, and it kind of gets back to some of what your questions are, Mr. LeMay.

The Byers had a very nice section of porosity, and it became -- It was productive or was turned on in 1986. It has only cum'd .849 million cubic feet of gas and 153,000 barrels of oil. It's currently making 270 MCF, 25 barrels of oil and 258 barrels of water, and has been on a flat-line decline. It's had no decline in over five years. It is a straight line.

And I think it illustrates the difference in

that the Byers well is not as heavily dolomitized. It does not have near the permeability that we have in our Neuhaus Federal. So the overlying constraint as far as permeability is the dolomitization itself.

So I think the Byers well just did not have the degree of dolomitization. It has dolomitization in it, but not to the degree that -- what you saw on the Neuhaus Federal Number 1, and therefore just is not as productive a well, although its ultimate recovery is not far off what we're seeing for our wells. It's just going to take a very long time to get there.

Q. So one well may -- That's not the average life, is it, six years or whatever you said?

A. This well here, the Byers well, it's already been producing for seven years, and like I say, it's been a flat decline now for five. I don't now at what point it will become uneconomic, but it's been producing for a long time.

Q. Are those wells in that field to the south?

A. That's the well to the south, right.

Q. In the 240 feet of pay or whatever it was --

A. 219, right, that's it.

Q. And it's made 8.5 -- or .85 BCF?

A. Right, it just doesn't have the permeability of our wells. So it's going to take them much longer.

Q. Okay.

A. Our particular well with the high perm will produce very quickly.

COMMISSIONER WEISS: Okay, thank you. That's the only question --

CHAIRMAN LEMAY: Additional questions of the witness?

If not, he may be excused. Thank you.

We'll break for lunch and come back at 1:15.

(Thereupon, a recess was taken at 12:17 p.m.)

(The following proceedings had at 1:20 p.m.)

CHAIRMAN LEMAY: We shall resume.

Mr. Carr?

MR. CARR: At this time, we would call Brian Ausburn.

BRIAN AUSBURN,

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

DIRECT EXAMINATION

BY MR. CARR:

Q. Would you state your name for the record, please?

A. Brian Ausburn, A-u-s-b-u-r-n.

Q. Where do you reside?

A. Houston, Texas.

Q. By whom are you employed?

A. J.R. Butler and Company.

Q. And what is J.R. Butler and Company?

A. J.R. Butler and Company is a group of oil and gas consultants.

Q. And what is your present position with J.R. Butler?

A. I'm a consulting engineer and president of the firm.

Q. Mr. Ausburn, have you previously testified before the Oil Conservation Commission?

A. No, sir.

Q. Could you summarize your educational background and then review your work experience for the Commissioners?

A. I have a master's degree in geological engineering from the University of Oklahoma in 1961. I worked for Shell Oil Company for 15 years and have been with J.R. Butler and Company for the remainder of that time.

Q. Are you a registered petroleum engineer?

A. I am in the State of Texas.

Q. Are you familiar with the Application filed in this case by Manzano Oil Corporation?

A. Yes, sir.

Q. And have you made an engineering study of the material balance characteristics of these Wolfcamp -- of the Wolfcamp reservoirs involved in this case?

A. Yes, sir.

MR. CARR: We would tender Mr. Ausburn as an expert witness in petroleum engineering.

CHAIRMAN LEMAY: Qualifications are acceptable.

Q. (By Mr. Carr) Mr. Ausburn, when were you employed by Manzano in this case?

A. About a week ago.

Q. And at that time what were you asked to do?

A. We were asked to review the material balance type of data, fluid properties, pressure, production data, in order to determine -- make our estimate of the original gas in place and the likelihood of one reservoir or two.

Q. And have you prepared certain exhibits for presentation here today?

A. Yes, sir.

Q. Let's go to what has been marked Manzano Exhibit 13. Would you identify this and review it for the Commission, please?

A. Exhibit 13 is a conventional, or what we would call conventional, pressure divided by gas

deviation factor plot -- that's the vertical axis -- versus cumulative gas production. P/Z versus cumulative gas production. This is for the reservoir as we believe it exists, which includes the "B" 1 and the Neuhaus 14, or the two-well reservoir.

The points line up nicely and would give us approximately 7 BCF original gas in place.

Q. All right. Let's move to Exhibit Number 14. Would you tell us what that is?

A. That's what we would call the one-well reservoir, the Jordan "B" 2 reservoir. It only has two pressure points. It extrapolates to a very small number of about 1.4 BCF gas in place.

Q. How would you characterize this figure? Do you think this is an accurate interpretation of this reservoir?

A. Well, this well has produced a considerable amount of water, so the extrapolated figure to 1.4 BCF is perhaps optimistic or too high. It may be less than that.

Q. Okay. Let's go to what's been marked Manzano Exhibit 15. What is that?

A. 15 is the combination of all three wells, the Jordan "B" 1 and 2 and the Neuhaus.

It's three wells, six pressure points, and it

extrapolates to approximately 6.65 BCF of gas. When I say "extrapolates", that's the end point to zero pressure. Then by definition, that's the total original gas in place.

The points do not line up nearly as well as when we separate the data points in the two reservoirs.

Q. And what is the reason for this?

A. Well, because I think they're two reservoirs, they're not acting in concert.

Q. When you compare the information on this exhibit with the first exhibit, Exhibit 13, what does that really show you?

A. Well, it shows a much better agreement of the pressure points if you just leave all the pressure points in the same reservoir and not combine them.

Q. And so these exhibits alone suggest that you have two reservoirs, not one?

A. These exhibits suggest that you have two reservoirs, yes, sir.

Q. All right. Let's go to what has been marked Manzano Exhibit 16. Could you first tell us what this is and then review the information on this exhibit?

A. This is a pressure-versus-time plot. No normalization for gas deviation factor, just straight pressure at a given datum and as a function of calendar

time.

And we have lines drawn connecting what we would call the Jordan "B" 2 reservoir and another line connecting what we would call the "B" 1 - 14 reservoir.

Q. There are two points that are in close proximity, one from each of these reservoirs. What does -- Do you rely on those figures or those points?

A. Well, of course, the marked change in slope is quite obvious, but the proper comparison as far as points, I believe, should be the last point of the Jordan "B" 2, which is in May 1 of 1992, and the second point of the "B" 1 reservoir, which is April 27th, only about four days apart. And as far as coincidence in time, those are the ones that would be -- that are closest.

Q. And what do they tell you in terms of the pressure in the two wells?

A. Well, there's about 400 pounds' difference.

Q. In your opinion, is it likely that these wells are in the same reservoir?

A. I think this is another piece of evidence that indicates that they're likely not in the same reservoir.

Q. Now, let's move to Exhibit 17. Would you just identify that for the Commission, please?

A. Exhibit 17 is the tabular data that went into Figures 13 through 16.

Q. We don't need to review that material in any detail?

A. No, I wouldn't think so.

Q. Okay. Let's move on, then, and to go Manzano Exhibit Number 18. What is this?

A. Exhibit 18 is the relationship between gas deviation factor, which is the vertical scale, and reservoir pressure, or pressure.

There are two curves shown on here. I don't have a colored copy, but the triangles are the Z factors that are obtained from Marathon's PVT report, which was supplied to Manzano, I believe, after the Examiner's hearing. But that the red -- or the triangle curve is the constant volume depletion Z factors.

The line with the boxes is the change in Z factor when one tries to allow for the two-phase of the reservoir.

The reservoir is even initially under -- beneath the individual dew point, so there was free liquid in the reservoirs. And we believe it's more exact and more important -- It is important to correct for the two phases in the Z factor.

Q. Basically, what you're showing us is a graph, and this information is where in fact the Z factor is obtained for the material balance calculations?

A. In order to normalize the pressures for the gas deviation factor, this is the source of that information.

Q. Okay. Now, let's go to Exhibit -- and just identify at this point Exhibit 19.

A. 19 is the backup or the tabular points that are plotted on Exhibit 18.

Q. In performing your material balance study of the reservoir, what Z factor did you utilize?

A. We used the one from the Marathon -- the PVT study shown on Table 9, which is the constant volume depletion study and is, in our opinion, the better set of numbers to use to do material balance work.

Q. And so you utilized the material from -- that is depicted on Exhibit Number 18; is that right?

A. Yes, sir.

Q. And you used the two-phase curve?

A. And we used the two-phase correction, yes.

Q. Now, in running their material balance work on the reservoir, what do you understand was actually used by Marathon?

A. I think Marathon used the Z factors from the

constant composition, table 8.

Q. And that's another table in this PVT study?

A. That's another table, right, and it's valuable information. It's my understanding this is derived principally to determine the dew point.

Q. All right. Now, why are we presenting this data at all?

A. There was some discussion in the transcripts about the proper Z factor to use, and I think even in the Order that came out, about the Z factor as having considerable weight or at least some weight, some significant weight, in the analysis of the reservoirs.

And we thought it was important to -- when wee undertook the project, to review those data and try to come up with our judgment as to the appropriate numbers to use.

Q. Did you review the Order that resulted from the Examiner hearing?

A. Yes, I remember seeing it.

Q. And did it in fact reference the selection of a Z factor in the calculations presented by the parties?

A. I think it referred to the fact that since Marathon had used laboratory-measured data, that likely their gas-in-place values were more accurate than the

gas-in-place values presented by Manzano.

Q. Do you agree with that?

A. No, I think that the numbers used by Manzano at the hearing, although they were obtained from empirical correlations, are probably closer to those from the constant volume depletion study than the ones used by Marathon.

Q. All right. What was Marathon's -- Tell me what was the approach or the technique used by Marathon?

A. Well, I don't know that I know for sure all they used, but they apparently used the Z factors from the constant composition, table 9, data.

Q. And what is that usually used for?

A. Well, it's usually used to determine the dew point.

Q. All right. And then we used -- not constant composition. What was used by you?

A. We used the constant volume depletion study.

Q. And in your opinion, which more accurately reflects what's actually going to happen in the reservoir?

A. Since the pore volume is -- remaining the same, it's been our view that the constant volume depletion study Z factors is the more appropriate one

to reflect the physical occurrence in the reservoir.

Q. How important is it whether you use constant volume or a constant composition technique in getting the Z factor?

A. Well, it can make a fairly significant difference. I think just on recovery factor alone it may make a 25-percent difference.

The Z factor is one of the large -- significant components in the gas expansion calculation. The lower the Z, the greater the gas expansion, the lower the number of acre-feet you need to accommodate standard cubic feet at the surface. So it can have a difference. And I think it makes on the recovery factor about 25 percent.

It in turn will influence the P/Z plot and make it -- using the lower Zs, will make the P/Z plot steeper and therefore it will give you a lower gas in place. So you start with a lower gas in place and then you divide by a higher number, and you come up with a lower -- too low, I believe -- acre-feet of reservoir rock required.

Q. So basically, just the way you get the Z factor can make a substantial difference in the number of acre-feet you ultimately determine to be in the reservoir?

A. Yes, sir, that's true.

Q. And in your work you believe you have used one that is more reflective of actual reservoir performance?

A. Yes, sir.

Q. All right. Let's go to what has been marked Manzano Exhibit Number 6. Would you identify this and review it?

And this exhibit was presented this morning as part of the geological presentation. It is a stick diagram, and it was Exhibit 6 this morning. Let's wait till we find it.

A. Yes, this was presented by Mr. Brown this morning, and he --

Q. Why don't -- Let's wait just a second.

A. Oh, excuse me.

Q. All right, would you go ahead?

A. Okay, this is the same schematic stick diagram that we had this morning. Mr. Brown covered most of the salient points. I might just reiterate my comments and my view of this.

One of them is the asymmetry aspect that would be required to include the "B" 2 in the buildup, particularly taking into account the slope that one has from the Neuhaus to the "B" 1.

Point number two would go back to one of our exhibits -- I think perhaps it was 14. We just -- The pressure plot for that reservoir, which would show a small reservoir, small isolated reservoir.

The -- Observation number three is what our geologist observed, that based on the log responses, that the "B" 2 would look like limestone, and the other wells -- the "B" 1 and the Neuhaus -- would look more like dolomite.

And then of course the water-level information. The dashed line, I think Mike covered that this morning, but just to make sure we all understand, that dashed line that goes across the main buildup here, that says water "B" 2, is at a subsea depth of minus 7757. That's one point perhaps I should have made.

All the depths shown on here are subsea depths. And so consequently if this were in the same reservoir, this well that has produced very high water, its top perforations would have covered what looks like well over half of the perforated interval of the "B" 1, and yet it came on production at only 13 percent water.

Q. Anything else on this exhibit?

A. I don't think so.

Q. All right, let's move on to what has been

marked Manzano Exhibit 20. Would you identify that?

A. Yes, sir, this is just the -- This is where we can convert P/Z gas in place volumes to volumetric parameters or numbers.

We have -- Our Exhibit 13 gave us 7 BCF or 7000 million cubic feet of wet gas in place. We have computed that each acre-foot at 8.5 -- 8.7 percent porosity and 22 percent water would give us 753 MCF per acre-foot.

The division of the 7 BCF by the 753 would give us a hydrocarbon rock volume of on the order of 9300 acre-feet.

Q. And this is including the Jordan "B" number 1 and the Neuhaus Federal in the reservoir?

A. This is our preferred interpretation of the reservoirs, yes, with just the "B" 1 and the 14 in the same reservoir.

Q. What happens if you add the Jordan "B" Number 2 to this calculation?

A. It's the same operation. We have a higher pressure, of course. You've got 4697 to solve for our recovery factor, which is now 858 MCF per acre-foot.

From Exhibit 15 we have 6650 million cubic feet of gas in place. The division of 6650 by 858 will give us 7751 acre-feet of reservoir.

Q. So actually by including the Jordan "B" 2, we have fewer acre-feet in the total reservoir?

A. We have fewer acre-feet in the reservoir.

Q. And why is that?

A. Principally because of the higher pressure on the "B" 2 well and the steeper P/Z line.

Q. So by including the "B" 2 --

A. If you honor all the points, yes, you get a steeper line and you come up with a lower gas-in-place number.

Q. If you include it in the reservoir, you also have to include it as a pressure?

A. That's true, yes.

Q. Let's go to what has been marked Manzano Exhibit Number 21. Would you identify this, please?

A. This was a figure adapted from a Manzano presentation at the Examiner's hearing. I think at that point they used feet. We've used porosity feet. The results are much the same.

This is a two-dimensional solution for a drainage boundary, I guess, simply put.

What we're saying is that we have 11.6 porosity feet at the Manzano Neuhaus well, and we have 5.3 porosity feet at the Marathon well. And then if you assume that equal production rates are coming out

of both wells, then you can schematically approach where the drainage boundary would be between the two wells. And that comes on the Manzano lease by about 120 feet.

Q. Now, you stated if we assume that the wells actually are producing at the same rate?

A. Yes.

Q. That's a premise --

A. That's --

Q. -- on which this is based?

A. That's a premise. It's a simplified two-dimensional solution.

Q. What is your understanding of the current producing capabilities of each of these wells?

A. The Marathon well is producing about 4.9 million a day, as I understand, and the Manzano well is restricted by allowable, I think, to 78 million a month.

Q. If opened up, do you know at any period in time at what rate it's able to produce?

A. I think it would be able to produce on the order of 5 million a day if opened up.

Q. And that's with the current wellbore, tubing string?

A. With the current tubing string, yes, sir.

Q. So basically at this point in time they are, in fact, fairly comparable in their ability to produce?

A. They are very comparable in their ability to produce.

Q. And if they do produce at equal rates, then your Exhibit 21 shows that the Marathon well would drain 120 feet onto the Manzano property?

