STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION COMMISSION

IN THE MATTER OF THE HEARING CALLED BY)
THE OIL CONSERVATION COMMISSION FOR THE)
PURPOSE OF CONSIDERING:)
)
APPLICATION OF SAMSON RESOURCES COMPANY,) CASE NOS. 13,492
KAISER-FRANCIS OIL COMPANY, AND)
MEWBOURNE OIL COMPANY FOR CANCELLATION)
OF TWO DRILLING PERMITS AND APPROVAL OF)
A DRILLING PERMIT, LEA COUNTY,)
NEW MEXICO)
)
APPLICATION OF CHESAPEAKE PERMIAN, L.P.,) and 13,493
FOR COMPULSORY POOLING, LEA COUNTY,)
NEW MEXICO)
) (Consolidated)

REPORTER'S TRANSCRIPT OF PROCEEDINGS

COMMISSION HEARING

2006 DEC 27 PM 2 52

ORIGINAL

BEFORE: MARK E. FESMIRE, CHAIRMAN
JAMI BAILEY, COMMISSIONER
WILLIAM C. OLSON, COMMISSIONER

Volume III - December 15th, 2006

Santa Fe, New Mexico

This matter came on for hearing before the Oil Conservation Commission, MARK E. FESMIRE, Chairman, on August 10th, December 14th, and December 15th, 2006, at the New Mexico Energy, Minerals and Natural Resources Department, 1220 South Saint Francis Drive, Room 102, Santa Fe, New Mexico, Steven T. Brenner, Certified Court Reporter No. 7 for the State of New Mexico.

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C U M U L A T I V E   I N D E X

August 10th, December 14th, and December 15th, 2006
Commission Hearing
CASE NOS. 13,492 and 13,493 (Consolidated)

Volume I: Thursday, August 10th, 2006:

	PAGE
EXHIBITS	3
APPEARANCES	5
OPENING STATEMENTS:	
By Mr. Gallegos	10
By Mr. Kellahin	18
SAMSON/KAISER-FRANCIS/MEWBOURNE WITNESS:	
RITA A. BURESS (Landman)	
Direct Examination by Mr. Gallegos	29
Cross-Examination by Mr. Cooney	38
Direct Examination by Mr. Hall	45
CHESAPEAKE WITNESSES:	
LYNDA F. TOWNSEND (Landman)	
Direct Examination by Mr. DeBrine	56
Cross-Examination by Mr. Gallegos	76
Cross-Examination by Mr. Hall	90
Redirect Examination by Mr. DeBrine	94
Examination by Commissioner Bailey	98

(Continued...)

C U M U L A T I V E I N D E X (Continued)

Volume I: Thursday, August 10th, 2006 (Continued):

CHESAPEAKE WITNESSES (Continued):

MIKE HAZLIP (Landman)

Direct Examination by Mr. Cooney	99
Cross-Examination by Mr. Gallegos	115
Cross-Examination by Mr. Hall	121
Redirect Examination by Mr. Cooney	126
Examination by Commissioner Bailey	127
Further Examination by Mr. Cooney	128

REPORTER'S CERTIFICATE 141

* * *

Volume II: Thursday, December 14th, 2006:

CUMULATIVE INDEX OF EXHIBITS 146

APPEARANCES 150

CHESAPEAKE WITNESSES:

DAVID A. GODSEY (Geologist)

Direct Examination by Mr. Kellahin	155
Cross-Examination by Mr. Olmstead	227
Redirect Examination by Mr. Kellahin	266
Examination by Commissioner Bailey	270
Examination by Commissioner Fesmire	276

JEFF FINNELL (Engineer)

Direct Examination by Mr. Kellahin	283
Cross-Examination by Mr. Olmstead	326
Examination by Commissioner Olson	363
Examination by Commissioner Fesmire	364

(Continued...)

C U M U L A T I V E   I N D E X   (Continued)

Volume II: Thursday, December 14th, 2006 (Continued):

OPENING STATEMENT:
By Mr. Olmstead 378

SAMSON/KAISER-FRANCIS/MEWBOURNE WITNESS:

LYNN S. CHARUK (Geologist)
Direct Examination by Mr. Gallegos 382
Voir Dire Examination by Mr. Kellahin 386
Direct Examination (Resumed) by Mr. Gallegos 387

REPORTER'S CERTIFICATE 409

* * *

Volume III: Friday, December 15th, 2006:

CUMULATIVE INDEX OF EXHIBITS 415

APPEARANCES 423

SAMSON/KAISER-FRANCIS/MEWBOURNE WITNESSES (Continued):

LYNN S. CHARUK (Geologist) (Continued)
Cross-Examination by Mr. Kellahin 426
Redirect Examination by Mr. Gallegos 438
Examination by Commissioner Bailey 439
Examination by Commissioner Olson 441
Examination by Chairman Fesmire 443
Further Examination by Commissioner Olson 450
Further Examination by Mr. Gallegos 451

(Continued...)

C U M U L A T I V E   I N D E X   (Continued)

Volume III: Friday, December 15th, 2006 (Continued):

SAMSON/KAISER-FRANCIS/MEWBOURNE WITNESSES (Continued):

RONALD JOHNSON (Geologist)

Direct Examination by Mr. Olmstead	454
Cross-Examination by Mr. Kellahin	541
Redirect Examination by Mr. Olmstead	569
Examination by Commissioner Bailey	570
Examination by Commissioner Olson	577
Examination by Chairman Fesmire	579
Further Examination by Mr. Olmstead	583

KEN KRAWIETZ (Engineer)

Direct Examination by Mr. Olmstead	585
Cross-Examination by Mr. Kellahin	623
Redirect Examination by Mr. Olmstead	627
Examination by Chairman Fesmire	629

JAMES T. WAKEFIELD (Engineer, Geologist)

Direct Examination by Mr. Hall	639

REPORTER'S CERTIFICATE 686

* * *

CUMULATIVE INDEX OF EXHIBITS

Volume I: Thursday, August 10th, 2006:

Stipulated	Identified	Admitted
Exhibit 1	12, 73	-
Exhibit 2	-	-
Exhibit 3	-	-
Exhibit 4	-	-
Exhibit 5	-	-
Exhibit 6	-	-
Exhibit 7	-	-
Exhibit 8	-	-
Exhibit 9	38, 43	-
Exhibit 10	-	-
Exhibit 11	67	-
Exhibit 12	83	-
Exhibit 13	-	-
Exhibit 14	-	-
Exhibit 15 (not a stipulated exhibit)	111	114

* * *

Samson/Mewbourne	Identified	Admitted
Exhibit 58	31	37
Exhibit 59	33	37
Exhibit 60	34	-

* * *

Kaiser-Francis	Identified	Admitted
Exhibit H-1	122	126

* * *

(Continued...)

CUMULATIVE INDEX OF EXHIBITS (Continued)

Volume I: Thursday, August 10th, 2006 (Continued):

Joint	Identified	Admitted
Exhibit 1	11, 28	-

* * *

Volume II: Thursday, December 14th, 2006:

Chesapeake	Identified	Admitted
Exhibit GEO 1	160	226
Exhibit GEO 2	164	226
Exhibit GEO 3	172	226
Exhibit GEO 4	184	226
Exhibit GEO 5	189	226
Exhibit GEO 6	193	226
Exhibit GEO 7	197	226
Exhibit GEO 8	201	226
Exhibit GEO 9	204	226
Exhibit GEO 10	206	226
Exhibit GEO 11	208	226
Exhibit GEO 12	211	226
Exhibit GEO 13	213	226
Exhibit GEO 14	214	226
Exhibit GEO 15	216	226
Exhibit GEO 16	217	226
Exhibit GEO 17	218	226
Exhibit GEO 18	174	226
Exhibit GEO 19	177	226
Exhibit GEO 20	-	-
Exhibit GEO 21	-	-

(Continued...)

CUMULATIVE INDEX OF EXHIBITS (Continued)

Volume II: Thursday, December 14th, 2006 (Continued):

Chesapeake	Identified	Admitted
Exhibit GEO 22	-	-
Exhibit GEO 23	-	-
Exhibit GEO 24	-	-
Exhibit GEO 25	-	-
Exhibit GEO 26	-	-
Exhibit GEO 27	181	226
Exhibit PE 1	-	324
Exhibit PE 2	288	324
Exhibit PE 3	290	324
Exhibit PE 4	291	324
Exhibit PE 5	292	324
Exhibit PE 6	292	324
Exhibit PE 7	293	324
Exhibit PE 8	294	324
Exhibit PE 9	295	324
Exhibit PE 10	297	324
Exhibit PE 11	297	324
Exhibit PE 12	299	324
Exhibit PE 13	299	324
Exhibit PE 14	300	324
Exhibit PE 15	301	324
Exhibit PE 16	302	324
Exhibit PE 17	302	324
Exhibit PE 18	302	324
Exhibit PE 19	303	324
Exhibit PE 20	-	324
Exhibit PE 21	305	324
Exhibit PE 22	307	324
Exhibit PE 23	309	324
Exhibit PE 24	-	324

(Continued...)

CUMULATIVE INDEX OF EXHIBITS (Continued)

Volume II: Thursday, December 14th, 2006 (Continued):

Chesapeake	Identified	Admitted
Exhibit PE 25	310	324
Exhibit PE 26	313	324
Exhibit PE 27	317	324
Exhibit PE 28	318	324
Exhibit PE 29	318	324
Exhibit PE 30	319	324
Exhibit PE 31	319	324
Exhibit PE 32	319	324
Exhibit PE 33	320	324
Exhibit PE 34	320	324
Exhibit PE 35	321	324
Exhibit PE 36	321	324
Exhibit PE 37	323	324

* * *

Samson/Kaiser-Francis/Mewbourne

	Identified	Admitted
Cross-Examination Exhibit 1	260	262
Cross-Examination Exhibit 2	262	262
Cross-Examination Exhibit 3	350	-
Exhibit 54	387	408
Exhibit 55	392	408
Exhibit 56	397	408
Exhibit 57	394	408

* * *

(Continued...)

CUMULATIVE INDEX OF EXHIBITS (Continued)

Volume III: Friday, December 15th, 2006:

Samson/Kaiser-Francis/Mewbourne

	Identified	Admitted
Exhibit 1	457	540
Exhibit 2	458	540
Exhibit 3	461	540
Exhibit 4	462	540
Exhibit 5	463	540
Exhibit 6	464	540
Exhibit 7	468	540
Exhibit 8	459	540
Exhibit 9	470	540
Exhibit 10	472	540
Exhibit 11	474	540
Exhibit 12	476	540
Exhibit 13	474	540
Exhibit 13A	475	540
Exhibit 14	-	540
Exhibit 15	479	540
Exhibit 15A	485	540
Exhibit 16	488	540
Exhibit 17	491	540
Exhibit 18	494	540
Exhibit 19	498	540
Exhibit 20	498	540
Exhibit 21	500	540
Exhibit 22		(withdrawn)
Exhibit 22A	501	540
Exhibit 23	503	540
Exhibit 24		(withdrawn)

(Continued...)

CUMULATIVE INDEX OF EXHIBITS (Continued)

Volume III: Friday, December 15th, 2006:

Samson/Kaiser-Francis/Mewbourne (Continued)

	Identified	Admitted
Exhibit 24A	506	540
Exhibit 25		(withdrawn)
Exhibit 25A	508	540
Exhibit 26		(withdrawn)
Exhibit 26A	-	540
Exhibit 27		(withdrawn)
Exhibit 27A	510	540
Exhibit 28		(withdrawn)
Exhibit 28A	-	540
Exhibit 29		(withdrawn)
Exhibit 29A	511	540
Exhibit 30		(withdrawn)
Exhibit 30A	-	540
Exhibit 31		(withdrawn)
Exhibit 31A	513	540
Exhibit 32		(withdrawn)
Exhibit 32A	514	540
Exhibit 33		(withdrawn)
Exhibit 33A	515	540
Exhibit 34		(withdrawn)
Exhibit 34A	516	540
Exhibit 34B	518	540
Exhibit 34C	518	540
Exhibit 35		(withdrawn)
Exhibit 36		(withdrawn)
Exhibit 36A	523	540
Exhibit 37	527	540

(Continued...)

CUMULATIVE INDEX OF EXHIBITS (Continued)

Volume III: Friday, December 15th, 2006:

Samson/Kaiser-Francis/Mewbourne (Continued)

	Identified	Admitted
Exhibit 38	528	540
Exhibit 39	531	540
Exhibit 40	533	540
Exhibit 41	536	540
Exhibit 42	-	-
Exhibit 43	-	-
Exhibit 43A	537	540
Exhibit 43B	537	540
Exhibit 43C	537	540
Exhibit 44	596	623
Exhibit 45		(withdrawn)
Exhibit 45A	596	623
Exhibit 46		(withdrawn)
Exhibit 46A	-	623
Exhibit 46B	600	623
Exhibit 46C	600	623
Exhibit 46D	601	623
Exhibit 46E	601	623
Exhibit 46F	602	623
Exhibit 47	602	623
Exhibit 48	608	623
Exhibit 49	611	623
Exhibit 50	-	-
Exhibit 50A	-	-
Exhibit 50B	-	-
Exhibit 50C	617	623
Exhibit 51	-	-

(Continued...)

CUMULATIVE INDEX OF EXHIBITS (Continued)

Volume III: Friday, December 15th, 2006:

Samson/Kaiser-Francis/Mewbourne (Continued)

	Identified	Admitted
Exhibit 52	-	-
Exhibit 53	-	-
Exhibit 57	-	-
Exhibit 61	593	623

* * *

Chesapeake	Identified	Admitted
Rebuttal Exhibit A-1	542	-

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A P P E A R A N C E S

Volume III: Friday, December 15th, 2006:

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(Continued...)

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Volume III: Friday, December 15th, 2006 (Continued):

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Volume III: Friday, December 15th, 2006:

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JEFF FINNELL
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DAVID GODSEY
Chesapeake

MARK M. LAUER
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Samson Resources Company

LEZLYE RICKEY
Samson

* * *

WHEREUPON, the following proceedings were had at 10:00 a.m.:

CHAIRMAN FESMIRE: Let's go back on the record.

This is a continuation of consolidated Causes Number 13,492 and 13,493. Let the record reflect that it's 10:00 a.m. on Friday, December 15th. The members of the Commission present are Commissioners Bailey, Commissioners Olson, and Chairman Fesmire.

Also present are secretary Davidson, counsel Bada, and the court reporter Mr. Steve Brenner.

At this time, if I remember correctly, Mr. Olmstead had just finished his direct examination of Mr. Charuk. We were about to begin the cross-examination; is that correct? Or, I'm sorry, Mr. Gallegos had finished the direct examination of Mr. Charuk. We were about to begin with cross-examination. Is that everyone's understanding of where we stand procedurally?

MR. GALLEGOS: Yes, it is, Mr. Chairman.

MR. KELLAHIN: Yes, sir.

CHAIRMAN FESMIRE: Okay. Mr. Kellahin, I guess it's your witness.

CROSS-EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Charuk, could you turn to your structure map? I think it was introduced as Exhibit 57. Can you get that up on the display for us, or do you have a copy?

A. The hard copy is on its way in, I think, unless someone else has one.

MR. GALLEGOS: Here --

THE WITNESS: Oh, thanks.

MR. GALLEGOS: -- why don't you take my copy.

Q. (By Mr. Kellahin) Let me ask you to take a moment and unfold your hard copy of that display.

A. Okay.

Q. As I understood from your testimony yesterday, this was your Morrow prospect in this area?

A. That's right.

Q. And when I look at the structure map, it is mapped on top of what horizon? What's my marker?

A. Morrow Clastics B.

Q. One of the things I thought I understood from our presentation, that as you look at this exhibit, over on the western two or three rows of sections as we move north and south --

A. Uh-huh.

Q. -- there's a series of wells that had existed at the time that you were putting this together?

A. Yes.

Q. And that your analysis caused you to believe that this channel had an orientation of north-south to it?

A. Yes.

Q. When you look down to the southern portion of the display and see the last two columns on the display, there's wells existed at the time you put this together?

A. Yes.

Q. Is that orientation down there not east and west?

A. That orientation is east and west right there, yes.

Q. Let me turn now to your isopach map. That was Exhibit 54.

A. Okay.

Q. I'm looking at the legend at the bottom of your display, Mr. Charuk. It says middle Morrow. When you identify this as the Osudo sand, are you talking about the entire middle Morrow?

A. No.

Q. Within the middle Morrow there is a subdivision that you've located that you identify as the Osudo?

A. Correct. It's on the montages, on Exhibits 55 and 56, it's highlighted in the darker yellow.

Q. In order to prepare this map, then, how are you making the calculations to come up with your porosity-feet?

A. I used a density cutoff of 6 percent porosity, approximately. Some of these logs are older logs. I also factored in the cleanness of the gamma-ray on the left side of the logs if it was over 50 API units.

Q. So your cutoff was 50?

A. Yes.

Q. On the gamma-ray?

A. Right.

Q. Use the gamma-ray log, and if it was over 50 then you counted that --

A. If it was under 50, it's cleaner that way.

Q. If it's under 50 it's going to be counted. That would be your thickness component?

A. Sure, because some of the logs are very old vintage logs, and you've got to normalize all your logs in an area to kind of be able to get, you know, a consistent porosity cutoff for the entire -- because you're dealing with logs -- all sorts of vintage logs from the 1960s, 1970s, 1980s, and then the modern logs that David had discussed yesterday in his testimony.

Q. As you're interpreting the easternmost-oriented channel that runs north and south --

A. Yes, sir.

Q. -- at the time that you're putting this together, your two principal control wells, the first one was in the north half of 15, that was the WEK well? You had that as a control?

A. WEL well, you mean?

Q. No, the one in the north half of 15.
A. WEK well, yes.
Q. You had that one. And then north of that in 10, in the south half, you have the WE Com 1?
A. Right.
Q. Right.
Q. Those were your two main control points for this channel, right?
A. Well, I have the Julia well, which is also in Section 15. That was drilled by Matador in -- I believe it was 2003. And I had the mud log on that well and also the porosity log, and it's a zero.
And then I also have the C&K Wilson well in Section 9 that offsets the WEL well in Section 9, which was also a zero in the Osudo sand. And in fact, it had no sand at all that was commercial.
So I had several more control points there than what you're saying there, Mr. Kellahin.
Q. The northernmost control point for this channel that runs north-south is in Section 10 --
A. Yes.
Q. -- and it's the WE Com Number 1 well?
A. That's true.
Q. And by your calculation you had 8 feet.
A. Of the Osudo sand.

Q. And this map is only of the Osudo sand?
A. One sand.
Q. As we project north through this channel, at the time that you're putting this map together, there is not another control point for this channel?
A. Until you get to Section 4, in the north -- kind of the northwest quarter of Section 4.
Q. The Jake Hammon well?
A. Yes.
Q. Okay, so that's on the western side?
A. Yes, and it was a zero, similar to the well in Section 32, the Warrior well in the southeast quarter. It was a zero also, as well.
Q. Let me ask you this, then: If those are the two zero lines, how come the zero line on the thickness map for that channel is not farther west?
A. Because I have two channels. I have more control on the west side of those zero lines, so I brought my zero -- I included those in the center channel, as you can see. And also because in Section 32 there's a paleo-high that was tested by BP for Devonian production, and it actually produced in the Devonian, it produced gas.
So my theory was that there was a small high here that was growing during Devonian Mississippian times, and it was probably a bump similar to like a salt-dome kind of

bump you would see on the Gulf Coast, and it was just pronounced enough to cause sand to be diverted around it and on the flanks of it.

Q. Do you think that small paleo-high had a greater influence on sand deposition than the Central Basin Platform off to the east?

A. I don't think the Central Basin Platform has any influence on sand deposition, at least as far as controlling the geologic framework of the Morrow in general along the Central Basin Platform. The geologic framework was controlled by the source and the slope of the Basin at the time, and if there was any sediment that came in on the Cen- -- from the Central Basin Platform, it was minor and it wasn't enough to control depositional processes that were occurring.

Q. Do you have a citation to a literature source that confirms your opinion?

A. Dr. Louis J. Mazzullo, this article right here, Significance of Intraformational Unconformities in the Morrow Formation of the Permian Basin. I can quote it.

Q. That's -- I'm not asking you to quote it. That's what you're relying on?

A. That's one of my articles, yes, because he's who I consider one of the premier experts of Morrow deposition in southeastern New Mexico.

Q. Come back to my question now. When we're looking at the Warrior well in 32 on the western side of this channel that we're running north south, beyond that point, as I follow within the zero line of your channel and go north, where is the next point of control?

A. There aren't any. But I see these other channels going further north, so I continue -- that gives me license to continue this eastern channel further north, based on the other work I did to the west.

Q. Let me ask you this --

A. I know it doesn't just stop there.

Q. Okay, going down to Section 10 again --

A. Yes, sir.

Q. -- and looking at the WE Com Number 1 well --

A. Uh-huh.

Q. -- there was an Apache well drilled north of that, correct?

A. Yes, about a year and a half after this map was generated.

Q. Did that well confirm or refute your interpretation here?

A. It had no sand whatsoever in it.

Q. North of that, then, the CC State well was drilled in the southwest quarter of 3, was it not?

A. Yes.

Q. Did that confirm your map?

A. We encountered -- I have it mapped as having -- would have had 13 to 14 feet of sand in there, because these are four-foot contours on the isopach, and we got 5 to 6 feet of sand in there.

Q. Do you have any disagreement with the conclusion that it was a dry hole?

A. No, it was probably some type of a crevasse splay that broke off from -- through the levee and deposited a little sand, and it was a limited reservoir, and maybe it's 5 acres, maybe it's 15 acres, but definitely we drained the entire reservoir when we produced it.

Q. That well, then, apparently has no connection to any of the other wells to the south that you've mapped?

A. No, probably not, based on the pressure data that we had in that well.

Q. When we look at Section 10 and move over to the west and get Section 9 --

A. Uh-huh.

Q. -- in the northeast quarter of 9 the Osudo 9 was drilled, was it not?

A. Yes.

Q. Did that confirm your map?

A. It confirmed that my map is about a half a mile or a quarter of a mile too far -- my channel axis is about a quarter of a mile too far to the east. Based on post-drilling, I would slide this channel over about a quarter of a mile to the west, that's all I would need to do to alter my map.

Q. And looking up above that in Section 4, in the southwest quarter of Section 4, at the location for the KF State --

A. Yes.

Q. -- Number 4 well, does that confirm your map?

A. That would have been my next location, based on after drilling the CC well. I would have recommended going a little bit further west, because we just missed the channel. The axis of the channel is probably running right along the boundary between 3 and 4, maybe a little further to the west, maybe a little more in Section 4.

Q. North of Section 4, in the next township, you're looking at Section 32?

A. Yes.

Q. There's the northwest quarter of 32 that you either purchased or leased?

A. Yes.

Q. I'm sorry, the northeast?

A. Northeast, that's correct.

Q. Was that a lease or a purchase?

A. That was a term assignment.

Q. Did you have the term assignment at the time that you were putting together this prospect?

A. Yes.

Q. Do you see any Morrow -- Osudo-Morrow sand within the northeast quarter of Section 32?

A. Not at the time this map was drawn, but since the -- with the new drilling that we have, the new information, I do now. I see the east half of 32 as being highly prospective.

Q. When we come back down to Section 10 and 15, the first two control wells --

A. Yes.

Q. -- in the north half of 15 you have the WEK well, and then north of that is the WE Com Number 1 well.

A. Uh-huh.

Q. Yesterday did you not tell me that you thought there was a break between those two wells?

A. I thought there was a permeability barrier. I think that the WEK well -- if you look on my stratigraphic -- or my structural montages, the WEK well has -- that's not the right one, Lezlye, the next one -- the WEK well has two sands. Both of them were perforated and completed simultaneously. Right here, this big fat one, and then right above it there is a smaller one.

And I have the mud log on that well, and both of them had drilling breaks and both of them had slight gas shows. But what I contend is, the lower, thicker sand is where the 6 1/2 BCF of gas came out of. The upper sand is smaller and did not contribute as much production to the WEK well, but it is the exact same stratigraphic equivalent in the WEL well. But the WEL well has been -- was a tight well. It had much less permeability than the WEK, and that is obvious from when they frac'd it, because it doubled its EUR after the frac.

Q. So despite the fact that it appears that those two wells are not in communication with each other because of this permeability restriction, you would draw them in the same reservoir?

A. Yes, because if you look at the engineering studies that we've discussed yesterday, the WEK well had an initial bottomhole pressure of approximately 7300 pounds, the WEL well had a bottomhole pressure of -- I'm just relying on my memory here -- maybe 500 pounds less than that after -- and it was drilled after the WEK well. I still think they're in communication.

MR. KELLAHIN: Thank you, Mr. Chairman.

CHAIRMAN FESMIRE: Mr. Hall, do you have any questions of this witness?

MR. HALL: No, sir.

CHAIRMAN FESMIRE: Commissioner Bailey? I'm sorry, Mr. Gallegos, would you like a chance to cross-examine your witness on --

MR. GALLEGOS: Redirect?

CHAIRMAN FESMIRE: Redirect, I'm sorry. "Cross-examine your witness..."

MR. GALLEGOS: I just wanted to clarify one thing so that the record is clear.

REDIRECT EXAMINATION

BY MR. GALLEGOS:

Q. You referred to a small high here, and for the record -- "here" doesn't tell us anything. Can you be specific as to Exhibit 54, where you're locating your high?

A. Yeah, if you go to the structure map, Lezlye, the last -- Yeah. I have the high in the northwest quarter of Section 32, 20-36, and I have a little bit more of a structural high right there in the northeast of Section 5, 21-35. And that information was based on some proprietary data that I had acquired through some old ARCO maps that had some 2-D seismic back in the 1960s, and they had a couple seismic lines and had an interpretation of a Devonian feature right in here.

And in fact, some of these wells were completed in the Devonian for some gas. And that is how this whole Morrow field was discovered, by drilling for a Devonian feature. They actually encountered the Morrow in that first well right there.

Q. Do you believe that high has an influence on the depositional pattern?

A. I think a lot of the paleo-highs that are productive in southeastern New Mexico were still active and still growing during early Pennsylvanian and, in some cases, into the early part of the Wolfcamp.

And when those features are growing -- what you do is, you can do an isopach across the top of that thing, and you'll see a thinning of all the sediments above it.

And yes, I believe that that feature had enough topography to influence sand sedimentations coming down from the north and bifurcating around it on both sides.

MR. GALLEGOS: Thank you, Mr. Chairman, that's my questions on redirect.

CHAIRMAN FESMIRE: Thank you.

Commissioner Bailey?

EXAMINATION

BY COMMISSIONER BAILEY:

Q. Do you have any seismic basis for the faults that you're showing on this exhibit?

A. Yes, there were some -- Well, I don't have it with me, because it was proprietary at ARCO. But they're based on their Devonian mapping. And also, if you look at this area right here, Commissioner, on my structure map, you'll see vertical throw where this is the downthrown side and this is the upthrown side.

But again, these faults weren't present during Morrow -- They were just minor during Morrow. These were post-depositional faults that occurred after Morrow deposition, because obviously you've got production on both the low side and the upthrown side. So there wasn't any influence as far as faulting influencing the channel. These occurred post-depositionally.

Q. You mentioned that the small reservoir in Section 3 was possibly crevasse splay that broke off. From what direction?

A. From the west to the east, because it doesn't go very far to the east, any further.

Q. I'll run you through the same questions that I asked -- The sub-rounded to sub-angular grains that were recorded in the sandstones in the KF State 4 --

A. Yes.

Q. -- would you comment on the transportation, the transport of those grains and the development of those sands?

A. Well, I've seen some -- typically, the entire Morrow section in southeastern New Mexico is described as sub-angular to sub-round, fine, medium, coarse grains. I don't see any difference in Morrow samples in this area than I have in western Lea or northern Eddy or Chaves County. They're very similar.

I mean, it depends on the type of sandbody that you encounter, whether or not you get the coarse or the fine grains. If you get a stream mouth bar channel that coarsens upwards, you'll find coarse grains on top and fining downwards. If you get a point bar system, it's just the opposite. You'll find the fine grains on the top and the coarser grains on the bottom. If you encounter a true channel deposit, you'll find -- you could find all three of them in there, and coarse grains distributed throughout the entire sand from bottom to top.

I haven't seen any difference in lithology in the Morrow.

COMMISSIONER BAILEY: That's all I have.

CHAIRMAN FESMIRE: Commissioner Olson?

COMMISSIONER OLSON: Just a couple questions.

EXAMINATION

BY COMMISSIONER OLSON:

Q. I guess, from looking at the isopach maps that Chesapeake has and then your isopach map, there seems to be at least some correlation between the western sides, because in Chesapeake's they do show some north-south linear features once they get over to the west, so the main point is just in the eastern portion up here against the

Central Basin Platform.

I guess if the source -- I think somewhere in the testimony, we're having the source of a lot of these sands that you are saying is the Pedernal, which is up to the northwest, why are more of the channels you're seeing here oriented north-south, even to actually having a northeasterly trend?

A. Well, I also said that source is also due north at the Matador Arch, and that is another main source of deposition. Up there on the Matador Arch you have granite sitting on top of Wolfcamp up there, so that was a viable source of granitic sandstone that was deposited as well from the north.

And the other thing that would trouble me about the other model that we're talking about is, why, if the Mississippian is described as being a source rock for this area, why aren't there more Morrow plays going on all along the western side of the Central Basin Platform? I mean, I find it hard to believe that the Mississippi that covered the entire Platform and all the sediment was shed from the Mississippian into this one spot and had east-west channels, well, we should see east-west channels for the next 30 or 40 miles to the south, all along this trend, and that's not the case. We don't see anything like that.

So that's kind of a preferred, you know, depositional direction. Why right here, you know? Why not everywhere? It was a widespread deposit, and the Mississippian covered the entire Basin. Why aren't we seeing that?

Q. Well, I guess the other thing is that even in your isopachs here you seem to be showing them terminating at points along this -- into the Central Basin upwards, instead of them coming parallel or sub-parallel to it.

A. Yeah, I don't necessarily know if the Central Basin Platform right in this area is like a straight line. I feel like there's actually some additional Morrow potential underneath this area going north.

And I terminated them there because, you know, when you start going further north, you just don't see any Morrow at all, no Morrow deposition. So it was a good -- without the well control, it felt like a good place to stop mapping.

COMMISSIONER OLSON: Okay, I think that's all the questions I have.

EXAMINATION

BY CHAIRMAN FESMIRE:

Q. Mr. Charuk, I think Commissioner Bailey and I have the same concerns. Are you telling us that these channel sands that you have mapped to the west are -- if we were to pick up the mud log, the mud log would say that they're sub-angular to sub-rounded, and it's -- Could you answer for the record?

A. Yes, sir. Yes, I am.

Q. Okay. So the Matador Arch is about 150 miles to the northeast up there?

A. Yes, it's north northeast, uh-huh.

Q. And the Pedernales are 120-plus --

A. Yes.

Q. -- miles to the northwest?

A. Yes.

Q. And you've got 100 miles of transportation of a granitic sandstone --

A. Uh-huh.

Q. -- and it still comes out -- the lithology is still sub-angular to angular to sub-rounded?

A. That's what I've seen, and I've run a lot of Morrow samples, and the rocks don't lie. I mean, I would think if we were really that close to the source -- an easterly source, we would see more arkosic-type deposits with more feldspars and more of those type of clays that you see in an arkose. And I don't think that there's any evidence in any of the petrophysical studies that ever describe the Morrow as arkosic. Every Morrow description I've seen on a core or thin section has always been a low-ranked type of graywacke sandstone that did not include a lot of arkosic type of K feldspars in the matrix.

Q. Would that be true if the source were the cherts off the Central Basin Platform?

A. You know, there's four major sedimentary rock types: There's carbonate limestones, there's dolomite carbonates, there's shales and there's sands. Once you get below that, everything else is trace amounts, as far as what covers the entire planet with sedimentary rocks. And I think cherts are maybe composed of, maybe at the most, of five-percent of the rocks deposited on the whole planet.

So to me, you know, the chert is a stretch to talk about it as a source for sand. And if you've ever seen chert under a microscope out on the rig, it's totally different appearance than a sand grain. I mean, it looks like a broken beer bottle. It has concave edges that are really bent around, very sharp edges, whereas a sand grain --

Q. Sort of sub-angular?

A. No, it looks more like a piece of -- a shard of broken glass than it does look like a grain. It's amorphous, it doesn't have a crystalline structure. And it also has H_2O in it, so it has small inclusions in it that you can see very clearly.

A sand grain looks just like a sand grain. I mean, it's roughed up, it looks like it's been sandpapered all around, and it has rounded edges, it has semi-angular edges.

But when you look at a piece of quartz, it's sharp edges. I mean, it looks like it would -- I mean, if it was a bigger piece, you could probably cut your hand on it. And that's a totally different lithologic appearance to me, and it's very distinctive under a microscope.

Q. Well, why then, if this material has been transported so far, why is it not more rounded, more fine-grained?

A. Well, the only thing that I see really rounded and fine-grained would be a beach deposit where it was worked for millions of years up and down by wave action.

Streams typically always, you know, produce sub-angular to sub-rounded grains. They're just -- That's as far as they ever get worn down. There could be exceptions where you'll see an occasional well-rounded grain. Like in the Yates formation, a lot of times I'll see big Yates grains that are perfectly round, look like little basketballs, you know. And we know that the Yates deposit was in an aeolian environment which was like sand dunes, near-shore shoreline currents worked those sands for many, many millions of years.

Stream deposits typically travel, you know, 100 to 150 miles in a in a slow-moving kind of environment like

-- picture the Mississippi River bringing currents down through Louisiana and depositing them all along the banks as you went. Or the Rio Grande River, it comes pretty far, and I'm pretty sure that the grains you would look at if you pulled some out of the Rio Grande River would look very similar to these.

Q. Okay. Are some of the grains that we see here well rounded, or are they all --

A. Occasionally you could see some coarser, well-rounded grains, some higher energy that had some well-rounded grains. But I think a lot of the petrophysical studies and some of the work that we'll be presenting later will describe the grains pretty thoroughly.

Q. Okay. And Chesapeake's theory that, you know, this is a mixed, multi-source area -- I guess I'm still interested in the fact that, you know, it seems like the lithology would support that idea.

A. Well, it could be mixed, but it wasn't -- it didn't have any influence on the depositional framework of the overall Morrow formation. It might have input some sediments some minor amounts, but there wasn't enough depositional influence to actually have channels running from east-west, in my opinion.

I mean, it may -- I mean, sure, some sediment shed off of the Central Basin Platform, but it just fell into this system, is my interpretation.

Q. Okay. It seems to me a lot has been made between the -- in the arguments before us today, or yesterday, of the idea that there's a difference between sediments and sands, the sediments that were coming off the Central Basin Platform. I don't follow that argument. Would you explain that to me?

A. Well, they talk about clastic sources of sands. It's more of a sand grain regime where there's more, you know, sand and less silt-size particles. It's describing a particle size.

Sediments could mean a lot of different things. It could mean silt, it could mean shale, it could mean re-worked chert, it could mean dolomites being re-worked or re-dissolved and transported by -- you know, through solution.

But clastic implies more of a sand-grain-type of environment where there's more sand-size particles of that nature coming in as a source.

Q. Okay. And lastly, the CC 3 well, the --

A. Yes.

Q. -- what I would call balloon-reservoir well, you know, the flash in the pan --

A. Yes.

Q. -- it seems to me that that does a lot of damage to your theory in that the wells -- you know, if the channels were running north-south, it ought to be in connection with the wells to the south. Explain again your theory, why that didn't happen.

A. Well, I see it just the opposite. I see that -- the fact that we just nicked the edge of the eastern side of the channel and then drilled to the west, and we got more into the channel's axis, we've got a good well.

And when I look at this I look at -- Go back to the other -- oh, here we are. If you want to go back here, you know, I looked at this and I thought about this. The WEK well here, which is a 6.5 BCF well. Okay? This Julia well has no sand at all. Okay? So going in an easterly, northeasterly type of direction, you go to zero. Okay?

Right over here, Devon drilled -- While we were trying to sell this original prospect, Devon drilled the Osudo Number 2, and it has zero Osudo sand in it. It's producing out of a small stray sand above the Osudo. It was only five feet thick, very similar to the thickness in the CC wel, but it's probably going to EUR maybe 2 million MCF -- or BCF, excuse me. But as far as how it fit on my map, it was a zero.

And right over here you've got the C&K well, which is also a zero. And, you know, I really think that between after we drilled this well and we drilled -- with the C&K well here, and then the information we gained from the CC well, that Mewbourne jumped right in there, and they felt the axis was running right here. I mean, we have a pretty nice amount of well control in this, you know, six-section area, and it's really, to me, a no-brainer to nail down a north-south axis running through here.

And similarly, that's why Mewbourne is going to drill that location starting next week, that we sold to them last month.

I mean, you know, I don't see the east-west connection here.

CHAIRMAN FESMIRE: Mr. Gallegos, any redirect on those matters?

COMMISSIONER OLSON: Well --

CHAIRMAN FESMIRE: Oh, I'm sorry, Commissioner Olson?

FURTHER EXAMINATION

BY COMMISSIONER OLSON:

Q. Well, just something I was thinking about. I seem to recall Mr. Godsey's testimony talking about transgressing and regressing seas coming across this during deposition.

A. Yeah, uh-huh.

Q. And how do you factor that in with the channels that you're showing here?

A. Well, if that was a true -- if that really happened, and if the channels were running from the east to the west like that is saying, and the shoreline is paralleling this Central Basin Platform edge and it's running north-south, you would see point bars right there where the sand was coming down through the channel, being deposited on the edge of the shoreline and then being re-worked in a north-south direction.

COMMISSIONER OLSON: Okay, thanks.

THE WITNESS: You bet.

CHAIRMAN FESMIRE: Mr. Gallegos --

MR. GALLEGOS: Well --

CHAIRMAN FESMIRE: -- anything on those matters?

MR. GALLEGOS: -- just curious about something.

FURTHER EXAMINATION

BY MR. GALLEGOS:

Q. You've got the Central Basin Platform with the Delaware Basin on the west and the Midland Basin on the east. Is that --

A. Yes --

Q. -- correct?

A. -- true.

Q. And you've got this idea that the erosion off of the Central Basin Platform -- Have you worked the Midland Basin some?

A. Some, I'm familiar with it. I live in Midland, so --

Q. Okay. Well, we've got this idea that the Morrow sands are the result of being eroded off the Central Basin Platform. I'm just wondering, when you get on the east side, then, over in the Midland Basin, what's the situation as far as Morrow sands?

A. It was non-deposited. There's no Morrow section in the Midland Basin. You actually have -- you have Atoka, which is slightly younger than the Morrow. It is the first Pennsylvanian you have. And there wasn't any -- ever any sand, there is no sand production, there is no sand deposition in the Midland Basin on the eastern side of the Central Basin Platform. There isn't any.

MR. GALLEGOS: Okay.

CHAIRMAN FESMIRE: Anything else?

MR. GALLEGOS: No, thank you, Mr. Chairman.

CHAIRMAN FESMIRE: Mr. Charuk, I appreciate it.

THE WITNESS: Thank you.

CHAIRMAN FESMIRE: May this witness be dismissed?

MR. KELLAHIN: (Nods)

MR. GALLEGOS: And we move -- if we did not before, we move the -- I think these were admitted, were they not?

CHAIRMAN FESMIRE: 54 through 57 have been admitted.

MR. GALLEGOS: I think at the beginning of the direct. Thank you.

CHAIRMAN FESMIRE: Mr. Gallegos, your next witness, please?

MR. OLMSTEAD: Samson calls Mr. Ron Johnson to the stand.

CHAIRMAN FESMIRE: Mr. Johnson?

MR. OLMSTEAD: And while he's getting set up, Mr. Chairman, with Mr. Kellahin's permission I'd like to hand out just a guide to Mr. Johnson's presentation. The exhibits in total have already been submitted for the record, but these are just -- He's just going to hit the highlights and then go on and --

CHAIRMAN FESMIRE: Again, there's nothing new that hasn't been --

MR. OLMSTEAD: Nothing new.

CHAIRMAN FESMIRE: Okay. Mr. Kellahin, do you have an objection to that?

MR. KELLAHIN: No objection.

CHAIRMAN FESMIRE: Mr. Johnson, you've been previously sworn?

MR. JOHNSON: Sir?

CHAIRMAN FESMIRE: For the record, have you been previously sworn?

MR. JOHNSON: Yes, I have.

RONALD JOHNSON,

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

DIRECT EXAMINATION

BY MR. OLMSTEAD:

Q. Good morning, Mr. Johnson.

A. Good morning.

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

A. Ronald Johnson, I'm a petroleum geologist for Samson.

Q. And where do you reside, Mr. Johnson?

A. Midland, Texas.

Q. And when and where did you obtain your geologic degrees?

A. I received my bachelor of science degree in geology from the University of Texas at Arlington in 1971. I also received a master in science degree in geology from UT Arlington in 1974.

Q. And are you a certified professional geologist?

A. I am.

Q. And how many years have you worked in the industry?

A. Over 30 years.

Q. And would you briefly describe your professional experience?

A. Well, I started out 1971 working at a small podunk town in west Texas for Sun Oil Company, Colorado City. They had me out there working and provided me with some work there for a while, make enough money to complete my studies for my master's.

I went to work for them in 1974 in east Texas, transferred back to their original production office in Dallas and worked the Midland Basin, transferred over to the exploration division and worked northwest Colorado and the Delaware Basin.

I moved to Midland in 1976 with Texas Oil and Gas, and I've worked for several companies in Midland since then. I've resided in Midland since 1976.

I have been everything from a lowly consultant, independent, to a district exploration manager for the companies there, and I have worked everything from the Eastern Shelf, Stephens County, and on the Bend Arch area on the Eastern Shelf, all the way to, on the west side, Culberson County, igneous seals there. I've worked everything from the Peterson Field and Roosevelt County in New Mexico, down through the Valverde Basin in southern west Texas. So varied experience through the area out here.

Q. And so how long have you worked the southeastern New Mexico area?

A. On and off for approximately 30 years.

Q. And were the exhibits that we're about to see prepared by you?

A. Yes, they were.

Q. And based upon these exhibits and your steady involvement in this area, do you have certain geologic opinions with regard to the orientation in the spacing unit in Section 4?

A. I do.

Q. And have you previously testified before the Oil Conservation Division, and were your qualifications as an expert petroleum geologist accepted at that time?

A. I was, yes.

MR. OLMSTEAD: We tender Mr. Johnson as an expert petroleum geologist.

MR. KELLAHIN: No objection.

CHAIRMAN FESMIRE: Seeing no objection, he'll be so accepted.

Q. (By Mr. Olmstead) Mr. Johnson, do you have just a short introduction, overview-type, to show what you're going to -- about the exhibits you're going to present?

A. Yes, I do. Actually, I have two parts here. The first part will deal with the source for the Morrow sands, and the second part will deal more with deposition and sandbody geometry.

The first part here, what I'd like to impress upon the panel here is that the middle Morrow B sands in the Osudo area are quartz sands, that the quartz sands are derived from a granitic source. In order for deposition to be in an east-west manner, there must have been an exposed granite source on the Central Basin Platform in close approximation to the Osudo field during middle Morrow time, that there was no exposed granite on the Central Basin Platform during middle Morrow time to source the Morrow B quartz sands, and that the sediment source was to the north with sediments transported to the south and north-south-trending fluvial channels.

And again, let me reiterate, in order for deposition to have been in an east-west manner, there must have been an exposed granite source on the Central Basin Platform in close approximation to the Osudo field during middle Morrow time.

The first article I'd like to reference here is the 1967 publication by the Roswell Geological Society --

Q. And this is Exhibit 1?

A. This is Exhibit 1. And on page -- well, I can't read it -- 143, I believe, they state that the lithologic description -- and this is from the field study again -- of the sandstone is coarse, angular, poorly sorted, orthoquartzite. And again, that orthoquartzite means it's a quartz sand.

From the article, "Play Analysis and Digital Portfolio of Major Oil Reservoirs in the Permian Basin", this is a combined study -- let's go back, please -- this is combined studies by both the state -- New Mexico State and the Texas State Bureaus of Geology, the New Mexico Bureau of Geology and Mineral Resources, and the Bureau of Economic Geology in Texas.

From this article you can see that -- their stratigraphic column that they have here. We've highlighted the Pennsylvanian in yellow.

Q. And is this on Exhibit 2?

A. Yes. The Pennsylvanian system is approximately -- or the duration of the Pennsylvanian system is approximately 20 million years, from 323 million years before present to the end around 302 million years before present. And the system is divided into five series, the Morrowan being the oldest, Atoka next, the Des Moines or the Strawn, Missourian, Canyon, and the Virgilian as the Cisco.

So if you divide this up into that 20 million, plus or minus, years, into those five series, you come up with approximately 4 million years or so per time period there for those, which would mean the Morrowan would be approximately 4 or 5 million years in duration.

And we're talking about the middle Morrow, so you're only looking at something that's a million and a half to maybe 2 million years in duration. So you're looking at this very small piece of the middle Morrow here in geologic time. So everything that we're talking about has to have happened in that particular point in time. And so I'd like to point out that we are approximately -- here on this map, we are right here in position pretty close to the Central Basin Platform.

Q. And you're referring to Exhibit 8?

A. Yes, the producing zone map that we talked about. And again, you'll notice -- easier for me to get up here and point, I think. We're approximately right here on the edge of the Central Basin Platform. Here is the Pedernal land mass to the northwest that we've talked about. Here is the Matador Arch on the very north end of Lea County, New Mexico.

I think -- and we're approximately the south one-third of Lea County, so you are approximately 70, 75 miles south of the Matador Arch, which Mr. Charuk mentioned could possibly be a source for these -- for the granite source for these quartz sands in there. And you are also -- I think the Pedernal kind of ramps around to the north and west. So you are fairly close to this.

And like I say, you have to have a granite source exposed at this particular point in time, this 2 million years, to source the quartz for these middle Morrow B sands.

Q. Well now, Mr. Johnson, what about the possibility of chert as a source of Morrow sand?

A. Up until yesterday I have never heard that referenced before about any of the Morrow sands out here at all. And I've gone through quite a bit of literature. I think you've seen some of it that I've gone through. I don't think you see in the literature anywhere that they mention anything about a chert source for Morrow sands.

Q. Now --

A. As Mr. Charuk described there, it's -- you can readily pick it out of the samples. It is like a broken beer bottle, it's very angular, whereas the quartz grains tend to be -- when you first erode them, yes, they're going to be fairly angular, but as you transport them they will be more rounded in through there, whereas the quartz -- always pretty sharp, pretty angular.

As a matter of fact, when you drill through any of the formations that has chert in them, it will eat a bit up. So that's how tough it is, and you will readily know that.

Q. What about mud log descriptions for various wells throughout the Morrow? Have you ever seen chert described?

A. Trace, traces of chert.

And we also reference the Core Lab study that was done in 2004, and in that they described or looked at almost 3000 foot of core, Morrow sand, and out of that the maximum percentage in any of those samples was 3.6 percent chert. Average was a little over 1 percent.

So chert is just a trace element in the Morrow sands.

Next.

This is the type log that we're going to be using here and talking about.

Q. Is this Exhibit Number 3?

A. Exhibit Number 3. There we go. The Morrow or the Pennsylvanian, like I said, is divided up into five series, and the lowermost is the Morrow. The Morrow overlies unconformably the Mississippian Barnett shale here at the bottom in the Osudo area.

By the way, this type log comes from an article by April Denise Coker. She was a student at UTPB, University of Texas Permian Basin, and did -- we'll get to it here in a minute, but did a field study on the Osudo field. So this is taken from her article.

And the lowermost Morrow here is Morrow A. It's the oldest. It is overlain by the middle Morrow B -- these are fluvial-deltaic clastics, some marine bay and marsh sediments here -- and then overlain by the youngest Morrow is Morrow C, which is a -- more or less a marine lime and shale deposition.

So we are talking about the middle Morrow B -- and again, only a time span of a million and a half to maybe 2 million years.

This Exhibit Number 4 is the 1999 supplement, Pennsylvanian Gas Fields. It was published by the Roswell Geological Society, and it's a symposium on the oil and gas fields of southeastern New Mexico. In this study, Robert Casavant and Kenneth -- well, I can't read it -- Mallet [*sic*] state in here that the detailed petrographic analysis of well cuttings from cores from our sandstone, southeast New Mexico, reveal that the sands are composed of 50 to 95-percent white monocrystalline quartz.

Now it doesn't say anything in there -- Now it's been several years since I've had mineral -- or mineralogy, but if I remember correctly, quartz is silica dioxide, SiO_2. And quartz -- or the quartz is SiO_2 -- and the chert, you add a molecule of water. I think it's OH, is the way the symbol, the chemical formula, would be. But you have water in the lattice there, and like Mr. Charuk said before, I believe it's amorphous. It does not have a good crystalline structure or a crystalline structure there. So you see here, he makes the distinction that this is monocrystalline quartz.

That they are poorly to well sorted, subangular to subrounded and fine to coarse. And again, you'll see this actual description of the sands all through the literature as being poorly to well sorted, subangular to subrounded and fine to coarse.

They also state that the petrographic analysis reveals that the parent rocks were granites and granite gneisses.

Q. Is this also on page 86 of Exhibit 4?

A. Yes.

The Pedernal Uplift to the north and west of Osudo is the source for the quartz sands in the Delaware Basin, and again that includes the Matador Arch as part of the Pedernal Highlands to the north and to the west.

From the West Texas Geological Society Fall Symposium publication in 2003 --

Q. Is this Exhibit 5?

A. -- Exhibit 5, here is the article discussed before. This is page 327. April Denise Coker -- again, she was a student at the University of Texas Permian Basin, and she did a paper here entitled Depositional Environments of the Morrow Formation in the Osudo Field, Lea County, New

Mexico. And in this article she states on page 328 that the Pedernal Uplift to the northwest provided the sediment filling for the Delaware Basin and the Northwest Shelf.

On Exhibit Number 6, the Future Petroleum Provinces in New Mexico - discovering new reserves, this was a 1989 article. This was a 1989 publication for the Future Petroleum Provinces in New Mexico. They state that a broad east-west uplift occurred across central and parts of northern New Mexico in late Mississippian-early Permian time. This resulted in the removal mostly of Mississippian strata that had overlapped the Devonian. Again, you had Barnett shale and lower Mississippian limestone.

Q. And this is page 70 of Exhibit 6?

A. Yes, 70. And it said, This uplift may have extended somewhat farther south between Roswell and Carrizozo. South of this line it appears that a fairly complete section of Pennsylvanian was deposited. And to the north on the early uplifts successively younger rocks of Pennsylvanian age overlap onto the eroded Precambrian. And they state that, It is this are to the north and northwest that served as a source for the clastic deltaic deposits in the Atoka and Morrow.

There are no Morrowan-age sediments in the Midland Basin.

Q. Now why is that important, Mr. Johnson?

A. Well, if the Central Basin Platform was uplifted and was supplying sediment at Morrowan time to the Delaware Basin, then there should have been Morrowan sediments in the Midland Basin.

Q. Is the Midland Basin immediately east --

A. Yes.

Q. -- of the Central Basin Platform?

A. The Midland Basin is immediately east.

Also, here's the outline on the regional production map here. You can see --

Q. Exhibit Number 8?

A. -- the Central Basin Platform here --

Q. That's Exhibit 8?

A. -- on Exhibit 8, yes.

The Central Basin Platform is approximately 100-plus miles long and 40 or 50 miles wide. When it was uplifted it divided the old Tobosa Basin, that Mr. Godsey spoke about yesterday, into the Delaware and the Midland Basin. If this Central -- And this is the way it looks now. And as we go through the presentation here, please keep in mind that we're talking about structure maps and structure as it is presently, and we're talking about deposition of the sands as it was 300 million years ago.

So if this Central Basin Platform was uplifted, and it was a highland, and it was being eroded and depositing sediments in the Delaware Basin, then you would expect Morrowan sediments in the Midland Basin --

Q. Mr. Johnson --

A. -- immediately east of the Central Basin Platform.

Q. Mr. Johnson, is it possible for the Central Basin Platform to have eroded in just one direction only, into the Delaware Basin to the west?

A. I don't think so.

Q. That just doesn't happen in nature?

A. That just doesn't happen.

CHAIRMAN FESMIRE: Mr. Johnson, may I ask a question about that? At least for part of this time, the top of the Central Basin Platform was underwater, correct?

THE WITNESS: Yes.

CHAIRMAN FESMIRE: And the onshore currents would have been moving to the west, right?

THE WITNESS: Well, the onshore -- the currents, I think, would have been moving parallel to your uplift, and parallel to the Central Basin Platform would have been in a northwest-southeast direction.

CHAIRMAN FESMIRE: Okay, but would you not -- and this may be, you know, geologically ignorant of me to ask, but would you not expect deposition on the onshore side of the Central Basin Platform, where you wouldn't get it towards the deep-water side.

THE WITNESS: I don't think I understand what you're saying there. If you -- You have a proto- or beginning uplift of the Central Basin Platform --

CHAIRMAN FESMIRE: Right, that's underwater.

THE WITNESS: Right.

CHAIRMAN FESMIRE: Okay, and --

THE WITNESS: If it's under- -- now, if it's underwater, you're not going to be eroding sediments.

CHAIRMAN FESMIRE: Okay, is --

THE WITNESS: It would have to be exposed in order for you to erode and transport and deposit those sediments.

CHAIRMAN FESMIRE: Okay, so that may be where I'm going wrong, but wouldn't you expect -- you would expect no erosion and deposition off the side of the Platform towards shore?

THE WITNESS: I would expect it in -- if you had small outcroppings or islands, as Mr. Godsey mentioned yesterday, I would expect sediment to be shed 360 degrees around that source. So not only would you be shedding it to the west, you would be shedding it to the east, maybe to the south and to the north.

CHAIRMAN FESMIRE: Okay.

THE WITNESS: So there should have been sediments on the Midland Basin side if you had an uplift of the Central Basin Platform.

CHAIRMAN FESMIRE: Okay, continue, I apologize.

THE WITNESS: That's fine.

The next article is the -- again, the West Texas Geological Society Fall Symposium publication in 1999. Here the --

Q. (By Mr. Olmstead) Is this Exhibit Number 7?

A. Exhibit Number 7. This is the article by Lou Mazzullo, Significance of Intraformational Unconformities in the Morrow Formation of the Permian Basin. Dr. Mazzullo is somewhat of an expert, he's worked a lot of time, put a lot of effort into the Morrowan studies here in New Mexico, here.

This is his kind of a location map or generalized map of the area, and again this is page 55. And you can see on the map here, he's showing the Central Basin Platform right here. We've kind of highlighted it in blue or shaded it in blue.

You will notice over here in the Midland Basin area he states, No Morrow. And what he's doing here, he's showing that -- the Central Basin Platform here, no Morrow over here, he's got a couple of small arrows right here. But he's showing the major source for Morrow sediment is to be the Pedernal Uplift to the north and west, and it's being transported to the south.

And Mr. Fesmire, you asked a question a while ago about sediments. And sediments is more or less, the way I see it, is a catch-all. There are all sorts of sediments. As a matter of fact, we get a good north wind or a northwest wind here from New Mexico, we catch some sediments in Midland in the houses and on the cars and everything else. The dust is a sediment.

But you'll notice here, Mr. Mazzullo makes a distinction right here in his sediments. Now he said, The primary direct influence on Morrow sedimentation was the emergence of the ancestor [*sic*] Pedernal Uplift to the north and west, which supplied most of the detritus -- now, he makes a -- detritus that makes up the Morrow clastics. He says the low-relief Central Basin Platform at the time provided minor amounts of sediments locally, but its continued uplift had more of an effect on post-depositional modifications to existing sediment packages in the Morrow clastics rather than as a source of sediment.

So he makes a distinction here --

Q. -- between clastics and sediments?

A. -- between the detritus that makes up the Morrow clastic and minor amounts of sediments locally.

Q. And is clastics another word for sand?

A. Yes. Again, here is the stratigraphic column that you see over here.

Q. Exhibit Number 2?

A. Exhibit Number 2. Again, this was taken from the combined study from the New Mexico Bureau of Mines and Mineral Resources and the Texas Bureau of Economic Geology. They have broken this stratigraphic column down into Delaware Basin, Northwest Shelf, Northwest Shelf Texas, Central Basin Platform and Midland Basin. You'll notice they show the systems and rocks that are present in each one of these in their stratigraphic order here.

You'll notice where it says Morrowan right down here, the basal Pennsylvanian, that there is no Morrow present in the Midland Basin or on the Central Basin Platform. Again, you'd think if the Central Basin Platform was providing sediment or clastic sediment to the Delaware Basin, then there should be some in the Midland Basin, and there are no Morrowan sediments in the Midland Basin.

Again from the combined study by both bureaus, New Mexico and Texas --

Q. Is this Exhibit Number 9?

A. Exhibit Number 9. They state on page -- I believe it's 124, that some workers correlate the Atoka shale in this area to the lower Pennsylvanian (Morrowan or Atokan), whereas others correlate it to the upper Mississippian (Chester) Barnett. And they're talking about the Midland Basin here now, because there's no Morrow present. The first Pennsylvanian sediments that you see -- or the oldest Pennsylvanian sediments you see in the Midland Basin is Atokan age.

Q. And is this page 124 of Exhibit 9?

A. I think -- Yes, that's page 124. And the state that the Atoka --

CHAIRMAN FESMIRE: Just a second.

THE WITNESS: Yes, sir.

COMMISSIONER BAILEY: Can we have a clarification? You're talking there are no Morrow-time sediments --

THE WITNESS: Correct.

COMMISSIONER BAILEY: -- in the Midland Basin, not -- so people will not misunderstand that there are Morrow-named sediments?

THE WITNESS: Right, there's no Morrow age or time sediments.

COMMISSIONER BAILEY: All right, thank you.

THE WITNESS: The earliest Pennsylvanian sediments are the oldest Pennsylvanian sediments in the Midland Basin or of Atokan age, which is immediately above or younger than the Morrow.

They state that the Atokan reservoirs in the Midland Basin in Andrews and Midland Counties are composed of thin (15 to 20-foot thick) silty to bioclastic-rich zones in the Atoka shale. And during sea-level lowstands, carbonate detritus was carried from carbonate banks into relatively deeper water and deposited in extensive, sheetlike units up to 40 miles thick.

Now the carbonate platform, or banks that they're talking about here, is the Central Basin Platform. And in Atoka time you did have some uplift, initial uplift here. It was high enough where you could erode that, and it was deposited into the Delaware and the Midland Basin as thin Atoka. And you can see, it says bioclastic-rich zones in the Atoka shale.

Q. (By Mr. Olmstead) How long was this after the Morrow deposition?

A. This was -- The Atoka would have been approximately 5 million years after deposition of the Morrow in the Delaware Basin. So it's 5 million years younger, approximately.

From the Habitat of Oil -- and this was a publication done by the -- it's a symposium conducted by the American Association of Petroleum Geologists in 1958, again --

Q. Is this Exhibit Number 10?

A. Exhibit Number 10, yes. Lewis Weeks was the author of this, and John Galley did the initial article here on the oil and gas geology in the Permian Basin.

Now again from this article in 1958 they state that the Pedernal massif was the principal provenance area for clastic sediments in the north and west margins of the Basin throughout Pennsylvanian time.

They also state -- well, here's the -- So in order -- and I think we've stated -- we've shown that the source for the Morrow here is the Precambrian granites that underlie all the paleozoic sediments here. And you've got sediments that are Ordovician age, Ellenburger, you've got Simpson, you have Montoya, Fusselman, Silurian, you have lower Mississippian lime and you have Mississippian Barnett shale -- All these lower Paleozoic sediments cover the Precambrian granite.

So in order to get to the Precambrian granite and source it for quartz grains, you have to uplift this rock and erode all these sediments off of the rock to expose the granite here. And that sedimentary covers up to 3000 foot here along the Platform edge. So in order to get the sand grains and erode them out of the granite, you have to erode all of that paleozoic sediment and expose the granite.

Q. And did that ever happen during Morrowan times?

A. No, it did not.

In the first hearing that we had before the Commission here, it was stated in here that -- Mr. Godsey stated in his testimony that -- and he's the Geologist by Chesapeake -- that the source rock for the Morrow formation in this area originated from the Central Basin Platform. The Central Basin Platform is located within walking distance directly east and northeast of this area, and it subcrops within Sections 11, 2 and 3, one to two miles east of this area, and trends in a southeast-to-northwest direction.

They also state in here that the east-to-west trend of Morrow deposition Chesapeake projects in this area is in very close agreement with published literature concerning the general trend of sands coming off of the Central Basin Platform.

I don't believe that either one of these statements is true.

Q. Is this Exhibit Number 11?

A. This is Exhibit Number 11.

If you look at Mr. Godsey's cross-section -- this is our Exhibit 13 -- where he shows the Pennsylvanian system pinching out -- coming up on the Platform here, he has a well here that I believe he said was four to five miles east of his last well here where he has some Pennsylvanian rocks available.

Q. Is this Exhibit 13?

A. Yes. You can see the Pennsylvanian system pinching out as it comes up, ramps up on the Platform here. But you'll notice he said in his statement there that the source was two miles east, within walking distance. The source for the quartz here is that Precambrian granite, and you can see that there's over 3000 foot of Paleozoic carbonate and shale covers, covering that Precambrian granite. There's no way this could have sourced any Morrow sands here.

Q. Now why is that?

A. Because the granite has to be exposed in order to erode it, erode out the quartz grains and transport those grains and deposit them. At this particular point in time, your middle Morrow B time, it has to be exposed then. And you can see that you have over 3000 foot of cover covering the Paleozoic granite here.

This is a cross-section I did from the -- Exhibit 13A here. I don't know if you can read these numbers or not, but that's the isopach. The cross-section is hung here on top of the lower Mississippian, I believe, and it shows the thickness of sediments covering the Precambrian granite through this area.

So again, there's no source, no granite exposed at Middle Morrow B time anywhere close to the Osudo field here.

Q. Mr. Johnson, let me ask you this. Was there ever granite exposed on top of the Central Basin Platform?

A. Yes, there was, there was a small exposure of granite, and it was exposed and eroded in late Pennsylvanian, early Wolfcampian time.

Q. How many million years is that after the Morrow --

A. That's approximately 20 million years after deposition of the middle Morrow B sands.

From a Carol Hill article in the SEPM special publication -- Mr. Godsey had a couple of exhibits from this article, so I took a look at it.

Q. And this is our Exhibit Number 12?

A. Exhibit Number 12.

Mr. Godsey spoke of the Darrell James article that showed the source to the east here. Now I know Mr. James, I've known him for 30 years, and his original article for the American Association of Petroleum Geologists in 1984, when this article -- original article was published, he credits a couple other people for helping him with this paper. One of those people was Mike Metcalf, who I've known for about 20 years and does consulting work for me now, so I've spoken to him about this paper and talked about the Morrow in general out here, since we're drilling Morrow wells now.

But if you break this up and look at these individual maps here that Mr. James has in his paper, you see he shows the Pedernal Highlands to the northwest and north. You also have what he calls Central Basin Platform highlands to the east here, showing sediment distribution from east to west. And if you look down here, he says this is patterns during early Morrowan time.

So he's showing the Central Basin Platform in its present configuration as a possible granitic highlands, like the Pedernal Highlands up here, in Morrowan time.

The next slide, please?

This is during Atoka time. Again, he's got the Central Basin Platform Highlands completely exposed during Atoka time.

Next one, please.

The next article here is -- or the next map shows Strawn time. And again, he shows the Central Basin Platform Highlands in here. So in this article Mr. James has the Central Basin Platform and its present shape and configuration exposed as a highlands from Morrowan through Atokan through Strawn time. So approximately 15 million years of Central Basin Platform Highlands. You would think there would be all sorts of sediments in both the Delaware and Midland Basins, and this is just not true.

You remember that there are no Morrowan-age sediments in the Midland Basin. There was only a few

Atokan -- thin Atoka beds in the Midland Basin in Atoka time. And as a matter of fact, during Strawn time the Central Basin Platform was submerged and was actually having carbonate material deposited on it.

So Mr. James' article is completely wrong here. Now he wrote this article about the Parkway Empire Morrowan fields over in Eddy County, New Mexico. Here it is over here. And we're over here by the Central Basin Platform, so it's a county away --

Q. So the focus of this paper by Joe James was a different field?

A. Yes, it was. And I talked to Mr. Metcalf about why they used these maps in here, and he said he took them as just a regional map out of a Floyd Wright publication that we will get to here shortly.

So next slide, please.

This is also out of the Carol Hill article in there, and this was what Mr. Godsey showed yesterday also, the -- through time, the evolution of the Central Basin Platform. And -- first slide -- it was originally the old Tobosa Basin, as he stated, just a big old broad, wide basin out here through early Paleozoic time. You had deposition of Ellenburger and Simpson and Montoya in the Tobosa Basin.

Q. Is this Exhibit 15?

A. This is Exhibit 15, yes. Next.

And in the Mississippian time, again, you still had the Tobosa Basin here, around the shelf edges. You had carbonates, Mississippian carbonates, being deposited. In the middle of the Basin out here you had black shales being deposited, and so -- you had deposition of the Mississippian lime, lower Mississippian lime and deposition of the Barnett shale during this time.