A. That's true.

Q. Now, what conclusions have you reached from your engineering study?

A. Well, our conclusions would be that the -- The weight of the evidence will us to think that there are two separate reservoirs.

The reservoir -- the big reservoir that includes the Manzano and the "B" 1 well is by far the better reservoir, and the better portion of that reservoir is under Manzano's lease. And Marathon will probably -- has already drained Manzano's reserves and will continue to do so, probably.

Q. In your opinion has Manzano gained an advantage on Marathon because of this unorthodox well location?

A. No, sir, I can't see that they have any advantage.

Q. And why is that?

A. Well, we have the better reservoir rock and the greater volume. We certainly have the better reservoir rock, and depending upon the geological interpretations which would -- I would certainly lean towards the Manzano interpretation. We've got more acre-feet on our lease.

Q. In your opinion, if Manzano is to produce its fair share of this reservoir, should this well be penalized?

A. No, sir, I don't believe it should be penalized.

Q. In your opinion, will approval of this unorthodox location without penalty be in the best interests of conservation, the prevention of waste and the protection of correlative rights?

A. Yes, sir.

Q. Were Exhibits 13 through 21 either prepared by you or compiled under your direction and supervision?

A. Yes, sir.

MR. CARR: At this time, Mr. LeMay, I move the admission of Manzano Exhibits 13 through 21.

CHAIRMAN LEMAY: Without objection, Exhibits 13 through 21 will be admitted into the record.

MR. CARR: And that concludes my direct

examination of Mr. Ausburn.

CHAIRMAN LEMAY: Thank you, Mr. Carr.

Mr. Kellahin?

CROSS-EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Ausburn, what is your understanding of the producing capacity of the Jordan "B" 1 well that Marathon operates?

A. It produces at something between 4.5 and 5 million a day, I think.

Q. And that's based upon a change in the tubing size that they made recently?

A. Yes, I presume that would take that into account.

Q. Okay. And what is your understanding of the producing capacity of the Neuhaus Number 2 well?

A. It's approximately 5 million a day.

Q. Upon what do you base that information?

A. The deliverabilities that the -- work that the Manzano people have done.

Q. Mr. Ausburn, are you aware of the deliverability test that was reported to the Commission and which has already been submitted in evidence as Marathon Exhibit 1?

Commencing on page 21, there was a test run

on September 27th of 1993, and it shows the ability of this well to produce not 5 million a day but 7.5 million a day.

A. I had heard that number. I wasn't familiar with it, no, sir.

Q. You were not aware of that current deliverability test on --

A. Well, I had heard this number talked about. The estimate was that under current conditions that they would produce about 5 million a day. But I didn't do any calculations, no, sir.

Q. The calculations that you have done give us a gas-in-place volume under different assumptions and using certain bits of information, right?

A. Yes, sir.

Excuse me, sir, can I go back to this that you just handed me?

Q. Yes, sir.

A. This 7.5 million a day, is that AOF or is that deliverability?

Q. You tell me. I'm not the engineer.

A. Well, I'm looking at the form here. I'm not that familiar with New Mexico's forms, unfortunately. They actually produced at 5 million a day, it looks like.

Q. Yes, sir, it's an AOF number.
A. Yes, the actual maximum producing was 5 million a day.
Q. The study that you've done --
A. Yes, sir.
Q. -- is to provide a gas-in-place number, right?
A. Yes, that's part of what we did.
Q. You have a gas-in-place number for Case 1, which is the two-well pod concept, and you have a gas-in-place number for the Case 2, which is the three-well pod, right?
A. (Nods)
Q. None of the work you have done as an engineer can tell us the size and shape of that container that holds that volume of gas, right?
A. Not the shape.
Q. Right. So when we're looking at where this shape is apportioned between the two operators and their two spacing units, that's not a function that you can perform, is it?
A. No, sir, not with the level of data available. It would take more well interference and sophisticated transient work to do that.
Q. You indicated that there were six pressure

points of data --

A. Yes, sir.

Q. -- among the three wells?

A. Yes, sir.

Q. When we look at Wolfcamp production at this depth, what would you expect virgin reservoir pressure to be?

A. Something on the order of what the "B" 2 well had, I believe, on an average.

Q. You told us 3600 pounds.

A. The "B" 2 well, no, sir, that was 4600, I believe, something.

Q. I don't want to get the wells confused.

A. I do too.

Q. All right.

A. Excuse me, the "B" 2 is right at 4700.

Q. Okay. "B" 2 is the first well --

A. Yes.

Q. -- that would have affected this area in the Wolfcamp?

A. Well, there may be other wells to the south that may have affected it.

Q. But we know at this point in time that the "B" 2, as the first of these three wells, has the greatest pressure?

A. Yes.

Q. It's 4698 or about 4700 pounds, right?

A. Yes.

Q. Okay. We drilled the "B" 1. What's its first pressure?

A. 3800, thereabouts.

Q. You drilled the Neuhaus Number 2, and what's its pressure?

A. 2125, something.

Q. All right. If you expect an undeleted pod of the Wolfcamp to come in at 4700 pounds, and if only the "B" 1 and the Neuhaus well are in that pod, having excluded the Jordan "B" 2, where did the 1000 pounds of gas go? Who took it?

A. Well, statistically, on the average, the 4700 would seem about right.

But there are Wolfcamp wells, I believe, that would -- There's a spread in pressure gradients, and there are Wolfcamp reservoirs that would have pressure gradients that would approach this lower pressure gradient as seen by the "B" 1.

Q. Do you have a calculation for what is the remaining recoverable gas to be produced between the Jordan "B" 1 and the Neuhaus 2?

A. No, I did not do that.

Q. Okay.

A. I would guess something like 3 BCF, but that's -- I did not do a calculation.

Q. All right, sir. When we look at the methodology for the gas-in-place calculation, the discussion before the Examiner is, the two engineers had used different Z factors.

The Manzano engineer had used a dry gas compressibility factor, and the Marathon engineer had used a gas condensate, a two-phase component, I guess, for the Z factor.

Okay, are you with me?

A. I'm not sure about that, sir. Repeat that again, if you would.

Q. Yes, sir. The Z factor was an issue of concern to the Examiner --

A. Yes, sir --

Q. -- okay?

A. -- it seemed to be, yes.

Q. The Marathon engineer used a Z factor that was picked for a gas condensate reservoir.

A. Under special expansion circumstances.

Q. Yes, sir, I understand. As a layman --

A. Yes.

Q. -- help me describe it in a way that is not

incorrect.

In my simple way, I had understood Mr. Brown, Donnie Brown, to have used a dry gas Z factor.

A. Well, I don't think it was dry gas. I think they corrected for full wellstream gravity, which would compensate for the liquids.

Q. In making the calculation, the two engineers came to approximately the same volume of gas in the reservoir in place. The Marathon engineer got about 6800 MCF?

A. I don't recall.

Q. Well, let me describe for you --

A. Okay.

Q. -- and then tell me what happens here.

The Manzano witness got, I guess, 6.5, give or take. So they're pretty close, 6.8 and 6.4, on gas in place.

But there was a substantial difference in how they calculated acre-feet. And the only parameter of difference was the pressure and the Z factor, the end result of which is, the Marathon witness had about 6400 acre-feet in the pool, the Manzano witness gets almost 9.9 BCF of gas in the pool.

Did you study any of that when you looked at your work?

A. I read the transcripts. There was a difference. The Manzano number would be higher. Or, to say it otherwise, the Marathon Number 1 would be lower, because I believe they were using, in my opinion, too low of a Z factor, too high of a gas expansion factor, so that when you make the division between gas in place and recovery factor you come up with a fairly significant difference in acre-feet.

Q. Okay. When you examined the gas-in-place number for the three-well pod, Case 2, you got 6.85 BCF?

A. 6.5, I think, 6.7, 6.6.

Q. 6.6 BCF of gas. The total acre-feet for that analysis is what, sir? Where's that exhibit?

A. Are you looking at Exhibit 20?

Q. Yes, sir, I think it's on here somewhere.

A. Okay. And your question is -- ?

Q. If I've got initial gas in place of 6.65, what's my acre-feet?

A. 7751.

Q. All right. The drainage volume, that's 7751, that's the acre-foot number I need?

A. Yes, sir.

Q. All right. Other than calculate the gas in place and translate that to acre-feet for the two case

examples, did you do any other reservoir engineering work that applies to this case?

A. Those were the principal things. We did the -- The exhibit 6 was generated in my office, and the material balance calculations, and that was really the majority of our work, yes, sir.

Q. Okay.

A. If that was your question.

Q. Yes, sir.

Is the methodology then to take that number in the acre-feet, provide it to the geologists, and let them give you a size and a shape that will match that volume?

A. Yes, you give them a shape that will match the volume, and they have the size. They will use these numbers to help on the size, but the shape is a geologic interpretation.

MR. KELLAHIN: No further questions. Thank you.

CHAIRMAN LEMAY: Thank you, Mr. Kellahin.

Commissioner Bailey?

EXAMINATION

BY COMMISSIONER BAILEY:

Q. Looking at Exhibit 16, because of the break in the decline between the two curves that you've shown

here --

A. Okay, yes, ma'am.

Q. -- is there any other explanation, other than that we're looking at two different reservoirs? Logical, reasonable explanation?

A. That's by far the most satisfying. No.

Q. Okay. Extrapolating the blue line which connects the Jordan "B" Number 1 and the Neuhaus 14 reservoir, the pressure goes to zero in 1995?

A. I'm sorry, what exhibit is this?

Q. Same exhibit, 16.

A. Oh, extrapolating -- Oh, I see what you mean. If you'd extrapolate it on down, it would go to zero in 1995?

Q. Uh-huh.

A. Well, that's what that trend would show.

The major purpose for this is really to block out when things happened. Pressures would never actually go to zero in a physical sense, but that's what that extrapolation would show, that's right.

Q. Is that a reasonable length of time for production of the gas in place, ranging from 7.1 to 6.8?

A. I don't think over the long -- Well, it might be. I don't know how long it would take us to get

another 3 BCF out of the reservoir. It wouldn't be too much longer than that, perhaps.

COMMISSIONER BAILEY: That's all I have.

CHAIRMAN LEMAY: Thank you.

Commissioner Weiss?

EXAMINATION

BY COMMISSIONER WEISS:

Q. Yes, sir. How were the pressures measured?

A. The pressures were a combination of pressures of -- Some were built up from bottomhole bombs.

The pressures on the Jordan "B" 2, the last pressure was an acoustic measurement to a fluid level, and it assumed 100 percent water gradient all the way to bottom.

Others, I don't know all of the exact methods that they were measuring.

Q. So they were not -- As far as you know, they're not P*?

A. There is one P* that would be the second porosity -- "porosity", excuse me -- the second pressure on the "B" 1. That was a P* estimate there. The others were statics, I believe.

Q. So there was one transient test --

A. Yes.

Q. -- and that's it?

A. As far as I know, yes, sir.

Q. So the statics were merely a function of that day?

A. And the shut-in time, yes.

Q. Okay.

A. But I understand -- Excuse me, but I understand that the reservoir is extremely good, and it looks extremely good, and the buildup time is extremely short.

So I had not -- I think that's a good point to believe that the statics are pretty good pressures.

Q. I haven't seen that.

Let's see, on Exhibit 21, this is interesting, if you have transient data off of the two wells, the Manzano well and the Marathon well, would it be possible to construct something like this and create a constant pressure boundary right at the lease line, adjust rates to reflect that kind of a pressure boundary?

A. Well, this is simplified. I suppose theoretically it might, yes, assuming that the properties of the reservoir were the same in all directions.

Q. Well, I guess that's a reasonable assumption, from what I've heard.

A. Yeah.

Q. About as good as any of the others.

And then -- Oh, you mentioned the low pressure gradients, that you had seen them elsewhere. Where was that?

A. On some of the -- I can't name you fields, but *Practical Reservoir Engineering* by Timmerman shows the graph that we've all used probably at one time or another and shows a statistical line at the west Texas fields.

But there's a scatter around that line, and if there are some of the -- Some of the fields that would line up with where our reservoir, our good reservoir would plot at that subsea depth.

Q. And that's your source?

A. That's my mental source. I have no documentation here to show you, but that's my mental image of the pressure relationships.

COMMISSIONER WEISS: Okay. Those are the three questions I had. Thank you.

CHAIRMAN LEMAY: Mr. Carr, will this -- this will be your only engineering witness?

MR. CARR: This is the only engineering witness.

CHAIRMAN LEMAY: Okay.

EXAMINATION

BY CHAIRMAN LEMAY:

Q. Mr. Ausburn, did you look at all the fluid characteristics of the reservoir?

The question where I'd like some clarification on is the water that's being produced in the reservoir and the fact that you do have a percentage of water, but you evidently watered out the Jordan "B" 2.

Is this a water-drive type depletion, or is it just connate water trapped in there that's produced and may make it uneconomical at lower flow rates?

A. I would think there's some amount of natural water drive in the "B" 2 reservoir.

Q. Do you have enough information on the Jordan -- assuming two reservoirs -- on the Jordan "B" 1 and Neuhaus Federal 2 to indicate a water drive on that reservoir?

A. No, sir, not with the level of effort we have done at this point. There's no way to make that conclusive statement.

It seems to me like the water drive is limited, very limited in the "B" 1/Neuhaus reservoir and more substantial in the "B" 2 reservoir. But I don't know that I can quantify that for you.

As far as the water itself, the salinity, I'm presuming it's all Wolfcamp water, which I presume is fairly salty.

Q. But this particular reservoir seems to produce both gas, fair amount of oil --

A. Yes.

Q. -- and water.

Do you know the gravity of the oil? Is it condensate or is it --

A. Oh, yes, it's in the 50-60 range, yes, sir.

Q. But as far as producing characteristics, the fluid production and all, you have no comment on that, why that produces all three components, oil, gas and water?

A. No, I haven't gotten any relative permeability information, and the type of information that might be available -- We have not done any detailed work on the well logs themselves, and special core analyses of capillary pressure and relative perm might be very helpful in determining what is irreducible water and what kind of water saturations might permit the flowing of free -- of connate water.

Q. Or the possibility of certain zones within this carbonate mound or something carrying water, other zones not carrying it, and you just perforate the ones

that carry water?

A. I suppose that's a possibility also. I have seen that on occasion.

But my guess is -- My intuition tells me that the water is coming up slowly from the bottom, principally, in both reservoirs.

CHAIRMAN LEMAY: Thank you, that's all I have.

Commissioner Weiss?

COMMISSIONER WEISS: One more question.

FURTHER EXAMINATION

BY COMMISSIONER WEISS:

Q. On the transient test, do you have it with you?

A. No, sir, I don't.

Q. Okay. So have you seen it?

A. I've seen it. It may be available, but --

Q. Did it look like a fractured reservoir, actually fractured?

A. No.

COMMISSIONER WEISS: That was my other question. Thank you.

CHAIRMAN LEMAY: Additional questions of the witness?

If not, he may be excused.

MR. CARR: That concludes our presentation for Manzano.

CHAIRMAN LEMAY: Thank you, Mr. Carr.

Mr. Kellahin?

MR. KELLAHIN: I call at this time our geologic expert, Lisa Gholston.

CHAIRMAN LEMAY: Mr. Kellahin, I assume you're going to have one geologist to testify?

MR. KELLAHIN: Yes, sir.

CHAIRMAN LEMAY: Thank you.

LISA GHOLSTON,

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

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q. Would you please state your name and occupation?