But in late Mississippian and early Pennsylvanian you had stresses in here, directed in more or less a north-south direction, and you had -- these stresses caused *en echelon* folds, low relief structures and -- that may or may not have been exposed, they were very low relief. And this split the Tobosa Basin up into the Delaware Basin on the west and Midland Basin on the right. And there could possibly have been some eroded Barnett shale and Mississippian lime.

In the middle Pennsylvanian -- and this is shown here as Pennsylvanian -- you can see that the author here shows the Central Basin Platform as being developed, but below sea level. So it was actually receiving carbonate bank deposits during middle Pennsylvanian time.

Q. And this is after the Morrowan time, correct?

A. Yes, this is several million years after Morrowan time.

And then in late Pennsylvanian-early Wolfcampian time, you had rejuvenation of the forces in here, and you can see that they show that the Central Basin Platform was finally uplifted into its present-day position, and you had Wolfcampian rocks deposited west into the Delaware Basin at this time.

Q. And how long afterward --

A. That was approximately 20 million years after deposition of the middle Morrow B sands. So you had major uplift, you had a present-day form. In places it was eroded down to granite, and you had granite wash production established on these old highs.

So the major uplift of the Central Basin Platform did not occur until Wolfcampian time.

Again from the Habitat of Oil, the 1958 publication, Exhibit 10, this symposium from the American Association of Petroleum Geologists, the article of John Galley, they state here in this article on page 417, minor uplift of portions of the later Central Basin Platform in late Mississippian or early Pennsylvanian time is indicated by present thin areas in the center of the Basin.

He also goes on to state in the paragraph immediately below this that evidence is lacking to show general uplift of the entire Platform area.

So again, minor uplifts, not of the entire

Platform area.

He also states that the Central Basin Platform was a relatively small positive area, and that receiving sediments -- that the Delaware Basin was receiving sediments from the Pedernal massif.

He also states in the paper that at the close of the Pennsylvanian period -- so 20 million years after deposition of the Morrow -- occurred the principal uplift of the two subparallel features which had been intermittently but moderately positive throughout earlier Paleozoic time, the Central Basin Platform and the Diablo Platform.

CHAIRMAN FESMIRE: Is this a good place to take a break?

THE WITNESS: Sure.

CHAIRMAN FESMIRE: Mr. Olmstead?

MR. OLMSTEAD: Yes, sir, that would be fine.

CHAIRMAN FESMIRE: Okay, at this time we will break until 11:30. And like I said, from 11:30 to 1:00 I intend to go, take a late lunch, and then come back and go the rest of the afternoon. So if you've got plans to make, do so accordingly, please.

We'll reconvene at 11:30.

(Thereupon, a recess was taken at 11:17 a.m.)

(The following proceedings had at 11:31 a.m.)

CHAIRMAN FESMIRE: Okay, let's go back on the record. This is the continuation of Cause Number 13,493, 13,493 before the New Mexico Oil Conservation Commission. Let the record reflect that we've gone back into session. All three Commissioners are still present. The quorum therefore is preserved.

I believe that we were continuing with the testimony of Mr. Johnson, our geologist, and we were still on the direct testimony, weren't we?

MR. OLMSTEAD: Yes, sir, Mr. Chairman.

CHAIRMAN FESMIRE: Mr. Olmstead, go ahead.

Q. (By Mr. Olmstead) Mr. Johnson, you were about to refer back to Exhibit Number 6.

A. Yes, Exhibit Number 6, Future Petroleum Provinces in New Mexico - discovering new reserves, an article that was written in 1989. In this article they state -- and this is taken from Adams' paper in 1965 -- they state that, He assumes -- and that's talking about Adams -- an almost catastrophic foundering of the Basin during Permian Wolfcamp time that squeezed the Central Basin Platform horst upward several thousands of feet to separate the Delaware and the Midland Basin.

Again, this is from Adams in 1965. The timing of the uplift of the Central Basin Platform would have been Permian-Wolfcampian time.

Q. And how many years is that after Morrowan time?

A. Approximately 20 million years.

From the West Texas Geological Society Fall Symposium in 1999, Exhibit 7, again this is from the Lou Mazzullo article. In this article he states that, A major tectonic event occurred at the end of Mississippian -- and this is taken from Wright, 1979 -- at which time the outlines of the major features of the present-day Permian Basin began to take shape. The Central Basin Platform, for example, was a low-relief feature at this time.

Again, low-relief. Nothing that you'd be expecting to shed any sediments.

Q. How would you describe low-relief? Would that be swamplike?

A. Yes, could have been some small islands, some slight exposure possibly of those islands at this time, but very low-relief, nothing that you would expect as a high-relief that would be shedding a lot of sediments.

Again from the combined study from the Bureau of Economic Geology of Texas and the New Mexico Bureau -- Geology and Mineral Resources, this is a --

Q. Exhibit 9?

A. Exhibit 9. This study was done in 2004, I believe, or 2002 and they state in this study that the lower Pennsylvanian Atoka deposits are interpreted to have been deposited before uplift of the Central Basin Platform.

Again, there were no Morrowan-age sediments in the Midland Basin, and the only -- the earliest Pennsylvanian sediments you had was Atoka in there, so therefore they believe that the Atoka deposits are interpreted to have been deposited before uplift, or as uplift was beginning on the Central Basin Platform, you had enough uplift to erode the Atoka and deposit it in the Midland Basin.

They said -- they further state here that the most intensive uplift of the Central Basin Platform postdated the Strawn. Right after the Strawn time, and you can see Strawn here as middle Pennsylvanian. So sometime after middle Pennsylvanian time was the most intensive uplift of the Central Basin Platform.

They also state that the Central Basin Platform was a depositional high during late Pennsylvanian, early Permian. And if you'll look over here, early Permian time would be Wolfcampian time.

They also state in here that one of the New Mexico reservoirs in the play here is the Wantz Granite Wash field. It's due east, over by the little town of Eunice here, and it says that this production is from Granite Wash clastics. And this is the first mention of exposed granite to where you would have a granite source here.

And it says reservoirs in the Granite Wash subplay are productive from laterally discontinuous Wolfcampian-age conglomerates and Granite Wash. So again, Wolfcampian age, 20 million years after deposition of your middle Morrow B sands.

And this is the article from Floyd Wright. It was a special publication by the West Texas Geological Society.

Q. Exhibit 15A?

A. Exhibit 15A. This is Mr. Wright's interpretation of -- this is on page 74 of his book, 15A here. This is what the west Texas, southeast New Mexico paleogeographic map looked like during late Pennsylvanian time. Again, late Pennsylvanian, right before Wolfcampian, in through there.

You can see that the Central Basin Platform here is uplifted in its present-day form. You probably had a highlands at this point in time, you had the Pedernal Highlands exposed to the west over here, and northwest this is the Matador Uplift here again, right at the northern edge of Lea County, southern edge of Curry County, here. And this was his view -- and like I said, the paleogeographic map -- in late Pennsylvanian time.

And in his paper here, he states that Springer and Morrow, which are lower Permian -- or Pennsylvanian age -- said, The pronounced late Mississippian-early Pennsylvanian uplift caused a general withdrawal of the seas, which subjected the exhumed region previously occupied by the Tobosa Basin to erosion. Subsidence at the close of Springer or Morrow time there permitted the seas to northward from the Llanoria Geosyncline. And regional subsidence continued throughout most of the Pennsylvanian period. Crests of the intra-embayment upwarps such as the Central Basin Platform, Matador, Red River uplifts, were exposed as chains of islands.

He also states that late Pennsylvanian and early Permian time boundary is marked by mountain-making movements with faulting and intense folding in west Texas and southeast New Mexico.

He further states that compressive forces uplifted the Central Basin Platform to its highest elevations. Highly deformed local structures formed ranges of mountains oriented generally parallel to the main axis of the Platform. The Fort Stockton High in north Pecos County, which is the very tip of the Central Basin Platform down here, 100 or so miles south and east of us there, and the Eunice Uplift, which we just talked about a second ago where that Wantz granite there -- it's called the Eunice High in southeast Lea County, New Mexico, which would be right here -- he said that these two terminated the south and the north edges of the Platform, standing at greater heights than the intervening structures.

The epoch of intense deformation was followed by a long period of erosion which reduced the mountains and stripped the Central Basin Platform and structure of the Reagan Uplift and others, uplifts here. And this would be this map at the close of Pennsylvanian or late Wolfcampian time. So in late Pennsylvanian a lot of uplifts, a lot of mountains. At the end of Wolfcampian time, most of that was stripped off and you have more or less a peneplain that developed here in west Texas.

So a lot of sediments eroded --

CHAIRMAN FESMIRE: Here in west Texas?

THE WITNESS: -- and were deposited during Wolfcampian time.

CHAIRMAN FESMIRE: Here in west Texas?

THE WITNESS: I'm sorry.

(Laughter)

THE WITNESS: Also New Mexico.

CHAIRMAN FESMIRE: We like to be included, especially in our own area.

(Laughter)

THE WITNESS: I'll do my best.

So -- And this slide here just shows the one there that everything is pretty much stripped off and eroded down to a peneplain by the end of Wolfcampian time.

Q. (By Mr. Olmstead) And when is -- How far after Morrow time?

A. Oh, approximately 20 million years after deposition of the middle Morrow B sands.

This paper is from the West Texas Geological Fall Symposium in 2000. It's Exhibit 16. This paper was done by Po-Ching Tai and Steven L. Dorobek. Po-Ching Tai was a doctoral student of Professor Dorobek at Texas A&M University, and they did this article on the Central Basin Platform, and it's one of the more recent and most detailed articles I've ever seen on the Central Basin Platform itself. It was entitled, Tectonic Model for Late Paleozoic Deformation of the Central Basin Platform, Permian Basin Region, West Texas.

And in this article on page 159 they state that in this study they utilized a data set that was donated to Texas A&M University by Chevron USA. And in this data set, which covers the southwestern Midland Basin and eastern Central Basin Platform regions, it includes five 3-D seismic surveys covering over 800 square kilometers, numerous 2-D seismic profiles, over 200 digital well logs and production data, and that using the seismic data, the structural contour maps and well log cross-sections, they determined the timing and deformation of the Central Basin Platform.

On page 163 they state that the western boundary of the Central Basin Platform is an approximate 10-mile-wide fault zone, and these faults parallel the present day Central Basin Platform and are downthrown to the west or to the Basin.

On page 167 they that the age of uplift along Central Basin Platform -- they state that a pre-Atokan, or before Atokan time, late-Mississippian, early-Pennsylvanian unconformity across parts of the Central Basin Platform reflect the timing of initial uplift of the proto-Central Basin Platform. Structural relief from the crest to the flanks of various structural highs was apparently negligible. After this initial deformation, which allowed for subsequent onlap of middle to late Pennsylvanian carbonate platform strata, again, the initial thrust in here, apparently negligible relief. After that, you had subsidence, and the Central Basin Platform was receiving carbonate sediment because it was below sea level.

They state that another regional unconformity, however, marks major uplift of the Central Basin Platform. This intense uplift removed most of the Pennsylvanian strata and parts of the lower Paleozoic section there. And it said that the Central Basin Platform, the interior, was eroded down to Precambrian basement. They state that the uplift of the Central Basin Platform reached a peak during late early Wolfcampian time. And again, that would be 20 million years after deposition of the Middle Morrow B sands.

And they also state that there were three stages of deformation which can be recognized based on significant changes in the style of the deformation. Said an initial east, northeast, southwest directive -- compressive stress caused minor *en echelon* folding across parts of the eastern Delaware Basin, Central Basin Platform region and Western Midland Basin during late Mississippian time.

And he said that renewed and amplified compressive stress in late middle Pennsylvanian time started generating right lateral movement again. And then it states down at the bottom that major uplift of the Central Basin Platform occurred during the last phase of late Pennsylvanian-early Wolfcampian deformation.

If you sum this up and put it on a stratigraphic column --

Q. -- which is Exhibit 2?

A. -- which is Exhibit 2 -- again we're talking about middle Morrow B deposition, that window in there of 1 1/2 to maybe 2 million years in there -- you had late Mississippian stresses that caused minor uplift or *en* *echelon* folds with negligible relief.

After that, you had a period of quiescence in middle Pennsylvanian time, which continued up until late Pennsylvanian time. And at the end of Pennsylvanian time you renewed those stresses, you had major uplift of the Central Basin Platform. So in late Pennsylvanian-early Wolfcampian time is major uplift of the Central Basin Platform, and you had exposed granite on the Central Basin Platform at that time.

And you can see the position there, you're talking about the middle Morrow B sands. And by the time that you had uplift and erosion, parts of the Central Basin Platform down to Precambrian granite, it was 20 million years after deposition of the middle Morrow B.

Next.

Again, there was no exposure of granite on the Central Basin Platform until Wolfcampian time. And this is from a symposium, the Oil and Gas Fields of Southeastern New Mexico, a 1995 supplement from the Roswell Geological Society.

Q. Exhibit 17?

A. Exhibit 17. This article is by Ronald Broadhead. He is with the survey over at Socorro. In this article he states that the Morrow section can be divided into three distinct zones, commonly designated as the lower A --

again, here on the stratigraphic column, the lower Morrow A -- middle Morrow B, which is what we're dealing with here, and upper Morrow C intervals.

And said, Productive reservoirs are found almost exclusively in the siliciclastic lower and middle Morrow intervals and are generally composed of angular to subangular, medium to very coarse-grained quartzose sandstone -- again, quartz sands -- deposited principally in fluvial-dominated -- river -- and wave-dominated middle Morrow deltaic settings.

Q. Mr. Johnson -- and Mr. Chairman, may I approach the witness please?

CHAIRMAN FESMIRE: You may, sir.

Q. (By Mr. Olmstead) I'm going to show you what was introduced yesterday as Chesapeake Exhibits 2 and 3, which I believe are the mud logs for the KF 4 and Osudo 9 wells, which had some sand description. Would you compare those mud log sand descriptions to Exhibit 17, please, sir?

A. Well, if I can read it here, I can. Let's see.

Q. The next exhibit, 3, might be easier to read.

A. Okay. Oh, on the Mewbourne well?

Q. Yes, sir.

A. Yeah, sandstone, clear to light brown, medium-grained, fine-grained, coarse-grained, angular, predominantly unconsolidated, some silica cement in there.

Q. And is that similar to this description --

A. Yes, it is, it's very similar to most of the Morrow descriptions that I have seen in here.

And again, I don't see where they mention anything about chert in that. I see there's some chert on Exhibit -- I guess Number 2 here -- in the KF 4 well, but the chert occurs below the sands.

Q. And so chert is distinguished from the sand?

A. Yeah, the chert is distinguished from the sand. It looks hot on the gamma-ray also, so I don't see any chert in the sand.

Again, the Core Lab study of the almost 3000 foot of cores from the Morrow indicated that their chert was just a trace element in those sands. And as a matter of fact, in this very detailed study they did in 2004 there is no mention in there anywhere I could find of sediments from the Central Basin Platform contributing to the Morrow.

Q. Okay. And a portion of the Core Lab study has been submitted previously as an exhibit, and we'll get to that in a moment, correct?

A. Okay, yeah.

Q. But in Mr. Broadhead's study here, he has a cross-section C-C' from the northwest to the southeast, from the Pedernal Uplift to the northwest, through Eddy and Lea Counties, up to the Central Basin Platform at C' to the southeast. Again, the Pedernal is to the left side of the screen, the Central Basin Platform is to the right side of the screen. The Precambrian granite is in pink. The lower Paleozoic is the brick pattern there, sediments. The Morrow is in orange.

You can see that the Pedernal is exposed. The granite, Precambrian granite, exposed in the Pedernal. You also have a small exposure of granite on the Central Basin Platform.

The next slide, you can see that he shows us a map view of the Central Basin Platform, the C' here. And you can see that he states here that there are -- well, there's two small granite exposures. This would be the Eunice high that we talk about early in here, and you can see at the bottom there, Figure 4, where he explains Figure 4, he states that this was Wolfcampian time, again, 20 million years after deposition of the middle Morrow B sands.

From the Atlas of Major Rocky Mountain Gas Reservoirs, Exhibit Number 18, I -- the publication here on the Granite Wash play, they state that the Granite Wash reservoirs was developed -- and again, this is in the Eunice area, eight or 10 miles east of the Osudo area, probably. Said these were developed in response to the final phase of uplift and burial of the highest portions of the Central Basin Platform during early Wolfcampian time.

So again in this publication, they state that the north end, the Eunice High, was not uplifted until early Wolfcampian time, and that's when you had erosion down through the core and you had exposure of the Precambrian granite where you could source.

So to summarize the first part of the study here, according to published literature dating from 1958 to present, the Central Basin Platform was only a local, low-relief structure that may have been a source for shale and carbonate sediments during Atoka time. No mention of the Central Basin Platform being a source for quartz sand until the Wolfcampian time, millions of years after deposition of the middle Morrow B sands in the Osudo field.

There are no Morrowan-aged sediments in the Midland Basin. There's no exposed granite on the Central Basin Platform at Morrow time to source the quartz sands. There's no easterly source. There's no east-west channels.

Sediment source was to the north, with sediments transported to the south in north-south-trending fluvial channels.

Now, I'd like to go into part 2, if I could now, talking about the deposition of the sandbodies and the geometry of those.

Q. Okay. Do you have a short introduction about what we're going to do in part 2?

A. Yes. We'd like to show that the source for the Morrow B quartz sand was the Pedernal Uplift north and west of the Osudo area, that sediments were transported south in north-south-trending fluvial channels. The Central Basin Platform was not a source but a low-relief influence or a guide for north-south fluvial channel deposition.

And -- Well, that's a little dark, but -- This picture was taken from a Geological Society of America publication, and it was taken from a painting that was done by a lady, and this is a reconstruction of a Pennsylvanian coal swamp. And this is probably very much what it looked like in the Osudo area at the time of deposition of the Middle Morrow B sands.

And in this slide you can see a couple of things here. First of all, it's a very low-relief area at time of deposition, very much like the Texas Gulf Coast or Louisiana Gulf Coast today. You had some small positive features in there, nothing really highs. We stated before, there wasn't any real uplift until Wolfcampian time.

But on the slide here you can see a channel here. This is the main channel of the river, fluvial system. And over here is an ox-bow lake or an abandoned channel here. And then you can see all this swamp growth, a lot of coal that you'll see in some of the samples in the Morrowan sediments.

But anyway, this will give you an idea of what it looked like just west of Eunice about 300 million years ago.

Next.

This slide -- and again, I don't know whether you can see that very well or not. This is a slide taken northwest Albuquerque. This is what you see when you fly in and out of Albuquerque, New Mexico.

Q. Which river is that?

A. This is the Rio Grande. And it's -- you can't hardly see it on the screen, but there are numerous sandbodies located in the main river channel here that you can see. These sandbodies are oriented parallel to the stream channel, they are very discontinuous here. And during times of flood you will get sediments transported in, you'll get these sandbars deposited. In times when it's a dry season, there's not much water flow through here, you'll deposit fine silts and muds, and some of these will compartmentalize these sandbodies that are in here.

But this is kind of what you're dealing with here at middle Morrow B time. You're dealing with sandbars in the river, river and stream channels resemble this. And if you can see, and -- What exhibit number is this?

MS. RICKEY: Nineteen.

THE WITNESS: Nineteen. If you'll look at Exhibit 19 and you look at these bars that are exposed in the river channel here, and you think about drilling these, drilling this fluvial system here, you have Morrow on 320-acre spacing, I believe, with a 160-acre option in there.

Look at the numerous sandbars exposed in here, and you think about drilling this on 320 or 160 acres. Some of these sandbars may be in communication, they may not. You may have some of the sandbars that will be common to one wellbore, you can actually hit two sandbars in through there. So a very complicated system that you have here.

Also, if you were to drill a well in here and you drilled this ox-bow lake over here, and you drilled an offset well, 160 acres so way over here in the main channel, you would say stratigraphically that those two sands in there, those Morrow sands, would correlate. But yet you would be wrong. There would be two different and two individual, separate sandbodies in there, two different systems.

Next.

This is a -- This is Exhibit Number 20. This is a commercial structure map. It was produced by Geomap. They are a commercial mapping company that's known throughout the oil business, they make maps all through all the oil producing provinces in North America, as far as I know.

This is a shot out of their map. I believe this is the deep horizon. They generally map shallow, medium and deep horizons.

This is in the Osudo area. The acreage in yellow is Samson acreage, the gray acreage is Chesapeake's acreage. The red arrow denotes the KF 4 well.

On this structure map -- and I believe this is the deep structure map, it's on top of the Devonian formation. And you can see the Devonian on the time scale here is right here, it's below the Mississippian, below the Pennsylvanian.

So on top of the Devonian, on the right side of the slide here is the Central Basin Platform in gray. You'll notice that there's a fault here on the Geomap. There's another fault here, a fault here, and all these faults primarily strike northwest-southeast. They're down to the west or down to the Basin.

Another feature you will note on here is this structural closure here, and also here, just west and northwest of the acreage and well in question, right here. And again, this is on top of the Devonian formation.

Q. (By Mr. Olmstead) And again, that was a Geomap?

A. That is a Geomap.

Q. And Geo is an independent third-party publisher --

A. Yes.

Q. -- of these type maps?

A. Yeah, commercial maps.

This is on the medium horizon here, and I believe this to be on the Strawn, which is just above the Morrow that we're talking about here.

Q. Is this Exhibit 21?

A. This is Exhibit 21. Again you will notice on the right side of the screen is the Central Basin Platform. Again, the acreage in yellow is Samson, the gray acreage is Chesapeake. The arrow denotes KF 4 well. Again, we have faults present on the west side that are down to the west, up to the east.

You will note that even though this is younger here, we still have a structural closure here in the northwest of 4, even at Strawn time. And this is -- again, this is present-time structure, present-day structure. It probably wouldn't have been like this at the time of deposition. Again, it would have been more of a swamp, low-relief area at that time.

Now again, this is the stratigraphic column over here, and again you'll note that the Barnett Mississippian is right here, and it's unconformably overlain by lower

Morrow A. You have Morrow B and you have the upper Morrow C which is, like I said, mainly marine sediments, limes and shales.

I mapped this point right here. And again, this type log was taken from that Denise April Coker article on the Osudo field, and this is my top of the middle Morrow clastics. So my structure map would be on top of the Morrow B right here. So I'm a little closer to the top of the Strawn map, the commercial map that was published by Geomap here.

The next slide here is Exhibit 22A. This is my structure map on top of that Morrow clastic horizon. Again, you have the Central Basin Platform to the east, you have a Morrow sediment pinchout here, you have a platform fault zone here, you have some faults in here and here. Again, these faults mainly strike north-south, down to the west. Again, you have a structural closure that sits here in the northwest of 4. And you'll note that the yellow acreage again is Samson, the gray is Chesapeake, the red arrow denotes KF 4 well.

You'll notice that the general dip direction is to the south. I believe these are 100-foot contour intervals here.

Q. So does your structure map pretty closely match that of the Geomap company?

A. It very much -- very closely matches the Geomap. It also very much matches Mr. Lynn Charuk's structure map in here, with the structure closure here and Central Basin Platform back to the east.

So you'll notice that there is a, like I said, structural dip. These are 100-foot contour intervals. It's to the south. You'll notice a low nose plunging up here to the north between these two positive features. To my way of thinking, this is -- sand is being distributed, being eroded from the north, transported to the south. It will go around, or be transported around these old paleo-highs in here. And again, these highs were very low relief, but they were a positive feature in here.

And you'll notice that we have a trough through here. That sand was transported down that trough, north-south through the Osudo area where we're drilling here. It was also deposited and transported around the west flank of this paleo-feature here and deposited on the west flank of this structure.

Samson purchased a seismic line, east-west seismic line here, in January of 2005. This line was shot by GSI, Geophysical Services, Inc., in -- I believe in 1982, in April of 1982. It was processed in September of 1982.

Q. So this seismic line was purchased subsequent to the original hearing in this matter?

A. Yes. And as a matter of fact, we didn't find this till this summer. We just hired a new geophysicist -- the other geophysicist had left -- and he actually found this line that's in here.

And we have a -- like I said, the seismic line east-west here. We have a well just north of the seismic line here, the ARCO Osudo State well that we had a synthetic seismogram made on. We picked the tops off the log, had the synthetic made, and then tied that synthetic into the seismic line to show the tops of the different formations. That seismic line looks like so.

Q. Is this Exhibit 23?

A. This is Exhibit 23, correct.

To the east, on the right side of the screen here, is the Central Basin Platform. This is the ARCO well that we used to tie the formation tops into the seismic line.

The blue here that you see is Mississippian, the orange is Morrow formation, the red is upper Mississippian, probably Barnett here.

You'll notice how the Mississippian limestone ramps up on the Central Basin Platform as it goes to the east. You'll notice that the orange Morrow sediments pinch out on the Platform as they go to the east.

You'll also notice that there are a couple of faults in here. This fault right here is the edge of the Platform fault. There's also another fault on the west side of the screen here. Both of these faults are down to the west.

And you will notice that there is a row in here, or a structure that's developed in here at this level. If you take this -- And just immediately west of the Platform fault here you can see how this structure rose to the east, and there are dips to the east. You have that downthrown fault right there. There is a low right here. That is the distribution trough that we're talking about that guided that sediment in there. This is between the old paleo-high here, Central Basin Platform here. It strikes north-south, and this was a guide to the sediments coming from the north, flowing to the south through the Osudo area.

I know it's going to be a little busy, but if you take this seismic line and overlay the structure map here, I think you can see that -- here's the Mississippian again, on the Central Basin Platform. The orange is the Morrow. Here's the pinchout for the Morrow sediments here. Here's the fault here, here's your fault zone right there.

And here is the trough right here. It's sitting in this low north-south. Here is your structural closure on the structure map. And again, here is your paleo-high showing the structure here faulted to the west. This very much agrees with the faulting here. It's down to the west and through here.

And as Mr. Charuk stated earlier, that is the reason that these wells -- the discovery well for the Osudo field was drilled in here, in the Morrow. They were drilling for the Devonian, the deep horizon, in here at the time and stumbled into Morrow production.

Q. So Mr. Johnson, does Exhibit 23, the seismic line, confirm your structure mapping?

A. Yes, it does. It also confirms the Geomap interpretation because -- if you would back up to the Geomap -- I think you will see that they also map a low between there -- go back -- You can see that they have the platform here, they have a closure here, and they have a low coming up from the south to the north in through there.

Q. And this is Exhibit 20?

A. Yeah. And again, that would be a low trough through there?

Q. And is this Exhibit 20?

A. Yes, it is.

So between the two positive areas, you have a low.

This is an isopach map of the middle Morrow B sands that we have here.

Q. This is the next one?

A. Yeah, okay. And the -- We were talking about the discovery well for the middle Morrow B --

Q. And this is Exhibit 24?

A. Exhibit 24 -- 24A. This field was discovered in the early sixties, like I said, by accident, like quite a few fields are. They were drilling for Devonian, stumbled into the Morrow here. So you've had continuous development through here from the early 1960s through 2006 here, we're still drilling this area. So you have all types of logs to deal with in here, all sorts of different logging companies, logging tools. So you have quite a variation of information to deal with.

Again, these logs are measurements of approximately a 7-inch borehole. A lot of things change once you get outside that borehole. God only knows what happens to the Morrow sands in here. But these are measurements of the sediment in those boreholes there from these logs. And like I said, we have all sorts of different -- we have sonic logs, neutron logs, density logs, we have neutron density logs, we have old e-logs in through here.

But anyway, you take all this data, and what I did was use a 6-percent porosity cutoff and a 50-percent gamma-ray cutoff. And the reason I did this was, in this

Core Lab study here they state that the very best Morrow producers have 10-percent or better porosity and 30 API -- gamma-ray API units or less. So I figured -- and we'd also been using 6-percent porosity from a couple of other different studies we had in the Hat Mesa-Teas area. So 6-percent was what the original geologist that was working this area before me had started out with, and so I used 50 API units on the gamma-ray here.

So -- And I might mention that I have been with Samson for approximately two years now, and the first year that I was with Samson I was working a different area. The geologist that was working this area at the time is no longer with the company, so I inherited his area when he left the company. So there were some difficulties going from what Ralph was working to what I was working in through there, but this is the latest map and this is what I have come up with.

There were some discrepancies in the earlier maps there because of the -- because Ralph had been mapping a particular sand in here, whereas I am mapping the total middle Morrow B sand interval in here.

Q. And so does that account for the changes in this map, Exhibit 24A, from your previous maps?

A. Yes, it -- it's -- some of the changes in there.

Also, we had not updated our system in several months. This hearing was supposed to have been, I think, in May, and so we didn't update. And then I believe it was supposed to have been maybe in August or something, and it was postponed to October. And finally it got to the point that -- where we had to update our system here. So there was a lot of wells that had been drilled of late that we did not have information on.

So at that time we decided to completely re-vamp this whole thing, get all the latest, up-to-date logs, all the new wells that had been drilled, and put all that information together into this isopach, middle Morrow B sands here.

Anyway, you see a definite north-south trend from my isopach of the middle Morrow B sands here.

If you take this, and this -- what you see on the easel over here, Exhibit 25A, you place that isopach map on top of the structure map, and you see a very good correlation between the two with sands in the low area here, sands coming around the flanks of the structure here, sands over here.

Again, these -- faulting of this structure map is present-day structure. You'll see a lot of throw on these faults. These faults were probably present at deposition of middle Morrow B time, but there was probably very little throw or relief on these faults in here. They probably acted more as a guide for sedimentation as any kind of a baffle or anything to that.

And as we covered before, major uplift of the Central Basin Platform did not occur till late Pennsylvanian-early Wolfcampian time, and that's when you had most of the throw on these faults develop.

Q. Mr. Johnson, are you aware of the impending Mewbourne well that I think Mr. Charuk referenced?

A. Yes, I am. We tried to buy it and actually thought we had a deal with him before he sold it out from under me to Mewbourne.

Q. And where is that well located?

A. It's in the northwest of Section 15. I believe it's right there.

Q. And does Samson have a proposed well in this area to the north of the KF 4 well?

A. Yes, we do, we just proposed a well in Section 32, I believe. Is that right here?

Q. I think it's due north.

A. Due north? Right there?

Q. Yeah.

A. Yeah, in the southeast quarter of Section 32, I believe.

We also have participated with Mewbourne, who has continued to drill wells in this area. We have partnered with them on some of their wells that they have drilled, and although we disagree somewhat on the sandbodies in here and their geometry and placement and all, I have seen their maps, they've seen mine, we both agree that there is a north-south trend to the fluvial systems in here.

This map shows wells -- middle Morrow B producing wells in here.

Q. Is this Exhibit 26A?

A. Yes -- No, 27A.

Q. Okay, 27A?

A. Yeah. The red circles indicate wells that have produced over 2 BCF of gas, and we use this as a cutoff because we figure that is our economic cutoff for these wells. We couldn't drill anything and make any money for less than 2 BCF in through here.

And I don't know whether you can see, there's some light red or dark pink wells in here. These were the new wells that we did the work for an EUR, estimated ultimate recovery, on these wells and decided that they would be better-than-2-BCF wells. So these are the wells in here that are 2 BCF, the better wells in this area, and you can definitely see a north-south pattern to these wells.

Again, if you take these wells and you place them on the isopach -- on the sand isopach map, you will see how they fit on the isopach. Definitely in a north-south manner.

Also, this is the Mewbourne Osudo 9, which kicked off the gold rush that's going on in here now. After this initial well was drilled right here, you had three locations staked by Chesapeake in here. The first two locations are straight due north of the really good Osudo 9 well in here. Since that time, there have been other wells staked in here, and these are in chronological order, if you take a look at these and see how they line up in here.

Q. And these are the recently permitted wells?

A. These are the recently permitted wells. You can see that the permits are north-south through this Osudo area. And this last one up here is our location.

I did a series of cross-sections in here, west-to-east and also north-to-south, and starting at the southern end of the Osudo area, Cross-Section W3-E3, you can see these wells are in close approximation to one another in an east-west direction?

Q. Is this Exhibit 28A?

A. Exhibit 29A.

Q. Exhibit 29A.

A. Yes. You will see that there is a small middle Morrow B sand present in the well on the right side here, that there are some really thin upper Morrow B sands that are present in these two wells over here. This was a dry hole here. This well, I believe, is probably producing out of one of these upper sands here. You can see that this was a poor producer here, it's probably uneconomic. It only produced maybe a half a BCF of gas.

As you move to the right here on the cross-section, you'll see that the section is thinning. That's because you're moving toward the Central Basin Platform and the whole section thins through here.

Again, this is my mapping horizon, the top of the Morrow clastics. That's the datum for the cross-section here.

And you can see that this sand is not present in either one of those sands over here, and those sands -- those wells are offset to one another.