A. Lisa Gholston, and I'm a geologist.

Q. The microphone in the hearing does not amplify your voice.

A. Okay.

Q. It won't help you.

A. Okay.

Q. It's just to --

A. I'll try to talk loudly.

Q. That's Steve recording, okay?

A. Okay.

Q. You have to speak up.

What is it that you do?

A. I'm a geologist. I prospect for oil and gas for Marathon.

Q. Would you summarize for us your education?

A. Yes, I received a bachelor of science degree from Duke University in 1984 and earned a master's of science degree from the University of Oklahoma in 1987.

Q. In what year?

A. In geology -- in 1987.

Q. In 1987?

A. Both degrees were in geology.

Q. Summarize for us your experience as a petroleum geologist.

A. I started in 1987 with Marathon Oil Company in Houston, Texas, in their exploration group. I was transferred after two and a half years to Midland, also in exploration. And the last year and a half to two years I've worked exploitation and development for Marathon.

Q. When this case was filed by Manzano for approval of the nonstandard location, did this geologic issue fall within your area of responsibility --

A. Yes.
Q. -- for your company?
A. Yes, it did.
Q. In what way?
A. I'm responsible for all the different horizons in this geographic area, for exploitation, exploration and development.
Q. Prior to this case, did you have familiarity and had worked on either of the Jordan wells?
A. Yes.
Q. You had made geologic interpretations in this area prior to this case?
A. Yes.
Q. Now, as a result of the Application, did you make a geologic study of the specific issues you thought were involved in this case as a geologist?
A. Yes, I did.
Q. Did you make that presentation to Examiner Catanach?
A. Yes, I did.
MR. KELLAHIN: We tender Ms. Gholston as an expert geologist.
CHAIRMAN LEMAY: Her qualifications are acceptable.
Q. (By Mr. Kellahin) One of the issues I've

asked you to address was the opportunity to encounter Strawn oil production in this immediate area.

A. Yes.

Q. Have you undertaken that investigation?

A. Yes, I have.

Q. And what have you discovered?

A. I find no Strawn oil potential in this area.

Q. How far do you have to remove yourself from this immediate area to find Strawn production?

A. There is Strawn production four miles to the southeast. Several wells have been completed in the Strawn. The best well in that area has a cumulative production of 4700 barrels.

Q. If you're faced with this geologic challenge of knowing the Jordan "B" 1 well is producing in the Wolfcamp and the south half of Section 11 is dedicated to it, and you're looking for the opportunity for production in this area, what is the target formation?

A. The Wolfcamp would be the primary target.

Q. Do you have a map that illustrates the Strawn potential?

A. Yes, it's Exhibit 2. It's a production map.

Q. Let's take a minute and unfold it, and then we'll talk about it.

A. Okay. All it is, is a --

Q. Wait, don't talk yet. I'm still folding.

A. All it is is a production map of the Wolfcamp and Strawn production in the area. And --

Q. What's the green dots mean?

A. The green is the Strawn production, and the red is the Wolfcamp production.

You can see from this map that the majority of the Strawn production falls on the map -- is several miles to the north and to the west of the Jordan "B" well and the Neuhaus well location. They're located on the far right side of the map.

This field on the far left side is the Lusk field, which is the largest Strawn field in the area.

Q. The area that's specifically in question here is identified how on this display?

A. It's -- The Jordan "B" well, is named. The well location is the southern well in Section 11 that's highlighted in red.

The Neuhaus 14 Number 2 well is also named, and it's the well in the north half of Section 14.

Q. Okay. Have you studied the geologic environment, the deposition for the Wolfcamp in this area on a regional basis?

A. Yes, I have.

Q. Have you studied it on a specific basis

concerning these wells?

A. Yes.

Q. Give us your summary and explanation of the geologic deposition and the setting for the Wolfcamp.

Let me get this display out of the way, and then we'll talk about it.

A. The geologic setting for the Wolfcamp at this time is a basinal setting. It's a fairly deep basinal setting. I interpret the environment of deposition for the Wolfcamp in this area to be that of a carbonate debris deposition.

Q. How do you reach that conclusion, that this is a carbonate debris flow?

A. I've looked at several different parameters. First of all, it is in a deep basinal setting. That's evidenced by wells that are to the east that are on the Central Basin Platform. There's a large fault, and these wells are -- the Jordan "B" 2 and the Neuhaus Federal are downthrown, on the downthrown side of that fault in a deep basinal setting at Wolfcamp time.

I've also looked at the samples for the wells in the area that I could obtain. I obtained the -- of course, our Jordan "B" 1 well, the Neuhaus Federal Number 14 -- 14 Number 2 well -- and the BTA Byers well, which is in Section 23, just south in Laguna

Osudo field.

Those samples show that at the base -- just below the base of the Wolfcamp pay zone, you encounter shales and limestones, basinal dark limestones. The shales and limestones are very silicious; they're real hard. There's chert in the samples at the base, and I interpret that to be a basinal-type deposit, the chert and the silicious nature of the deposit, it's evidence that it's basinal.

You go from that into the Wolfcamp pay zone in all the wells, and that is a clean, tan to white dolomite. I did not see any evidence of fossils, but you could see rhombs and large dolomite crystals.

From there, after you get through the Wolfcamp pay zone, you grade into, again, basinal type limestones, dark limestones and shales.

So that led me to believe that at the -- that you're in a basinal setting below and above the Wolfcamp debris zones.

I also looked in just this area. Exhibit 6 is a structure map contoured on the base of the Wolfcamp pay zone, just in the immediate area of the Jordan "B" Number 1 well and the Neuhaus Federal Number 2 well.

Q. Let's take that out of order and talk about

it now.

A. Okay, well, that's another point.

Q. All right, let's do it now while you're thinking about it. It's Exhibit 6. This exhibit and all the geologic displays represents your own work?

A. Yes.

Q. These are your own interpretations?

A. Yes.

Q. Okay. Describe for us what you're trying to illustrate with Exhibit 6.

A. The structure map on the base of the Wolfcamp shows that there is a low in the vicinity of the Jordan "B" 1 well and the Neuhaus Federal well.

Again, I would expect a low to be a perfect setting for a debris flow to be deposited. I would not expect -- I would expect a buildup to be more on a paleotopographic high where the water is just a little bit shallower, at the base of the Wolfcamp.

And finally, I have some cross-sections that I'll get into in a little bit, but the logs in this area at the top of the Wolfcamp debris zone show a fining upward character, and that again is indicative of transport deposition. So I've used that as a piece of evidence to call this a debris flow versus a buildup.

Q. As part of your geologic study, did you prepare structure maps, isopachs and cross-sections?

A. Yes.

Q. Let's turn to Exhibit Number 2 -- I'm sorry, it should be Number 3.

A. Okay.

Q. What's the purpose of Exhibit 3?

A. This exhibit illustrates the potential in the area of the Jordan "B" 2 well and the Neuhaus Federal well as -- for Strawn potential.

This cross-section is a stratigraphic cross-section hung on the top of the Strawn. It also includes the Atoka section.

The line of cross-section is on Exhibit Number 4, if you need to see where the wells are located in relationship to the Jordan "B" 1 well, cross-section S to S'.

The well on the right side, the farthest right well on the cross-section, is the Amoco LL State Number 1 well. This well was perforated and a completion attempted within the section that I've shown on the cross-section. Those perforations were from 11,980 to 12,030 feet. The scout ticket reported that from those perforations three barrels of oil were swabbed and 142 barrels of water in 24 hours. The zone

was subsequently squeezed. And I've interpreted those perforations to be within the Atoka section.

As you move up and look at the Strawn section, you can see that it is ratty limestone in all the wells on the cross-section, the better limestone being developed at the top, although that limestone is tight.

On Exhibit 4 in parentheses by each well I've put the feet of porosity greater than four percent that each well that penetrated the Strawn encountered. It ranged from 10 feet to 16 feet, and all of those zones of porosity were in the bottom 50 feet or so of the Strawn.

I think this illustrates that the Strawn is tight in this area. It's -- The porosity develops in ratty limestone stringers, and the only well in the area where a completion was attempted near the Strawn, I interpret that to be in some shaley sands that I will call Atoka.

The wells to the south that have produced from the Strawn that are poor producers typically have 30 or so feet of porosity within the clean limestone section of the Strawn.

Q. What is your conclusion, then, about the opportunity to encounter commercial Strawn oil

production in this immediate vicinity?

A. I don't believe there is any opportunity to.

Q. Let's look at the Wolfcamp now, Exhibit 5, cross-section.

A. Yes, that's cross-section W-W'.

Q. Okay. Give us your conclusion, and then let's talk about the reasons for the conclusion.

A. My conclusion from this cross-section is that the Wolfcamp would be deposited in a deep basinal setting in the Neuhaus -- I mean in the Jordan "B" Number 1 well, which is the first well on the cross-section.

Q. Describe for us using Exhibit 5 the reasons that brought you to reach that conclusion.

A. Well, Exhibit 5 is an east-west cross-section. The first three wells, three wells to the right, are located on the Central Basin Platform, and the Wolfcamp has been age-dated from fusulinid and fossil data by Garner Wilde, who's a consultant that we hired in Midland Texas. And he also age-dated the second well in the cross-section, which is down -- on the downthrown side of the fault.

You can see from the geologic evidence that there is a major fault between the second and third well on the cross-section. The fault is the magnitude

of 2000 feet. This is evidenced by the Wolfcamp section on the Central Basin Platform, sitting right on top of eroded Mississippian and Devonian section on the Central Basin Platform.

As you move to the west, to the wells to the west, you see that you still have the whole Morrow Atoka and Strawn section in the wells that are on the downthrown side. So this dates the faulting as pre-Wolfcamp faulting. And it puts the Jordan "B" 1 well, which is the first well in the cross-section, in a basinal setting.

Q. Do you see any geologic opportunity for the Jordan "B" 1 well, in a geologic sense, to be in the same reservoir with the Wolfcamp wells to the south?

A. The wells south of the Manzano?

Q. The ones down in the Osudo --

A. In the Osudo field?

Q. -- Osudo-Wolfcamp Southwest.

A. No, there's control points between those two wells that have no porosity in the Wolfcamp.

Q. As you go north of the Jordan "B" 2, into the sections north of 11, is there any opportunity geologically to have connected any of the Wolfcamp with this particular reservoir --

A. No.

Q. -- we have in question here?

A. No.

Q. What's the story on the Sims State Number 1 that Manzano drilled in the adjoining section? Was it successful in the Wolfcamp?

A. No, it was not. It encountered tight Wolfcamp in the -- tight Middle Wolfcamp interval.

Q. We have a log on that well?

A. Yes, it's Exhibit Number 8, cross-section B-B'. This is an east-west cross-section through the Amoco Federal AG Com well in Section 14, through the Manzano Neuhaus Federal Number 2 well, and the last one in the cross-section is the Manzano Sims State well.

Q. If we use Exhibit 6, which is your base of the Middle Wolfcamp pay structure map --

A. Yes.

Q. If we use that as a guide, then, we can follow the line of cross-section --

A. Yes.

Q. -- for Exhibit 7?

A. Yes.

Q. Tell us the geologic importance, then, of the Sims State 1 in defining the size and shape of the container for this production.

A. Well, the Sims State 1 encountered no pay

within the Middle Wolfcamp pay zone, so it provides a boundary to the east where you must pinch out the pay zone quickly between the two wells to the east.

Q. You go through the Manzano Neuhaus 2 well, and you get to the well at the B location, which is the southwest well?

A. Yes.

Q. What does that tell you about a control point for the reservoir?

A. That well also did not encounter any pay in the Middle Wolfcamp pay zone. It's tight through that whole zone, and it provides a control point to the west for the pinchout of the reservoir.

Q. We've looked at the northeast-southwest direction on the structure map. Let's go north to south.

A. Okay.

Q. Exhibit 7, is it?

A. Exhibit 7 is the north-south cross-section It's a cross-section, A to A'. It's a stratigraphic cross-section, again hung on the top of the Wolfcamp.

Q. Hang on just a minute. All right, describe for us Exhibit Number 7.

A. Okay. The first one on the cross-section is the Marathon Jordan "B" 2 well. It's the northernmost

well.

You can see the whole Wolfcamp debris zone I've marked, starting at 11,288, and you can see a fining upward character to the Jordan "B" 2 well at the top of what I've defined as the top of the debris zone.

As you get into the Middle Wolfcamp pay zone, you see that this well encountered seven feet of porous dolomite within this zone. This well was perforated and had an IP of 175 barrels of oil per day from that zone.

The next one on the cross-section is the Jordan "B" Number 1 well. This was originally a Morrow well that was recompleted to the Strawn. Again, if you look at the top of the Wolfcamp, what I've called the top of the Wolfcamp debris zone, you can see the fining upward character in the log at the top of that debris zone. As you move into the Middle Wolfcamp pay zone, the well encountered 39 feet of porosity, greater than four percent, in clean dolomite.

Finally -- Or the next well on the cross-section is the Manzano Neuhaus Federal Number 2 well. And the zone that I've highlighted in blue is what I consider to be the gross porous interval within the Middle Wolfcamp. Again, you can see that the well encountered -- that the well at the top of the Wolfcamp

debris, what I've marked the top of the Wolfcamp debris on the cross-section, has that fining upward character that's indicative of debris or indicative of a transport-type deposit.

The well encountered 90 feet of clean dolomite with porosity greater than four percent within the area that I've shaded blue as the Middle Wolfcamp porous zone.

Finally, the last one on the cross-section is the BTA Neuhaus Federal Number 1, which was drilled in 1992. That well encountered the Middle Wolfcamp pay zone, but it was tight. The well was DST'd within that zone, Middle Wolfcamp pay zone, and recovered 390 feet of mud with just a trace of oil. So the reservoir was tight in that well.

Q. Let's go back to the Marathon Jordan "B" 1 well.

A. Okay.

Q. All right? Looking at that log, give us the geologic criteria that you have used when you're trying to determine the total net thickness that you're then going to isopach for this interval.

A. I used a gamma ray cutoff of 30 API, and a cross-plot porosity cutoff of four percent.

Q. By applying that criteria, what did you get

for your net footage in the Marathon Jordan "B" 1 well?

A. 39 feet.

Q. You go over to the Manzano well --

A. Okay.

Q. -- did you apply this same methodology?

A. Yes, I did.

Q. And what do you get for the footage in that well?

A. 90 feet.

Q. You and Mr. Brown have a difference, don't you?

A. Yes.

Q. Okay. Identify for us on the log of that well where the area of difference is.

A. The area of difference that I see is from 11,470 feet down to 11,485 feet. I did not include that as being in the gross Middle Wolfcamp pay interval. I felt that you went from high porosity of eight to ten percent down to porosity right at four percent. I did not feel that that contributed to the reservoir, and it was not perforated by Manzano.

Q. Okay. Have you prepared an isopach that uses that interval and shows us the shape of the Wolfcamp reservoir?

A. Yes.

Q. In addition, have you prepared another isopach which will take into consideration the footage in dispute in the Manzano well?

A. Yes.

Q. Let's turn to Exhibit Number 9. If you'll take Exhibit 9 and find the structure map, Exhibit 6, let's look at those two together for a moment.

What if any relationship is there between the contouring of the isopach on Exhibit 9 and its relationship, if anything, to the structure shown on 6?

A. As I said before, I feel like the structure at the base of the Wolfcamp is indicative of a paleotopographic low in the area of the Manzano Neuhaus Federal Number 2 and the Jordan "B" Number 1 well, and I think this is a perfect setting for a debris deposition.

As you move south to the BTA Neuhaus Federal Number 1 well, you can see that the structure at the base of the Wolfcamp -- You move updip quickly to that Neuhaus Federal Number 1 well BTA drilled.

So that was a reason -- That was another piece of evidence I used to contour the southern pinchout of the debris flow in this area.

Q. When we look at Exhibit 10, you have displayed all the control points by which to make the

interpretation for the isopach for the area shown on the display?

A. Yes.

Q. You have some zero points for the Manzano Sims, and you have a zero point for the Neuhaus Federal 1 down to the south. You move to the southwest, and the Amoco federal is a zero point.

A. Yes.

Q. Both you and Mr. Brown agree that those are zero points, right?

A. Yes.

Q. Within the range of those controls, did your reservoir engineer give you any gas in place and/or acre-foot numbers in which to provide at least a size for the container?

A. Yes, he did.

Q. And what were those numbers?

A. The acre-foot number was around 6700 acre-feet for the entire reservoir. And I believe the gas-in-place number -- I don't have it written up here, I'm not sure I recall it right, but I think it was around 6 to 6.5 BCF.

Q. Okay. Prior to having that information, did you make an interpretation of the size and the shape of this Wolfcamp reservoir?

A. Yes, I did.

Q. And what was your conclusion, independent of the engineering information?

A. The shape and orientation of the reservoir did not change. I revised my contour slightly to make sure that my reservoir was not larger than his acre-foot number.

Q. Prior to having the reservoir data to match, had you drawn the Jordan "B" 2 in the same reservoir with the Jordan "B" 1?

A. Yes, any interpretation I made in the area, I've drawn the Jordan "B" 2 in the same reservoir as the Jordan "B" 1.

Q. What's your basis for doing that?

A. Well, I believe that the debris flows in this area are oriented north-south. All three wells, the Jordan "B" 2, the Jordan "B" 1 and the Manzano Neuhaus Federal well, all encounter porous dolomite debris, and I felt like the dolomite debris came from the north. It was -- the thickest part of the debris was deposited in the lowest point on the map, but it was deposited in all three wells.

Q. When the reservoir engineer provided you with the gas in place and the acre-foot -- at least parameter by which to validate your map, did you make

any adjustments?

A. I revised my contour slightly to -- as I said before, to make sure that my reservoir was not larger than his numbers.

Q. This is the exhibit that you introduced to Examiner Catanach at the Division Examiner hearing?

A. Exhibit 9?

Q. Yes.

A. Yes.

Q. All right. Let's go to 10 then.

A. Okay.

Q. At the Examiner hearing there was an issue about whether or not the bottom portion in the Neuhaus 2 well had been properly credited to the reservoir, right?

A. Yes.

Q. All right. What have you done that is different in the area mapped vertically between 9 and 10?

A. I've added the 15 feet in the Manzano Neuhaus Federal Number 2 well that I previously counted as out of the porous debris interval and recontoured the map to honor that data point.

Q. All right. When we look at Exhibit 10, what is the footage you're dealing with when we get to the

Manzano Neuhaus Federal 2 well?

A. 105 feet.

Q. Okay. There is still a difference between you and Mr. Brown over that value for that well, right?

A. Yes.

Q. He's counted -- What was it? 115?

A. 115 feet.

Q. And you have 105?

A. Yes.

Q. Where's the difference?

A. Without talking to him --

Q. In a general way, what is --

A. -- foot by foot -- I mean, I just counted out the shaley zone, and any porosity that was right at four percent I did not count as being over four percent. If it was four percent or less, I did not count it.

Q. Okay. And so you come up with 105 foot?

A. Yes.

Q. When you take that additional footage, factor it into the analysis, did it change your conclusion?

A. No.

Q. What, if any, change has that difference made in the two isopachs?

A. The change -- The one change that it made

previously, the acre-foot numbers that I had for the Exhibit 9 map were 6776 acre-feet under the Marathon tract and 2333 feet under the Manzano tract.

The numbers changed from 3953 feet under the Marathon tract and 2488 feet under the Manzano tract.

So the relationship between the two numbers stayed the same.

Q. Let me ask you to draw a comparison to your Exhibit 10 to Mr. Brown's Exhibit 9, and I'm going to give you a copy of his --

A. Okay.

Q. -- his exhibit.

A. Okay, the overall shape of the reservoir is the same. The main difference is that he's pulled the --

Q. Hang on just a minute.

COMMISSIONER WEISS: I don't know which one to look for.

MR. KELLAHIN: We're comparing Manzano's Exhibit 9 to the Marathon Exhibit 10.

Q. (By Mr. Kellahin) The overall shape is similar?

A. Yes, and the north-south trend is similar.

Q. What happens to the apportionment of acre-feet between the two spacing units under the two

different interpretations?

A. There's an almost reverse relationship. He has 69 percent of the acre-feet on their tract and 31 percent of the acre-feet on our tract, on the Marathon tract.

Q. When we look at your interpretation, what is the approximate percentage that you conclude are in each tract?

A. Just about the opposite, 35 or so percent on their tract and the remaining 65 or so percent on our tract.

Q. You were present during Mr. Brown's testimony today in this case?

A. Yes.

Q. Was there anything that he told you or explained that causes you to want to change any of your conclusions or interpretations?

A. No.

Q. What explains the difference in mapping using similar data, if you will, between your map and his map?

A. Well, it's an interpretation of -- I think one of our main differences was reservoir -- was environment of deposition, and on this map he has pulled the zero line farther to the south than I did.

Based on my interpretation of a debris flow, I did not pull the reservoir as far south, based on the structure map and where it --

Q. Is it going to make --

A. -- deposition.

Q. Is it going to make a material difference between the 105 feet for the Manzano well on Exhibit 10 and the 115 feet that Mr. Brown used on his isopach?

A. No, they both fall within the 100-foot contour. On both of our maps we both used a 20-foot contour interval, so it would not make a significant difference.

Q. The difference in positioning of the pod is directly based, then, on each geologist's conclusion about the depositional environment for the Wolfcamp in this area?

A. Yes.

MR. KELLAHIN: That concludes my examination of Ms. Gholston, Mr. Chairman.

We would move the introduction of her exhibits 2 through 10, I believe it is.

CHAIRMAN LEMAY: Without objection, Exhibits 2 through 10 will be admitted into the record.

Thank you, Mr. Kellahin.

Mr. Carr?

MR. CARR: Thank you, Mr. LeMay.

CROSS-EXAMINATION

BY MR. CARR:

Q. Ms. Gholston, if we could go first here to Exhibit Number 6, please...

If I look at the contours on this exhibit, it appears that in the northeast quarter of Section 14 there is a -- basically a deflection in this middle Wolfcamp zone; is that correct?

A. Yes.

Q. And when you're talking about a debris flow, is it that area in which you would see the debris actually moving?

A. Well, I think the debris moves from north to south in this area, based on the fault that's to the east, and it sets up a conduit for debris from the north, either from the San Simon Channel or the northwest shelf or from the platform, coming down.

Q. So does that show where you catch this as the debris moves down from the north?

A. Yes, that's what my interpretation is.

Q. Okay. And if I look at the deflection, basically the deepest portion or the thickest portion is actually somewhat south of the Neuhaus Federal Number 2, is it not?

A. Slightly south, yes.

Q. Now, if I also look at this, it seems to me if I look at this formation, it's thicker in the Neuhaus Federal Number 2 than it would be in the Jordan "B" Number 1; is that right?

A. Yes.

Q. And so we've got -- And I may be confused, but then when I take and I try and look at your isopach on the Middle Wolfcamp, it seems to me that in fact what you're doing is pulling the thickest portion of this interval away from the thick to the south, and you're pulling it actually to the north; isn't that right?

A. Well, I'm pulling -- I think I have an equal thickness on the south part, and I'm honoring the Jordan "B" 2 well to the north, so I'm pulling the zero contour up there, and also the -- all the other contours onto that point.

Q. So the reason you're -- You're pulling those contours north to honor the "B" 2?

A. And to reflect the north-south trend that I believe the debris has.

Q. But I am right, am I not, that if I look at your Exhibit Number 6, where I would anticipate the real thick to be is sort of from the Neuhaus Federal

Number 2 and immediately south?

A. Well, slight -- Well, I think that the Neuhaus 2 and the thickest part of the reservoir is right in the area of the Neuhaus 2 and the Jordan "B" 1. I mean, you can't base it all on the structure map, but --

Q. If I look at the structure, actually the debris flow would flow into that --

A. Into that low.

Q. -- structural deflection that is somewhat south of the Neuhaus well?

A. Yes.

Q. If I look at Exhibit Number 10, your isopach map, have you a porosity foot map that would actually support the way you have pulled the contours together around the Neuhaus Federal Number 2 well?

A. This is the map that I have in the area.

Q. And is this actually a porosity foot map?

A. It's a net porosity and clean dolomite map. It is not a ϕh map or porosity foot map.

Q. Wouldn't a ϕh map actually give us a better read of what we're actually looking at?

A. Well, I think in this case it would show about the same thing. Both wells have an average porosity of 8 percent, and -- if you take the overall

section. So I don't think there would be a significant difference if you use a ϕh.

Q. You're using 105 feet, correct?

A. Yes.

Q. At the Neuhaus well?

A. Yes.

Q. Mr. Brown, throwing out the shale stringers, came up with 115 feet?

A. Yes.

Q. And to get that discrepancy out, wouldn't really a porosity feet map be the way to do it?

A. No, I think it would tell you the same thing as a net porosity map.

Q. If I look at this map, this is your best interpretation of what this Middle Wolfcamp zone would look like?

A. Yes.

Q. I'm talking about Exhibit 10.

A. Yes.

Q. There isn't any control, though, that would suggest, or anything other than just your general interpretation, that would tell us that if in fact we moved the Jordan "B" well, say, 300 feet to the east, we'd be 90 to 100 feet of thickness. That is just basically just your interpretation?

A. Well, I believe, again, because you have the Jordan "B" 2 well to the north, you have to honor that data point and pull the contours to the North, including the 100-foot contour.

It would be hard to flip this and flip the whole pod to the west and move the 100 foot to the west of the Jordan "B" 1, so I believe it's to the east of the Jordan "B" 1.

Q. While we're on this map, you've got the Manzano Sims State Number 1 well on this map. It was high to the -- in this Wolfcamp zone, to the Wolfcamp wells that are producing to the west, was it not?

A. Yes.

Q. And was it basically on a -- It's a platform, is it not?

A. Well, I wouldn't call it a platform. I'd -- It's still deep in the basin. It's just high. It's regional dip.

Q. Okay. But it is also, as Mr. Brown indicated, structurally high at that point?

A. Yes, it is structurally high.

Q. You talked early on in your presentation about Strawn possibilities in the area, and I think your Exhibit 2 talked about Strawn production; isn't that correct?

A. Yes.

Q. When you looked at the Amoco State LL Number 1, which is shown on your Exhibit Number 4, being in Section 12, you looked at the test on that, and I think you testified you thought it was in the Atoka; is that right?

A. That's how I interpret it, yes.

Q. It was actually a swab test back in 1982 by Amoco; isn't that right?

A. Yes.

Q. And you looked at the scout tickets?

A. That's where I got the information.

Q. And Amoco actually reported this as being a Strawn test, did they not?

A. They didn't report on a scout ticket, I don't believe. They reported an interval and they picked the top of the Strawn, above --

Q. Let me just show you what I think is the scout ticket, and if I'm completely wrong you can tell me. Is that not the scout ticket?

A. That's the PI scout ticket. It's a Company that takes all the information and reports it. The scout ticket I looked at was from the Midland Scouting Association, and it's generally more detailed.

Q. When this says "perforations STRN", that

would tell me, maybe not you, that that's Strawn; isn't that right?

A. Well, that's -- Yeah, that's what that scout ticket says.

Q. Okay.

A. Sure.

Q. Now, look at your cross-section, and I'm talking about the north-south cross-section, Exhibit Number 7.

I look at the log of the Manzano Neuhaus Federal Number 2.

A. Yes.

Q. If we look at this and we look at the zones shaded blue, both to the north and south of the log, what does that blue zone indicate?

A. It's the zone that I've defined as the porous debris interval.

Q. And if we go just above that on the north side of the log, in fact, don't we see in the zone above a wedging of the buildup like what Mr. Brown was discussing earlier today, when you have these carbonate buildups?

A. Just between the blue and the top of the Middle Wolfcamp pay zone?

Q. Yes.

A. That wedge?

Q. Isn't that the same kind of wedging we were talking about earlier?

A. That kind of wedging -- Yeah, that is defined as a wedge, but I don't think you have to necessarily say it's found in only a carbonate buildup area.

Q. What if we look now at this exhibit and there's an area that you've shaded in purple or violet or something on the left side of the log? What does that indicate?

A. That is the gamma ray cutoff I used for clean dolomite.

Q. And the area that is shaded, is that permeable rock?

A. It's just a definition between clean dolomite and shale.

Q. So what does the purple show me? Is that clean dolomite?

A. It just shows you what's clean dolomite.

Q. And so -- But you have cut off what you interpret to be the producing zone in this well to exclude that bottom portion of the clean dolomite that extends below the area shaded in blue?

A. Yes.

Q. Can you tell me again why you excluded that

particular portion --

A. I felt, based on the porosity, how it went from a high porosity right down to four percent, that that was not contributing, that was not part of the porous debris.

Q. It still would be --

A. Still in the debris zone, still clean dolomite.

Q. And permeable rock in terms of your interpretation?

A. Well, I didn't base the permeability on clean dolomite.

Q. Okay. It would be clean dolomite?

A. It would be clean dolomite.

Q. And yet you have excluded it from your interpretation of the thickness of the reservoir?

A. Of the porous debris.

Q. In determining how much porosity you have in the zone, you used a four-percent cutoff; is that what you told me?

A. Yes.

Q. And yet when you went through the zone, you cut off everything that was at four percent or less?

A. Yes.

Q. Is four percent the proper cutoff to use if

you have to do that, or shouldn't you have used five or something --

A. Well, I generally feel four percent is a good cutoff for --

Q. But if it was right --

A. -- carbonate debris.

Q. And if it was right at four percent, you excluded it?

A. Yeah. And actually in this area, these two wells, the zones that have been perforated both by Manzano and us are greater than four percent. The overall average porosity is well above four percent. It's eight percent, more like eight percent.

MR. CARR: That's all I have.

CHAIRMAN LEMAY: Thank you, Mr. Carr.

Mr. Kellahin?

REDIRECT EXAMINATION

BY MR. KELLAHIN:

Q. When you look at your net pay isopachs, either Exhibit 9 or 10, when we look in the east half of Section 14 --

A. Yes.

Q. -- down in the center of the spacing unit there's a square?

A. Yes.

Q. What does that represent?

A. That square is the boundaries for where a legal location could be drilled in a standup unit in the east half of Section 14.

Q. Both you and Mr. Brown agree that this well could not have been successfully drilled in this formation at a standard location?

A. Yes.

MR. KELLAHIN: No further questions.

CHAIRMAN LEMAY: Thank you, Mr. Kellahin.

Mr. Carr?

RECROSS-EXAMINATION

BY MR. CARR:

Q. The box on Exhibit 10 that Mr. Kellahin just discussed, that is the box that is 1980 from the end line and 660 from the side boundary on this 320-acre tract?

A. Yes.

Q. That's what you're saying?

A. Yes.

Q. Those are the only available standard locations?

A. Yes.

Q. And if the reserves that are under the east half of Section 14, the Manzano tract, are to be

produced at all, they would have to have a well at an unorthodox location, wouldn't they?