Q. In an east west direction?

A. In an east west direction. If you look at Cross-Section W2-E2, again a west-to-east through the area there, again to the right over here the section is thinning as you come to the Central Basin Platform. There's no sand present in this well. This was a very good well, drilled by Amerada. You've got two sands developed in the middle Morrow B here.

Q. What's that well name?

A. It's the Amerada WEK well. And that well produced almost 6 1/2 BCF of gas from these two sands. The well immediately to the west here has a middle Morrow sand in it also. I do not believe that these sands -- This well only, I believe, cum'd maybe 3/4 of a BCF of gas.

So I don't believe that these sands are in communication here, these are probably separate sands, and so there's no west-to-east continuity of sands through here. You've got some real thin upper Morrow clastic sands that yo could say are present in these wells here, but nothing of the middle Morrow that was producing here.

As you move farther to the north with Cross-Section W1-E1, again you can see how closely spaced in an east-west direction these wells are.

Q. Is this Exhibit 30A?

A. This is Exhibit 31A. This is the Amerada WEL well. I believe this well made in excess of 3 BCF of gas from this middle Morrow sand here.

Immediately to the west was the Kaiser-Francis well that's drilled. It has two middle Morrow B sands in it, and you -- by position to the top of the lower Morrow A here, you could say that these sands could be correlative.

The C&K well, in close approximation to the this well to the west here -- I believe that's only about 1400 foot -- does not have any middle Morrow sand to speak of in it at all, and it was a dry hole.

So there is some east-west continuity in middle Morrow B sands between these two wells right here.

Again, if you look at the southwest-to-northeast cross-section through here --

Q. Which exhibit is this?

A. 32A. -- this is the Mewbourne well that had over 50 foot of middle Morrow sand in it, the one that started the drilling in here that really got started.

Q. So this is the Osudo 9 well?

A. This is the Osudo 9 well. As soon as this well was drilled and word on the street was out how good of a well it was, Apache moved due east approximately 320 acres, as close as they could get to this well, to drill a direct east offset to this well. And you can see how much sand was in there.

You'd think if the source was to the east and it was being transported to the west, that a due east offset to 50 foot of Morrow sand would be present in this well. I gave this well approximately 40 -- 4 foot of sand in there. It's only because that they did have a little gamma-ray kick in there, some porosity was 6 percent, and they did have -- logged some sand on the mud log. But the sand that's shown in here was probably an overbank deposit, one of those crevasse splays. It was not -- they didn't even test the well; they put the cement to it as soon as possible.

You can also see the C&K well, the immediate southwest offset to this well, has absolutely no sand in it. It was a dry hole also.

Q. And so --

A. You'd think if the sediments were sourced to the east, transported to the west and deposited, that the two -- that two wells, the east and the west offset to the best well here in this field, in this area, would have better sands in them.

Q. And so the Apache well to the east is one of the closest if not the closest well to the prolific Osudo 9; is that correct?

A. Correct, yes.

This is a northwest-southeast cross-section.

Q. What exhibit is this?

A. 33A. The well on the right is the CC 3 well that we talked about earlier that Chesapeake drilled. It was a limited reservoir. It did have some really good sands right here that was a flash in the pan, as I think I heard somebody say here, a very limited reservoir.

This is the KF 4 well here. Again, there's two sands present in this well. It's a very good well. These sands have some areal extent to them. The well is making approximately 3 million cubic foot a day.

You will notice as you move to the west here, to this well here, the Morrow section thins. It thins to the east because you're coming up on the Central Basin Platform. The Morrow section thins to the west because you're moving up on that old paleo-high, as Mr. Charuk stated earlier. That's the reason we know that that was somewhat of a positive area at that time, because the sediments thin as they move, and this well is on the southern end of it. It is not on top of that. So you can see how the sediments would really thin if you move toward the top of the structure in there.

You will also notice that the Morrow section thickens in this KF 4 well right here. And the reason it thickens, it's in that depositional trough that trends north-south, and the sands would transport it from north to south through the Osudo area.

A north-south cross-section through here that's approximately -- this would be Exhibit -- I can't --

Q. -- 34A?

A. 34A, is a north-south cross-section through here, and this is -- would you go back one, please? That's all right, go ahead and throw that up there. That is approximately seven miles long through here, down through this area.

And we just went through several west-to-east cross-sections of wells that were really closely spaced, west-to-east offsets through there. And you saw out of all those cross-sections that there was maybe one in there that you could say had some west-to-east continuity. But then again, the well was so poor compared to the other well in there that you'd say it probably was not in communication with that.

But if you look at the total sand package as you move from north to south through here, you can see that there's sand present, middle Morrow B sand present, in all these wells through here. So to me, this is a channel through here that you have deposited middle Morrow sands in.

And you'll also notice as you move from north to south, the whole Morrow section thickens. Again, you're moving downdip here.

Now I did another north-south cross-section of the wells immediately -- go back, please -- immediately adjacent west of the other -- of the north-south cross-section in through there. I picked the wells immediately adjacent to that and west. And you will note that on these wells there is an absence of sand in here. Again, the cross-section thickens from north to south, but there is an absence of sand. You see a few thin sands in here.

Again, these are probably overbank crevasse-splay sands. During flood season these would -- you'd flood, you'd go over the natural levees that were probably built by the fluvial system here and deposit those thin sands out there. Those are probably limited. That's probably what you had in the CC 3 well, and the reason it was limited.

But you can see, once you get out of the main fluvial system here, you have an absence of sand. You're just in overbank deposits, in those swampy deposits.

Q. This is Exhibit 34B?

A. This is Exhibit 34B.

Next. This is the Kaiser-Francis well.

Q. Otherwise known as the Hunger Buster Number 3?

A. The Hunger Buster well.

Q. Is this Exhibit 34C?

A. This is Exhibit 34C.

Q. And where is this well located in relationship to the Osudo 9?

A. It is immediately south of the Osudo 9 well. There's been quite a bit of discussion about the sands that are present here and how much and whether you can make a north-south correlation between these two wells or not.

Q. Now this is where you disagree with the Chesapeake geologist; is that correct?

A. That is correct.

Q. And how many feet do you pick of net sand in the

Hunger Buster?

A. I believe it was approximately 26 or 28 foot of sand in there. I believe Mr. Godsey picked 11 foot in there, so --

Q. Okay --

A. -- almost twice as much sand.

Q. -- and what does Exhibit 34C show us?

A. Well, Exhibit 34C shows you that -- Here is the logs, are the logs on the Kaiser-Francis well. You have a density neutron log and you have a resistivity log here. These wells were logged by Halliburton Company.

The middle log here is the mud log. It was logged by Quality Logging.

And the log on the right is a computer log that was done by Halliburton. It's an interpretation, or computer interpretation, of the logs, the density neutron and the resistivity logs here. And this well is almost due west of the WEL well, I believe. Or is it the WEK? WEL well.

In that well -- it's an old well, and the only porosity log you had in that -- it was drilled by Amerada -- was a density log. And I believe this is -- Mr. Godsey has an exhibit on this. I don't remember which one it was. Mickey, do you have that?

Q. I'll be looking for it.

A. But Mr. Godsey used a density log, the same thing that I used in that well. He used a 50-percent gamma ray on that, and arrived at -- and I don't remember now exactly what the net sand was in that well, but he used -- all he had -- he used what he had, he used the density log in there.

But on the Kaiser-Francis well here, you have a density and you have a neutron log. And like I said, this is the direct west offset to that well. Mr. Godsey only used the density neutron cross in this well. Instead of using the density as he did in the offset well, he only used the density neutron cross-plot porosity, which only gave him approximately 11 foot here.

So that's the reason that we are at odds on how much sand is present in this well. Mr. Godsey said there's only 11 foot of net sand in here, and therefore there's no north-south orientation. I say that there's almost 30 foot of net sand in this well, and there is definitely a north-south orientation to this.

Q. How much sand did Halliburton say that there was in --

A. Halliburton --

Q. -- analysis?

A. Halliburton used the same parameters that I did, because I gave them to them, which was 6-percent or better porosity, a 50- -- well, actually I think they used a 40-percent API cutoff on the gamma-ray where I've used a 50-percent. They were a little more critical of it than I was. And they also went ahead and used, I think, a water saturation -- or not a -- a water-resistivity number in here also. They can handle almost as many parameters as you want to feed into that computer process log there.

They have corrections out here to the west for borehole condition. Some of these logging tools are pad tools that fit up against the borehole. If you have washouts through here you lose contact with the pad, so you have to take that in consideration on this stuff.

This line here, I believe, is the gamma-ray.

They also have a column over here that shows the lithology. They can take your water saturation -- or they can take your water resistivity and compute a net pay in here on this. So they can take all sorts of parameters, give you all sorts of information on this well.

But basically what they came up with, using the parameters that I had used, was also 26 to 28 foot of net sand in here.

Q. Now Mr. Johnson, the Hunger Buster 3 is a poorly performing well, correct?

A. Correct.

Q. Do you have an opinion as to why that is?

A. Yes, I do. If you would look at the mud log here, you can see that right down here at this sand where you get a good clean gamma-ray here and a gamma-ray -- good clean gamma-ray over here on the logs, you get a really good drilling break right here, and also a drilling break right above it where you start getting a gas show up in here.

There was a small upper sand in there, and the well kicked -- tried to flow on the Kaiser-Francis. They had to weight their mud up, and they weighted up with barite. They also had to put a lot of lost-circulation material in the mud to keep from losing the mud in the lower zone down there. So they had a lot of stuff in their mud system here, as far as barite and lost-circulation material and all go.

But if you look at the mud log description here, they're logging sand down through this clean gamma-ray down here. And -- But like I said, if you use the density porosity on this, you will come up with approximately 26 or 28 foot of sand in here.

So -- And in the process of completing this well they ran pipe on this well and was going to frac the well, and I think there's also been some discussion about some of the poor wells in here have been frac'd and remarkably made really good wells because of the stimulation there.

Kaiser-Francis was going to the same thing here on this sand, and the casing parted on them right in the middle of the frac job. Thereby, not only did they have a lot of barite and lost circulation material in the mud and stuff down there, they also dumped all of their frac fluid in there on that formation and could not get it out.

Q. Did they actually ever get a frac?

A. They never did get a frac on this. And ever since this train wreck on the well here, it's been a poor producer.

So -- and this is Mr. Godsey's Exhibit 33, I believe.

Q. From the original hearing?

A. Yeah, from the original hearing. He says recent Morrow studies show east-to-west depositional patterns.

I don't believe so. Basically, I see northwest to -- from northeast to southwest, from northwest to southeast, but basically a north-south depositional pattern in here.

Q. And that's our Exhibit 36A?

A. Yes. From the oil and gas field studies, again, by the Roswell Geological Society in 1967 where they discussed the Osudo field, Osudo Morrow field, they state in this study, the field study, that the type of trap here is a stratigraphic trap and that the pay consists of pinchout of several small sandbodies along the west side of a strong positive structure.

Again, even at this time, like I said, they were drilling that structure in there, looking for Devonian production, and they stumbled into this. But again, you can see, they state here that there is a strong, positive structure here and that these sandbodies are along the west side, so along the west flanks of that positive feature the sands were deposited.

This is the original map from that field study by the Roswell Geological Society. The solid lines here are the structural contours, and again you can see that they have the structure here. The dashed lines here are the isopach of the net pay in that interval. And you can see that they have there -- here in Section 4, the yellow acreage is Samson, the gray acreage is Chesapeake. You can see that they show a zero line through the northwest part of that section.

So they are showing that you have a structure here and that you have these sands deposited around the flanks of that structure. Again, that's exactly what we were saying, the deposition is from north to south, and it went around that old paleo-high, depositing those sands.

The Morrow sands in the area trend north-south. And this is from the West Texas Geological Society Fall

Symposium of 2003. Again, this is the Osudo field study done by April Denise Coker.

Q. What exhibit is this?

A. Exhibit Number 5. She states that a cross-section constructed north-to-south shows an overall thickening of the Morrow clastics section.

Again, if you'll remember the two north-south cross-sections I had a while ago, they thickened from north to south.

Cross-sections going from the west side of the field to the east side demonstrate the complexity and a number of channels.

So again, if you have channels trending from north to south and you do a west-to-east cross-section, it's going to demonstrate the complexity and number of channels in there.

And say that, The depositional environment of the entire field is interpreted to be marginal marine to deltaic.

She also states, A structure map on top of the middle Morrow indicates there could be two major faults and that the structure is highest to the northeast and lowest to the southwest stepping down across the faults.

Q. And does that confirm your faulting on your structure map?

A. It does, it does.

In addition, a gross thickness map of the Morrow clastics show alternate thicks and thins from north to south across the field. It is possible that these thicks and thins could be attributed to minor faulting between the two major faults.

And again, there's probably not a lot of relief on these faults, they more or less acted as a guide.

Also from the Fall -- West Texas Geological Society Fall Symposium in 1999, the article by Lou Mazzullo, he states that, Pre-existing late-Mississippian faults in places may have influenced deposition of south-trending fluvial channels in the basal Morrow during an initial lowstand event.

That's on page 60 here.

Q. Of Exhibit -- What exhibit was that?

A. Exhibit Number 7.

Again, here's the Rio Grande just outside of Albuquerque. You can see these sandbars in here and how they trend, that they're fairly diverse in their occurrence within the channel there, and how they're separated. Please keep that in mind as we talk about the sandbody geometry. The Morrow sandbodies are very complex, with various depositional environments.

From the -- again, from the Core Lab study that I have here that was done in 2004 where they looked at all of the Morrow in here, they came up with several depositional environments for the Morrow in here. These are some of those depositional environments that they show.

Q. Now who where the participants in the Core Lab study? Samson --

A. There was about 12 or 15 companies, and Samson and Chesapeake both participated in this study.

If you take a look at the Figure 2-6 [*sic*] up here, depositional summary of Morrow sands --

Q. And this is Exhibit 37?

A. -- Exhibit 37, you will see that they show a fluvial system here and -- dumping into an estuary.

So you've got the main channel coming down through here, and then they show these crevasse sands, crevasse splays, right here, parallelling the main channel. And like I say, during wet season or during flood stage you would overflow those natural levees of that channel, and you would deposit the sands on the outside of that channel there. And again, these are very fine-grain, they're very tight, they're limited, so pretty much non-productive.

And you also note there is an abandoned channel over here. You can see how this fluvial channel migrates through here. You also have an ox-bow or abandoned channel here. This used to be part of the fluvial system. And if you'd go in here and you drill a Morrow producer over here, you drill the Morrow producer here and you drill one over here in the channel, deposition is all at the same time here, and you'd say that all those sands in there correlate.

But if you look at this diagram here, you can see that they would all be separate sands, separate reservoirs in there.

And if you take a look at the -- another diagram that they have here showing the main channel, you can see that -- and this is kind of like what you saw in the aerial photograph of the Rio Grande there -- you have channel bars in here --

Q. Is this Exhibit --

A. -- that are developed --

Q. I'm sorry, is this Exhibit 38?

A. 38, Exhibit 38. -- that you actually have bars in here. And these bars are separated by a channel braid. And like I say, these bars are probably formed during flood stage, you're bringing in a load of sediment and forming these bars.

In times that you don't have flood stage or in the dry season, you'll settle out a lot of fine silts and clays in here, and you will compartmentalize and separate these sandbars.

They show three different types of deposition here, in a map view and also in a cross-section view here, to give you an idea what's going on.

And if you look at the belt here that they show, you'll notice, when I was talking about the trough and north of the -- the channel north of the Osudo 9 there, where we say that the channel trends, it's a very narrow channel. Because it's between the old paleo-positive and the Central Platform, it's a very narrow belt. And they say that in this narrow belt-type deposition you'll get vertical stacking of sandbars here.

And I think that's right. If you will remember the log on the Osudo 9, you had two different sandbodies in there, separated by, I think Mr. Godsey said, a 3-foot shale, separating those two sandbodies in there.

And so what happens is that you will get the stacking of these sandbodies in there, and you'll get a shale break between them, so you'll have vertical stacking of sandbars.

Q. Would --

A. The --

Q. I'm sorry, go ahead.

A. The opposite end of that spectrum is this discontinuous sheet where you have a lot of lateral migration of your channel system in through there, and you'll get what they call isolated stacking.

And again, if you were to drill a well right here -- my Parkinson's has taken over, but these two wells right here. If you drilled a well in there, you would encounter two sandbodies, and you would probably be producing out of those two. And if you drilled another well over here, you might only be producing out of that one. And if you drilled another well over here, you'd have a separate sandbody. Again, you would probably say those sands correlate, but actually those are separate. And you can see the way they show them in here, those would be separate sandbodies in there, separate reservoirs.

And then you get a combination of the two here, this continuous sheet where you get somewhat of a lateral migration in here and you get some lateral stacking. And again, you could have a well here producing out of both of those sandbars, you'd have another well over here, and you'd be producing out of the same one, but then you'd have a separate bar down here. So it can be very complex.

Q. Mr. Johnson, does the isolated stacking -- would that explain the CC State 3 well, which produced a minimum amount of gas but was --

A. No, I don't think it would. I think the CC 3 well was a crevasse splay sand, or maybe a break in the levee at flood stage, and you just dump some sediments out there over a small area.

Q. Okay.

A. And that's probably what it was.

Now this is from Darrell James' article where they actually cored the Morrow section in here --

Q. Is this --

A. -- and have a description of it.

Q. -- Exhibit 39?

A. This is Exhibit Number 39.

Q. Okay.

A. And not only do they have a description of the -- well, they actually describe it over here, but they have a description here. They have a gamma-ray core that they run on the log to give you an idea how clean or how dirty these sands are. They also have the permeability or -- in the sands there. And they also have a porosity of this, to give you some idea of what the Morrow sands are like in these sand bars.

And as you start from top and go to bottom up here, you have a fine-grained sand that's well sorted, small-scale cross-bedding, right here in the very top, and you have a gamma-ray that's fairly clean in through here. The permeability in that is maybe .5 -- you go from .1 to 1 here, so maybe .5 in there -- and porosity of less than 10 percent.

Now the next thing you have in there is a dark gray shale through there. And you can see it's hot on the gamma-ray there, and you have little or no porosity or permeability in there. Again, this shale layer would isolate you vertically between the upper sands up here and these lower sands.

Now right below that gray shale there, you have a medium-grain improved bedding in there that you have a fairly decent gamma-ray on. Again, the permeability is not all that good, the porosity is not all that good.

But when you get to the large-scale cross-bedding and poorly bedded, very coarse-grain sands in through here, this interval right here, you get a lot of cross-bedding and stuff, you get a very clean, a very good gamma-ray in through here, your permeability is approaching 20 millidarcies, and the porosity is better than 10 percent in through there.

And then you grade down to a coarse sand that's poorly sorted, not nearly as clean a gamma-ray as you had. The permeability, again, is not very good, and the porosity is not very good, and then finally down here at the bottom you get into this black shale, coal, plant fragments, again, the swampy material that you have out there.

So there is a lot of variation vertically and laterally in these sandbodies, very heterogeneous, very compartmentalized.

This is from the Core Lab report -- again, that was done in 2004 -- that we all -- that both companies participated in?

Q. Is this Exhibit 40?

A. Exhibit 40. They state in here that the climate during the early Pennsylvanian was the primary driver of sea-level changes and that you had what Mr. Godsey was talking about yesterday, you had glacial ice accumulate. And because this glacial ice would accumulate, you would have ranges in sea level from 150 to 250 foot, from highstand to lowstand, and your shoreline would move approximately 20 to 30 miles in through here. So you have a -- what we used to call yo-yo tectonics through here, sea-level ups and downs.

But they also state that in addition to the climatic mechanism, tectonism in the Pedernal Highlands to the north of the study area probably influenced sediment influx into the Morrow rivers. And -- which makes it even more complex as far as the depositional system goes in through here, because you could be depositing finer-grain materials in your stream bed through there. You would have a little influx or minor tectonism in the highlands, you would have a bigger, maybe coarser, influx of sediment coming in. So you would have coarser grains, or a coarser sandbar overlying a finer-grain sandbar in there.

And again, it could have something to do with wet and dry seasons. You'd have more energy in the channel, swifter water flow. It would be able to carry a coarser-grain sediment in flood stage than it would just under normal flow or maybe dry conditions.

They state that fluid communication within fluvial channel deposits is controlled to a varying degree by sedimentology, that the depositional process is here, and that the communication in here -- This leads to internal heterogeneities, including shale drapes and abrupt textural changes. It may compartmentalize the reservoir.

They -- Go back one, please. You can see that they say that the processes here supplied sediment, influenced the depositional or sedimentary processes within the channel, creating a wide variety of bed forms that may erode, cross-cut or overlay one another. And again, this just makes it that much more difficult to work with. Very heterogeneous.

They also state that the fluvial reservoirs are the most abundant and important reservoir type in the middle and lower Morrow in northern Delaware Basin, and that the -- and they also state here that based on this study, they may most commonly be recognized by their well-log shapes there. They have a sharp base and a fining-upward character.

The fluvial channel reservoirs will be oriented parallel to depositional dip, and depositional dip is from the north to the south, and these fluvial channel reservoirs would be oriented parallel to that. So the reservoirs or the channels are from north to south.

Said these reservoirs and fluvial valleys that contain them broadly trend northwest to southeast in the western half of the Basin and become more north-south in the eastern half, which is exactly where we are and what we're dealing with here in the Osudo area and, as stated, becomes more north-to-south in the eastern half.

They also gave a photo of a couple of cores that they studied in this paper. And although you can't see too well here, again this is kind of like the description we looked a while ago. There's a lot of coarse-grained sand, you get some fine-grained sands mixed in with it, you get some coarse-grained sand, you get some cross-bedding in here, you'll get some fine-grained sands, you get some cross-bedding up here.

So you get a lot of mix and poorly sorted. If you drilled through this and you took a look at those samples in your cuttings there, you would see an assortment from fine to coarse and from rounded to -- well, probably -- maybe not rounded here, but it would be subrounded to angular in here, on -- so it's kind of a grab-bag of quartz grains?

Q. And this is Exhibit 41?

A. Yes. Due to the complexity of the Morrow, pressure data is of limited value when attempting to predict reservoir continuity over large areas. It can be helpful in limited situations when the data is reliable.

And again, remember, you're developing this on 320 acres with optional 160s, you have multiple sandbars in through here.

Next.

And this is from the West Texas Geological Society Symposium, 1999. Again, the Lou Mazzullo article. In this article he states that, In field extension studies, production histories and bottomhole pressure data (if available) of each Morrow well may be useful in determining pressure separation between zones in adjacent wells that were thought to be correlative. They can also be used to identify suspected permeability barriers that exist between closely spaced sandbodies that may actually reflect mis-correlated, pressure-separated sandbodies.

So you have to be careful using pressure data.

And just to summarize --

Q. Just a minute, Mr. Johnson. Before you summarize, let me show you what's been previously submitted as our Exhibits 43A, -B and -C.

A. Okay.

Q. What do these represent?

A. These maps, I believe, are the isopach maps that Mr. Godsey had on his three different sands there, his orange, blue and -- what was -- green sands that he shows an east-to-west -- that he claims shows an east-to-west depositional pattern in the way he contoured his net sand here.

I have taken his numbers and re-contoured his map here, and it's fairly easy to do, you can make a definite north-south trend out of each one of these, using his figures of net sand here.

So in summary -- and before I do summarize, I do want to say one thing. Nowhere in this book -- and like I said, it was a 2004 very in-depth study of the Morrow out here -- does it mention anything about sediments derived from the Central Basin Platform or Chert playing any kind of important part in Morrow sands.

And just to sum it up and close, Samson's structure map on top of the Morrow clastics is supported by the commercially published Geomap in the Osudo area. It's also supported by Mr. Charuk's map, structure map, in there.

The seismic line we have confirms Samson's structure map and shows a low which acted as a distribution trough for middle Morrow B sands.

Samson's isopach map of middle Morrow B sand compares favorably with the cumulative production map and the structure map.

All east-west cross-sections show little or no middle Morrow B sand correlation or continuity in an east-west direction.

Only the north-south cross-sections show any continuity of sand.

No sands on Chesapeake's 160-acre lease in the southwest quarter of Section 4.

That the published literature overwhelmingly supports Samson's geologic position.

That Morrow B quartz sands are not sourced from the Central Basin Platform to the east, therefore there's no east-to-west-trending sands.

Morrow B quartz sands are sourced from the Pedernal Uplift to the north and west and are transported south in the north-south-trending fluvial channels.

Sandbars are very complex, grading vertically and laterally with changes in porosity and permeability, which makes any correlation of sandbodies between the wells very speculative, even with pressure data, especially if you have multiple sandbars which may or may not be common to different wells.

The multiple sandbars in this are more correlative in a north-south direction.

And I'll leave you with that last shot of the Rio Grand, showing that multiple sandbars developed in that system there.

Q. So Mr. Johnson, is the 320-acre unit as proposed by Chesapeake necessary to protect correlative rights and prevent waste?

A. No, it's not.

Q. What is the best unit to protect correlative rights and prevent waste?

A. The best unit would be the east 320 acres.

Q. Standup 320?

A. The east -- yes, standup 320 acres, the southeast of Section 4.

MR. OLMSTEAD: Mr. Chairman, that concludes our direct case of Mr. Johnson.

I would move to introduce the exhibits he discussed. Because of all the substitutions, I guess I'd better list them, if that would be permissible.

CHAIRMAN FESMIRE: I think we need to list them for the record. I've lost count.

MR. OLMSTEAD: That would be Exhibit 1 through 13, 13A, 14, 15, 15A, 16 through 21, 22A, 23, 24A through

33A, 34A, B and C, 36A, 37 through 41, and 43A, B and C.

MR. KELLAHIN: No objection.

CHAIRMAN FESMIRE: There being no objection, Exhibits 1 through 13, 13A, 14, 15, 15A, 16 through 21, 22A, 23, 24A, 33A --

MR. OLMSTEAD: No, I'm sorry, 24A through 33A. So it would be 24A, 25A, 26A...

CHAIRMAN FESMIRE: You're right. 24A through 33A, 34A, B and C, 36A, and 37 through 41 will be admitted. Is that --

MR. OLMSTEAD: And 43A, B and C.

CHAIRMAN FESMIRE: 43A, B and C.

MR. OLMSTEAD: Yes, sir. And I apologize for all the confusion on that.

CHAIRMAN FESMIRE: As long as we've got them all in.

With that, we will adjourn until 2:15 and reconvene with the cross-examination of Mr. Johnson at that time.

MR. OLMSTEAD: Thank you.

(Thereupon, noon recess was taken at 12:58 p.m.)

(The following proceedings had at 2:10 p.m.)

CHAIRMAN FESMIRE: Let the record reflect that we're going back on the record in Causes Number 13,492 and Consolidated 13,493. The time is 2:10 p.m. on Friday, December 15th. Again, all three members of the Commissioner are present, therefore the quorum is here.

We were about to start the cross-examination of Mr. Johnson.

MR. KELLAHIN: I'm ready, Mr. Chairman.

CHAIRMAN FESMIRE: Okay, Mr. Kellahin, I guess the witness is yours.

CROSS-EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Johnson, would you please turn to your isopach which was Exhibit 24A? If you might put that up on the display, and if you'll look at a hard copy.

(Off the record)

Q. (By Mr. Kellahin) Am I correct in understanding, Mr. Johnson, that this version of your isopach is the most current version that you've prepared?

A. Yes, sir.

Q. And that in preparation for the earlier hearings we had and Exhibit 24 that predated this?

A. Yes, sir.

Q. Did you make changes to the two maps?

A. Yes, we did, updated this map compared to the other one.

Q. And prior to that, back in -- When was it? It was August of last year, of '05, you were the geologic witness for Samson at the Examiner Hearing that Mr. Jones and Mr. Brooks had?

A. I was.

Q. At that hearing did you use an isopach?

A. I believe so.

MR. KELLAHIN: If I may approach the witness to identify that isopach?

CHAIRMAN FESMIRE: You may, sir.

Q. (By Mr. Kellahin) Mr. Johnson, do you recognize what is marked as Chesapeake Rebuttal Exhibit A-1 --

A. I do.

Q. -- as the Exhibit C that you talked from at the Examiner Hearing?

A. Yes.

Q. If memory serves me right, Mr. Johnson, you in fact did not prepare Exhibit -- what was Samson Exhibit C at the Examiner Hearing? That was presented -- that was prepared by another geologist?

A. This?

Q. Yes, sir.

A. No, I believe it was prepared by me.

Q. Oh, you prepared this one?

A. It was -- it had -- there was a -- and I think I stated earlier, there was another geologist working this area, and when he left the company I ended up inheriting this, so it's a partial work of both of us. I ended up going in here and taking over where he had left off --

Q. Okay --

A. so...

Q. -- in these three different versions of the isopach, my question, sir, have you calculated the net feet of clean sand in the same way for each wellbore?

A. Yes, I tried to.

Q. Was your calculation one based where you took the gamma-ray log with a cross-plot porosity of greater than 6 percent and consistently using a 50-percent cutoff?

A. Yes.

Q. And that was done for all three of these displays?

A. Well, I know it was done here for the last one. Like I said, some of this work was Ralph's. I'm not sure exactly what he did. But -- so possibly not.

Q. Well, let's work with the most recent one --

A. Okay.

Q. -- which is 25A. This one, then, for all the calculations that you have made, you used that methodology with a 50-percent cutoff?

A. On 24A?

Q. Yeah.

A. Yes.

Q. So when you took Mr. Godsey's isopach structure map, which is marked as Samson Exhibit 43A, and took his data points and showed that you could take his data points and re-interpret it to be more acceptable to how you have mapped the sand --

A. Yes, I interpreted it could be a north-south orientation.

Q. In making this change for this map, were you using Mr. Godsey's method for calculating net feet of pay, or did you simply use your numbers?

A. I simply used Mr. Godsey's numbers.

Q. And correspondingly, I assume, you would agree that Mr. Godsey could take your numbers and recontour your map so that they correspond to his map?

A. Possibly.

Q. When we look at Exhibit 24A, you've got a series of cross-sections linking certain of these wells together, and I would like to see -- even though you haven't put together a specific cross-section, I want to find out if, in fact, you believe certain pairs of wells are in the same channel reservoir that we're talking about.

When we look at your map and -- Let me find the wells. I want to look down in Section 16. I think we're right here.

A. Okay.

Q. Section 16, that should be the PQ Osudo well. Do you see that well?

A. All right.

Q. There's not a line of cross-section to it, but when we go over here into the adjoining section --

A. Are you talking about the well in the northeast quarter of Section 16?

Q. Yes, sir, and then I want to look at the southwest quarter of 10.

A. Okay.

Q. There's not a line of cross-section between those two.

A. No, sir, I was trying to do straight east-west --

Q. But in fact, there's no doubt in your mind that they are, in fact, in the same reservoir?

A. I wouldn't say they're in the same reservoir, no. I think that would be highly improbable. They're probably in the same fluvial system.

Q. So what then are you mapping here with this channel?

A. Sands that are greater than 6 percent, are equal to porosity, and 50 API units or less gamma-ray.

Q. When we find the KF State 4 up here, do you find that it's in the same reservoir as the Osudo 9?

A. I doubt that it's in the same reservoir. It's in the same channel system, but I would doubt that it's in the same reservoir.

Q. So what is accomplished by the isopach that's oriented north-south?

A. Well, you have a sand thick, and in order to stay in that channel I think you'd want to stay on trend and drill in the projected direction of that sand thick.

If you remember the north-south cross-section -- could we bring that up? -- which was basically, I think, trying to -- I was trying to show that you were in that sand package, the channel package there, and those are probably individual sands, but all those sands are correlative as a middle Morrow B.

Q. All right, let's go back to Exhibit 24A.

A. Right here, this would be the north to south. Now if you moved one quarter mile west, that other north-south, you'll see there's sands in there at all. So what I'm saying is, if you'll stay in this general orientation of thick sand here, that would be the place to find more sands. And as Mr. Charuk found out, if you're a quarter of a mile or so away, you can be out of the channel, limited reservoir.

Q. Let's go back to Exhibit 24A then.

A. Okay.

Q. When you're mapping the accumulated thickness of

this Morrow channel, you have a distribution of sand thickness that goes to the east of the paleo-high --
A. Yes.
Q. -- see where I'm pointing?
A. Yes.
Q. At the section line, the township line separates the two townships. At this point, going north within the trough of this channel, how far north do we have to go before we get to a control point?
A. Oh, probably about three miles.
Q. If I'm looking at your contour --
A. I'm guessing that -- I think this is a control point right here.
Q. If I'm looking at your contour lines --
A. Well, wait a minute. No, I don't -- Are you talking about a control point that has sand in it, or are you just talking about a control point for the Morrow? Because --
Q. What I'm looking for is a control point for this thickness of sand, this trough and its thickness.
A. All right.
Q. I have to go --
A. Well --
Q. -- all the way to here, right?
A. -- I believe there's some wells here on the east

-- or on this old paleo-high that the Morrow section had thinned and there was no sands in there, so that was a zero.