A. Yes.

Q. Because they couldn't get them in a standard location at all?

A. That's correct.

Q. And then they would be drained by other wells in the field?

A. Yes.

MR. CARR: Okay.

CHAIRMAN LEMAY: Thank you, Mr. Carr.

Commissioner Bailey?

EXAMINATION

BY COMMISSIONER BAILEY:

Q. I'm trying to visualize the setting. We have a fault to the east, we have a positive force to the north, debris flow from the north to the south.

How does all this correlate with the Osudo Wolfcamp to the south? Is that a continuation of a debris flow? Is there a relationship to that field?

A. Yes. Well, I feel all the fields along that trend -- If you look at the production map, they're all oriented north-south. I feel they're all debris-flow fields.

I did, as I said, look at the BTA -- samples

from the BTA Byers well, which is the good well in the Laguna Osudo field, and those samples indicated to me that beneath the pay zone there was silicious shale, silicious basinal-type limestones, and -- grading into the porous debris, and above those zones there is also basinal-type deposits.

That log also demonstrates the fining upward character at what I call the top of the debris.

So yes, I feel that's still a debris-flow deposit. It's offset east and west by two wells, but the closest well north is the BTA Neuhaus Federal in Section 11, as a poor control point.

Q. Okay. How about to the east and west? Do we have similar-type structures from the same source?

A. Yes, in a regional setting there's several fields east and west that are northwest -- or north-south trending. The Corbin field is another Wolfcamp field, probably 12 miles west of here, that demonstrates a strong north-south trend, and I interpret that as a debris field -- or debris-flow deposit also.

There are no fields east of this location, no Wolfcamp fields directly east, because of that fault and -- as you move up on the Central Basin Platform.

As you move to the other side of the Central

Basin Platform, there are again several fields in Texas that are interpreted as debris flows. Amacker Tippett is a field that's been developed by Chevron, and it's a -- There's some literature on it by Mary Van Der Loop that discusses the same type of silicious basinal deposits at the base of the Wolfcamp, the thick debris zone and then the fining upward sequence. And it's a similar type setting on the eastern side of the Central Basin Platform in Texas.

COMMISSIONER BAILEY: That's all I had.

CHAIRMAN LEMAY: Thank you.

Commissioner Weiss?

COMMISSIONER WEISS: I have no questions. Thank you.

CHAIRMAN LEMAY: Ms. Gholston, I have a couple, I guess.

EXAMINATION

BY CHAIRMAN LEMAY:

Q. What's the debris?

A. It's dolomite, and it's shelf-derived sediments, so it would be built-up type sediments derived from the shelf that are transported down the shelf and deposited in a basinal setting.

Q. And specific to your exhibits, what's the debris? The outline of the zero contour line on your

isopach map?

A. That's the porous debris. I feel the whole Middle Wolfcamp section --

Q. -- is debris?

A. -- is debris. But I've just outlined the porous debris.

Q. Okay. So if this is debris -- I'm kind of just coming down. You stated that the origin is in a shelf section. How do you account for the silicious dirty dolomite surrounding the porous body as being a shelf-derived section? I would assume that's basin. How could all this come from the shelf?

A. Well, I didn't -- I saw silicious limestone at the base. I didn't see any evidence of silicious dolomite within the debris section, and I saw silicious basinal limestones and shales at the top.

So I visualized shelf-derived material flowing from a shelf environment into the basin and being deposited as a deposit, interfingering maybe at the top, with shales and --

Q. I thought your testimony was, surrounding this body -- we'll call it a clean limestone or dolomite body -- the zero isopach that you produced and also Mr. Brown produced where we're talking about clean gamma ray, that within that you're saying that that's

only part of the debris, that there's additional debris coming down from the shelf both above that clean dolomite and below that clean dolomite?

A. Yes.

Q. But then I thought your testimony was that the section actually above and below was -- indicative of a basin environment -- was dirty, shaley, cherty limestone.

A. Well, I guess the difference we're talking about here is, if you look at cross-section B-B' --

Q. What exhibit --

A. I'm calling --

Q. Oh, okay, I have it here. Yes.

A. Okay, what I'm calling debris, you can see where I've marked the top of the debris zone --

Q. Yes.

A. -- and the base of the Middle Wolfcamp pay zone.

Q. Yes.

A. I'm calling all that debris. And that can be tight -- It could still be tight, even though it's dolomite debris, as I believe in the Sims well the same section is also debris. I believe in the Amoco Federal AG well, that same section is also debris.

Just because it's debris, I don't feel that

-- I mean, it doesn't have to have porosity just because it's debris.

Now, at the base of the Manzano Neuhaus Federal Number 2 well --

Q. Yes.

A. -- where I've called the base of the Middle Wolfcamp pay zone, that's where I saw the silicious, shaley limestones, and I would call that the base of the debris.

As you move up to the top --

Q. Yes.

A. -- up what I've defined as the top of the debris --

Q. Yes.

A. -- there is some dirty limestone inter-fingering with shales between what I've marked as the Middle Wolfcamp pay interval and what I marked as the top of the debris, but what I feel is the basinal shaley zones is above that.

Q. So you saw a facies change between -- above the top of the debris and below the top of the debris?

A. Yes, in the wells that I looked at.

Q. Therefore -- Are you saying that the interval from 11- -- well, take the Neuhaus Federal 2 -- from 11,290 or 11,288 --

A. Uh-huh.

Q. -- to 11,352 --

A. Yes.

Q. -- that zone is a shelf zone, is a shelf-derived depositional zone?

A. Yeah.

Q. Clean dolomite, clean limestones, green, red shale, or what -- ?

A. Well, debris flow is also -- It's not going to be homogeneous throughout. It's not like one big buildup flows down all together. It's a series of sequence -- sequences of events.

So they can be interfingered with basinal deposits. You know, you have one debris flow, some sedimentation on top of it of shales or limestones, another thin debris sheet, sedimentation on top of that, of basinal deposits.

So I'm not saying it's all one big -- it's not one event. It's several events that --

Q. A combination of events?

A. A combination of events.

Q. In time?

A. In a deep-water setting, yes.

Q. I'm sorry, I thought your testimony said dark limestones and shales both above and below the pay.

You have that, but you have that interfingered --

A. Yeah, it's --

Q. -- with a shelf-type limestone dolomite.

A. Yeah I didn't -- Yeah, it's interfingered. I'm not trying to say it's all one big package of clean debris that flowed at once. It's a series of debris-flow events.

Q. I'm just trying to understand your model, that was all.

A. Yeah, that's the model.

Q. There are certain things it has to fit.

A. Yeah, that's the model.

Q. And this debris tends to settle in the lowest spot, generally?

A. Yes.

Q. Your exhibit -- Well, there's a couple exhibits, I guess, I'd like you to look at. Exhibit 10 in conjunction with Exhibit 6 --

A. Okay.

Q. -- assuming this debris -- and I guess -- Would you say that at least a porous body is one debris, or is that a combination of debris too or --

A. I would think it would be a combination of debris. I don't think it's -- I don't think -- Unless I had a core, there wouldn't be any way to say that was

one debris.

Q. But somehow all the clean debris kind of through time settles in one spot, which is a low spot?

A. Yes, a lot of the -- a larger section of debris will settle in the low spot.

Q. If you take that debris as defined as clean and use that, and just superimpose it on your Exhibit Number 6, it looks like some of that clean debris in the vicinity of the Marathon Jordan "B" 2 actually overlies a nose up there, if that's your interpretation.

The low seems to be centered around the Manzano Neuhaus Federal 2, and it looks like you have a nose, a structural high, up there in the vicinity of the Marathon Jordan "B" 2.

A. Well, I think that debris is -- there's a channelized nature to it, and I think it can be deposited -- It doesn't all have to be in the very lowest spot. I mean, it can also be deposited updip in the channelized section. That's why I have that in the north-south trend to it.

If it's coming from the north --

Q. Right.

A. -- I can -- I visualize it stopping when you have a high, but I don't necessarily -- It's got to

come from the north and stop at that high, so I don't necessarily see it not in the Jordan "B" 2.

Q. But there again, this is in one big chunk. You're saying through time lots of little chunks --

A. Lots of little chunks --

Q. -- will tend to deposit in the low first and then kind of spill off into the highs. The low is the epicenter of the deposition --

A. Yes.

Q. -- and it spills off into the highs. So it could spill off to the south high too, couldn't it? I mean --

A. Well, the way I've interpreted it is that between the BTA Neuhaus Federal 1 and the Neuhaus Federal 2, I know it pinches out there, and I'm interpreting it as stopping because of the debris flow coming from the north and hitting that nose, and then not having enough energy to make it up the other side of the high.

Q. Over time this happens, I guess?

A. Yes.

Q. These little pieces.

The cross-section that you submitted, who's J. Chapman?

A. He's the geologist at Marathon Oil Company

that did the original cross-section in the area, and I revised his cross-section to include the Jordan "B" Number 1 well. It did not -- It stopped with the Mallard -- with the second well in the cross-section.

Q. It looks like you're tearing the shelf-to-basin cross-section here, or at least Mr. Chapman was on Exhibit 5, he showed the faulting?

A. Yes.

Q. Was it your testimony the faulting is pre-Wolfcamp in age?

A. It's pre-Wolfcamp, it's generally thought in the area that the latest faulting is Middle Wolfcamp. But I think this cross-section illustrates that it is pretty much pre-Wolfcamp.

Q. This looks like you stop at the unconformity right above the Mississippian.

A. Yes.

Q. Okay, and then you have an unconformity there. Do you see unconformities within the Wolfcamp on the platform? That's a lot of shale and stuff out of --

A. Yeah. Like I said, the age of the early Wolfcamp, middle Wolfcamp and Lower Wolfcamp -- or late Wolfcamp -- was determined by fusulinid data, and that was determined by Garner Wilde, who is a consultant

that we used in Midland that we used to make -- that John had make these interpretations so that he could make cross-sections in the area.

A. It looks by this cross-section that your faulting doesn't go up into the -- It stops at the base of the Wolfcamp.

A. Yeah, I don't think --

Q. It doesn't extend to even the Lower Wolfcamp.

A. Yeah, I don't think it does in this area. But -- generally in this specific area. From what I've read, regionally there is faulting up into the Middle Wolfcamp time.

Q. Are you familiar with the Huapache Monocline in western Eddy County?

A. No, I'm not.

Q. Okay. You wouldn't be surprised if this went up into the Wolfcamp, then, would you, because there are major tectonic events in the Wolfcamp?

A. Yeah, there are.

Q. You could expect faulting --

A. Yeah, you can.

Q. --in the Middle Wolfcamp?

A. Yeah, I'm just -- Yeah, you can expect them in the Wolfcamp.

Q. What's the age of your debris flow in here?

Is this -- This is Middle Wolfcamp?

A. Middle Wolfcamp.

Q. Would you expect this to be a time of uplift and faulting and erosion, or would you expect it to be a quiet time?

A. I interpret it as a quiet time, just based on the wells in the area that I could find, that the faulting doesn't seem to extend up into the Wolfcamp in this area.

Q. Based on the major platform fault you see?

A. Yes.

Q. And the fusulinid work that your people have done?

A. Yes.

CHAIRMAN LEMAY: That's all the questions I have.

THE WITNESS: Okay.

CHAIRMAN LEMAY: Any other questions of the witness?

Thank you, you may be excused.

Let's take about a 15-minute break.

(Thereupon, a recess was taken at 3:15 p.m.)

(The following proceedings had at 3:30 p.m.)

CHAIRMAN LEMAY: We shall continue.

Mr. Kellahin?

MR. KELLAHIN: Thank you, Mr. Chairman.

I'd like to call at this time Mr. Craig Kent.

CRAIG KENT,

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

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Kent, for the record would you please state your name and occupation?

A. My name is Craig Kent, and I'm a reservoir engineer.

Q. Mr. Kent, on prior occasions have you testified before both the Commission and the Division of the Oil Conservation --

A. Yes, I have.

Q. Have you as a reservoir engineer been asked by your company to make an analysis of the reservoir engineering data and information concerning the subject matter in dispute today?

A. Yes, I have.

MR. KELLAHIN: We tender Mr. Kent as an expert reservoir engineer.

CHAIRMAN LEMAY: His qualifications are acceptable.

Q. (By Mr. Kellahin) Let me ask you some basic

conclusions, Mr. Kent, and then we'll go through the details of the work.

As a result of your effort, were you able to reach any engineering conclusions concerning whether or not the Jordan "B" 1 well was in the same reservoir with the Jordan "B" 2?

A. Yes, I have.

Q. And what did you conclude?

A. I've concluded that those two wells are in the same reservoir.

Q. Were you able to conclude as to what in your opinion is the original gas in place within the reservoir?

A. Yes, I have.

Q. And based upon that calculation, were you also able to determine the acre-feet in that reservoir?

A. Yes, I have.

Q. Were you also able to apportion the acre-footage with the geologic interpretation that Ms. Gholston gave you so that you could determine reservoir share between the two companies?

A. Yes, I have.

Q. Have you been able to calculate the remaining gas in place in the reservoir?

A. Yes, I have.

Q. And do you have a recommendation to the Commission as to how to allocate that remaining gas to be recovered between the two wells?

A. Yes, I have a recommendation.

Q. Let's go back and have you summarize for me the facts that caused you to conclude that the Jordan "B" 2 and the Jordan "B" 1 were in the same reservoir.

A. I think what you have to look at is the initial pressures that were seen in both wells, and also keep in mind the depth at which both wells are completed in.

The Jordan "B" Number 2 was completed in the Wolfcamp, I believe, in 1985. There was initial pressure of just under 4700 pounds at a depth of 11,400 feet, which gives you a pressure gradient around .41, which is typically what you would expect to see for most areas in this area of Lea County.

When you look at the initial pressure on the Jordan "B" Number 1, which was completed in December of 1991, same zone, you see a pressure of about 3800 pounds, which gives you a pressure gradient of about .3 p.s.i. per foot.

Now, these wells are less than a mile apart. You wouldn't necessarily conclude that if these wells were in two separate reservoirs that you would see such

dramatic differences in virgin reservoir pressure.

Q. The differences that Mr. Ausburn described for us in terms of initial pressures, virgin reservoir pressures as you move into other Wolfcamp areas, would they explain to you the difference in pressure difference between the wells that are this close together?

A. No, it might explain the difference in pressure gradient between wells -- in different parts of the Basin, but not wells that are within a mile of each other.

Q. Were you able to reach any engineering conclusions about whether or not the Jordan "B" 1 was in communication with the Manzano Neuhaus Number 2 well?

A. Those two wells are definitely in pressure communication. Based on our projections of material balance, the pressure that was reported by Manzano on their DST fell almost exactly where we anticipated it would on our P/Z plot.

Q. What have you concluded to be the remaining gas left to be recovered in the reservoir at the approximate point in time that the Manzano well started to compete for reservoir gas?

A. As of July 4th, which was the date that they

penetrated or DST'd the Wolfcamp, there's roughly 3.2 BCF of gas remaining to be recovered from this reservoir.

Q. In your opinion, what is their share in a percentage of that remaining gas?

A. Their share is roughly 37 percent.

Q. Do you have a recommendation to the Commission concerning how to set a producing allowable on the Manzano well so that it does not gain more than its share of the remaining producible gas?

A. Yes, I do.

Q. And what is that recommendation?

A. I'd recommended that an allowable equal to 33 percent of the well's deliverability in a pipeline be applied to the well.

Q. Let's talk about some of the tests on the Manzano well. Do you have a copy of Marathon Exhibit 1?

A. Yes.

Q. Let's go to the first test. We've got a four-point test that was the initial potential on that well, I believe it was. It's on page 10.

A. Correct.

Q. Okay?

COMMISSIONER WEISS: Give us a minute, will

you, to find Number 1?

MR. KELLAHIN: Sure.

(Off the record)

Q. (By Mr. Kellahin) The results of the test, Mr. Kent?

A. The results of the test were that Manzano calculated that they had an absolute open flow potential just over 2.6 million cubic feet a day.

Q. Okay. Based upon that initial test, then, the Division director provided a temporary producing allowable of 882 MCF a day, I believe it was?

A. That's correct.

Q. Okay. Do you see anything wrong with this test?

A. Yes, the -- As Manzano has testified to, the rates at which the well was produced are not sufficient to lift all the fluids from the wellbore, which caused an excessive back pressure on the formation, making the test not valid.

Also, because of that excessive back pressure, it didn't have sufficient between their data points to get a good test.

Q. Let's go to the next test. That's the one on page 12 that gets an open flow potential of 35 million a day?

A. Correct.

Q. You're with me there?

A. Uh-huh.

Q. All right. Anything wrong with that test?

A. Again, there was not enough spread in the data points to give an accurate test.

If you look at the *New Mexico Back Pressure Testing Manual*, they recommend that the pressure at the lowest rate be no more than 95 percent of the shut-in pressure and that the pressure, the bottomhole flowing pressure at the lowest -- or at the highest rate -- be no more than 75 percent of the shut-in pressure.

All four of their data points fall above 95 percent of the bottomhole shut-in pressure.

Q. Apart from the fact that the four data points are too close together, is there any other difficulty with this well under this pressure and this circumstance in its ability to produce 35 million a day?

A. Well, obviously it's impossible with these reservoir pressures to physically force 35 million cubic feet of gas a day and the associated liquids through 11,000 feet of tubing and get it to the surface.

Q. And based upon filing this test, Manzano

obtained from the Division an adjustment in the temporary producing allowable, and it went up to something like 11 million a day?

A. Correct.

Q. In your opinion, does the Manzano well have the capacity to produce against pipeline pressure at that kind of rate?

A. No, it does not.

Q. Let's look at the next test. I think you've got to go to the tail end of the exhibit. It starts on page 22?

A. Yeah.

Q. What does that test show?

A. What this test shows is the calculated absolute open flow of the well at the surface. So what you're including is the pressure drops not only through the reservoir but through the tubulars as well.

The number that is calculated, the 7.5 million cubic feet a day, would be to atmospheric pressure.

Q. Anything wrong with this test?

A. The test in itself, there's a couple of interesting things.

If you were to look at the wellhead pressures and the rates and compare the wellhead pressures and

rates on the previous four-point tests, these data points all fall above the points that were reported on the original -- or on the second four-point test.

Q. What does that tell you?

A. Well, it leads me to have a little bit of concern about the validity of some of the testing that's been done on this well.

Q. Could you get a higher initial pressure on this test by shutting in the well for a period of time and letting it build up pressure?

A. That's correct, that's right, and that's a techniques that's used sometimes in deliverability testing. You're not -- What you do is, you allow the near wellbore region to charge up, you open the well up, you get a lot higher rates than what you would see at stabilized flow for a given wellhead pressure.

Q. Have you studied the details of the testing requirements under the Examiner Order for establishing an allowable against which this well will produce?

A. Yes, I have.

Q. And what was required by the Division Examiner Order?

A. The Examiner Order said that a deliverability -- that the well should be tested to determine the deliverability against pipeline pressure.

Q. Was that done for this well in this case?

A. No, it was not.

Q. Do you have an opinion as to what you think this well will do against that criteria?

A. The number that I've calculated for the well is not all that different from the AOF number that Manzano has presented.

Q. But we still do not have a test performed in accordance with the requirements of the Division Order for the well?

A. That's correct.

Q. Let's turn now, Mr. Kent, to what is marked as your Exhibit Number 11. Identify and describe that display for us.

A. Exhibit Number 11 is a P/Z plot, a material balance plot, for the Lea Wolfcamp Gas Pool, starting from the time of first production of the Jordan "B" Number 1.

Shown by the solid black squares are the pressure-point data divided by the gas deviation factor.

Shown by the solid diamond shapes are the actual pressure points at the respective cumulative gas production.

And then shown by the solid black line is the

best-fit line through the three data points.

Shown also at the bottom is the same data in tabular form.

Q. Any problems with the data?

A. The only problem that I see is the choice of Z factor that was used. I chose to use the Z factor from the constant composition depletion test that was run on the fluid sample.

Q. As a reference, let me show you a fluid study, and let's see if this is the source. Is this the source document?

A. That's correct. The data that I used is shown on page 11 in tabular form. It is also expressed again on page 16 in graphical form.

MR. KELLAHIN: Mr. Chairman, with your permission we'll mark this as Marathon Exhibit Number 18. It is captioned, as you can see, the "Osudo Reservoir Fluid Study for the Jordan 'B' Number 1 Well".

CHAIRMAN LEMAY: Without objection, it will be Exhibit 18, Marathon Exhibit Number 18.

Q. (By Mr. Kellahin) All right, sir, please continue.

A. One of the pieces of -- or there's actually two parts of the testing that were performed: a

constant composition expansion, as well as a constant volume depletion test.

In a constant composition expansion test, fluid is placed into a cell. They evaluate the amount of liquid vapor in the cell. They withdraw mercury from below the cell, which allows a piston to drop, allowing the volume of the cell to increase and the pressure to drop. This procedure is repeated, and the properties of the fluids are measured.

One of the pieces of data that can be calculated or be measured is the dew point of the sample. As you can see on page 11, we found that the dewpoint of this sample was approximately 5700 pounds. That is substantially higher than the pressure that we saw initially saw in the Jordan "B" 1. It also is substantially higher than the pressure in the Jordan "B" 2.

This caught us off guard, to be honest with you. We actually performed three separate analyses on this fluid over a three- or four-month period, two by Core Laboratories and one by ourselves, and in each case we confirmed that we had a dew point of approximately 5700 pounds.

When we took -- started looking into this in some detail and looking at some of the literature

that's available on PVT analysis, particularly dealing with gas condensate reservoirs, we found that when you perform this type of analysis on a fluid where you actually have free condensate flowing into the wellbore, you artificially inflate the dew point of the fluid sample. That caused some questions in our mind, but it also -- both in terms of PVT analysis, but also in terms of what this reservoir is doing.

What -- The other piece of this PVT analysis, the constant volume expansion, that procedure is done by placing a fluid sample in a similar cell, except this time instead of withdrawing mercury from below it and allowing the piston to drop, expanding the volume, you withdraw gas from the top, fill the cell back up with mercury, allowing the piston to go back to a position where you have the same volume, and you measure similar properties.

What happens in the real world is kind of somewhere in between. What we're seeing is not just production of gas from this reservoir, as would be the case in a constant volume depletion test, but we're also seeing a removal of liquid that is fallen out or -- fallen out of the vapor phase in the reservoir and is being produced as well.

So in reality, the PVT properties of this

fluid fell somewhere in between the two tests that you see here.

One of the things that we had hoped to do with this analysis was to go through and build a composition simulator of this reservoir.

Because of the limitations of having free condensate being produced at such an early point, it was impossible -- we first didn't know how much free condensate was being produced, and so we had no way of going back and correcting that into this analysis to give us any better data. So going forward with some sort of compositional simulation was basically impossible.

Q. With that complexity of the data, based upon your engineering knowledge, what was the solution you selected in order to make the P/Z plot for the well?

A. I actually plotted it both ways.

Q. Okay.

A. And in terms of coming up with a gas-in-place number, it really doesn't make a significant difference.

Q. So the record is clear, on Exhibit 11 what was chosen for your Z factor?

A. I chose the constant composition expansion Z factor to plot.

Q. And based on that methodology, what did you conclude was the original gas in place for the reservoir?

A. The gas in place at the time that the Jordan "B" 1 was first put on production, approximately 6.38 BCF.

Q. What then did you do?

A. The next step I took was to take that gas-in-place number, the pressure of which we -- or we initially found the Jordan "B" 1 to be at, and to calculate the volume of the reservoir.

Q. What was the method to calculate the volume?

A. What I did was use the volumetric equation which is shown on page -- Exhibit 12. I took the gas-in-place number, took results of the PVT analysis, as well as log analysis, re-arranged the volumetric equation to calculate the amount of acre-feet in the reservoir.

Q. And what do you calculate to be the acre-feet in the reservoir?

A. Based on a material balance, using the constant composition expansion Z factor, there's about 6842 acre-feet in the reservoir, and this compares very closely to the 6748 acre-feet which was contained in the geologic mapping.

If I were to have used the constant volume test, the change would have taken place approximately a third of the way down the page where you see the symbol Zi, which stands for the initial gas deviation factor. I've got a number of 0.6759.

Under the constant volume depletion test, that number would have been slightly higher, which would have caused the formation volume factor to be lower, which would result in an increase in acre-feet of roughly 20 percent.

Q. Have you determined with the aid of Marathon's geologist whether that is going to make a material difference in the apportionment of the reservoir, acre-feet of the reservoir between the two spacing units?

A. I spoke with the geologist about this, and it was her opinion that if she had to add additional volume to the reservoir, it would be done proportionately to the shape that's already there, so the ultimate split between the two tracts would not change.

Q. What have you concluded, based upon this analysis, is an appropriate percentage split between the two spacing units?

A. Based on the geologic mapping and the

material balance -- or based on the geologic mapping, it appears that an appropriate split between the two would be allowing the Manzano well to produce 37 percent of the remaining gas, the Marathon well to produce 63 percent of the remaining gas.

Q. Let's turn now to Exhibit Number 13. Would you identify and describe that?

A. Exhibit Number 13 is a copy of the initial deliverability test on the Jordan "B" Number 2. This was filed in 1985 on the initial completion of the well.

The important number to see is located probably three-quarters of the way down the page on the bottom left, where you see the P_c or reservoir pressure of 4698 pounds.

There's also data that was taken by John West Engineering with bottomhole gauges that reports the same numbers, that's attached to this test.

Q. To what purpose have you utilized this information, Mr. Kent?

A. What I looked at was a comparison of the initial pressures of the Jordan "B" 1 and Jordan "B" 2.

As you can see, in 1985 when the "B" 2 was completed we had a reservoir pressure of roughly 4700 pounds. In 1991 when we completed the Jordan "B" 1,

the reservoir pressure had declined to about 3800 pounds.

One of the things that I tried to do, as Manzano had tried to do, is put the two wells, the two pressure points, or the multiple pressure points on the same P/Z plot, and it just doesn't work.

Q. All right. Is there an explanation as to why it doesn't work?

A. My explanation to the problem is that the Jordan "B" Number 2 produced a large amount of water.

Q. How would that have affected the calculation?

A. That would have meant that there was additional volume being removed from the reservoir, causing additional pressure drop that's not accounted for just by plotting up strictly gas, so you'd have an additional pressure drop that you would not be accounting for by using the conventional P/Z plot.

Q. The fact that that pressure point does not fall on a P/Z plot with the other points, does that make a material difference to you in whether or not these two wells are in the same pool?

A. Not really. I think there's some other information that has to be looked at.

Q. Is there information that is more definitive of whether or not these wells are in the same

reservoir, apart from where they might be plotted on a pressure point?

A. I think there's two or three pieces of evidence that you need to look at, one being, looking at the production map that our geologist presented, the only other well, or the only other wells in this area that could have possibly caused any pressure depletion of the reservoir are the wells in the Osudo field to the south.

Q. Okay.

A. Now, what -- the calculation of original or of gas in place that I made was from the point at which the Jordan "B" 1 started producing. And from there also, the calculation of reservoir volume is based on that number.

In order to connect all those wells up, you'd have to have a long, skinny reservoir, that it would be lucky that any of us hit it. But it's highly unlikely that you could join those two reservoirs up.

The next piece of data that I looked at was the drilling reports from the Jordan "B" Number 1, particularly when we drilled through the Wolfcamp.

As you'll recall, when Manzano testified about their drilling progress, they stated that they were losing circulation while drilling through the

Wolfcamp pay and that they were severely overbalanced.

I calculated, based on our mud weight, that our bottomhole pressure while drilling through the Wolfcamp was roughly 5300 to 5400 pounds. If our pressure at that point would have been 3800 pounds, we would have been 1500 pounds overbalanced.

I would have assumed that with 1500 pounds overbalance, the tremendous amount of permeability that we see in this reservoir, that we would have lost a lot of fluid while drilling through this. There was no -- We continued drilling this well down through to the Morrow, and there was no evidence of -- or reading through the drilling reports, there was no indication of lost returns, lost circulation during any of that drilling time.

As Manzano also stated, one of their concerns when they stopped was that they had already seen some skin damage on their well because of the fluid inflow.

Immediately after our completion, we did perform a transient test, and that indicated we had a negative skin. We did acid-stimulate the well, but still we didn't see any evidence of damage from drilling fluids that would have been indicative of drilling through this -- drilling through an underpressured zone.

Q. Based upon this other technical information, then, what is your explanation about the fact that that one point for the Jordan "B" Number 1 well doesn't fall on a P/Z plot?

A. My explanation is that the water production from the well caused additional pressure drop in the reservoir.

Q. Does that item by itself cause you to conclude that the two wells are not in the same reservoir?

A. No, it does not.

Q. Let's go to Exhibit Number 14. Would you identify and describe that?

A. Exhibit Number 14 is a cartoon of the two sections. I should note that the north section is labeled "Section 6"; it should read "Section 11".

In the north section there's a gas well symbol labeled "Marathon Jordan 'B' Number 1". The location of the well is at 660 feet from the south line, 1980 feet from the east line, which is a standard gas well location for 320-acre spacing.

Also shown on there is a box which represents the standard locations for 320-acre gas well spacing.

Q. You have testified in the past before the Division concerning the various options for penalizing

wells at nonstandard locations?

A. Yes, I have.

Q. You've testified on various occasions for encroaching wells in the Indian Basin-Upper Penn Pool?

A. Yes, I have.

Q. All right. You have here a series of displays showing various options under various penalty choices?

A. That's correct.

Q. All right. If we look at what is characterized as the distance encroachment method --

A. Correct.

Q. -- on Exhibit Number 14, describe for us what that is.

A. The distance ratio method is a simple method of applying the penalty where you compare the actual location of a well to the standard location.

In this case, the Manzano Neuhaus 14 Federal Number 2 is located 660 feet from the North line of its proration unit. The standard location would be 1980 feet from the north line of that proration unit.

In order to determine an allowable under this scenario, you take the actual position, divide it by the legal position, and come up with an allowable which in this case is 33 percent.

Q. Turn now to Exhibit Number 15 with me, and look at this penalty option. How would you characterize this one?

A. What I've shown here are two different calculations -- two different ways of making the same calculation. This penalty involves a plot -- or this method of plotting involves an allowable based on reservoir share.

What we're dealing -- normally, what you would do would be to compare, say, productive acreage in a tract to the standard or the normal amount of acres in that tract.

Q. For example, in this case you would be dealing with a 320 spacing unit versus what you've determined to be productive acres?

A. That's correct.

Q. All right. That's sometimes used by the Division Examiner to try to factor in apportionment for an encroaching well?

A. That's correct. In this case, this really isn't a valid assumption, because when you make the first calculation, you have to assume that the spacing unit that's being encroached upon has the full 320 acres that are productive. In this case we don't.