But if you move to these two wells right up here at the very top of the map, then those wells were productive, I believe, out of the middle Morrow B sands.

Q. When we look at this point here, at the intersection of these four sections, that is within a point of thickness that's greater than 40 feet? That's your contouring method, is it not?

A. Yes, I think I used 20-foot contours.

Q. And for this little pod there, in fact, is no control point, is there?

A. No.

Q. When I look just to the north, at the north end of Section 4, that is a zero line, is it not?

A. I believe so.

Q. And then the next line is the 20-foot contour line?

A. Yes.

Q. Can I honor the data that you have and simply roll the 20-foot line over and the zero line over and close off this trough so it stops right about at this intersection between the two townships?

A. You could.

Q. On the eastern side of the trough, you've got a zero line that you have got some control for. I see the control points.

A. Where now?

Q. The eastern side of this isopach line has got a zero line, and the zero line continues along that eastern margin, right?

A. Okay.

Q. When we go to the western side, how far do we have to go to find the zero line?

A. Well, if I may explain, the Morrow pinches out coming up on the Central Basin Platform, so not only are you pinching out the middle Morrow B, you're pinching out the entire Morrow package.

But because you have these fluvial channels through here in a north-south direction, during flood stage a levee breaks, you're going to have sands over these levees, natural levees that are built.

And so you're going to deposit some amounts of sand out here, as in the CC 3 well up here. So you may have 4 to 6-percent sand that is non-effective, would be non-reservoir, but it might be 6-percent porosity or better, and it might have a 50-percent API, or less, cutoff. So for the most part out here, you're going to have some overbank deposits.

If you will remember the picture from the Core Lab study where it talks about the different reservoirs in there, you remember the channel, and it showed the splay sands on either side of the channel there. I think that's what you're looking at here.

So no, there wouldn't be a zero out there. You might have 2 foot of sand, you might have 4 foot of sand, you might have 6 foot of sand. But -- It's going to be basically ineffective, but there would be a minor amount of sand out there in those wells.

Would you go back to --

Q. Let's go back to 24A and look at some of your mapping decisions that you made. There's an oriented pod that -- in Section 17. Section 17 -- I think this is 17, and I'm looking for your justification for your contouring and putting this thickness of sand within the area I'm describing with my highlighter. It looks to me like the only control point you have for that thickness is in Section 17 where you have 25 feet.

A. That's correct, but on either side of the 25 foot there you have, I believe, 16 feet and 8 or 10 foot. So you do have a 25-foot thick sand in between those wells. And some of the wells -- as you go to the north up there, you also have a 16, a 10 and an 8. So to me it's very possible that if you're in the middle of that channel you could have 20-plus feet of sand.

Q. When we go down into Section 18 and look over in Section 13, you've got a well here that's got 32 feet.

A. Excuse me?

Q. Yes, sir, if you --

A. Oh, 18 over to 13? Okay.

Q. Yeah, I mean 13. And in 13 there's a control point here with 32 feet.

A. Yes.

Q. And if I go east I pick up a well with 56 feet. And then if I come back south into 13 again and pick up another control point, I've got a well in here with 40 feet.

With those kind of control points here, how come you have an absence of sand between the two pods?

A. Well, there's several wells north of this general area. If you look up on the east side of Section 1, you have a well there with 12 foot in it. In the middle of Section 1 there's a well with 14 foot. In the southeast of Section 1, up there to the north, there's 14 foot.

If you look in the west part of Section 20, there's a well there with 14 foot.

Down in the southern part of Section 8 there's a well with 12 foot and 8 foot.

So to me, that's one of those interfluvial divides.

Q. When we look at the relationship of the KF State well in 4 and move over to the CC 3 --

A. Yes, sir.

Q. Within that width -- of approximately what, a half mile? -- that is where you put your point of greatest thickness for this channel that runs north-south?

A. Yes.

Q. It fits in there?

A. Yes.

Q. And as we follow that north, we get up to this point where you have the Central Basin Platform to the east, and you have this paleo-high which you say is a closed structure --

A. Yes.

Q. -- that affects having this -- what I will call the eastern channel.

A. Yes.

Q. Could you go to the structure map, which is 25A, I believe it is?

A. May I use this --

Q. Yes.

A. -- it's got the structure map --

Q. Yeah --

A. -- on it?

Q. -- there's one right there.

A. Okay.

Q. When you go to the north, is the -- I'm following the red arrows that go down and feed sand volume into the eastern channel. Do you see where my pointer is?

A. Yes.

Q. Is there a control point in the structure or in the isopach that tells you that this kind of event occurs where the distribution stream is split into a western and an eastern portion?

A. Probably not. The -- What I was relying on was the field study done by the Roswell Geological Society, where they said those sands were deposited along the western flank of that structure.

It would be pretty easy if you have a north-south source and you have a low trough in there, feed it right down. We do have the seismic line across there, that shows that trough in position there at the north side of Section 4. And as a matter of fact, we believe it's strong enough that we do have a location. And if you would bear with me a month or two here, we'll have a point up there in the southeast quarter of Section 32.

Q. In order to test your theory, wouldn't a better control point be to put a well right here in the eastern 160 acres of Section 4? That would be definitive as to

which way to orient the spacing unit, would it not?
A. Sure.
Q. This paleo-high, you have concluded, is a closed structure?
A. Yes.
Q. Is your conclusions about the distribution of the sand to the eastern trough predicated on the existence of this paleo-high as a closed structure?
A. No, not necessarily. It could have probably been a nose in there, possibly.
Q. So you disagree with me, if this is not here as a closed structure, that you need this as an essential part of your conclusion?
A. Oh, you need a structure there, yes, you need a high point there.
Q. And without that, then, you can't funnel this sand into this eastern channel?
A. Oh, I think you probably could.
Q. When we look at the western channel and follow the sand distribution and start moving down that line of arrows, and we get to the last one that you have projected on the exhibit, can this line also continue and move down so it comes into the lowest portion of the structure and feeds into Section 4 and down to the sections to the south?
A. It possibly could, but you do have control there

on the south end. And if you will remember the old field study done by the Roswell Geological society in here, they show a zero line through there.

Q. Is this the zero line?

A. On their study?

Q. On your study. If I'm looking at your structure map, trying to find a place where this sand distribution is going to follow a zero --

A. Well, actually I think that's 20 foot. There may be some, again, overbank deposits in there. You may have 4 to 6 foot of sand around in there where you'd deposit some of that tight, thin sands.

Q. Is there enough velocity to the sand migration in the western channel that it will come down and it will move around the southern base of the paleo-high and feed into Section 4?

A. That's a possibility. But again, that would be north-to-south stream orientation, wouldn't it?

Q. Let's talk about the seismic line. If you'll pull out that display that had the seismic data on it. I believe it's Exhibit 23.

MS. RICKEY: Unfortunately, the slides aren't in order. It's not that easy to find.

MR. KELLAHIN: So you're like ours.

Q. (By Mr. Kellahin) This line through here, this log line, well log --

A. Yes, that synthetic seismogram there.

Q. Yeah, let's go -- and maybe it's easier to do if you look at Exhibit 24A, that control point. I'm trying to hold it still. It's right about in here, isn't it?

A. Yes, I think so, right in there.

Q. So that's the projection of that wellbore down through that seismic line?

A. Correct.

Q. And we're looking at an east-west seismic line that is going to -- in my own simple way -- split off the southern side, and I'm looking north with the west on the left and the east on the right?

A. Correct.

Q. I've got a slice of the earth. When I go down on the -- When I go across on the top, I'm looking at feet from the control point in each direction, am I not? Or have I misread that?

A. I don't think it's feet. It may be time. Usually seismic is in time.

Q. And that was going to be my question, this is a time line as opposed to footage?

A. Yes, I think so.

Q. Do you have a display where you've taken the time line and converted it into a conventional structural display?

A. No, I haven't.

Q. So help us understand. If I'm looking for this paleo-high, the structural closure of the paleo-high, and I'm following along on the township line that cuts across that -- and again, I'm looking at Exhibit 24A -- there's a thickness here, and I guess this represents the southern end of the paleo-high?

A. Yes.

Q. Across that interval, show me on this display where we see the eastern edge of the paleo-high.

A. I think the eastern edge of the paleo-high would be right here.

Q. Can you call that out so that the record will reflect where you put the pointer?

A. Call it out as such where we show the depositional trough there, you mean?

Q. I think that would be helpful.

A. Okay. Yes, the paleo-high has eastern roll, and it rolls into a low there. That would be the eastern edge of the paleo-high.

Q. So as we take the paleo-high and roll to the west, it's got a little crown to it, does it not? Am I saying that properly?

A. It rolls from east to west, so if that's --

Q. Okay.
A. -- the crown you're talking about, yes.
Q. And as we take the crown and go to the west, where do we find the western margin of the paleo-high?
A. At the fault, which I believe I have right here on the --
Q. On Exhibit --
A. -- structure map.
Q. -- 25A?
A. Yes, on the structure map right here would be the fault. The eastern edge of the paleo high would be approximately right here, and I can't read that shot point on there, but --
Q. Okay, so -- but I see this line here, this red line. Is that the western edge of the paleo-high?
A. Yes.
Q. And that corresponds to the line of fault here?
A. Yes, to the north-south fault right here. This would be the western edge of that paleo-high.
Q. So your western channel is coming through a portion of the paleo-high, as opposed to going west of the paleo-high.
A. At the time of deposition --
Q. Uh-huh.
A. -- these were very low-relief features. There

was a high there. Since that time we've had all of this uplift, all of the fault movement, and it's a lot more structure now than there was at time of deposition.

Q. Does that explain why the wells that have produced tremendous quantities of gas that are higher on this paleo-high? There's some wells in here that have produced a lot of gas, are there not?

A. Yes. I believe, like I said, the field study stated that production was on the west flank of the strong structural.

Q. All right, come back to the seismic line with me and help me find this Morrow -- this -- the Morrow is shaded in this -- This looks like a muddy orange.

A. Correct.

Q. How do you find the top and the bottom of that Morrow on a seismic line?

A. We did it -- you pick the top and the bottom on a log. I think in this case it was a sonic log. So you know where those points are in footage on the log. You take that log and you convert it into a synthetic seismogram where you have time, and then you fit that time into the time on the seismic line. And you have those reflections in there, you have peaks and troughs that correspond to the formation tops, and you try to fit that to the peaks and troughs on the seismic line.

Q. Are you a geophysicist?
A. I am not.
Q. Normally a seismic line would be used to interpret structural position?
A. No, not necessarily. There's a lot of stratigraphic information that can be gained from seismic lines.
Q. On this seismic line you're attempting to infer sand deposition and thickness of the Morrow?
A. Yes, but also stratigraphically you're showing a pinchout of the Morrow section back to the east there. So you're showing a little of both here, you have structure and stratigraphic.
But basically, yes, it's a structure. It pretty much confirms the Geomap, paleo-high in there, my map, and I think Lynn Charuk's map, so...
Q. Would you pull up for me your line of cross-section? You have a line of cross-section that is Exhibit EW 3, I think it is. It's the southern one that picks up the PQ Osudo and the WEK well. Show me on this exhibit, Mr. Johnson, what you are mapping, then, when I get to the isopach exhibit, 24A?
A. Well, I think probably these sands here, possibly these sands here, I'd have to go back and look and see.
Q. So when I look at the State 15 well and I'm

looking at this green-shaded area on this log, this is the target thickness that you're mapping on the isopach that's represented on Exhibit 24A?

A. Yes.

Q. And I'm going to continue over and look for it in the Samson PQ Osudo State well, and I don't see it shaded. Have I misunderstood?

A. No, I don't believe that that particular sand is present in the Samson PQ well.

Q. So when I go back to the isopach, Exhibit 24A, I find on your isopach you've got 30 feet on this package for the WEK well --

A. Where now?

Q. -- I'm sorry, I misspoke. When I go down and look at the State 15, which is this well, 15, this thickness here that you've mapped on the cross-section --

A. Yes.

Q. -- corresponds to the 4 feet that you see on the isopach?

A. Yes.

Q. And then as I move over into the -- go all the way over here to the -- I'm misunderstanding the display, Mr. Johnson. We need to go up and look at Number 2, the Cross-Section 2. I've got the wrong cross-section. Let's look at Cross-Section 2, please.

Let me try again. When I'm looking at the isopach and I pick up the WEK well, which is the center well on the Exhibit 30A, and I come down and I find the two areas shaded in green, are these the thicknesses that you're mapping on your isopach that gave you the 30 feet?

A. Yes, I think so.

Q. And then as I go over to the west and I pick up the PQ Osudo State well, there's another green-shaded area. Is this the area that you're calculating to have a net thickness of 34 feet?

A. I believe so.

Q. And your argument when we look at this channel and its varying composition is that you can find a total package -- for example, in the State WEK well -- that has a disconnect between them and still has a total footage, and come over here and find a thickness in the PQ State well, and you've got different pods --

A. Yes.

Q. -- within your sand deposition?

A. Different sandbodies, yes.

Q. What is your reason for not connecting the two green pods in these two wells?

A. Oh, a couple of things I think I took into consideration. One of them is the position of the sandbody to the marker here, the top of the lower Morrow A. If there had been another sand over here in that same stratigraphic position, I would have probably connected those.

But you can see the position of this sand as to the top of the lower A. And all of this stuff is deposited from the bottom up, so I think that would be...

Also one of the other things that I looked at in here is, this was a heck of a well here. I think it was 6 1/2 BCF, almost. This well over here was 3/4 of a BCF. So -- not being an engineer, but it looks to me like if those had been connected, there might have been a little better production out of the well in the west.

Q. Let's look at your isopach, Exhibit 24A, in relation to the north-south cross-section line. I think it's Cross-Section Line Number 1.

A. All right, now what are we --

Q. I'm looking for Cross-Section Line 1, it's --

A. Oh, the north-south cross-section line --

Q. -- the north-south line.

A. -- okay.

Q. The southern point is a control point down in Section 21.

A. Correct.

Q. I want to move to the -- I guess it's going to be your second well on that log, you're going to pick up the

W- -- the PQ Osudo well in 16.

A. Okay, the second well, the PQ?

Q. Can we display the cross-section on the screen? Is the second well -- No, I'm going the wrong way. The second one from the right. This should be the PQ Osudo well, am I correct?

A. Correct.

Q. And when you go down, you're going to find a thickness total of 34 feet in that well for the isopached interval?

A. Oh, yes.

Q. Again, then, if I'm looking at the cross-section, which is Exhibit 34A, I am following the lines that have been shaded in in the green. Am I looking at the right place? The green shading?

A. Yeah, the yellow shading there?

Q. Is that yellow?

A. It should be, yes.

Q. It looks green to me.

A. Okay.

Q. We'll call it yellow. Starting with the PQ Osudo well, which is the second one from the right, and then moving north, the next well I pick up is the Hunger Buster well, correct?

A. Correct.

Q. And this is the well where you count 26 feet of pay?
A. 26 foot of net sand.
Q. Net sand. This is the one where you and Mr. Godsey have the disagreement?
A. Yeah.
Q. He's got 11 feet?
A. There's a subtle difference between net pay and net sand, but yes, this should be net sand.
Q. And geologically, then, you're linking these two wells in the same sand channel at this interval?
A. Yes, I think these are probably not the same sandbodies, but they are sandbodies in the same channel.
Q. And then we move from the Hunger Buster up into the Osudo 9 well, which is this well, right?
A. Correct.
Q. And from the Osudo 9, then, you move up into the KF State 4?
A. Yes.
Q. Let's examine the last of the cross-sections I'd like to talk to you about. It's the top one, and I don't have a number associated with it.
A. The top --
Q. It's the one --
A. -- west to east?

Q. East to -- Yeah, west to east, and --

A. I think that's the northwest-southeast cross-section.

Q. That's the one I see. It picks up the KF State well and the CC 3.

Looking at Exhibit 33A, looking at the far right on the southeast corner, the first log is the CC 3, correct?

A. Correct.

Q. And then the next log over is going to be the KF State 4, correct?

A. Correct.

Q. You've chosen not to link this Morrow B clastic together, have you not?

A. That's correct. Could have dashed the lines, but...

Q. So summarize, then, for me, when we look at the isopach and I look at Exhibit 24A, and I look at what you're mapping as the isopach for this thickness of Morrow B clastic. What am I seeing?

A. You're seeing sandbodies in the middle Morrow B channel, and with greater than or equal to 6-percent porosity and 50-percent or less API gamma-ray, with sands that occur in that B interval.

Q. And your conclusion for how these things are oriented is based upon your opinion that they're sourced from the Pedernales Uplift and not the Central Basin Platform?

A. No, if you take a look at the figures here and you come up with your net sand numbers, then you have a distinct north-south orientation or thickness of the sand in there.

Like I said, if you would take a look at the north-south cross-section that's a quarter of a mile west of this north-south cross-section, just a quarter of a mile away, there are little or no sands present in that. Most of the sands present are just overbank deposits. So you have little or no sand there, little or no sand to the east.

So this is the only thick sands you have, is that north-south orientation here.

Q. So come back and show me on Exhibit 24A -- I think that's 25. Let's go to the isopach, 24A.

A. I'm sorry, where are we now?

Q. I'm looking at the isopach that's 24A.

A. Okay.

Q. And I'm looking down here, down in Section 15 and 16.

A. Okay.

Q. And when I look at the WEK well with 30 feet and move to the west, into Section 16, for the PQ Osudo well and it's got 34 feet, I'm -- not the same package that's oriented east-west, together in that fashion?

A. No, sir, I think we just looked at that cross-section that -- Those are probably not the same sands. There are sands that occur in that middle Morrow B, and it just so happens that the well in Section 16 is the well that had 34 foot of sand, made 3/4 of a BCF.

The well in the northwest part of Section 15, that Amerada well, made 6 1/2 BCF. Those both have thick sand packages in them, but I don't believe that they are the same sands. They're different sands in this system.

Q. Have you attempted to do what Mr. Godsey did, and that was to take these individual components of the Morrow middle and subdivide them and map them individually?

A. I have not.

Q. He did?

A. (Nods)

MR. KELLAHIN: No further questions.

CHAIRMAN FESMIRE: Mr. Hall, did you have any questions of this witness?

MR. OLMSTEAD: Oh, I'm sorry.

CHAIRMAN FESMIRE: I'll take that as a no. Mr. Olmstead?

MR. OLMSTEAD: Just a couple.

REDIRECT EXAMINATION

BY MR. OLMSTEAD:

Q. Mr. Johnson, your seismic line, Exhibit 23, and isopach map, Exhibit 24A, those represent the structure as it exists now, correct?

A. Correct.

Q. Not at depositional time?

A. No.

Q. Let's -- Can we pull up Exhibit 34A, the north-south Cross-Section Number 1 that Mr. Kellahin was asking you about? Okay, and that runs -- If I'm correct, does that run through the east side of Section 4, through the Samson acreage?

A. I believe it does.

Q. And it's your opinion that you've got correlative sands, middle B sands, running north and south through that cross-section?

A. Yes.

Q. Let's go ahead and pull up Exhibit 34B. Now what is Exhibit 34B?

A. 34B is the north-south cross-section immediately -- maybe a quarter of a mile west of the wells that are due west of the other north-south Cross-Section 1.

Q. And does this cross-section run through the Chesapeake acreage, the southwest quarter of Section 4?

A. Yes, it does.

Q. And what does this cross-section indicate?

A. It indicates that there are nothing but probably overbank deposits in the western part of Section 4.

Q. So in other words, likely no fluvial sands, no Morrow middle B sands?

A. Correct.

MR. OLMSTEAD: That's all my questions.

CHAIRMAN FESMIRE: Commissioner Bailey?

EXAMINATION

BY COMMISSIONER BAILEY:

Q. The seismic line --

A. Yes, ma'am.

Q. -- if you could bring that one up, Exhibit 23, you showed the trough line to the east of the reference well?

A. East of the --

Q. -- reference well, the well that you have shown up there.

A. Yes.

Q. Okay, you're showing the trough line to the east of it?

A. Are you talking about the well that we have the synthetic seismogram on?

Q. Yes.

A. Yes.
Q. The only well up there.
A. Yes.
Q. And you have a trough that you're showing -- that you've indicated there on the seismic line?
A. Yes, right here.
Q. According to your maps, shouldn't we see trough lines to the west also?
A. Well, you --
Q. Could you point any of them out to me?
A. This row here would be a low. Now like I said, the throw -- you didn't have this much throw on this fault at the time of deposition. I believe this positive area -- this positive feature was here, and you were rolling and dipping to the west here, which I believe would have been guidance for around this structure here. So you are moving downdip to the west, on the west side of this feature.
Q. I'm assuming that you also had seismic line that continued to the west, but you didn't show them to us here?
A. I'm not sure how far west this seismic line does go. I think I have got in my file here -- I can try to dig through some boxes and find --
Q. Well, I'm just looking for evidence of troughs to the west of this well, by looking at your seismic lines.
A. Well, if you look right here, on the west side of

this fault, on the downthrown side, you see a trough developed right here in response to this fault. You're downthrown, and then you come back updip over here. So you're looking at a trough on the downthrown side of this fault. I feel it's very similar to being on the downthrown side of that fault there, where we have the trough marked.

Q. Yes, but couldn't that be a factor from the faulting, not from the trough that would have been in existence during Morrow time?

A. I think the faulting here was in place. It was the initial faulting in here. But I don't believe that there was that much movement on those faults. As stated in a couple of the papers, Mazzullo, I believe, and Denise Coker, she mentions the fact that there were faults in the system here, and that there had been some minor faulting between the two major faults that helped guide the deposition through here.

Q. The Core report also talks about many changes in sea level in this area.

A. Yes.

Q. At time, the Central Basin Platform was covered, at times it would not have been covered by the seawater; is that not right?

A. It's a relative thing, if you will. It depends on -- If you're dropping sea level -- in the report there I believe it said maybe 150 to 200 foot. If the Central Basin Platform was 200 foot below sea level at that time and you drop sea level 200 foot, you would be at sea level. So it's going to be a relative thing in here.

If Central Basin Platform was 200 foot below sea level and you drop sea level 100 foot, you're still 100 foot below sea level. If the Central Basin Platform is at sea level and you drop sea level 200 foot, then yes, you'd have 200 foot of the proto- -- whatever piece it might be of the Central Basin Platform exposed.

Q. But we are speculating as to the height of the Central Basin Platform above or below sea level at any time during this period of fluctuating sea levels. The braided stream deposition that you're showing as your belief for the area would have been deposition during times of lower sea level, because these are terrestrial streams that you're talking about, right?

A. Right, you would have -- at a lowstand you would have streams farther south. If you had highstand or a rise in sea level, you would move that shoreline to the north, and you would probably bury those stream deposits under bay or esturine or swamp deposits.

Q. Which helps explain the shales that we're seeing in the logs?

A. Right. And then if you should happen to drop that sea level again and you extend that shoreline farther south, you would probably incise down into the previously deposited fluvial systems. And so you could have stacked systems on one another by oscillations of the sea level.

Q. But if we're talking about lands that are above sea level, receiving sands from the north through these braided stream systems, I'm trying to understand what's happening off to the east, if we have a platform that is any kind of a height above sea level or not.

A. Well, according to the literature now, the combined study, the New Mexico Bureau of Mines, Mineral Resources, and the Bureau of Economic Geology in Texas, the earliest sediment of Pennsylvanian age in the Midland Basin are Atoka, and those are bioclastic shales and some carbonates.

So according to their idea there, those -- you probably didn't have uplift of the Central Basin Platform until Atoka time to where you could erode those and deposit those as sheetlike deposits out into the Midland Basin.

Now if you're thinking about the Central Basin Platform being at sea level and you drop sea level 200 foot, say, what kind of a deposit would you have then? Well, it would probably be like your mountains around here now: You have alluvial fans. You have the mountains that are uplifted at a pretty high elevation, you erode those, and you have your alluvial fans there at the foot of the mountain to the base of the mountains.

And of course, this would be close to the ocean, so if you think of something maybe like the mountains over in the Mediterranean or so where you'd have a fan delta, is what the call that, and you erode those deposits from the mountains, or however high it would be in through there -- We used to call that trash-basket geology, because you would dump everything eroded right there. You would have that far of a depositional trend there, or -- That's how far you would transport it to deposit. And so you're dumping boulders, cobbles, pebbles, sand, clay, everything. It's just a junk pile right there.

The farther you transport your sediment, the more you winnow it and clean it up and sort it. So if the Central Basin Platform was at sea level and you dropped it 200 foot, then you would expect a fan delta or something of that sort to be along the edge of the Central Basin Platform, or I would, if it was a high stand.

Q. With possibly minor drainages into the --

A. Yes.

Q. -- river systems?

A. Uh-huh.

Q. We've heard discussion about the lithology of the Central Basin Platform, but we haven't heard any discussion about the lithology of the two sources, the Matador Arch and the Pedernal Uplift, as contributors to this river system. Can you give me a short description?

A. Well, all I know is, they talk about the granitic highlands, and they mention that there's thousands of square miles of granite exposed, and erosure -- erosion, to erosion up here. And they say granite and granitic gneisses. I am sure that there are several different -- I'm not sure it's just one nice granite batholith of the same chemical composition was exposed at that particular time. There's probably a mixture of different igneous rocks in there.

But if I remember my old mineralogy again, it seemed like granite was maybe a 25 -- was composed maybe of 25-percent quartz, maybe 50 percent orthoclase feldspar, and then the other 25 percent would be plagioclase feldspar and some of the dark mafic minerals. And I know the compositions change with the different granites around, but I think that's probably what you're looking at there.

If you look at the samples in the cores and stuff, there will be a lot of clays and things. And that's one of the things about damaging the Morrow up here, and those clays are from the degraded feldspar class that's in the sands. So you have that same mineral assemblage in the sand that you do, basically, from your granitic makeup, up there.

Q. We're looking at macroscosm and microcosm in this case. Can you just briefly talk about the Morrow pools to the north? Are they linear? Are they north-south? Are they east-west?

A. The Morrow pools --

Q. Yes.

A. -- to the north? As far as I know, they're north-south. I think if you look at the little production map over here --

MR. OLMSTEAD: Is that Exhibit 8?

THE WITNESS: Yes, Exhibit 8. The blue in here is Pennsylvanian or Morrow. I think you see a distinct north-south trend here on the production map.

COMMISSIONER BAILEY: Thank you, that's all I have.

CHAIRMAN FESMIRE: Commissioner Olson?

EXAMINATION

BY COMMISSIONER OLSON:

Q. I just had a question. I guess if we -- if the Central Basin Platform is limiting the migration of any of the deposition to the east, how high above the elevation of Morrow deposition was the Central Basin when this was occurring?

A. I don't think it would have to be very high. I think it acted more as a baffle, and it probably didn't even have to be exposed, you know. You're talking about the sediments coming across the Delaware and into the Midland Basin?

Q. Right.

A. Yeah. I think, again, it was just probably a very low-relief, swampy area like the picture showed, kind of like Florida. Any low-relief positive feature would be enough to direct those stream channels north-south parallel to your structure.

And I think it's like what Mazzullo said in there, that it's more of a guide and influenced later deposition than it had on -- as a source for deposition. So I don't think you needed a very large structure at all.

Like I said, you think of the Gulf Coast these days, you've got some salt domes down there that have thousands of foot relief, but you get them to the surface and it's only very minor. So, you know, maybe 30 foot or something, which would be gigantic down there on the Gulf Coast.

And also, you're talking about the faults. If you think maybe of Houston down there, there's a lot of faulting on the Gulf Coast down there, and if you go to some parts of Houston, you go down there and look, and the curbs will be offset, sidewalks and curbs will be offset a little bit. So there are -- there is a little bit of movement, but -- You know, basically Houston is down there, and it's flat as a pancake in through there.

So I think there was some minor movement on those faults, just enough to orient your deposition.

COMMISSIONER OLSON: That's all the questions I have.

EXAMINATION

BY CHAIRMAN FESMIRE:

Q. Mr. Johnson, you brought up something that I'm remembering now about the Morrow. The clays in the Morrow are terribly water-sensitive, aren't they?

A. Yes, they are.

Q. And you have to be very, very careful when you drill it and you frac it?

A. Yes, you do. I think most of the studies, you have to have at least 2-percent KCl or better, or you will damage those clays. And again, those clays are formed by the degradation of the feldspars that are present at the time of deposition, but they will decay over time.

Q. Okay. And playing with something Commissioner Bailey said, I don't think -- and if they are, I missed it, but I don't think Chesapeake is arguing that the general trend of the Morrow is not north-south. Do you understand the argument to be that it's completely an east-west-trending reservoir system?

A. I find it hard to believe that all of this is -- all your channels are trending north-south except for this one little area right here where they are represented and where they're looking. All of a sudden, that's just 90 degrees to everything else.

Q. Okay. But, you know, barring the questions that we had, notwithstanding the questions that we've had about source on the Central Basin Platform, even Dr. Mazzullo in his paper indicated that some of the deposits in the Morrow came from the Central Basin Platform, didn't he?

A. He said sediments, and again you're talking about a multitude of things. Shale can be a sediment. Limestone, eroded limestone, can be a sediment. And what he's talking about, at the time of the deposition on the Central Basin Platform you had Barnett shale, you had Mississippian limestone, I think you saw on the logs where you had over 3000 foot of Paleozoic cover over the Precambrian granite, so...

Q. But I think that misses the point. Isn't the point that those sediments will be coming down at a 90-degree angle and would be entering the system at a 90-degree angle and would have localized 90-degree channels --

A. Only if you had enough relief on the Central Basin Platform to get it there. And I think the bulk of the literature will show that you had little or no relief through Morrowan time to cause that to happen.

Q. Okay, but that's not what Dr. Mazzullo said. Doesn't he say in one of his -- the description of one of his figures, Small arrows to note limited sources of sediments from the Central Basin Platform? So he was anticipating in his writings that some of the Morrowan sands, the Morrowan reservoir sands, were coming off the platform, wasn't he?

A. No, sir, not at all.

Q. No?

A. No. If you will note the article in there, he talks about detrital -- clastics detrital, and I think he's making the distinction there that the clastic detrital is from the Pedernal Uplift and the Matador Uplift to the north. He's -- makes that distinction between clastic detrital and sediments.

And yeah, there could be some sediments coming off the Central Basin Platform. Again, it would be Barnett shale and Mississippian limestone. And if you want to enter those into the system, that's fine. But we're talking about middle Morrow B sands.

So no, there is no sand sediments coming off the Central Basin Platform.

Q. But these channels, these highways or -- okay, let's say side roads, as opposed to the right-angle highways for the Pedernales and the Matador Arch sediments, you've got some sediments, no matter what you call them, coming into the system. And then with the raising and the lowering of the sea level, they're getting worked into that system on a localized basis. Is that possible?

A. I don't know, I think you lost me.

Q. Okay. Dr. Mazzullo -- You'll agree with me that he at least anticipated some parts of the sediments that would become the Morrow reservoir are --

A. No, sir, I don't think so --

Q. -- not --

A. -- I don't think he's talking about sediments for the Morrow reservoir at all.

Q. The sediments --

A. I think he's talking about some shales and maybe some limes that might get mixed in through there, but I don't -- I think on that article he says that there is detrital clastics from the north. I think he makes that distinction for a reason, from the north up there, that the sands, the quartz grains that comprise these Morrow sands, is from the Matador up there.

There might be some sediments, namely Barnett shale or lower Mississippian lime, that might be shed off of the Central Basin Platform at a low stand of sea level, and you can actually erode that. But no, sir, I do not think at all that there were any sands. I don't think he had that in mind either.

Q. Okay. And I guess it would disturb you if I read his -- at least that one blurb as indicating that he anticipated some of the sediments in that reservoir to be coming off of the Central Basin Platform.

A. Go ahead.

CHAIRMAN FESMIRE: Okay, I will.

Mr. Gallegos, did you have any -- or, I'm sorry, Mr. Olmstead, did you have any further questions?

MR. OLMSTEAD: Just one, prompted by the Commissioners' questions.

FURTHER EXAMINATION

BY MR. OLMSTEAD:

Q. Mr. Johnson, have you ever seen any evidence of braided streams on the Central Basin Platform during Morrowan times?

A. No, I haven't.

Q. And what does that tell you?

A. I don't think there's been any encountered in any of the wells drilled on the Platform, so I would think that if there were any, there would be at least one or two wells, as many wells as drilled on the Central Basin Platform, that would have encountered a braided Morrow stream at that time.

Q. And a braided Morrow stream would have indicated what, had you found it?

Or let me phrase it this way: The evidence -- The lack of evidence of a braided Morrow Stream on the Central Basin Platform means what?