So what this method does, it compares the

productive acres, or reservoir volume, in a particular tract to the tract that's being encroached upon.

Using productive acres, we see that there's 84 productive acres in the east half of Section 14, 134 productive acres in the south half of Section 6. Dividing the two, you'd come up with an allowable of 63 percent.

Using reservoir volume, the same calculation, 2488 acre-feet in the east half of 14, 3953 acre-feet in the south half of 11.

I should mention that where I've got Section 6 in here, that should say 11. That's a typo.

But in either case you come up with an allowable of 63 percent.

Q. Were these and other choices presented to the Division Examiner by which to choose a penalty from?

A. Yes, they were.

Q. What penalty did the Division Examiner select for a method for imposing a penalty on the well?

A. The Examiner chose a method which allowed Manzano to recover the amount of gas that was remaining under its spacing unit, which happened to be 33 percent.

Q. All right. How did he do that? What was the method?

A. The method that he used was to review well recoveries at various penalty levels on the Manzano well that were supplied by me to the Examiner and -- He reviewed those calculations and found one that allowed Manzano and Marathon to recover their respective amount of gas from the pool.

Q. That was pursuant to a directive he made to you during the course of the hearing to provide that to the Division post-hearing as a submittal, and it was also provided to Manzano?

A. That's correct.

Q. All right. Let's look at 16. Exhibit 16 is another penalty calculation. What is this one?

A. Exhibit 16, as you said, is another method of calculating penalties. This one combines the previous two methods, so you account not only for the comparison of the standoff between the legal and actual position of the well, but also the productive acreage or reservoir volume in the respective units.

In each case, using either productive acres or reservoir volume, an allowable of 48 percent was calculated.

Q. Do you have a recommendation to the Commission as to what type of penalty ought to be imposed and how to make the calculation?

A. Yes, I do.

Q. And what is that?

A. I recommend a penalty of 67 percent or an allowable of 33 percent of the well's capacity to deliver to the pipeline be applied.

Q. What's the basis for that?

A. The basis for that is a calculation of well recoveries at various penalty levels for the Manzano well.

Q. Let's look at those recoveries, starting with Exhibit 17.

A. Exhibit 17 is just a -- is a compilation of some of the pertinent facts from the case.

Based on our geologic mapping, the reservoir occupies about 6700 acre-feet with 2488 acre-feet underlying the east half of Section 14, 3950 acre-feet underlying the south half of Section 11.

MR. STOVALL: Excuse me, Mr. Kellahin, I think he's looking at 18.

Q. (By Mr. Kellahin) Yeah, we skipped 17.

A. Oh, I'm sorry, 17.

Q. You're one ahead of me.

A. Exhibit 17 is a table which compares the calculated absolute open flow for the Manzano well, using various penalties on a CAOF to the actual well

deliverability.

As you can see, if the well was allowed to produce at their full AOF, they would have an allowable of 35 million cubic feet a day. But by their own calculation, they have a deliverability of only 7.5 million cubic feet a day.

Q. The point is, you're recommending not applying the penalty against the CAOF?

A. That's correct, because until you get down to an allowable of somewhere less than 20 percent of the CAOF, you're not penalizing the well at all.

Q. The method chosen by the Division Examiner is to penalize the well based upon its deliverability against actual pipeline conditions?

A. That's correct.

Q. All right. If you do that -- Now let's go into 18.

A. Exhibit 18 --

Q. Your recommended analysis for the Commission for a penalty is based upon what?

A. The recommended penalty is based on an analysis of the remaining gas that's in the pool and the relative share of that gas that underlie each spacing unit.

Q. The remaining gas in the reservoir is 3.158?

A. That's correct.

Q. All right. And as you read down the summary sheet, you want to arrive at a penalized allowable that would allow the Manzano well to recover 37 percent of the remaining recoverable gas?

A. That's correct.

Q. All right. Is there a way for you as an engineer to do that?

A. Yes, there is.

Q. Okay, how did you do it?

A. What I did was to take my material balance calculations, take nodal analysis techniques that I use on these wells, put the two together, and construct what amounts to a crude reservoir simulation.

Q. The Jordan "B" 1 and the Manzano well, they're not going to know where this property line is, they don't know how big their spacing units are. All they know is that there's gas to be produced out of that well?

A. That's correct.

Q. All right. And as the two wells compete for the remaining gas, then how have you adjusted the producing rate of the Manzano well so it doesn't get more than its share?

A. What I did was to at various levels of

penalty, percentages, calculate pipeline deliver-abilities on a yearly basis, apply the appropriate penalty level, and then determine the amount of gas that's produced from each well.

Q. What are you using for the deliverability of the Marathon well?

A. The Marathon well deliverability is based on transient testing analysis as well as actual production data.

Q. Let's turn to Exhibit 19 and have you describe that.

A. Exhibit 19 is a table which summarizes the well recoveries at various levels of penalties on the Manzano well.

In the left-hand two columns it's entitled "Neuhaus 14 Federal Number 2 Allowable". The left-hand-most column is percent. That represents the percent of deliverability that the well will be allowed to produce at.

The column entitled "MCFD" is the deliver-ability that I have calculated for the well. In this case, at 100 percent the deliverability would be about 7.2 million cubic feet.

At various -- And shown down the column are the allowables at various reductions of that

deliverability.

Q. If I look over on the spreadsheet and find the column that says "Neuhaus 14 Federal Number 2" --

A. Yes.

Q. -- read down it till I get 1.277 BCF --

A. Yes.

Q. -- that is just slightly over, what you say is there's 37 percent of the remaining gas --

A. That's correct.

Q. -- to be recovered?

And if I read back along that row, then I can find 33 percent?

A. That's correct.

Q. All right. Now, is this at simply one point in time, or is this 30 percent adjusted against some deliverability or producing rate as it goes through the course of its producing life?

A. What I did was adjust the producing level of the Manzano well on a yearly basis.

Q. Let's see how you did that. If you'll turn to Exhibit 20.

A. Exhibit 20 is a spreadsheet which is for an allowable of 33 percent of deliverability on the Manzano well.

In the left-hand-most column there's a --

entitled "Pressure", that represents various reservoir pressures that will be seen through the remaining life of this pool.

What I chose to do was to decline those pressures from known points at even 100-pound increments, to an abandonment pressure of 500 pounds.

As you move to the left, I utilized the Z factors from the PVT analysis to calculate the P/Z factor at each reservoir pressure.

Using the material balance, I calculated the corresponding cumulative gas that would have been produced at that pressure point.

Then I calculated the amount of gas that will be produced between each pressure point. That is shown by the column entitled "Delta Cum Gas".

The next two columns involve nodal analysis of the two wells. These rates were predicted at a flowing tubing pressure of 200 p.s.i. Currently line pressure on the GPM line runs about 100 pounds. We're seeing about 100 pounds of pressure drop through our facilities, giving us a wellhead pressure right now of roughly about 200 pounds.

Based on what I've heard about the setup of the Manzano well, their facilities are similar, and I would expect similar capabilities of producing, as far

as tubing pressure goes.

What I did then is, as I stated, I made a calculation using an in-house nodule analysis program of the producing rates at each reservoir pressure.

I did have to make some small adjustments through the life of the well. And with most gas wells that produce large volumes of liquid, there's going to come a time when they're going to load up and die.

I made the assumption that when that occurred, that inch-and-a-half coiled tubing would be running each well, and that pipeline pressures and facilities would allow that the wellhead pressure would be able to be produced at roughly 100 pounds. I kept -- made those calculations, as I said, to an abandonment pressure of 500 p.s.i.

The next column over which says "Total Rate" is simply the sum of those two rates at a given pressure.

Q. Does your penalty formula have anything to do with the orientation of the spacing unit?

A. No.

Q. Does it have anything to do with where the wells are located?

A. No, it doesn't.

Q. It's simply an allocation of remaining

recoverable gas between the two wells competing for that gas, based upon acre-feet or reservoir share?

A. That's correct.

Q. In your opinion, is this a fair and equitable solution to this issue so that Manzano has an opportunity to recover its share and that they might do so without impacting adversely the correlative rights of Marathon?

A. Yes.

MR. KELLAHIN: That concludes my examination of Mr. Kent. We move the introduction of his Exhibits 11 through 21.

Mr. Chairman, I need to re-identify the fluid study. We have called it 18. There already was an 18. If we may now re-label the fluid study as 21, the transcript will --

CHAIRMAN LEMAY: Let the record reflect that the fluid study will be Exhibit 21 and not 18.

Mr. Carr?

CROSS-EXAMINATION

BY MR. CARR:

Q. Mr. Kent, let's go to Exhibit 11. If I look at Exhibit 11, this is your P/Z plot. and what you did was, started this at the time the "B" 1 actually came on?

A. That's correct.

Q. And so the pressure that you used is 3800 instead of the "B" 2 pressure, which was 4700?

A. That's correct.

Q. You also did not include any production from the "B" 2 well?

A. That's correct.

Q. Did you convert any of the liquids produced from the "B" 2 well and integrate that into this figure?

A. No, I did not. One of the problems is, looking at the production history of the "B" 2, that well IP'd producing some water. Reviewing the production data that was submitted to *Dwight's Energy Data*, there's no water production listed for that well for the first two years.

I didn't feel that was reliable, and I did not make that calculation.

Q. Did you convert liquids produced from the "B" 1 and integrate those figures into this calculation?

A. No, I didn't.

Q. Wouldn't you normally want to do that to have an accurate depiction of the reservoir?

A. What we found is that by plotting the cumulative gas production since the initial production

of the "B" 1, we've been very close to the actual performance of the reservoir.

As I stated earlier, the pressure that was reported by Manzano on their DST falls almost exactly on the line that we had from our initial two pressure points.

Q. Now you're including the "B" 2 in the reservoir; is that correct?

A. For this analysis, no. The pressure is simply the initial pressure on the "B" 1.

Q. So what we're doing is, we're doing a P/Z plot for this pool, we're throwing the "B" 2 out completely and not considering the initial pressure, its cumulative production, or converting any liquids that it might have produced or any liquids that would have been produced by the "B" 1?

A. But the bottom-line calculation is, the reservoir volume is going to be the same. Reservoir volume won't change whether I use the initial pressure or some intermediate pressure, because the line of a P/Z plot is a straight line.

Q. If you didn't convert the liquids from the "B" 1, you would, however, be underestimating the original gas in place, would you not?

A. No, I'd be overestimating, especially

considering water production.

No, I take that back, you're right, you're right. I have to think about that a second.

Q. Is it common for you in doing a P/Z curve to throw out a well because it doesn't match your curve?

A. If I want to calculate reservoir volume, because of the nature of the P/Z plot I can take any intermediate points, calculate the reservoir volume at that pressure.

Q. And so here that's what you've done?

A. That's correct.

Q. You've just thrown the "B" 1 out?

A. "B" 2

Q. "B" 2 out.

All right, we go to your second exhibit. This is your volumetric analysis. If I look at the pressure buildup figure, again you're only starting with the "B" 1, you're discounting the "B" 2, correct?

A. That's correct, because what I'm trying to calculate is reservoir volume, which won't change regardless of which pressure I choose to use.

Q. Now, we go to the Z factor. Here I think you testified you used the constant composition expansion material on -- I think it was your Table 8?

A. Correct.

Q. And I think you testified that that might increase the acre-feet in the reservoir -- one versus the other might affect the acre-feet in the reservoir by 20 percent?

A. That's correct.

Q. And so that's -- Right at that point alone, we might affect acre-feet in this reservoir by that amount; isn't that fair?

A. The total acre-feet, but the distribution between the two tracts would not be affected.

Q. Because that's based -- you're talking about with a volumetric analysis, the amount in the reservoir; isn't that right?

A. That's right.

Q. And when you're saying it wouldn't affect, because of the distribution between the tracts, we're going back to the geological interpretation of where that volume is placed --

A. Correct.

Q. -- isn't that right?

And so we're just stacking on the geological testimony to make that statement?

A. I'm --

Q. When we say it wouldn't affect the two tracts, that's just based on the geological

interpretation. You're not telling us with this where that production is?

A. That's right, this can't tell you --

Q. We have to accept that geological interpretation, then, to allocate between the two tracts?

A. Correct.

Q. When the PVT study was provided to us and others earlier this fall, there were some additional attachments on that. Are you familiar with an SPE paper written by Philip Moses?

A. Yes, I am.

Q. And doesn't he advocate that in fact the constant volume expansion that we have used is a preferable way to go?

A. He mentions that that can be used.

Q. Now, we get into your penalty calculation. And we go through a lot of them, but if I understand it, what we say after we go through Exhibits 14, 15 and 16 and 17, that these aren't the way to go? That's what you said --

A. That's right.

Q. -- isn't that right?

A. That's correct.

Q. Because in fact, what we're doing with each

and every one of these is really ignoring some of the information we have about the pool today --

A. That's --

Q. -- isn't that a fair statement?

A. -- very correct.

Q. Okay. If we get to the recommended approach, what you are doing is stating that we should make an allocation based on acre-feet; is that correct?

A. Correct.

Q. And based on the allocation that you have shown us for the two respective tracts?

A. Correct.

Q. And if that penalty is going to be correct you have to have a correct number for acre-feet; isn't that fair to say?

A. That's right.

Q. And we have to have a correct geological interpretation?

A. That's correct.

Q. And so we have to accept your calculation of acre-feet and accept the geological interpretation for this to be the proper way to go?

A. That's correct.

Q. Now, if I look at Exhibit 19, when we look at this exhibit -- and it says, if I understand this, and

I may not, top line -- 100 percent, the first number in the table, that means unrestricted, does it not?

A. Unrestricted flow at any point in time for the Manzano well.

Q. And if we were at an unrestricted flow, if we go across that column we would get what? 55 percent of the reservoir?

A. Manzano would recover 55 percent of the remaining gas.

Q. Now, if we're right and if we have 80 percent of the reserves, then if we're right Manzano in fact would be drained by Marathon, wouldn't it?

A. You would have to accept the Manzano geologic testimony, which we don't believe to be correct.

Q. But for the purpose of this question and this penalty --

A. But I don't accept the Manzano geologic testimony to be correct.

Q. I understand that. But if you did, there would be drainage the other way?

A. If that were the case.

MR. CARR: Thank you, that's all I have.

CHAIRMAN LEMAY: Thank you, Mr. Carr.

Additional questions? Commissioner Bailey?

COMMISSIONER BAILEY: No questions.

CHAIRMAN LEMAY: Commissioner Weiss?

EXAMINATION

BY COMMISSIONER WEISS:

Q. Yeah, I think I hear there's a difference in the geologic interpretations here, and I'll ask you the question about a constant pressure boundary, establishing that on the lease line as a way to determine the allowables or the penalties or whatever you want to call it.

Now, as I see it, you've got a transient test, so you can get a KH?

A. Uh-huh.

Q. What is that number?

A. KH was roughly -- I'd say it was somewhere on the order of 400 millidarcy-feet.

Q. Okay.

A. We've got thickness of roughly 39 feet, permeability of about 10 to 11 millidarcies, to gas.

Q. Could that be used to -- Could you calibrate your four-point test with that, to get the same number?

A. You should be able to.

The one problem that we have is that this is such a small pool it doesn't take very long to start hitting boundaries.

Q. I understand, but you think you could.

Now, could you use the Manzano four-point test to get their KH?