A. That there weren't any.

CHAIRMAN FESMIRE: Mr. Kellahin, anything more from this witness?

MR. KELLAHIN: (Shakes head)

CHAIRMAN FESMIRE: Mr. Johnson, thank you very much.

Is the attorneys okay with dismissing this witness?

MR. OLMSTEAD: It's okay with us.

CHAIRMAN FESMIRE: Okay. Why don't we take a 10-minute break, and we'll come back? You have one more witness, and then Mr. Hall has a witness?

MR. OLMSTEAD: Yes, sir, that's correct.

CHAIRMAN FESMIRE: Okay.

(Thereupon, a recess was taken at 3:14 p.m.)

(The following proceedings had at 3:32 p.m.)

CHAIRMAN FESMIRE: Okay, let's go back on the record. Let the record reflect that it's 3:30 p.m. on Friday, December 15th, 2006. This is a continuation of consolidated Causes Number 13,492 and 13,493. I believe -- Mr. Olmstead, are you going to call the next witness?

MR. OLMSTEAD: Yes, sir, I am.

CHAIRMAN FESMIRE: Okay.

MR. OLMSTEAD: And I call Mr. Ken Krawietz to the stand, please.

CHAIRMAN FESMIRE: Mr. Krawietz, have you been previously sworn in this case?

MR. KRAWIETZ: Yes, I have.

CHAIRMAN FESMIRE: Go ahead, sir.

MR. OLMSTEAD: Thank you.

KEN KRAWIETZ,

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

DIRECT EXAMINATION

BY MR. OLMSTEAD:

Q. Mr. Krawietz, please state your name and occupation for the record?

A. My name is Ken Krawietz, I'm district engineer for Samson Resources.

Q. And where do you reside?

A. In Midland.

Q. And when and where did you obtain your degree?

A. From Texas Tech University in 1978.

Q. And you are a certified professional engineer?

A. Yes, sir.

Q. And how many years have you worked in industry?

A. Twenty-eight years.

Q. And can you briefly describe your duties for Samson?

A. My duties for Samson are, I manage the -- Samson's assets in southeast New Mexico, I'm responsible for the reservoir engineering, production engineering, reserve evaluations, hearings, everything except the drilling part of it, basically.

Q. Okay. And the exhibits that we're about to see were prepared by you?

A. Yes, and with some help.

Q. And based upon these exhibits and your study and involvement in this area, do you have certain engineering opinions with regard to the proper orientation of the spacing unit in Section 4?

A. Yes, I do.

Q. And have you previously testified before the Oil Conservation Division, and were your qualifications as an expert petroleum engineer accepted at that time?

A. Yes, and yes.

MR. OLMSTEAD: We tender Mr. Krawietz as an expert petroleum engineer.

CHAIRMAN FESMIRE: Mr. Kellahin?

MR. KELLAHIN: No objection.

CHAIRMAN FESMIRE: Mr. Krawietz will be so accepted.

MR. OLMSTEAD: Thank you.

Q. (By Mr. Olmstead) Mr. Krawietz, do you have a short overview of what you'll be presenting today?

A. Yes, I do. We're going to zoom in on the area around Section 4. We're going to address some of the testimony that's already been presented, the case that's been presented by Chesapeake, to determine sand orientation using engineering data. This evaluation involved pressure data, gas-gravity data, volumetrics and decline-curve analysis.

I'll address each of these methods in detail, and at the end my conclusion will be that you cannot conclusively determine -- or support an east-west sand orientation with engineering data.

The first and most relevant part of the data I want to address is in the immediate area of Section 4. I think we've all seen the puzzle to this as very complicated. We've seen several surprises from drilling, we've seen maps change with each well. As each well is drilled, we see a more clear picture. And we've seen big changes in a relatively small area.

For the purposes of the hearing, and ultimately what I was asked was, in Section 4, as we move from the KF well -- say we go a half a mile or so from the KF well -- where would the next well be, or where should the proration unit be drawn? So to me the most important data is what we have right around Section 4. So we're looking at a two-mile area versus a big, regional picture.

The best data I have is the KF 4 well and its three offsets. I've used Chesapeake's exhibit here --

Q. PE 21?

A. PE 21. Not that I'm picking on this one for any reason, but I want to use it later. If I'm asked -- our KF well is in here, and I'm asked, should -- in this little area right here, should the next well be north, should the next well be west, or should there be no well, I need to look at the most relevant data that I've seen in the whole pile of papers we have, and that would be the offset CC State 3 Number 1, the WEL Well Number 2, and the Osudo 9 Number 1.

If we look at the KF 4, CC State 3 Number 1, and we eliminate all the extrapolations to the north and extrapolations to the west where we have no well control whatsoever, I want to focus on this area and what does this tell us?

Q. Can you identify some of the wells on this log?

A. Okay, again, KF 4, CC 3, the WEL Number 2, and the Osudo 9 Number 1.

We've talked about the CC State Number 3. There is no argument, both parties agree that there is no communication between CC 3 and the KF 4. We have no other well control in an east-west trend along the south third of Section 4. The only data point we have shows that the sand does not continue to the east.

Q. So in your opinion, does that deny the viability of an east-west trend in that immediate area?

A. With the facts we have, yes. I mean, there's no facts to support an east-west trend with those two data points.

The next pair we'll look at is the Osudo 9 Number 1 and the WEL Number 2. Again, there's no argument here that there's no communication between these wells. One well is a monster, and the other one is a dry hole.

If we look at the north-south, KF 4 and the Osudo 9 Number 1, you have sand in the KF 4 that's productive, you have sand in the Osudo 9 that's productive.

If we look at the CC 3 and the WEL 2, it's not productive.

So with these four data points, which again I believe to be the most relevant data to the whole case in our localized area of the south half of 4, there's nothing that supports an east-west trend whatsoever.

Q. In fact, does it tend to support a north-south trend?

A. It does. Now if we talk about -- you know, the facts are, you have sands trending north, you do not have continuity east-west, and that's undisputed.

Now we talk about a little bit of interpretation now, we talked about the pressure buildup on the CC 3, up here, and the conclusion of that analysis was, the size of this sand in this well was 11 acres or so. So the 80-acre shape we have drawn on the well was not supported by the pressure buildup test, so any remnants of sands in this area coming from the east is not supported with the pressure buildup data.

The next thing we'll look at is to honor -- We said that these were undisputed facts. No communication to the east offset in the CC 3, sand present north to south.

If we go back to the map just a second.

Other thing to note on this map, we've zeroed in on the area where we have well control. We've seen that with each one of these wells drilled we've changed maps. There's been a lot of surprises in here, a lot of disappointments.

However, in this area where we have very good well control, we see the trend on this map going north-south that has been mapped, sands going north-south. And then they tend to move a little bit northwest-southeast, but it is definitely not an east-west trend. And that little contouring interval right between these four wells appears to be fairly consistent wit all interpretations.

Q. Fairly consistent with the north-south interpretation?

A. Yes.

Okay, I'm moving away from the wells a little bit and going to address the data that's been presented. I think pressure data is the only conclusive way to determine communication between the reservoirs. We've heard in Mr. Johnson's discussion how the sands can be laterally stacking. You have to be very careful about how you use the pressure data. It can show pressure communication -- sands can appear to be in communication when they're actually not. So there's been an exhibit entered that discusses that, but it can be very difficult.

In my discussion, I'm going to discuss the criteria that I used to determine what I think valid reservoir pressure is.

We can go on to the next one. Okay, get organized again.

Pressure data that we use in any reservoir evaluation has to be reservoir pressure. We can't just look at every data point without considering, does that reflect the reservoir, or does it reflect something else, some sort of flowing condition such as line pressure or -- so forth.

And these pressures are difficult to obtain. The data is very limited. There's some public data. It's not real easy to get your hands on, so we use what we have.

Most of the data we get publicly comes in the form of *Dwight's PI*, and you have to look very closely at that data. There was a little discussion about that yesterday, but the requirement for the reporting of pressures was a -- up to -- or at least 24-hour shut-in period. And that involved a little bit of loss of production, that was not very popular.

So it was -- you know, in 24 hours that does not give the reservoir time for the pressure to build up high enough to be indicative of reservoir pressure. It would take a week, maybe. When we run pressure buildups, we shut the well in for usually about a week, and then we'll extrapolate pressure from there, using PTA techniques.

So most of the data we see reported you have to look at very closely. It may not be indication whatsoever of what reservoir pressure is. It simply was something that was required to do, and it was reluctantly done, and in some cases may not have been done right. But the point is that you can't just take that data and use it.

As I go through the pressure what I want to talk about is, we'll go through criteria used to get valid reservoir pressure, we'll come up with a plot of a table showing valid points that I've used in my evaluation, talk about wells that I think have virgin pressure, obvious virgin pressure. We'll talk about relationships and the direction of these pressure relationships, and from that we'll talk about additional wells I interpret as virgin pressure. I'll show that the KF 4 is considered to have virgin pressure, KF 4 is not in communication with the well to the east, nor with the well to the south, and therefore no pressure relationship can be used to conclusively determine sand orientation of Section 4.

Q. Okay, do you have -- We're not ready for the first exhibit yet, are we?

A. No. The sources we get for reservoir pressure data -- of course we talk about public data -- it has to be valid. Initial data is usually pretty good, during the life of the well you have to be careful. You would want to look for periods of shut-in that correspond to -- or a pressure that corresponds to a period of shut-in, you know, say a month or so on either side that may indicate a higher pressure or the well has been shut in for longer than for 24 hours. So we tried to filter the data down to that.

The data I got from *Dwight's* we've shown in

Exhibit 61, just so that it's shown where I've got my data. This is a direct dump out of *Dwight's* showing the well, the date, the cum at that time, the shut-in surface pressure, bottomhole pressure, and then the last column is gas gravity. This is all the public data that's available.

Another source is data that's not public. That would be information that's in the hands of the operator or the owners of a well that is not available publicly. We have some of that. Pressure buildup test is the best source we have. That's not public unless somebody volunteers to share it.

Drill stem tests are a good source, it's a good indication of initial pressure. We want to feel good that this is a good drill stem test and it's giving us some accurate data. So it takes some interpretation, but it's a very good source.

Another source is mud weight. Mud weight has limitations. We've had data points using mud weight, which does not equal bottomhole pressure, but I think in this case the data points presented before and the data points I have are close enough to where I can save everybody some time and just accept mud weight pressures.

Okay, the pressures I came up with, the first well is the CC State Number 1, and I'm listing the date, the bottomhole reservoir pressure, and where I got the pressure. Again, I'm listing where I got it. This was from -- we took a kick in the zone of interest, which gives us direct measurement of bottomhole pressure. I think 7300 was mud weight number, and that's the number we'll default to.

The next well, WEL, I've listed the sources from there. Most of them are *Dwight's* pressures.

Same with the next well, it's the WEK. I want to point out, the last one on there is a point that was provided to me by the operator of the well in July of this year. The well was still shut in, and they gave me a direct surface pressure, and from that I calculated the bottomhole pressure there. So that data point is -- that's what that well's pressure is right now.

CHAIRMAN FESMIRE: Can I ask a quick question --

THE WITNESS: Yes, sir.

CHAIRMAN FESMIRE: -- about the last point? They just gave you the surface point, or did they know where the -- Did they shoot a fluid level or --

THE WITNESS: No, sir.

CHAIRMAN FESMIRE: So we don't --

THE WITNESS: So this would be a minimum. It could be higher, like you mentioned yesterday, if there's fluid in the well.

CHAIRMAN FESMIRE: Okay.

THE WITNESS: In fact, that's true of all these *Dwight's* data points.

Just quickly moving down, the Osudo 2 and the Osudo 1 are wells that Samson operates. We've provided the data on the pressure buildup analysis for that.

The Hunger Buster 3, there was some problems on the well. I'm going to accept mud weight of 6600 p.s.i. on this one.

And then the same with the Osudo 9 Number 1. We never got a steady -- a stabilized shut-in pressure on it. The mud weight pressure that was given was 6300, and I'll accept that. That's close.

KF 4 was from hearing notes.

And then I wanted to bring out three more wells in the area that I thought were significant. These were all -- All three of these wells were discovery wells in the Osudo area, and the point being to show, being discovery wells, that these would be virgin pressures.

Q. (By Mr. Olmstead) And that is Exhibit -- for the record, that's Exhibit 45A?

A. Yes, sir.

Q. Exhibit 44 is the plot of the pressure data provided by Exhibit 39 of Chesapeake. I think there's been one submitted since then. The one data point would be this number 4 over here, being the PQ Osudo 1, and it was just adjusted because we gave the pressure buildup data to Chesapeake, and they adjusted that to that pressure.

We see sources from DSTs. These look like good points. We have some initial pressures. I think where I got the box is when the well was drilled, this pressure was up here. These are mud weights, bottomhole, et cetera, but they're all scattered in the same general area.

And one point I want to make here is, if we look at the -- There's two wells in the area, we've heard, that have long-term production history, being the WEL 2 and the WEK 1. Both of these wells, when we get out to the time these wells were drilled, based on this data, you're going to see pressures something like 1500 p.s.i. or less. All of these pressures are well above 6000. And I think just from this alone, I would conclude that there's no communication between these new wells and the WEL and the WEK.

And even if there was, you're looking at very minimal -- if there is any at all, it's very minimal.

Q. And the two older wells, the WEL and the WEK, are easterly -- easterly wells?

A. We will -- to the subject well, they're south and east.

Q. Okay.

A. But the point I want to make on that is that I don't see communication between the two older wells and the newer wells.

Q. Based on the difference in reservoir pressure?

A. Yes. I would expect the pressure in the new wells to be much closer to 1500 pounds than they would be to 7000.

We said we need to have shut-in time on these wells long enough for them to buildup, so what looks real suspicious to me are these points along the bottom of the graph. We've got a point here of 1200 or so. We provided one from the operator, which was in the 1200 pounds or higher. So -- It's impossible for reservoir pressure to increase without a water drive or some unusual occurrence, so I don't think any of this is valid because of that.

The next well we looked at, WEL 2, we see the points go down, up, down, up, down. Pressure cannot increase, so something looks funny in here or here. As we look at the data and we look at where we see corresponding shut-in pressures and -- This point up here corresponded to a shut-in pressure, and I'm told the person that took the well over noticed that, and that's why they frac'd the well a few years later. So I know points below that cannot be correct. I did not see a shut-in period associated with these, so just to fit my criteria I've taken those out.

Next well is the 15(1), number 3 right here.

This well had an initial pressure in the 7600, 7700-p.s.i. range, drilled eight years after the WEK well. This well had produced about 5 BCF between here and here, yet this pressure is higher than the original pressure in this well. So, you know, I think that's a good point. And any points that drop here just show -- it's a limited reservoir, it's low-perm, the well depleted, and that's supported by the cum on the well. So I don't think that really has a whole lot of bearing, other than to show the well depleted. It doesn't show any relationship to the other well.

PQ Number 1, we talked about that on the corrected exhibit. It's back up here, 6380, I believe. Same thing there, this is a very low-perm well. It quickly dropped down to line pressure. It's a function of low perm. The critical point up here is the initial pressure.

Next well is the -- We said the CC 3, Osudo 9, Hunger Buster, we would accept the mud weight pressures up here, just for the sake of time. And then of course, the KF 4 is up there.

So if we eliminate those points, the graph looks more like this to me, as far as what I think is really happening out there. And I still see some points that look kind of funny, and I think -- there was a discussion yesterday that this one didn't look funny, and I don't show the -- that -- that I agree with that.

So what I did was, I looked at -- the two wells with production history, I looked at the -- a plot of P/Z versus cumulative gas, and this --

Q. Is this -- I'm sorry, is this Exhibit 46B?

A. Yes, sir. And what P/Z plot would indicate as we plot P/Z versus cum gas, and in a volumetric depletion -- pressure depletion drive reservoir like we have here, it should yield somewhat of a straight line. If we have good reservoir pressure, these points would stack along a straight line. And this is a very well documented technique that we use, and we use it a lot during the life of the well to predict reserves and so forth.

But this well has already cum'd 3.1 BCF, and if we say the well is at an abandonment pressure of 1000 p.s.i. today -- or let's just say I take the last data point. It looks like that.

Okay, the next one we look at, I think we look at decline curve analysis, and I think there was agreement yesterday that this well would be -- cum somewhere in the 4-1/2-BCF range, maybe longer. It's a very low decline. But if I take a data point to establish an end point and say that the well is going to make 4 1/2 BCF, abandonment pressure of 1000 p.s.i., you see, I only have maybe one data point that touches that line.

Q. And this is Exhibit 46C?

A. Right. So we further eliminate some pressures. And something else we can observe on this graph too is that today cum is 3.1 BCF, so if we got back up on this line, P/Z would be somewhere in the 2700, 2800-p.s.i. range.

So I think right now that pressure, as we saw on the other graph, would extrapolate to about 1500 p.s.i. I think the well -- the pressure -- the bottom- -- the reservoir pressure in this well is a little bit higher, based on this.

Next well is the WEK P/Z. We see the same thing.

Q. Exhibit 46D?

A. Yes, sir. And we've already said we've got data points out here on the end. The operator provided us a good pressure point, so we would expect to see a relationship something like that which says these data points are questionable. That one certainly is.

So I'm left with no data points during the life of the well, and just to give me something to -- something in between, just to demonstrate what it would really look like --

Q. Exhibit 46E?

A. 46E. -- I took a point at 1-1-70. At that point in time the well had cum'd somewhere around 3 BCF. P/Z was somewhere around 4000. And then you'd calculate a bottomhole pressure corresponding to 1-1-70 that we can transpose to pressure versus time.

So we come up with a plot -- what I've come up with is a projection of pressure versus time, because this is the only data I feel like we really have. Like I said, I've kind of calculated this point. If we extrapolate that line again, it's down in the 1500 range. But I believe it's a little bit higher based on my P/Z. And this is point we calculated just to show that this well is going to drop, and it will mirror the production profile on it. If I did it again, it would swing down, you know, lower.

Q. And that's the WEK well?

A. That's the WEK.

Q. And this is Exhibit 46F?

A. Yes, sir. And the reason I'm doing this is to kind of show pressures and time relative to pairs of wells east-west and north-south. And this is data we can use.

Now if you again look at the big difference between the new wells drilled and the older two wells, there's a considerable difference between these that would indicate to me -- I don't see any communication between these wells.

Q. If there were communication, what kind of pressures would you be expecting in the new wells?

A. If there were communication, I would expect to see it much closer to 3000 than I would to 6500. So 4000 or lower, you know, something much lower.

Exhibit 47 is a map of the area we've been looking at. I've posted the wells with the cumulative production, completion date, I've put the cum on it, and I've put the pressures that I calculated. And again, we said we were going to default to some mud weight pressures.

The -- I'd like to look at some of the directions or pressure relationships between the wells, now that we've established what we think is more reasonable.

The first pair I want to look at -- Okay, when I plot all the pressures on here I see, to me, two distinct pressure regimes. We've got -- Okay, when I look at -- I'm going to go north-south and -- starting over here with the well CC 3, and talk about wells that we think are virgin pressure. And these would be -- my criteria for that would be wells that are a discovery well, wells that have pressure higher than other wells around it, wells with very limited reservoirs, wells that are completed in isolated sands, and so forth.

First well I want to talk about is the CC 3. We've already seen that's an 11-acre tank, therefore not in communication with everything. I believe that's a virgin pressure.

Next well would be the WEK. That's the discovery well for the area. We had drill stem test pressure of

7491. I think the other exhibit showed 7354, or something like that. I got this out of the OCD record. There were three shut-ins on this well, and I took the highest of the three, 7491. But either pressure is fine with me. Either way it was virgin.

Next well, the H 15(1), we've seen that as a very limited -- limited reservoir as well. The pressure here was 7700 p.s.i., pressure here was 7500. This was drilled eight years later or so. So I believe that to be a virgin pressure.

Next well is the PQ Number 2. This well is completed in an isolated sand, it is not in communication with any other sand out there. There's no way this well could be drained by any other well. So therefore, this well is virgin pressure, 6667, and that's from a pressure buildup test.

The next well we pointed out earlier. This is the discovery well for the field that was drilled. That pressure reported was 6715. That's a virgin pressure.

Next well is the State DA -- DQ State -- DQ State Number 1. That well was a discovery well for this area. Its initial pressure was 6633.

From that, I see a pretty -- a distinction that the wells lining up here are greater than 7000 p.s.i., and I believe those to be virgin pressures. Note, we go from

7000, 7500 to 7700, but they're all virgin pressures, and it shows that virgin pressures can vary in different reservoirs. Left of that line, everything is less than 7000.

So I see a distinction here of two separate pressure regimes.

If we look at pairs east-west now, this is the KF 4 and the CC 3. We've already said that these are not in communication, that was uncontested.

The next pair, the Osudo 9 and the WEL Number 2, these wells are as close as you can legally get to each other. We have a dry hole, we have an extremely good well. There's no east-west relationship between those two.

If we look at the Osudo 9 Number 1 and the WEL, that's one of the wells that had produced for a long time, and earlier I said I saw no communication between the two because of this large pressure difference.

The next thing to notice here is that we have a dry hole offsetting this Hunger Buster, further saying no east-west continuity in that area.

Next pair, we look at the Hunger Buster and the WEL. Again, the pressure would have been much lower in the Hunger Buster well if these wells were in communication. Because of the large pressure difference, I see no communication.

Next pair, we look at the PQ 1 and the WEK Number 1. This well we said was virgin pressure. It came in -- it produced 6 BCF, most of that by the time this well was drilled. There's a large pressure difference between these two. Because of that pressure difference, I see no communication.

The bottom pair, the PE 2 and the other one, we said both of these are virgin pressures, so that means they're not in communication, they're not the same sand either.

So if we want to look again at -- Let's look at the trends north-south.

Again, we see our 7000-p.s.i. line. Earlier in my opening of where I said these are the four most important data points that I have, we noticed a contour line showing zero or very -- no sand -- or dry hole to dry hole here, and the contour is showing that.

The next pair we look at is the CC 3 and the WEL. We said this one was very limited, there's no communication between those two.

These two wells are the two long-term producers in the area. If you look at the initial pressures on these wells, you have a DST pressure here and a DST pressure here, this 7500, this was 7080, so -- It was drilled two years later, so it might lead you to think, well, maybe there was a little bit of depletion between that. I think if there is any communication between those it's low, as described by Mr. Charuk when he said that the perm between the two is low, so I think there's very little between the two.

CHAIRMAN FESMIRE: Can I ask you a question on those --

THE WITNESS: Yes.

CHAIRMAN FESMIRE: -- two DSTs? Are they extrapolated pressures, or are they final shut-in pressures?

THE WITNESS: These pressures are -- I looked at the initial shut-in and the final shut-in pressures.

CHAIRMAN FESMIRE: So they're not extrapolated buildups on the DSTs?

THE WITNESS: No. No, sir. This -- I -- That's the data we'd love to have, but we don't. And I try to look to see if they're reasonable, if -- I look at the hydrostatic pressures before or after, is the instant shut-in, final shut-in, fairly close to each other? And without seeing the chart, of course, we couldn't --

CHAIRMAN FESMIRE: Right.

THE WITNESS: -- I mean, as you know, couldn't exactly tell. But that's the best verification we can do.

CHAIRMAN FESMIRE: Okay.

THE WITNESS: Okay, the next pair -- We're talking about the -- back to the WEL and WEK. This -- These are the logs that were on Mr. Johnson's cross-section. I don't think he had this particular cross-section. But I did want to point out that there was some possible -- or there was some correlation between one of the sands in these wells.

Q. (By Mr. Olmstead) Which two wells are those?

A. This is the WEK Number 1 --

Q. Uh-huh.

A. -- and this is the WEL Number 1 --

Q. And this is Exhibit --

A. -- it would be south to north.

Q. On Exhibit 48?

A. Yes. And again, I said you saw a little pressure difference at the start. There may be some minor communication there, but it's not much if any.

And the other point of this cross-section I wanted to show, this is the PQ Osudo State Number 2 well. A while ago I said it was virgin pressure because it was completed in a sand that no other well is. It's a very thin sand, but the well has performed very well. But you can see it's not completed in any other well around it. That's why I said it's virgin pressure.

You can see the pressures are -- between the two wells, WEK and WEL, you can see a slight decrease. But like I say, I don't -- it may be minor, if there is any.

Next pair, PQ Osudo 2 and PQ Osudo 1, PQ Osudo State 2, we said, was an isolated sand. We have a pressure buildup, 6667. I think that is a good virgin pressure. The well right next to it, the PQ Number 1, when that well was drilled they ran a pressure buildup on it and they came up with 6379, and I'm noting these pressures are very close to one another. I know one's virgin, so this well would be virgin or very close to it.

The next pair, the Hunger Buster and the Osudo 9 Number 1, we said this well was 6600 by mud weight, this was 6300 by mud weight, and -- There's a little bit of difference between the two. And again, you know, the pressure data we have on it is kind of tough to get on those two wells.

The next combination is the north-south direction, we looked at the KF 4 and the Osudo 9. Again, we have pressure of 6300 in this well, pressure of 6600 in this one. Both of these wells have good permeability, yet they show a difference of 300 p.s.i.

Q. What does that indicate?

A. I'm going to -- What it indicates to me, when this well was completed we had 6300 p.s.i. When the KF 4 was completed it had 6600. At the time this well was turned to production, this well had cum'd somewhere around 3 BCF -- 3 -- in that 3-BCF range.

At this time that this well was drilled and completed and shut in, it had -- from the data that I have, shows that when it was shut in it had 6600 basically, and then when it was put on production it still had 6600. In the meantime, this well had produced 3 BCF.

Q. Does that indicate to you that the Osudo 9 is not draining any reserves from Section 4?

A. That's what it indicates to me, that -- The initial pressures are different. And we would have seen this pressure change. We did -- without knowing it, we have an interference test. It should have showed some decline in this well.

Q. So --

A. The fact that that pressure is higher, initially, than that, to me, also tells me -- I don't think those two are in communication.

Q. So does it further indicate to you that there was not necessarily any hurry in drilling the KF 4 to protect Section 4 from drainage?

A. No, but that's after the fact.

Q. Okay.

A. I mean, that was -- a big well like that, you know --

(Laughter)

THE WITNESS: This -- You know, that was one of the surprises that I was speaking of. That was a surprise, this was a surprise, that was a surprise, that was a surprise, that was a surprise. And every time we got a surprise, the map changed.

I want to go back to the PQ Number 2. The -- Well, we're showing the north-south combinations. This is the proration unit that was found -- established with the well staked right here by Chesapeake, the Cattleman, on a north-south trend.

Now I want to talk about other wells that I believe were virgin pressure, because of the data and the analysis, what I see as in communication and what's not.

The PQ 2 I believe is virgin or very near it. We have a buildup that was run by another operator. The engineer evaluating it says he believes it's virgin pressure of 6400.

Q. (By Mr. Olmstead) And this is from Exhibit 49?

A. Exhibit 49. I don't know this engineer, I just found this in a well file. I believe the Osudo 9 Number 1 to be a virgin pressure. And it is a little lower than the other pressures in the area, but we have a 6600 here. I've already talked about the KF. We have a dry hole here. I don't see any communication there to the WEL well. I don't see any way this could have been -- any well that could have drained anything here, so I believe this to be a virgin pressure.

And of course we said no communication north-south, none to the east-west. I believe that the KF 4 is virgin.

In fact, I really don't see any communication between any of the wells, and I think what it's telling me is that it supports the geological interpretation of sand-stacking. We have sands moving along a channel. These sands may correlate, but they're not the same sands, and I think the pressure -- this is what the pressure data, to me, is confirming. If we looked at the exhibit Mr. Johnson showed, even though we may have a sandbody moving through, we're going to have vertical stacking, and my analysis says this is what we're seeing with the pressure data.

My conclusion from looking at pressure data is, first, we have to use valid reservoir pressure. And it takes a lot of work to get to that, and a lot of interpretation.

I see two different pressure regimes in this area, separated by a north-south line. Pressure data does not support any east-west trend.

And any possible reservoir pressure relationships I see are north-south, and even -- there's not much pressure relationship between any of the wells.

There's no communication between KF 4 and any other well. KF 4 is virgin pressure.

Sand orientation in Section 4 cannot be conclusively determined from reservoir pressure data analysis.

Next section we wanted to address was gas gravity. Chesapeake presented an exhibit showing six data points over roughly a 40-year period, which is very, very little data to draw a conclusion from. If you remember Exhibit 61 where I showed the data that was dumped from *Dwight's* and we saw the column of gas gravities, you saw it was very little data in there.

However, there was some data that was not included in the evaluation, and just to be complete it probably ought to at least be addressed.

In the right-hand column we see -- without going through each well we see you have a data point every now and then, on through here, you have a well here and there. Very little data.

But if we take the data from the *Dwight's* dump and add it to here, we see up in the Wilson area we have a .59, well right next to it has .67. Wells right next to each other have very different gravities.

We look to the north, we have .61. Just south of that we have .60. These wells line up. So I can use that to draw -- we can draw lines with it, but I don't think it means anything.

Next well is down -- this discovery well down here, which really doesn't enter into the discussion, but it's a data point.

The next one that was not entered was the CC Number 3. This is a Chesapeake well. We've talked a lot about it, we've said it was a limited reservoir. However, for completeness it should have been included on the deal, and we look at it and it does not fit the contour that was drawn, which was close to a .62 range, something like that. But that point does not fit that contour.

We showed that the PQ Osudo Number 1 and the PQ Osudo 2 were producing out of two separate sands. The PQ 2 is the only well producing in that particular sand, so there's no way these wells are in communication at all. Yet they both have the same gravities.

So I think we see some evidence here that with very, very few data points over 40 years, we've shown that there's two points here with the same gravity that are obviously not in communication.

So I think this technique is susceptible to things like -- it matches a structure map, as you go downstructure the gas gets richer. There can be sampling errors, there can be -- where the sample is taken, there's a lot of things that can happen here that five data points is not going to capture. I think you'd need to see a longer life profile of gravity to be able to draw conclusions.

Q. Now Mr. Krawietz, have you ever seen any textbooks or published authority to support the idea of using gas gravity to show communication?

A. I've never heard of this. I've tried to look it up. I couldn't find anything. I've asked colleagues, and it's a new technique to me. There is some cases where they do matching of crude oils, but they don't -- they look more at the components, individual components and things like that, but -- never for gas, never seen it before.

My conclusion from gas gravity is, sand orientation cannot be determined from gas gravity.

The next part was an evaluation of volumetrics and using decline curves to confirm volumetrics.

First thing I would say is, I don't think volumetrics is really an engineering issue, and it's not -- as presented, was not engineering data, because it was simply a geometry problem using the map provided to him by the geologist, and that was what we heard yesterday. Therefore, you just take the area of whatever the geologist gave you and -- it's not an engineering problem, it's geometry from the geologist's map.

This is the area A in question that we used. They had determined -- did the volumetrics of this area and came up with, I think, 30 BCF or something like that. And it's -- again, using the geologist's map they said -- as I understood it, we pretty much held all the parameters constant, being -- we used the area drawn here, the shape of Louisiana, straight lines on the section line, and used the contours for h. It appeared we used an initial pressure of 7000, which to do that calculation would assume that that whole tank is in pressure communication. And we've seen information that shows that it's not.

You would use the same water saturation. It appears that all the constants except h were the same. And we've seen in Morrow wells, and you can see on this map, how the world changes so quickly. Any errors in any one of those values is going to lead to some big errors.

Unfortunately, the Morrow is not like that. It's not a homogeneous reservoir. It changes, it's very complicated. The fact that you've seen all these different geologic maps, I think, is proof of how complicated it is and how many different ways you could draw volumetrics. In the Morrow we don't know the reservoir shape, we don't know the drainage area. We don't know recovery factors. That varies depending on permeability and abandonment pressures and other things. And we've seen some wells in here that initially looked very good, and we saw that it was only an 11-acre tank. But if we did volumetrics on that initially, we might be pretty excited.

Like I said, the sand maps are going to change as the well is drilled, and we've seen that. Morrow sand volumetrics are known to be unreliable. It's a technique we try to use and hope it works sometime and there's some uses for it, but it's -- because of the complexity of the Morrow, it is unreliable.

We saw pressure show there's very little communication between wells in this area, yet in drainage area A we started out the wells all at the same pressure and assumed it was one tank.

If you look at a range of any of the parameters in the volumetric equation, it can result in big errors, and most of the parameters we put in there, we really don't know with the kind of accuracy we would like to. For instance, what's porosity, what's water saturation? There's a lot of ways to get different answer. Even slightly different answers can get you errors.

And just pull out something from the reservoir engineering textbook by Craft and Hawkins --

Q. Exhibit 50C?

A. 50C. -- where they talk about limitations of volumetrics, and in his write-up he says -- it says, With the best core and log data and uniform reservoirs, it appears doubtful that initial gas in place can be calculated more accurately than 5 percent. Now that's -- if we had the layer-cake homogeneous reservoir, that's the best we could do.

And the figure will range upward to 100 percent or higher, depending on the uniformity of the reservoir and quantity and quality of the data available.

The Morrow formation definitely is un-uniform. So even here we're saying that volumetric errors can be very high.

Just a couple of examples of where volumetrics would lead you astray. This North Wilson Deep 2 well has a cumulative production of close to 29 BCF. If we were to do volumetrics on that well as a new well, I don't think anybody would give it 29 BCF. It was certainly a pleasant surprise for whoever's well it was.

Another one is the PQ 2. That well has maybe 3 foot of sand in it. I don't -- I probably never would have set pipe on it, yet the well has cum'd -- I think it will ultimately make 2 1/2 BCF or something like that. It's been a fairly decent well.

And there again, volumetrics out of 2 or 3 foot of sand, it's not going to give you enough gas to where we'd expect volumetrics to be reliable, yet it was a pleasant surprise.

And of course, we talked about the CC 3. I think anybody that saw the data on that well as it went down, the logs, et cetera, would have felt that that would have been a pretty good well. Yet we saw the drainage area was very small.

My conclusions using volumetrics is, you cannot determine sand orientation with volumetrics.

We use decline curve data if we have it and try to make the two agree, and that's a very good technique to use. But decline curve analysis requires us to have a trend in order to extrapolate a decline rate. We don't have a trend, we can't do decline curve analysis unless we use some sort of type curve for the area or analogies with other wells or so forth. But decline curve analysis cannot be done without a trend.

When we looked at the information from yesterday -- this is Chesapeake Exhibit PE 22 -- we talked about the initial well. This is the WEL Number 1. The well was producing along at a hyperbolic character. The well was frac'd, again hyperbolic character.

And then we have the new wells, Osudo, KF and Hunger Buster, added to it. Looks to me like we have one data point, and from that we're going to extrapolate a decline.

As I said before, you have to have some data, some trend, to establish this line.

Another point is that Morrow wells in this area do not have the same decline rate. If we look at Chesapeake Exhibit PE 9, clearly shows this. This is the Osudo 9 Number 1 well declining. A little bit of a hyperbolic characteristic.

And the next well is the KF 4. Ad as we said, that well has not hit line pressure yet, so it's -- the rate has been very constant at about 2.9 million a day, somewhere in that range. It's been very good, but you can see there's no decline. So with no decline we cannot do decline curve analysis.

The third well being the Hunger Buster well, which is not as significant as the two, but again you can see a different decline profile there too.

Go back. And as we saw on this graph here, we saw three wells, very different decline profiles. We see hyperbolic decline, we're going to take one data point, and we're going to drill a straight line, exponential decline, where we saw one well with no decline, another well with hyperbolic. And to take all these different profiles and sum it into one is -- without any data, it is pretty iffy decline curve analysis, in my opinion.

Q. Well, Mr. Krawietz, with that limited amount of data would it be pretty easy to manipulate that decline curve with your computer?

A. Yes, I think it could easily be manipulated. I think it would be better to evaluate the wells individually, come up with a sum. I think -- would be -- get better.

Like I said, we're showing a decline rate where one of the significant wells in there has no decline. So the data to date is not valid when we're summing the wells.

We said the KF 4 was included as -- in the decline, where the well has not declined yet.

We saw stimulation can change profiles, it can change the reserves. I don't see a trend on Exhibit PE 22, as we just showed, and I don't think this is valid, simply for the fact that we don't have data to support a trend. And I don't think this decline curve study can validate volumetrics.

My conclusion from decline curve analysis, sand orientation cannot be determined from decline curve analysis.

Adding all this up, my conclusions are, sand orientation cannot be determined with pressure data, sand orientation cannot be determined with gas gravity, sand orientation cannot be determined with volumetrics, sand orientation cannot be determined with decline curve analysis.

Engineering analysis cannot conclusively determine sand orientation in Section 4.

And I will go back to my very first discussion of -- to keep sight of what I believe to be the four most valid data points in this whole study, and those being the KF 4 and the three wells next to it. And I think the question would be, based on this -- you see two wells with the sand going north-south, you see two pair showing no sand going east-west. Where would the next well be?

Q. So Mr. Krawietz, in your opinion is the laydown 320-acre unit as proposed by Chesapeake necessary to protect correlative rights and prevent waste?

A. No.

Q. So what unit would you recommend, or where would you put the next well to protect correlative rights and prevent waste?

A. I think a standup 320 would be appropriate.

MR. OLMSTEAD: That concludes our direct of Mr. Krawietz.

Move to introduce our Exhibits 44, 45A, 46A, B, C, D, E and F, 47, 48, 49, 50C and 61.

CHAIRMAN FESMIRE: Any objection?

MR. KELLAHIN: I assume that's the correct ones.

We have no objection.

CHAIRMAN FESMIRE: If that's the correct ones, I -- I haven't been keeping track of that.

Seeing no objection, we'll admit Exhibits Number 44, 45A, 46A through F, 47, 48, 49, 50C and 61.

MR. OLMSTEAD: Yes, sir.

CHAIRMAN FESMIRE: Mr. Kellahin, do you have any cross-examination?

MR. KELLAHIN: Thank you, Mr. Chairman.

CROSS-EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Krawietz, would you pull up your Exhibit 47 for us? I want to examine Section 10 and look at the WE Com -- WE Com L well.

A. Yes, sir.

Q. Do you see that?

A. Yes, sir.

Q. It's to the right of this 7000-foot pressure line?

A. Yes, sir.

Q. If I'm right at the line I have higher pressure?

A. Yes, sir.

Q. And if I'm to the left of the line it's lower pressure?

I don't remember the W --

A. Yes. Yes, sir.

Q. I don't remember the WE Com L well in 10 being one of the wells that you said had virgin pressure.

A. I did not say that, no, sir.

Q. Does it?

A. I think it's very close to it. That's the one where my discussion was, there's some indication that it may have some communication to the well to the south --

Q. Uh-huh.

A. -- but that communication would be, I think, fairly minor. But I can't conclusively tell you that that's virgin pressure. That's why I left it off.

Q. So when I'm looking at that pressure number, the 7080, that's the pressure number for that well?

A. Yes, sir.

Q. And if I move across the 7000-foot line and go into Section 9 and go up to the Osudo 9 well --

A. Yes, sir.

Q. -- the corresponding pressure for that well is 5951?

A. There was some discussion on that where I agreed to accept Chesapeake's Number of 6300, to save everybody time. I'll be glad to explain it, if you like.

Q. Well, I'm about to ask you.

A. Okay.

Q. So let's use your numbers on the display. It's easier --

A. Okay.

Q. -- for me to read it than to remember the other one. It's 5951. Is that an original virgin pressure?

A. No, it's not. In one of my previous exhibits -- I kind of skipped through it, but this 5951 was calculated from the daily report for the well, which would be in your possession, I'm sure. But the well was still building 75 p.s.i. per day when the well was shut in. So 5951 is the highest measured pressure. They turned the well on sales immediately after that, with the well still building. And then there was a mud weight calculation of 6300 p.s.i., which would establish in my mind kind of the upper limit of it. And my best guess would be somewhere around 6200 range, so -- We don't have a good pressure on that well, unfortunately, but I think 6300 is as high as it can be.

Q. Have you looked at your pressure information in relation to Mr. Johnson's structure map, his Exhibit 25A, to look at depth of burial in relation to pressure?

A. I've looked at all of his maps. I don't know which one you're talking about, but yes --

Q. Well, if we look at Section 10 and look at the State WE Com L, from Mr. Johnson's map he's got a subsea depth on that well of 8043, right? Just accept that for the moment?

And if you go across into Section 9 and look at the Osudo 9 well, his depth of burial on the structure map there is 8060. They're approximately equivalent, they're only 23 feet apart.

If they're that close in terms of depth to burial, would you not expect the pressures to be the same?

A. I probably would until I started looking at this area. I think there was some discussion yesterday, and Mr. -- Jeff agreed that if wells are in different reservoirs, they can have different pressures. There's an explanation as to how that can occur. It's very lengthy, but --

Q. Let me ask you this. But for your interpreted 7000-foot p.s.i. line running through the boundaries between Section 9 and 10, but for that line, the pressure drawdown on the Osudo 9 well could have come from production from the State WE Com L well that had produced 3 BCF of gas, could it not?

A. I don't think so.

Q. You don't think so?

A. No, sir.

Q. Does -- The center line of your 7000-foot pressure line runs down the middle of Mr. Johnson's eastern sandbed stream and bisects it in half. How does that happen?

A. There was no intention on my part, and I'm sorry, to make that line correspond to anything geologically.

Q. Doesn't it bother you?

A. Well, all I'm showing you is wells right of that line and wells left of that line, is all I'm showing you.

Q. In the sense of pressure, there's none of these wells talking to each other?

A. I don't think so, no, sir.

Q. This sand deposition that Mr. Johnson has plotted here for us is so compartmentalized and so discontinuous that there's not a single well here that's talking to another one?

A. That's my opinion, yes, sir.

MR. KELLAHIN: No further questions.

CHAIRMAN FESMIRE: Mr. Hall, do you have any questions?

MR. HALL: No questions.

CHAIRMAN FESMIRE: Rebuttal on that subject?

MR. OLMSTEAD: Just one.

REDIRECT EXAMINATION

BY MR. OLMSTEAD:

Q. Mr. Krawietz, the Osudo 9 well, I think you just testified, was building at 75 pounds per day whenever it was connected to sales?

A. Yes, sir.

Q. Is that a significant amount of pressure to be building?

A. That's a significant amount. And neither -- of the two good wells in question, neither well has had a pressure buildup run on them, neither well have a -- any RFT data, neither well have any FMI data, any -- and subsequent to the wells being on production, there is no pressure buildup data to where a person could do some reasonable P/Z analysis to calculate reserves, especially in a well that has no decline, that's produced about a BCF, has no decline, we can't use a decline curve. Reservoir pressure is a significant piece of data, and yet we have not run a pressure buildup in that well.

Same thing in the Osudo well, the well that good, with the potential of reserves and reserve errors, we don't have a pressure buildup on that well to where we could do P/Z analysis.

Having those two pressures would be very good data to show -- demonstrate communication between these wells also. But I don't see any of that data come forth.

Q. Okay.

A. And I think it's very relevant, and I think that's the only way you're going to be able to tell reserves at this point in both those wells' lives, or communication.

MR. OLMSTEAD: No further questions.

CHAIRMAN FESMIRE: Commissioner Bailey?

COMMISSIONER BAILEY: No, I have no questions.

CHAIRMAN FESMIRE: Commissioner Olson?

COMMISSIONER OLSON: No questions.

EXAMINATION

BY CHAIRMAN FESMIRE:

Q. First matter. Are you aware of how the gas gravities that are reported to *Dwight's* were collected?

A. Yes, sir, usually they are -- on the older wells, a lot of wells, they will be reported with the completion.

Q. Okay. So a new sample isn't generally taken every year, it's just the same number reported, right?

A. Right.

Q. So it's a little --

A. And on the form there's not a blank for gas gravity. There's a blank for oil gravity --

Q. Right.

A. -- but not for gas, so --

Q. The point --

A. -- somewhere --

Q. -- I'm trying to make is, using the *Dwight's* data would be just as bad as using some of the other data that we've --

A. Yes, sir.

Q. -- talked about today; is that correct?

A. Yes, sir.

CHAIRMAN FESMIRE: Okay. Do you have Mr. Johnson's isopach anywhere that we could put up for a minute?

MR. OLMSTEAD: Yes, sir.

THE WITNESS: Mr. Johnson's or --

CHAIRMAN FESMIRE: Yeah, Mr. Johnson's.

Q. (By Chairman Fesmire) Now Mr. Krawietz, would you point out the KF Number 4 on that map so that I'm not lost here before we get started?

A. I believe it's that well right there.

Q. Okay. And just to the south of that, what, about a mile, is the Osudo 9, right?

A. Yes, sir.

Q. Okay. And just south of that is the Hunger Buster?

A. Yes, sir.

Q. Okay. And your contention is, neither one of those three wells are in communication, right?

A. I did not say anything about the Hunger Buster and the KF.

Q. Okay.

A. But I don't think the Osudo well is in communication with either one of those two wells.

Q. Okay. Now --

A. And one thing I did -- or I guess the point I was trying to bring out is, when those wells were brought on, the gas produced out of the Osudo well was very significant, several BCF. And yet the pressures in both of those wells was higher, had higher initial pressure. And I just don't think that's possible.

Q. I see your point --

A. That was my reasoning.

Q. -- that they're not in communication, because the second well came in with a higher initial pressure than the other well after it had been producing for 2 BCF?

A. Yes, sir.

Q. Okay. Have you -- And from your answer to the last question -- I don't know, have you calculated an EUR on either one, either the KF or the Osudo well?

A. Yes, sir, I have.

Q. Could I get those numbers from you?

A. But I'm going to admit to you that I think the way to do it is -- like I said a while ago, is for me to get a number I feel comfortable with would be a pressure buildup data --

Q. Right.

A. -- P/Z in a reservoir like this, that stuff kind of works.

Q. Right.

A. But the KF 4, I simply used analogies. I looked at wells in this whole area. I did a deal where you can sum a lot of wells together to get a type curve, you know, it's an option in *Dwight's*, and it's something. And my guess would be somewhere in the 4-1/2-BCF range.

Q. For the KF?

A. Yes, sir.

Q. And how about the Osudo 9?

A. The Osudo 9, my estimate is somewhere in the 9 BCF range.

Q. Do you all have an interest in those wells?

A. In the KF we do.

Q. Okay.

A. The Osudo, unfortunately, no.

Q. Looking at the isopach, have you calculated what kind of acreage, theoretical acreage, that either one of those two EURs would result in drained acreage?

A. I did. I don't put any validity in it.

Q. Nothing like a witness that disclaims his answers first.

A. Well, that's what I've been saying, that volumetrics in the Morrow are very unreliable. But if I -- I can find it -- This was done several months ago, and I see where I assumed the Osudo would make 7 BCF. This was, like I said, a few months ago. If I assumed 6200 p.s.i., 30-foot layer-cake reservoir,with 12-percent porosity, 30-percent water, abandonment pressure of 600, I would say 320 acres.

Q. 320 acres, and that's at 7 BCF?

A. Yes, sir.

Q. Okay, and what about the KF 4?

By the way, I'm not going to hold him to the answer. You have an interest in the KF 4.

A. I'm sorry, I can't find my calculation. I wanted to say it was in the --

Q. Can we assume it's something --

A. -- 200 acres or something like that.

Q. Okay, 200 acres, plus or minus some.

The thing I'm trying to say is that there's a -- essentially a zero net pay line just south of the Osudo, right? Then the two wells are -- How far apart is that? I'm a little leery on the odd section, but --

A. The Hunger Buster and the Osudo?

Q. No, the KF and the Osudo.

A. Okay, the KF and then the Osudo.

Q. Is it roughly -- what, 1320 feet?

A. Oh, 13 -- oh, 19 -- Probably a little further than that.

Q. Okay.

A. I'm having trouble --

Q. I guess the point I'm trying to make is --

A. -- with my map.

Q. -- there are no reserves coming to the Osudo from the south, essentially. I mean, it's almost on the zero line. And it's essentially going to be cut off to the north by the flow in the KF. So that's telling me that that -- the axis of the area drained by each one of those wells has to run east and west, doesn't it?

A. No, it -- not in my opinion.

Q. Okay, then where are those reserves coming from?

A. Well, I think they're in the -- like we showed, the display of the sand stacking in the channel, that you can have different sands within that channel.

Q. But you said you used Mr. Johnson's net pay isopach to do those calculations, right?

A. No, I didn't use any of his -- The calculation you asked me on volumetrics --

Q. Uh-huh.

A. -- has nothing to do with this.

Q. Okay.

A. It has to do with, I said, this reservoir is a perfect reservoir.

Q. Okay.

A. It has a layer cake, everything is the same. And this is the acres, it says nothing about the shape.

Q. Okay. Well, if we look at that isopach, that 30 foot is going to be kind of high, isn't it? So if we -- I guess what I'm doing is comparing your numbers to that isopach, then --

A. Yeah.

Q. -- if you didn't use the isopach to do the numbers.

A. Yeah.

Q. And so the drainage area of 320 acres is going to be probably considerably expanded, right? For the Osudo?

A. I'm not sure I'm following you.

Q. Okay. You used 30 foot -- a uniform thickness of 30 foot, correct?

A. Yeah, 34.

Q. Okay. But if we compare it to that isopach, the 30 foot is -- in fact, that exceeds the maximum, or the amount of sand that we see in that net-pay isopach; is that correct?

A. I can't really read his -- showing 50 feet, I believe.

Q. Okay, so 30 foot might be a good average? I think his number is 54, so...

A. He's showing 52.

Q. 52, okay. So 30 would probably be a good average. So if you had a 7-BCF EUR, that would be 320 acres. A 9-BCF EUR would be closer to what? 450 acres? And I'm not asking for an exact number, I'm asking --

A. You're just saying if the h went down, the area would get bigger?

Q. Right.

A. Yes, sir.

Q. But, you know, I've decided that, you know, you use 30 foot, the maximum there is 52, maybe 30 foot is a good average. And you calculated at a 7-BCF EUR, 320 acres. But you told me that the EUR you calculated for that well was 9 BCF, so we've got to increase it by 2/7, and that would be what, 400 -- you know, somewhere exceeding 400 acres, right?

A. All right. But also keep in mind, the maps -- What I'm talking about is pay, what they're talking about is sand. There's a difference.

Q. So --

A. When I use --

Q. -- we may need to reduce that 52 foot?

A. Well, I just took the log, and I looked at -- you know, we saw yesterday how we do crossover and that sort of stuff.

Q. Right.

A. And based on that, I took what I thought was pay, and that's how I came up with the numbers.

Q. And that's how you came up with the 30 foot?

A. Yes.

Q. Okay. So if we use the 30 foot and use the 9 BCF, we've got a drainage area for the Osudo of about 400 acres, plus or minus? You know, these are real rough numbers.

And the point I'm trying to make is, they're basically -- between the two wells -- you've got two wells on very close to one 320-acre, you know, Osudo spacing unit.

A. Yes, sir.

Q. Okay? And you've got one well that's going to drain 400 acres, one well that's probably going to drain 200 acres, and yet you're pretty much bounded to the south by a zero-flow boundary, you're pretty much bounded to the east by a zero-flow boundary, because we've got the CC 3 there on the other side, and to the north, you know, the isopach gets relatively thin. And I'm trying to -- you know, trying to see -- Where are all those reserves going to come from? We know they're going to be produced out of the well. Doesn't that sort of elongate our drainage area to the east and west?

A. I don't think it does, no, sir.

Q. Okay.

A. I think -- I think -- As I stated early on in my presentation, the facts we have are very limited. And my opinion is influenced mainly by -- I see sands going northwest, I don't see any sands going east-west with the data we have. Everything projecting one way or the other is projection, estimate. My opinion is -- I've said just exactly what I think, and I've also said that this is a very complex area.

And where would I put my money, which I intend to do? As soon as we can resolve this issue, we will propose a well north of the KF 4 --

Q. Okay.

A. -- period. And that's what I believe, and that's where I'm going to put my money.

Q. Okay.

A. And I think you're -- what you're saying about the reserves and the tank -- and I agree, and that's why I'm thinking there's --

Q. It's got to run --

A. -- there's more in this play, and so does everybody else, just which way do you think? I think it's north --

Q. That's a lot better problem than --

A. -- and that's where I'm going to put my money.

Q. That's a lot better problem than some we could have out there, right?

A. Yes, sir.

CHAIRMAN FESMIRE: I have no further questions. Anything else from anyone?

COMMISSIONER OLSON: No.

COMMISSIONER BAILEY: (Shakes head)

CHAIRMAN FESMIRE: Mr. Krawietz, thank you.

THE WITNESS: Thank you, sir.

CHAIRMAN FESMIRE: I assume that the witness can be excused?

MR. OLMSTEAD: Please, sir. We have one more witness, or Kaiser has a witness.

CHAIRMAN FESMIRE: Okay.

MR. HALL: Take a minute to set up, Mr. Chairman?

(Off the record)

CHAIRMAN FESMIRE: Mr. Wakefield, have you been previously sworn?

MR. WAKEFIELD: Yes, I have.

MR. HALL: Ready to go?

JAMES T. WAKEFIELD,

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

DIRECT EXAMINATION

BY MR. HALL:

Q. For the record, please state your name, sir.

A. James T. Wakefield.

Q. Mr. Wakefield, where do you live and by whom are you employed?

A. I live in Tulsa, Oklahoma. I'm employed by KF Energy, LLC, a wholly owned subsidiary of Kaiser-Francis Oil Company.

Q. And in what capacity are you employed by --

A. Vice president.

Q. And what is your professional background?

A. I have a degree in petroleum engineering from the University of Tulsa in 1972.

Q. And you've previously testified before the Division and its Examiners and had your credentials as an expert petroleum engineer made a matter of record; is that right?

A. Yes, as -- in front of the Division, never the OCD [*sic*].

Q. All right. Are you familiar with southeast New Mexico as a part of your responsibility?

A. Yes.

Q. And can you give the Commission some idea of your background in the area?

A. Came out of school, I went to work for Gulf Oil in west Texas, primarily on the Waddell Dune Waterfloods, later for them worked on waterfloods in north Texas to learn a little bit about humility, and some gas wells up there.

Left in 1975 for Duncan, Oklahoma, to work for Skelly as a reservoir engineering evaluation for their Velma Vest Properties, Velma Nonvest Properties, and devised a development scenario for all the stacked properties other than the best sands are being waterflooded. So it was a mixture of gas and waterflooding, again.

And in 1976, early 1977, Mr. Getty died and Skelly was absorbed into Getty Oil Company, and I was promoted to area engineer in Drumright, Oklahoma -- again, you're noticing a trend here, places -- and was their area engineer for two years managing a -- what the staff people -- group of waterflood properties in Bartlesville and other formations at Cushing Field, as well as scattered waterfloods in northeast Oklahoma and in -- gas fields in the Arkoma Basin.

From there I went to work for Grace Petroleum in 1979 as an expert enhanced recovery engineer, mainly because of my experience at Cushing, and -- had just purchased a number of Cushing properties. After a year of that evaluation and implementing some waterfloods, I was promoted to vice president, engineering, for -- assistant vice president, engineering, for the mid-continent region, which gave me a staff of people, and head of all their engineering for New Mexico, Texas, east, west Texas, panhandle of Texas, and Oklahoma.

And began my experience then with the area in southeast New Mexico, particularly the south Salt Lake area and south, down to the Texas-New Mexico border, predominantly Morrow.

1982, I left for the green pastures of consulting with Lee Keeling and Associates, which coincided with the loss of nearly all of their bread-and-butter-type evaluation work, but we were saved by bankruptcies. So I worked on bankruptcies for three years, a lot of which had to do with properties in southeast New Mexico and west Texas.

From there, 1985, I joined Kaiser-Francis where I've been responsible for all the southeast New Mexico work since that time, initially in their enhancement group, until 2004, where we formed an LLC -- actually, we formed a number of LLCs, and me and another gentleman run this LLC for Kaiser-Francis. And again, I do all the work for southeast New Mexico within the LLC.

Q. Mr. Wakefield, in the course of your professional experience and currently within the scope of your responsibilities for Kaiser-Francis, have you been called upon to make geologic interpretations?

A. We're a fairly thinly staffed group, and actually throughout my career I have predominantly been responsible for all of my own geology, as well as the engineering, and to some extent land work. So I've wore all three hats predominantly throughout my career. And at Kaiser-Francis in particular, I have done all of the geologic work for southeast New Mexico.

So from 1985 to date, some roughly 20 years, I have mapped Morrow, Delaware, Bone Springs, Devonian plays throughout southeast New Mexico.

Q. Does Kaiser-Francis make business management decisions based on your geologic interpretations?

A. Yes, we do.

Q. And does Kaiser-Francis commit capital based on your geologic interpretations?

A. We do.

MR. HALL: Mr. Examiner, at this point we offer Mr. Wakefield as a qualified expert petroleum engineer. We also propose to have Mr. Wakefield offer expert opinion testimony in the area of geology.

CHAIRMAN FESMIRE: Okay, Mr. Kellahin, do you have any objection to a dual-expert qualification for Mr. Wakefield?

MR. KELLAHIN: I'd like to be done, but Mr. Chairman, am I clear in understanding Mr. Wakefield is not going to be a fact witness to talk about the land part of this problem?

MR. HALL: Primarily no, Tom, that's correct.

MR. KELLAHIN: Because we've concluded that, and we did not bring Linda Townsend back to rebut anything Mr. Wakefield had to say.

CHAIRMAN FESMIRE: He's asking to be --

MR. HALL: We will briefly touch on that, but --

CHAIRMAN FESMIRE: He's asking to be qualified as an expert petroleum engineer and in petroleum geology.

MR. KELLAHIN: That's fine, I don't care.

CHAIRMAN FESMIRE: Okay. Seeing no objection, he'll be so accepted.

Q. (By Mr. Hall) Briefly, could you explain to the Commission, what is Kaiser-Francis' interest in Section 4 here? What is its ownership interest?

A. In Section 4 Kaiser-Francis owns -- Well, at the time this all started, we owned 50 percent with Samson of the southeast quarter of Section 4.

Q. And is it true, Mr. Wakefield, that the Kaiser-Francis division of interest in the KF 4 State Number 1 well will be the same, regardless of whether the well is ultimately configured with a standup or laydown unit?

A. That's correct. If I might finish what I was going to say a minute ago --

Q. Yes.

A. -- we have -- what it is, we own the southeast quarter of 4, and the south half of 9 is the same lease, and we own 87 1/2 and Samson owns 12 1/2 percent of that non-continuous tract. And it's part of our -- we'll talk about it in a minute, is that in here we sold a part of that 23 acres to Mewbourne Oil Company for an acreage trade in another area. So we have about 37 percent of the southeast quarter -- 37 percent of a 320-acre tract that that would go into, is the way I meant to say that.

CHAIRMAN FESMIRE: Either way, it's --

THE WITNESS: We have 37 percent, roughly, and 87 1/2 net revenue.

Q. (By Mr. Hall) By the way, Mr. Wakefield, is Chesapeake paying Kaiser-Francis for production from the KF 4 well?

A. No, no, there's -- They started paying us at a 75-percent net. We notified them it was incorrect. They then sent us an original title opinion -- I mean drilling opinion. We said okay and sent it back. We haven't had anything back since this summer.

Q. All right. Mr. Wakefield, did you undertake your own evaluation of the Osudo area?

A. Yes, I did.

Q. Can you tell the Commission briefly -- give the

Commission a brief summary of your conclusions, from your interpretation.

A. I don't know that anyone's really went through what's gone on to get us to this point or not. First, to tell you exactly what our interest is, we have this 160, we have the south half of 9, we have about a 25-percent interest in the North Wilson Deep 2-5, the 28-BCF well. We had a similar, slightly larger interest, about 31 percent, in the discovery well that was plugged, oh, a few years back when it would no longer produce at commercial rates, and we own the west half -- a substantial part of the west half of 13 over here in 21-34, and then we own a large acreage block of shallow acreage that's not -- that is depth-limited, we don't have any deep rights in it. And then down in here somewhere -- I think it's this section, we own a little bit of rights down here.

So our rights are scattered throughout.

We -- this initially -- in about 2003, the wells that were here at that time were the WEL 1, the dry hole, the Wilson, the Osudo State 1-16, the WEK 1, the plugged 15 1, and I think that was it. That little pod was developed. There wasn't -- and there was some wells down here, but they aren't really strongly pertinent to what we're going to talk about. And there was some dry holes around this ancient paleo-high.

On this side, there's virtually no sand. That well right there had virtually no sand. There is a group of wells as you come down through here that have some pretty nice cums, and then there's an area in here with no particular gas, and then you have these two really good wells. This was a 9 -- I think 8 to 9-BCF well, and 29-BCF. And so our interest has been for a long time, you know, where to find another one of these.

And we looked down here, and the problem with this area was that you have the PQ Osudo well, which always underperformed the log. It's a pretty thick sand, I can't remember exactly the pay. Let's see if it has it on here. It has 16 feet of sand, but it never produced at anything remarkable in terms of rate. I think maybe the initial potential on it -- or initial production was in the neighborhood of 300 MCF a day or so.

Similarly with the WEL Com 1-10. Very nice looking sand, but never produced at any rates really much higher than 300 MCF a day.

And then you have this WEK 1-15, which I think that's the well, tucked down here, that had an excellent permeability and produced, you know, 6 BCF and then has been essentially shut in for years.

And then you had a well down here that found a thin portion of the sand and was limited and didn't make anything.

And so what we were willing to do when gas prices started to pop in 2000 was go in and take another look at this. Just before that, in 1987, this pressure -- they took a pressure on this well after it had been shut in for some time --

Q. For the record, would you identify that?

A. That is the WEL 1-10. And that pressure was in the neighborhood of about 4400, 4500 shut-in tubing pressure, and it amounted to about a 6300-pound P/Z. And you take the P/Z data points, it implied that this well had a recovery something like 6 -- possible of 6 BCF, which was nice, but it just wasn't performing. And until recently, until the -- oh, probably the mid-1990s, there wasn't any effective frac treatments for Morrow wells.

And in the early 1990s they devised these alcohol foam fracs, and they tried one here and it worked. The well went from roughly 1030 MCF a day to 1500 MCF a day, and we'll talk about the -- we'll go through the production graph in a minute on that.

But at the point in time they frac'd it, it only had made 720 million cubic feet of gas from 19- -- what? Let's see. 1970 through 1994. In 24 years, it made 724 million.

And so you know, the conclusion is -- and I had always thought it was pretty highly damaged and somewhat tight, but if we could frac that, then I became interested in drilling more wells through this trend north-south, because I had mapped it as a north-south trend with sand trending through the east half of 9, the east half of 4, up along this paleo-high between the Central Basin Platform. And we had this acreage up here, so what we thought we'd do would be try and get a well drilled in this area.

About that time, late 2003 or early 2004, when we were forming the LLC, Mewbourne came to us and wanted to drill that well right there.

Q. Identify that for the record.

A. That's the Osudo State 1-9. And I said yes, I'd like to do that.

Coincident with making that decision, Samson was drilling a well over here called the Dilly Bar 1-8. They proposed a well called the Hunger Buster 1-9 right there, effectively freezing the south half of this unit as a laydown, and they didn't want to release that APD until they got this well down and tested --

Q. And "this well", say that --

A. Dilly Bar 1-8, their Dairy Queen prospect, as if you didn't know already.

Now at the same time, the northwest quarter of 9, the southwest quarter of 4, this middle 320 of 4, and then the 320 in the north half were all state leases that were unleased. And there was a series of -- in late 2004, maybe early 2005 -- series of lease sales in which Rubicon and Samson purchased this interest. Chesapeake then inherited or purchased the Rubicon interest. And if I'm wrong about Rubicon and Chesapeake you can tell me, but that's my understanding.

So that then set up ownership in the play. And immediately, Chesapeake and Mewbourne after that formed a 320-acre unit and proposed that well and drilled it.

Q. And you're pointing to Section 9

A. That is the Osudo State 1-9.

CHAIRMAN FESMIRE: That's a 320 laydown in the north half?

THE WITNESS: 320 laydown in the north half, cutting me out of it completely. I was not happy. Very angry with Samson at the time, because they were still insisting that they wanted to drill over here. But they also wanted to drill over here, they just couldn't have it both ways. Actually, that is kind of what you get into in these situations, company policies. Those people are all gone that did this, by the way.

So because of this well -- and we didn't have an interest in it and we couldn't get any information. I -- and we needed acreage somewhere else from Mewbourne. I conducted an acreage trade, which gave me 100-percent of the information rights to this well.

Q. (By Mr. Hall) "This well", again, is the

A. Is the Osudo State 1-9.

Q. -- Osudo 1-9?

A. And that was very early in March.

Now coincident with receiving that information, Chesapeake proposed a well in the south half of Section 4.

Q. Did they tell you where?

A. I called to ask where and they didn't give us a specific location, which is typical Chesapeake AFE all over the company, they send out a legal location letter asking you to make an election, and they did.

MR. COONEY: Mr. Chairman, I thought we weren't getting into --

THE WITNESS: I'm sorry, I'm not trying to cross any lines here, I'm just telling a little history.

MR. COONEY: We understood the land case was over, and we're not prepared to address it today.