A. You could. The problem that I've got with their four-point test -- and I'll admit to you that I used it in my analysis, because it's the only data I have to use on their well. You could use it if you thought it was --

Q. Did you get a KH for them?

A. I didn't calculate KH, no.

Q. Well, if that was known and you wanted to establish a constant pressure barrier at the lease line, you could adjust the rates with just the basic flow equation, to -- and then one well would produce this much and the other well would produce this, and the pressure at the lease line would be constant, it would decrease constantly --

A. That's --

Q. -- and everybody would get their own gas, and it wouldn't matter where it's located?

A. That's correct, and what you're looking at is the principle of superposition. The problem in this reservoir is that with these -- with superposition you've got to assume that you've got an infinite reservoir. We've got a very, very finite reservoir.

The methodology that I've tried to use, I'm

not sure creates the constant pressure boundary that makes sure that everybody gets their share.

Q. As I see it, what you suggest is based on geology, where there's a real difference of opinion, and therefore I'm trying to get around that difference of opinion, and that might be a way?

A. But with superposition, as you're suggesting, you've got to take into account those boundaries that exist around the wellbores, because if you don't know where they're at you can't balance the two KHs.

If you've got a large volume behind one of the wells that allows it to drain a large volume, that's on the other side of the boundary, you could actually shift your boundary based on -- your pressure boundary based on where the --

Q. Granted, but we don't know where that is.

A. That's right, and that's where I had to make the assumption, based on our interpretation of the geology, on how to allocate the two.

Q. But we saw another interpretation of the geology that was exactly backwards.

A. Correct.

Q. So my point is, maybe there's an engineering method here that could be used that might be --

A. I don't think there is, because I think you

have to know a lot about the geology to make the engineering calculation.

COMMISSIONER WEISS: All right, thank you. That was my point, my question.

THE WITNESS: Okay.

CHAIRMAN LEMAY: Thank you, Commissioner Weiss.

EXAMINATION

BY CHAIRMAN LEMAY:

Q. Let's see, Mr. Kent, you indicated that the penalty recommendations you made, I assume, would take into account certain characteristics about the Jordan "B" 1, being their deliverability or their producibility or...

How would -- I understand -- Didn't you say you switched out some tubing in that well and --

A. Yes, we did, we -- It's been about a month ago. We originally had 2 3/8 tubing in the well. At that point we were capable of producing about 4 million cubic feet a day.

We replaced that tubing with 3-1/2-inch tubing, and we've been able to increase the rate from our well up to around 5 million cubic feet a day.

That change is reflected in the calculations that I made, and that change was presented to the

Examiner in the supplemental exhibit that I presented to him. I made calculations, both with 2 3/8 in the Marathon well and 3 1/2, and indicated in the cover letter that it was our intention to make that change in the near future. So that information was presented to the Examiner.

Q. Do you know if he took it into consideration?

A. Yes, he did, because the calculation or the penalty that he arrived at matched the numbers that I had for the 3-1/2-inch tubing in the Marathon well.

Q. I guess in the broadest sense my question is, by penalizing one well, is it also depended upon what the other well produces in order to distribute the gas between the two parties?

A. Yes, it is, if you choose the methodology that I've proposed.

Q. But in trying to divide up this reservoir -- I mean basically it looks like you're both fighting for the biggest share of the reservoir you can get, if you want to boil it down to the bottom line here, and you're proposing formulas and geologic interpretations to give you the best competitive position in the reservoir you can get?

A. Correct.

Q. And so one well isn't in isolation; the two

wells, and whatever they're producing is part of the equation to distribute whatever map -- to distribute God's map. Who knows how much is on each side?

A. That's correct. The ultimate recovery of both wells is going to be -- or the recovery of one well will be dependent on the producing rates of the other. That's very correct.

CHAIRMAN LEMAY: I have no further questions.

Does anyone else have any questions of the witness?

COMMISSIONER WEISS: One more.

CHAIRMAN LEMAY: Yes, yes, Commissioner Weiss.

FURTHER EXAMINATION

BY COMMISSIONER WEISS:

Q. This seems similar to some of the others we've heard. I've often thought it would be wise to unitize them.

Do you have a comment concerning that? Unitization?

A. I think we'd be at the same point we are right now.

Q. But it would be your problem?

A. I'm not sure.

COMMISSIONER WEISS: That's my only comment.

Thank you.

CHAIRMAN LEMAY: Any other questions of the witness?

If not, he may be excused.

Thank you, Mr. Kent.

(Off the record)

COMMISSIONER WEISS: Let me just ask from here, do you have somebody that knows the KH of your well?

KENNETH BARBE, JR.: It would be Donnie, if he did.

DONNIE BROWN: No, I haven't calculated.

CHAIRMAN LEMAY: We have a procedure where we're a little informal. In the event after it's all over, if one of us has a question of any of the witnesses, we feel it's in the best interest to be able to ask that question after all the testimony is in the record. That was -- reflects Commissioner Weiss's question of the Manzano witness.

Does that conclude your --

MR. KELLAHIN: Yes, Mr. Chairman.

CHAIRMAN LEMAY: -- presentation?

MR. KELLAHIN: It does.

CHAIRMAN LEMAY: Do you want to -- Does anyone else have anything to offer in this case?

Statements?

Do you want to wrap it up with anything?

MR. CARR: I think we ought to make -- I'd like --

CHAIRMAN LEMAY: Closing statement? Sure. I think we're at that point.

Mr. Kellahin, you have the --

(Off the record)

MR. KELLAHIN: I told you -- what? seven hours ago? six hours ago? -- that this was an interesting case, and it is a very interesting case.

We have given you two of our best experts. The data is difficult. This is a complicated reservoir. There is a substantial difference of agreement about the geology. There is difficulty for the engineers with the calculation. And so what are we to do?

The Commission in the past has done different things. Sometimes you say that there is not enough data to allocate reservoir share, and therefore we're going to penalize the party that's encroaching. That penalty is an acreage encroachment penalty, and we do it as a failsafe, if you will, because that is the rule that Mr. Barbe knew before he put this well where it is, and for Marathon when they put the well where it

is.

Dealing with 320 gas units is very difficult. That rectangle is a nuisance. But we have consistently and uniformly applied the 1980 setback from the end line.

Mr. Barbe and Manzano had some choices. They had a choice when they started that Sims well as a Strawn oil well 660 out of the corner.

In response to your question, they knew they had to come to a hearing. They knew that that well is likely to be penalized if it's going to be a gas well in the Wolfcamp. They knew that. That's a business risk they assumed.

Forget for a moment the corner shot with the Sims well.

Forget for a moment the fact that the Neuhaus well was moved to be as close as they could, 660 from the Marathon well.

Forget the fact that they could have force-pooled the north half of their section and had a laydown north-half and have been standard to the dimension that encroaches upon us now. You can forget all that stuff.

Forget about the temporary allowable, the business about whether they were over the proper

producing authority that the Division provided to them on a daily basis, the fact that they produced 3.5 to 4 times the 882 MCF a day. Forget all that.

What do you do when you don't have enough information? You always have imposed the encroachment distance penalty. Okay?

Sometimes we have data and it's not enough. Sometimes we have the same information, and we come to the opposite ends of the spectrum. Sometimes you say that it is too difficult, too uncertain, too complicated.

What is this? A debris flow or a reef mound or -- ? I don't know what it is. Maybe nobody knows.

Do we want to factor in a penalty with that kind of speculation and uncertainty?

Maybe it's coincidence that being two-thirds too close backs into Mr. Kent's calculation about reservoir share. I think it's a coincidence. But maybe sometimes that's the only way you can do it.

Mr. Carr and I have done this for a lot of years and there's no magic answer to this kind of case, but I think we have both presented to you our best effort on how to allocate that reservoir share, because sometimes we do that, sometimes there's enough information where you can forget the political boundary

or the political spacing unit, and you can allocate reservoir share.

When you see where the pod has been positioned by the two geologists, the difference is substantial. But the reason for the difference hinges upon one control point, and that is whether or not you believe the Jordan "B" 2 is in the same reservoir. If you believe that, we prevail. If you don't believe it, they prevail. It's as simple as that.

The proof is not the complexities of the P/Z curve and how these pressure points line up. The answer is right there. How do you explain the Jordan "B" 1 well coming in at 3800 pounds, when just a few hundred feet north the first Wolfcamp well was 4700 pounds? Where did the 1000 pounds go? It's as simple as that.

You're in a depleted reservoir. The gas went somewhere. You have to geologically connect the Jordan "B" 1, Jordan "B" 2. If you believe that and believe us, then the allocation of reservoir share is appropriate, based upon the methodology of these experts.

Mr. Kent has refined that, and rather than just mechanically factoring in the penalty he has also plotted what will happen over time as the two wells

compete for the remaining recoverable gas, the 3.2. And he has found a way to penalize the Manzano encroaching well such that they get no more than the 1.2 or 1.3.

Anything else becomes a science project. Anything else becomes very difficult to try to establish a no-flow boundary between the two wells.

Mr. Kent is as good a witness as I've had in this topic, and he has got reservations in this reservoir that Commissioner Weiss is suggesting, which is a great suggestion. It doesn't fit, unfortunately, for this pool. It's too bad, because it would have worked real well. That would have been a neat fix. It doesn't work here.

We've had a couple of other examples of various penalties over the years. And at my suggestion, I asked Mr. Kent to provide the formula for you so you can just see, as a point of reference, see what happens.

Our best recommendation to you, when we get through the process, though, is to affirm the Examiner Order.

Mr. Catanach saw basically the same case. It was his judgment that our solution was appropriate. We believe it still is appropriate after six or seven

hours of testimony, and we would ask you to affirm the Examiner Order.

The interesting thing about Mr. Kent's solution is that it satisfies Mr. Carr's argument that the orientation somehow matters, that somehow the wells' being only 660 apart along the boundary matters. His solution is independent of that.

Allocation of reservoir share between the two wells is as a good a solution as we have. We think it's supported by substantial evidence, and we ask that you provide an order that adopts our recommendation.

CHAIRMAN LEMAY: Thank you, Mr. Kellahin.

Mr. Carr?

MR. CARR: May it please the Commission, after a long discussion about how we got here and talking about the Strawn and various other things, what we finally have to present to you is a technical case in which we, both sides, have presented engineering and geological information.

We leave this data to you. I wish it was more clear, because all of us sitting here recognize that although we can, I think, agree that what we have is a case about the Wolfcamp, not the Strawn, we've given you a mixed bag of information about the Wolfcamp.

There are some things, however, that absolutely are true, clear and not subject to dispute. And one of them is, Manzano, if they were to produce their fair share of the reserves under their tract in the Wolfcamp, had to drill 660 from the lease line or at least nonstandard on a standup unit, because a standard location on a standup unit would put them outside the pool. Everyone agrees on that.

And no matter how you cut this, no matter how you count it, no matter who does it, the Manzano well is substantially better than the Jordan "B" Number 2. It just is. It's three times better, and that's a given.

Now, Mr. Kellahin wants to talk about "the encroaching well" and cast the Manzano well as that. It's encroaching under the rules, but we submit to you, in fact, it is not.

We play sort of two games. We talk about wells that drain circles and ovals, and we impose rectangles and squares on the surface over them.

But the fact of the matter is, and it is true, they are as close to us as we are close to them.

And so now we're talking about the shape of the reservoir. And I hope when you retire you take a look at the geological presentations, for I believe if

you look at Marathon's Exhibit Number 6, you're going to see a structure map of the Middle Wolfcamp, and you're going to see a deflection under the Manzano tract. And when you look at that, if this is a debris flow, the thickest part of that debris flow has to be south of the Manzano well.

And you look at the data on Manzano well, and it is thicker than the wells to the north. And yet while it gets thicker and thicker and thicker as you go to the south, they take the same data and they go upstructure and they slide their isopach map, Exhibit 10, to the north to improve the picture for their own property.

The way to get around a lot of this, we submit, is to simply go to a porosity-feet map. And we've presented one; it's our Exhibit 10.

And we think that is the best example you have before you of the configuration of the reservoir, and we do because we think it honors the carbonate buildups in this area that truly do exist. It honors the shape of carbonate buildups. We haven't arbitrarily cut off 15 feet at the bottom of the formation.

We submit that in trying to calculate what's in this reservoir, we've used the better Z factor. And

we think that in fact what we have done is used the correct pressures and the best pressures available to us in running material balance calculations, not just discarding a well because it doesn't seem to fit the -- one of the wells we're using to distort the reservoir, we submit, to the north.

Our engineering data confirms the geology. It says there are two reservoirs, that the reservoir is clearly better under us, and that Manzano has gained no advantage.

But we are confronted -- unfortunately, I guess -- with a political situation where we have east-half and south-half spacing units. If we had a north-half laydown unit, we would be standard, and we wouldn't be here today.

But we've presented the question for you to resolve, and it's a difficult question. And I know that there's a general perception that often lawyers have no business being in these kinds of hearings because we just muck up good testimony, and I think there's probably some truth to that. But there is a role for lawyers, and I think we help at this time because I think it's incumbent on me to point you to the Oil and Gas Act and to the Rules of the Division, because the statutes and these rules tell you how you

carry out your duty, they define your responsibilities.

First of all, you have to know you don't have to penalize a well because it's in an unorthodox location. You know that. Rule 104 is the place where penalties for unorthodox locations are discussed, and that rule says, "Whenever an exception is granted, the Division may take such action as will offset any advantage which the person securing the exception may obtain over the other producers by reason of the unorthodox location."

In a recent case where Yates was seeking an unorthodox location, they were opposed by BHP. This Division found that, yes, Yates, was at an unorthodox location, but they had to drill there or they couldn't produce the remaining reserves under their tract. And they also concluded they had not gained an advantage on BHP, and no penalty was imposed.

So you don't have to impose a penalty. But if you decide to, you first have to decide that we've gained an advantage. I don't know how you do that on this. We submit to you the data we have submitted is sound and shows that in fact no advantage is being gained.

If we are correct, if the recommendation being made by Mr. Kent is adopted and we are -- if you

look at his exhibit, next to the last exhibit -- 100 percent, no restriction, we would get 55 percent of the reservoir.

What if we have 80? If that -- If we are correct, no penalty at all means we still get drained. So it's an extraordinarily difficult case for you.

But we submit to you that the material we have provided, that the geological presentation is the best geological presentation, and we leave it to you to judge that.

And we submit to you that the engineering data presented to you by Manzano is more reliable, because we submit to you when you look at the PVT study that they have submitted to you, the attachments that came with it originally, we used the best Z factor. And that Z factor alone will make a 20-percent difference in the net acre-feet in this reservoir.

Compare ours, 9000, approximately, to whatever theirs were, 6600. The numbers are here. But you'll find just slightly more than a 20-percent difference, and it may go just back to the kind of numbers that are being thrown at you.

We submit to you what we have presented more correctly honors the hard facts that we have on the reservoir, that it isn't an easy decision, but that if

you're to carry out your duties under the Oil and Gas Act, the only thing you can do is approve this location, recognize it isn't an encroaching well, that it's just as close to them as they are to us, and set no penalty on it.

CHAIRMAN LEMAY: Thank you, Mr. Carr. Is there anything else in the case?

If not, we shall take this case under advisement.

Thank you. You're all excused.

(Off the record)

Mr. Kellahin and Mr. Carr, could you submit some draft orders to us?

MR. KELLAHIN: We'll do it.

MR. CARR: I'd be happy to submit a good order.

(Thereupon, these proceedings were concluded at 4:42 p.m.)

* * *

CERTIFICATE OF REPORTER

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

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

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

WITNESS MY HAND AND SEAL October 19th, 1993.

STEVEN T. BRENNER
CCR No. 7

My commission expires: October 14, 1994