CHAIRMAN FESMIRE: Okay, that objection is probably valid, given the --

THE WITNESS: Okay, well we'll go to the next statement, which is, after that conversation they proposed a well right there, 660 by 660 --

Q. (By Mr. Hall) And this is --

A. -- from the southeast quarter.

Q. Section 4?

A. Section 4. And they coincident with that proposed wells --

MR. COONEY: Mr. Chairman, same objection. I ask that this testimony be stricken. We're getting into land issues that we understood at the last hearing -- Mr. Gallegos stated, Mr. Hall agreed, everybody agreed, the land case was done with. That was what was discussed and agreed to at the prehearing conference. And it's getting late, we don't need to go into this, and we shouldn't.

CHAIRMAN FESMIRE: Are the things that Mr. Wakefield is saying -- are they in dispute in the land case?

MR. COONEY: Yes, they are.

CHAIRMAN FESMIRE: Okay. Mr. Wakefield, I'm going to ask that you avoid those subjects and --

THE WITNESS: Well, the only subject I want to say is that where the location was proposed and drilled for the well in question, which is the --

CHAIRMAN FESMIRE: You notice --

THE WITNESS: -- KF 4 State.

CHAIRMAN FESMIRE: -- he didn't sit down.

THE WITNESS: Well, the KF 4 State was drilled, was it not? Right there?

CHAIRMAN FESMIRE: Okay --

THE WITNESS: It's an undeniable fact.

CHAIRMAN FESMIRE: Okay, that we can accept.

THE WITNESS: And there was two other --

MR. COONEY: We agree with that.

THE WITNESS: -- wells proposed.

MR. COONEY: We agree with where the well was drilled, but where it was proposed and what the discussions were, all that stuff is in dispute, and the land case is over with.

CHAIRMAN FESMIRE: Yeah, except for --

MR. COONEY: That's right, yes.

THE WITNESS: The well was proposed at 660 by 660 and drilled to 10,000 feet and sidetracked to that point. And coincident with the APD for that well, APDs were filed for the -- what would be the middle third, would be the east half of it, and an APD was filed for the north third, in the northwest quarter. So there was three APDs filed by Chesapeake in that section.

The KF 4, then, was spud in late April, and it drilled to a TD -- I believe logged around July 1st or so is what we decided the other day, wasn't that, Mr. Godsey?

MR. GODSEY: I'm sorry, I --

THE WITNESS: July 1st, is that when we logged it?

MR. GODSEY: I'm sorry, when what?

THE WITNESS: The Osudo -- I mean the KF 4 State, about then?

MR. COONEY: Mr. Chairman, the record will reflect where that well was proposed, the KF State 4. Again, we keep drifting into this land case, and I haven't heard much about engineering or geology here in a while.

CHAIRMAN FESMIRE: Mr. Wakefield, why don't you go ahead and stick to the subject of this hearing --

THE WITNESS: Okay.

CHAIRMAN FESMIRE: -- this part of the hearing?

THE WITNESS: Anyway, this -- the situation that we wanted was to drill a well, a group of wells, north-south through this area. We had -- By this time, this CC 3 State well had been drilled and been proven to be a -- splay sand, had a great gas show, and didn't produce any appreciable gas.

Prior to our hearing in August of '05, this well was drilled in early -- either late July or early August and was proven to be a pure dry hole by Apache. And by that time we had drilled the Hunger Buster well, and that concluded the development that's happened in this area.

And my mapping showed much of what this shows right here. You know, it might be a foot or two off on net pays, but basically my map is exactly that, that I used to arrive at the decision to produce in the Hunger Buster, to try and get into the Osudo State and to participate in the KF 4.

Q. (By Mr. Hall) When you say your map is exactly that, do you mean to say that your geological interp- --

A. General trend and the --

Q. -- your geological interpretation is in line with Samson's?

A. That's right.

Now the results of this match also about what we had planned, or we had assumed would happen in a play like this. You would have a couple of wells drilled on this side that defined the edge, we'd have a good well drilled somewhere in here, and a well that was a little bit less of reserves, and then we thought we had a location here we could really get in and share reserves with that well.

And what I'd like to do now is talk about the depletion of this well and try to answer some of the questions we've had from the two engineers and the geologists about it up to this point.

Q. For the record, identify that well, please.

A. That's the Hunger Buster 3-9.

Q. All right, why don't you give the Commissioners some additional background about the experience you had in drilling and completing that well?

A. That well blew out -- or almost blew out, at 11,810 feet.

If we could pull up that Hunger Buster plat.

It blew in that -- nearly blew out in that sand, and created this show, had a 75-foot flare, it took 10.8-pound-per-gallon mud to control, plus an additional shut in drill pipe pressure of about 600 pounds, giving us a bottomhole pressure in the range of about 6900 pounds, just shy of 6900 pounds, with the added pressure and the mud weight. We were able to control it to TD with 11, 11.1-pound-per-gallon mud.

Now in doing that, when we weighted up, this sand right here had quite a bit of permeability, and we wound up having to put quite a bit of barite and lost circulation material in the mud to control it, and control this kick and control fluid loss.

And you can see on the -- I can't see it from here, I'm just pointing, but if you look at this you'll see that there's a PE number here that implies that you've got a lot of barite in this, and there's some significant mud cakes in here, and we're not going to go into all that.

Needless to say, we've got a well that looks like it has the same kind of pressure in this interval and looks to be correlative to the zones that are producing -- at least one of the zones producing in the Osudo well.

So because of the lower-pressured sands down here, we wanted to complete this group of sands individually, and we wanted to put a little frac job on it. And so we -- Since they no longer do alcohol foam fracs, the next best thing is a 70-percent quality CO_2 foam frac, and that was conducted on June 25th of 2005.

We were just starting the 2-pound-per-gallon stage of sand, and the casing parted at 228 feet. Fortunately, it didn't hurt anybody or kill anybody.

The frac pressure was all transmitted to the back side and essentially went into the Bone Springs formation. After -- this was all -- After that happened, we could never load the back side. And because we had pressure down here, we were having trouble controlling the well and we had to spot a heavy pill just above the perforations so that we could get the casing out and tie back into it. And we got that accomplished fairly easily.

That still left us without any perforations in this zone, so our idea was to come in with a packer on tubing and set here, perforate this and get it producing, and then move our packer up here and commingle them.

The problem was that from 7400-8000 feet the casing was corkscrewed, and we could barely get tubing in the hole. Once we got past that point we could go down due to gravity, but we couldn't pull up. So we could no longer try to isolate these zones.

So we ran in with a strip gun and perforated that zone. And before that we couldn't really get much gas out of this, and we couldn't effectively swab it, but we had 4100 pounds pressure at the surface a day or so after this, but we couldn't get it to really unload and produce. It had to be shut in for a considerable period of time before we could do that, about a week.

So we have all the zones open, they made about 750 MCF a day initially at about 1000 pounds flowing tubing pressure, which declined, you know, to line pressure immediately, and we're now at about 100 MCF a day.

So we're looking at re-drilling this well and trying to -- Let's see, let's go back to the other, prior plot. Probably try to re-drill this well through Section 9 right there, probably try to drill it down here in the southeast quarter a little bit.

And in the meantime, this acreage has come up for auction as explained by Lynn, and there's a Mewbourne well to be drilled there. So we're probably going to wait for it to be drilled, then drill over here, is our current plan.

Now a lot has been made of the pressure data between these two wells and the KF 4 State. Ken did a pretty good job of going through all of that, and I don't want to bore you with that again. But it's obvious that the pressure at the Hunger Buster and the KF 4 State is greater than that at the Osudo and significantly greater than at the WEL Com 1.

Let's go to that next plot.

This kind of shows, again, reinforcing that north-south trend. So you can see it's a very strong north-south flavor to that.

Can you go back to the original -- Yeah.

Now I want to draw your attention to the results of these five wells that have been drilled. If you look at this area of the field development from about these two sections here, down this township line to about right here and across, there have been 33 wells drilled out here, in that area.

The success of those 33 wells -- pardon me, 38 wells. There's 26 dry holes or stinkers, wells with less than a half a BCF recovery. There are nine wells with reserves of 1 to 8 BCF and three wells with reserves greater than 8 BCF.

So two-thirds of the wells in this area are failures. So you're wondering why we're continuing to drill out here, right? Because this area has great promise when you have this and you have this tract where you can put significant sand north-south right through there.

And the reason I point that out is, this results, with these dry holes and the successful wells, pretty much match historical development trend in here. It's about what you would expect. If you were to buy a prospect and you were to invest in that acreage, you would expect not to find every well being an Osudo State, you would not expect to drill all dry holes, and you'd expect it to look like this.

Now the other thing I like about this map, and Lynn Charuk's too, is that we're out in here, we have this thin -- or this small distance across where the -- you have a dry hole here, a dry hole here and -- that thinning area in there, versus this widening area, allows this sand to pile up, for lack of a better word, or to get thicker or to overlap each other, because it restricts sand movement to the south. And this area, once it comes through, winds up doing the same thing with another thin area down here.

So you get these thicks and thins on east-west-type of width of the channel. And we have these little thicks, you typically have cleaner sand, and the -- under this evaluation, under my evaluation, the KF 4 State when it was sidetracked wound up being on the west side of the sand trend, whereas if it had been left where it was initially spud I would have been very happy and I hopefully even found that nice thick sand, because I think the KF 4

State and the CC 3 State set up this north-south trend through here very nicely.

Conversely, in looking at this map --

Q. And you're referring to Chesapeake's GEO 4?

A. GEO 4 map. I really don't find anything I like about it. I'm sure Mr. Godsey has done exactly what he said on picking sands, and I don't really care about that. All geologists have pet ways of picking sands. I do too. Some of my sand picks match his; some of them, they don't. I don't fault either one.

But this Central Basin Platform right through here, as Lynn said, Lynn Charuk said, this area is heavily drilled, has lots of seismic on it, and in 20 years I've never had anyone bring to me a prospect, knowing that we had this acreage, and say, there's going to be an east-west trend here and I want to drill on your acreage. It's never happened. There's never been anyone show any kind of seismic line through here that shows any kind of channels cut during Morrowan time that would transport chert from the Mississippian, as Mr. Godsey states, out into here.

And if it was true, I'd expect not just these three or four wells to have cherty sands in them, but I'd expect the whole area to have cherty sands in it. It would have to have. It would be too much -- You just couldn't contain it right here, particularly with these channels that he's drawn in clear out here.

Now the other thing that I don't like about this map that -- versus this one over here where you've got dry holes open spaces with no sand in it, where you've got shale deposited, you know, clear-cut places where there's -- you know, you're not going to find productive sand -- you don't find any of that on here, hardly.

What he does, he takes wherever there's a negative point between the Central Basin Platform and the wells that are producing, and he either puts a zero or a thin until he runs into a sand out here that's got some thickness. And he just keeps doing that.

Now during our original hearing he presented two maps, the Exhibit 22 and Exhibit 25. Exhibit 22 he testified that he prepared for the hearing back in April or May of 2005. At that time he had the CC 3 State 1 drilled right there, and he had the pressure data from it, showing it not being continuous. But on his map he had all of this area communicated to the CC 3 State, plus without the WEL Com 1-10 dry hole, he had all of this area tied together.

At the conclusion of that hearing we were asked to determine the net pay from Chesapeake's maps and from Samson's maps, and from his Exhibit 22 we calculated in turning to the Commission that there was 28 BCF on his Exhibit 22 in Section 4, this area right here.

On his Exhibit 25, which he drew after the WEL Com 1-10 came into play, it had reduced to 12.4 BCF, I believe is the right number. And currently he's got 14.3 in there, on the...

So Mr. Godsey has -- in all his -- the comments he's made about, you know, hitting sands over here correctly and -- But when you look at these dry holes, it obviously was -- he didn't contemplate that. And that's really the failure of this map. It doesn't contemplate the success potential of this area.

And in particular, if you look at -- troublesome to me is, in Section 4 where he's got this 50-foot-thick sand coming off the Osudo 4, coming over this way, you know, there probably is some 50-foot sand but it's probably going north-south, in my opinion. But just in terms of his map, he comes down to his little thin that he's got here and the little thin he's got up here, and he just fills it completely with sand.

And he does the same thing down here in what was called the south lobe. This was that area A that we've been talking about with the engineers for the last couple of -- last day. And this is that south lobe with the WEK 15, the Osudo State 1-16 and the 2-16, which was not part of the sand, and the 1-15 that was in all that pressure data we talked about.

Well this little area A, the Chesapeake engineer said it had 30 BCF of gas. And I did a quick check -- I don't have a planimeter with me, but I just take -- a quick way of checking the acre-feet is just take a unit -- in this case, 160 acres -- and find the mid-point of each 160-acre tract, and then add them up, multiply by 160 and the original gas in place. And the 1200 number that I think people have been using here is not a bad number for original recoverable gas in place, and that does give you right at 30 BCF.

I did the same thing down here in this south lobe where we had the conversation with Mr. Finnell that -- and he said this area was completely drained from those three wells. Well, they're only going to recover about 9 BCF from those sands. There's 40 BCF of gas in that same little area that's similar to this. Obviously, that's not drained. The wells have compartmentalized sands that they produced from, but they're not draining the entire reservoir package. And I contend that that's way too much sand for that area, as is this right here.

Now on this map, from down here in this part of 16, going up to about the top of that point right there in Section 4, there's 40 BCF of gas on that same basis, taking the 160 acres and just calculating that. Those wells, per my evaluation -- we can go through the -- my determination of how we get there -- will recover about 30 BCF.

And so that matches pretty much what Lynn Charuk's prospect map is showing, in that you could drill in through here -- and there's two or three wells that can be drilled in this trend right now, this is -- the 30 BCF includes these new wells. Before these were drilled, you had about 20 BCF you could have drilled for. There's still 10 BCF left, which is one reason why Mewbourne is drilling that test right there, and we're willing to drill another well right there.

So from my point as the vice president, having to make the decision to spend our money, we have -- we'll have 87 1/2 percent of that well. I have to know that we're going to have sand in it, and it's going to be enough to pay for the cost.

Similarly, if we -- if -- what I contend, and what Samson and Mewbourne contends, is that this should be a standup 320. I want to drill that well right there, because it's probably going to be thick, thicker than this well, probably going to have better transmissibility, and it's probably going to recover more gas than this well.

So it's --

MR. KELLAHIN: Mr. Chairman, there's no longer a question before the witness to answer. Is there a question?

CHAIRMAN FESMIRE: We've been doing that a bit --

MR. KELLAHIN: I know --

CHAIRMAN FESMIRE: -- a bit much, so...

MR. KELLAHIN: And I know we're trying to get done, so --

Q. (By Mr. Hall) Mr. Wakefield, let's talk about some of the reserve estimates for these wells in greater detail. Do you want to refer to Samson Exhibits 46 and 46F?

A. 46 -- Which ones did you ask?

Q. 46, 46F.

A. Okay, this was -- That's fine, we'll talk about that. This goes to the pressure data that Ken was talking about. And the only -- what I want to make in this, just reinforce, is, these pressure trends all imply that these wells are constantly -- have produced independently, predominantly, from each other.

This well, if you were to describe it completely, had a very high rate and produced 3 BCF in this time period right here. It could potentially -- since there is a sand in this well, and this well -- they correlate, it could have affected it? I don't know, can't tell, can't determine that.

But I do know on depletion that this well came down to here, about 1500 pounds at this point, and then went flat very low rates. This produced -- when it got to this point it produced right at 5.6 BCF, and it produced another 600,000, 700,000 over the next roughly 30 years.

So predominantly the reservoir was drained at that point, and it's just a drainage scenario.

This well, because it's damaged, and we knew it had pressure here, did not follow that same trend. Every time they shut it in -- you remember all these points here in the middle -- it always had pressure. That doesn't mean much of anything except it's tight.

And the other wells they talked about, the 15-1 and the Osudo State 1-16, both of those wells have nothing to do with either of these two. This well, the 1-16, is a very low-perm reservoir. They even frac'd it a couple of years ago and couldn't get anything out of it. Improved it slightly, it at least makes a hundred and -- 250 MCF a day, I guess.

This well just, you know, went nearly to zero immediately and then went off line and was dead.

These are all brand-new wells. These pressures, although grouped together, don't really tell you whether or not they're in the same sand or not. And based -- if you go back to what I said a minute ago on that isopach map from Samson, there's 40 BCF in a north-south direction. We've got 30 BCF to be produced, we have 10 BCF left.

Trying to fit the sand thicknesses on a volumetric basis to the sand recovery from the wells is a mistake. It's not accurate, it doesn't reflect the gas in place because we can't drain all the sands from the wells that are drilled. Our densities are going to have to be quite a bit more. We don't have a density adequate to do that.

And maybe we can just go and do the next plat.

Q. Let's discuss the decline curve analysis that Chesapeake used. If you'd refer to their Exhibit PE 22 for the area A wells.

A. We don't have it up there.

Q. Do you have the hard copy?

A. Yeah, if I can just get the exhibit number. Okay, it's Exhibit PE 22 if you want to pull it out of your file.

Q. What's your opinion of the analysis that Chesapeake utilized here?

A. Well, I think Ken's right, it's not valid. There's the three wells -- actually four wells, Hunger Buster really doesn't count. But there's three wells involved here. And draw your attention to the -- this curve starts on the left-hand side in 1970, and all the production history through 2005 is only from the WEL well.

As you'll notice, there's a decline rate of about

10 percent, 12 percent from 1970, about 1977, and then it goes virtually flat through 1991, 1994, I guess, and then it increases. And this was the increase from the frac job, 10 to 20, 30 MCF a day, to 1500 MCF a day.

And then if you'll notice, the well is now declining again. I think it was mentioned that it was hyperbolic. That well is currently declining at about 4 percent. If you continue that decline, you get 6.16 BCF ultimate recovery in that well. So it's a very accurate way of determining the reserves for this well.

Also, as Ken pointed out on his P/Z data -- What exhibit was that?

MR. OLMSTEAD: WEL, WEK?

THE WITNESS: Yeah, I just didn't have a copy of it. Actually, it's 46D -- no, 46C.

He came up with an estimated ultimate EUR of about 4.5 BCF. I ran the numbers a little bit differently than that and came up with a P/Z of 5.8 BCF.

CHAIRMAN FESMIRE: For the entire area?

THE WITNESS: No, for just that one well.

CHAIRMAN FESMIRE: For the one well.

THE WITNESS: One well. It's a two-point P/Z.

The other thing is, we want to look at what is the recovery from the two wells you're asking about, the Osudo State and the KF 4?

The Osudo State well has been -- and he -- there was an exhibit put in by Chesapeake that showed what the well was producing, and it was producing at about 5 MCF a day, and the flowing tubing on that well had dropped down to line pressure.

A plot of that on a semi-log graph would show that the early history of that, the first few months, was about a 90-percent decline, from about August of '05 through the first few months of '06 it was declining at 58 percent, and then it hyperbolic'd to 38 percent for the last few months. It's currently at 150,000 a month, 5 million a day.

So you have a 5-million-a-day well declining at 38 percent, you have a 300-MCF-a-day well declining at 4 percent, and then we have the KF 4 State Number 1 that we'll talk about in a second.

In terms of trying to get some pressure data for the Osudo 9 State Com Number 1, we know what the initial pressure was, and we know on 8-25-05 that we had a -- the Kaiser-Francis Hunger Buster well had a fairly lengthy shut-in due to some pipeline problems, we had a 2550-pounds shut-in tubing pressure, and using that we think that is probably somewhat in communication with the Osudo well. We get a P/Z on that of 7.5 BCF, 7.6 BCF.

CHAIRMAN FESMIRE: For both wells?

THE WITNESS: No, just that one well.

CHAIRMAN FESMIRE: Just one well.

THE WITNESS: Because -- but we don't have any real production from the Hunger Buster. I mean, it's 100 million or less.

CHAIRMAN FESMIRE: Yeah.

THE WITNESS: So I think that that is a reasonable projection, first projection of what it would be, to recover gas from the Osudo 9 State Com 1. If you just continue the 38-percent decline, that's too low a reserve.

There are several pretty good wells, WEK 1 being one of those, whose later life decline was 24 percent. So taking 24 percent from 10,000 MCF a month and continuing the current 38 percent to that point, and then taking 28 percent from there, you get an EUR of 8.7 BCF, which is larger than the pressure data would suggest, but you'd expect it to, because we probably aren't really truly reflecting all the pressure from the Osudo. But I think 8.7, the 9 BCF from Ken, are not too far apart.

Then it comes to the more difficult one, in some respects, the KF 4 State 01. That well has been producing, and there was an exhibit presented by Chesapeake that showed it then flat, but -- and production at about 3 million a day, slightly under that, and that flowing tubing pressure had just been dropping like a rock. And we're now at 500 pounds. That pressure is on that line pressure. So they're floating on line at 3 million a day.

Now back in April of '06 they did get a bottomhole -- they did get a shut-in tubing pressure. So I went back and grabbed that, that was 4100 pounds at 4-2-06. And that, using the initial reservoir pressure, gives us a two-well P/Z that turns out to be about 3.1, 3.2 BCF.

That pressure, then, if you assume that -- you know, you've probably run out of -- you can no longer sacrifice flowing tubing pressure to keep the KF 4 State at 3 million a day. It's going to have to go on a decline. So if you sacrificed all the flowing tubing pressure it has to go on decline.

If you have a 3.1 BCF EUR from P/Z data, what decline would you have? And that decline would be about 38 percent, which is roughly equivalent to where the decline is at on the Osudo 9-1 well.

And so then you get an idea of what the recovery is from those wells. You get 3.1 BCF from the KF 4 State, which is reasonable for 17 feet of pay. You get roughly 9 BCF out of the Osudo with 54 feet of pay. And you get about 6 BCF from the WEL Com Number 1. And you add those together, you get 15, 18 BCF, about 18 BCF. And that's a real reasonable number, based on what we know about the trend.

Now your question -- If we could go back to that graph, and don't pull anything in, just the sand trends. Your question about where does all the gas go? And we're talking about the Osudo 9-1, the KF 4 State 1, and the WEL Com 1. Well, the WEL Com 1, obviously you can come down here, and as long as we don't drill a successful test to replace this one, obviously some of this gas is available, and there's a lot of gas right in here.

If this well is only going to make 3.1 BCF, which is what I think it will do, based on that 4100-pound shut-in tubing pressure back in April, then that would be reasonable for these wells to share in that.

It also implies that the compartmentalization, at least as far as it goes for the Osudo State well, probably is tied into at least one if not two of the sands, probably one of the sands, has a lot of areal extent, probably not seen in this well. And this well did have, you know, a sand that looked like it was tied to this one, but it had other sands that weren't.

And so there's plenty of room for this well to drain reserves up this direction, it doesn't have to go down here.

And so you get a map -- or at least from my point of view, from Kaiser-Francis' point of view, you have a map, it has 40 BCF container, at least. We think that there's 30 BCF to be recovered from the existing wells, which allows 10 more BCF to be recovered from new wells to be drilled in 15, maybe 9 and up here in 4, and then whatever up in here, which I didn't include in the 40.

So again it confirms back to what Lynn Charuk thought. You have some decent wells, some nice sands, it's bracketed with dry holes, bounded by the Central Basin Platform, by the paleo-uplift, and we have a sand trend that allows us to progress up through here and drill wells.

CHAIRMAN FESMIRE: And all that's based on the idea that the KF and the Osudo 9 are in communication?

THE WITNESS: I didn't -- no, I said the only communication I could find was the Hunger Buster and the Osudo State.

CHAIRMAN FESMIRE: Okay.

THE WITNESS: I didn't say anything about communication between these two wells.

CHAIRMAN FESMIRE: Okay.

THE WITNESS: I don't think they are in communication. As Ken said, you have a much higher pressure here than you do here, and this well produced 3 BCF, and you still had that same high pressure.

CHAIRMAN FESMIRE: Then I must have missed something in your argument. How are you going to drain the gas to the north, past that well that's not in communication?

THE WITNESS: There are two sands in this well, thick sands in this well. There's one sand that may be correlative in here, may not be, we don't know for sure. It may just be -- look correlative.

And it has several other sands that don't appear to be correlative to this. This has potential to have a sand that winds through here and will recover through that.

CHAIRMAN FESMIRE: And it was just missed in the well with the arrow --

THE WITNESS: Excuse me, I'm sorry?

CHAIRMAN FESMIRE: And it was just missed when the other -- the well was drilled outside of that --

THE WITNESS: Yeah, when they sidetracked it, they probably missed it, which is the only point I was trying to make earlier about -- when I got in trouble.

Q. (By Mr. Hall) Mr. Wakefield, let's turn to Chesapeake Exhibit PE 22 and compare that to Chesapeake Exhibit PE 25, the BHP-versus-time exhibit.

A. PE 25, which one is that?

Q. PE 25 --

A. It's the pressure data? Okay, that's the pressure data, okay.

Q. In your opinion, can you utilize the data points shown on PE 25 for the purposes that Chesapeake did?

A. No.

Q. Why not?

A. These -- None of these sands are necessarily in communication with each other on a pressure basis.

Q. Let's turn to PE 22 again --

A. Okay.

Q. -- Chesapeake's reserve estimates. What are they showing there for that area A?

A. They show a 27.4-BCF ultimate recovery based on the decline that they have drawn on there, beginning in July of 2005?

Q. Now, is that correct?

A. Now that -- First of all, he didn't even try to sum up the individual decline curves to project what each one would be producing at a future point in time, which is what you have to do if you're going to draw this curve. He just assumed it would be 14 percent based on some decline he pulled out of the WE 3, which is obviously a damaged well, not producing at capacity.

And the only way you can utilize decline curves in this manner is if they're producing at capacity. We've already seen that the Osudo well and the KF 4 -- Well, the Osudo well definitely is producing at capacity, and the KF 4 is about to produce at capacity, no longer be flat. And the WEL is producing at capacity.

If you take the numbers I gave you, about 17, 18 BCF, for those wells in that area A that was talked about, the Osudo 1-9, KF 4 State 1 and WEL 1-10, you would have a 28-percent decline, which is much more consistent with what the good wells out here have produced. And by "good wells" I mean the wells with 5, 6, 7, 8, 10 BCF of reserves.

Q. Now what's your estimate for the recoverable gas in place for that same area A?

A. Say that again?

Q. What is your estimate for the recoverable gas in place for area A?

A. I mean, I wouldn't dispute what they put on their -- 30 BCF, from their map. I mean, if you were to planim- -- and I checked it back, looking at the thicknesses on each 160. I think his map shows 30 BCF there.

Q. All right.

A. I don't think it would cover it, but I think it's there.

Q. Mr. Wakefield, in your opinion is Section 4 best developed with a standup 320-acre unit comprised of the southeast 160 and the middle east 160?

A. Mr. Johnson's map, which is essentially my map, shows that the east-half unit is underlain by substantial thick sand, whereas the west-half unit does not.

Further, if you look at -- you know, there's a dry hole there -- these wells did not go deep enough, but there's a dry hole there that condemns that part of the west half. These wells were all failures. Had some sand in some of them, but they were basically -- those four.

There's really very little evidence -- or there's no evidence, as far as I'm concerned, that there's any sand should be found in the west half of Section 4.

Q. As a consequence, if the Commission upholds the standup communitized area that you initially proposed, will Chesapeake's correlative rights be violated?

A. No.

MR. HALL: Nothing further of this witness, Mr. Chairman?

CHAIRMAN FESMIRE: Mr. Kellahin, do you have a cross-examination?

MR. KELLAHIN: Mr. Chairman, I know we're short of time, but we've used substantially less than our seven hours, and I'd like to save my questions and answer in terms of our rebuttal witnesses, so -- and I don't know what the time component is for the Commission, considering that we're out of time for today.

CHAIRMAN FESMIRE: We're certainly getting close. How many rebuttal witnesses do you have?

MR. KELLAHIN: I want to call both the geologist and engineer back.

CHAIRMAN FESMIRE: Okay.

MR. KELLAHIN: And my count with the geologist is, I've got 10 exhibits, and I'll have five or six for the engineer, and so all of a sudden you've got --

CHAIRMAN FESMIRE: Okay, and they're going to need to bring their people back to -- So the objective of getting at least to the point where just the lawyers would have to come back today is pretty shot.

MR. KELLAHIN: I don't see how to do it.

CHAIRMAN FESMIRE: Given that, would you have a cross of this witness, or do you want to just wait and do it all in rebuttal with your own witnesses?

MR. KELLAHIN: I think I'd rather do it with rebuttal with my witnesses, and perhaps we could come in the morning, if you want to start in the morning, or --

CHAIRMAN FESMIRE: Saturday morning?

MR. KELLAHIN: I work Saturdays. I work Saturdays. I can do Mondays. And I can go on through this evening, if that fits your schedule.

CHAIRMAN FESMIRE: Well, I think there's a matter that one of the Commissioners has to address as quickly as possible.

This week? Next week? I'm not in favor of coming Saturday, I've got to do my Christmas shopping.

COMMISSIONER BAILEY: -- on Tuesday, and I'm leaving town on Wednesday.

CHAIRMAN FESMIRE: How long are you --

COMMISSIONER BAILEY: The 28th -- 29th.

CHAIRMAN FESMIRE: Through New Year's.

COMMISSIONER BAILEY: No, through that weekend.

COMMISSIONER OLSON: I'm booked Monday, Tuesday --

(Off the record)

CHAIRMAN FESMIRE: Sounds like we've got a whole 'nother day. It looks like we would be towards the first week in January.

MR. KELLAHIN: Mr. Chairman, this case is too important for us to just stop. We've restructured our case to have a rebuttal case, to answer all the things that we've heard today, and it will be a disservice to my client if I just stop now. We would like to come back later and finish this.

CHAIRMAN FESMIRE: Okay, later as in -- ?

MR. KELLAHIN: January, or whenever you tell us to come back.

CHAIRMAN FESMIRE: Okay. Mr. Hall, Mr. Olmstead?

MR. OLMSTEAD: Is there any possibility of finishing it tonight?

CHAIRMAN FESMIRE: No, that's -- we --

MR. OLMSTEAD: That's not an option?

CHAIRMAN FESMIRE: Yeah, unfortunately it's not an option.

MR. OLMSTEAD: Can we have some kind of time limit on Chesapeake's rebuttal case so it doesn't go another day, day and a half?

MR. KELLAHIN: We'd have to ask the court reporter to total up the time used.

MR. KELLAHIN: I assume I have about two hours left, and I don't think I would use more than that.

MR. OLMSTEAD: I think we'd be -- we can agree to a two-hour limit.

MR. KELLAHIN: I think in a half day we'd be done. That would give them time to cross, give you a chance to ask our witnesses the time to ask the questions that you might have thought of during the course of the presentation today, and have a conclusion.

CHAIRMAN FESMIRE: Okay. Does everybody have their calendar?

MR. GALLEGOS: You know, Mr. Chairman, I think -- full docket.

CHAIRMAN FESMIRE: Florene, our docket's full for the January meeting, isn't it?

MR. HALL: I'd be amenable to a couple of continuances in the Commission docket, among other dockets.

(Laughter)

CHAIRMAN FESMIRE: Mr. Hall's attempted contributions are noted.

(Laughter)

MR. HALL: Trying to be helpful.

CHAIRMAN FESMIRE: The first week after the holidays, is that -- How about the Tuesday after the holiday? That would be the 2nd. Would that foul up everybody's holiday if they had to have this hanging over them?

MR. COONEY: Well, the witnesses would have to travel, Mr. Chairman, on New Year's Day --

CHAIRMAN FESMIRE: New Year's Day.

MR. COONEY: -- it would be difficult for them, and there's probably going to be a whole lot of folks traveling that day.

CHAIRMAN FESMIRE: That's true, hard to get reservations.

What about the Wednesday?

MR. GALLEGOS: What if we started at 1:00 or 1:30 on that day?

MR. COONEY: We could do that. As a point of personal privilege, I'd like to say that's my daughter's 18th birthday.

CHAIRMAN FESMIRE: That only happens once.

MR. WAKEFIELD: I don't think you can get here from Tulsa that morning. You'd have to leave the night before, or -- I hate to poke bubbles --

CHAIRMAN FESMIRE: How about Wednesday the 3rd?

MR. HALL: That might be a problem for Tom and I.

MR. KELLAHIN: We've got the --

MR. HALL: -- the case on Thursday.

MR. KELLAHIN: -- case on Thursday for the --

CHAIRMAN FESMIRE: For the what?

MR. KELLAHIN: We have a hearing on the Examiner docket on the 4th, the Concho case.

MR. HALL: We're going to need a lot of that preceding day to prepare for that, I think.

MR. KELLAHIN: It's the Concho/Mack Energy --

CHAIRMAN FESMIRE: Could we address that earlier?

MR. KELLAHIN: The Concho case?

MR. HALL: You know, I sent notice out a day early. We could -- Just going to miss some good football games too, Mr. Chairman. How about that Friday?

CHAIRMAN FESMIRE: Well, I don't think Bill --

COMMISSIONER OLSON: That Friday, no, I've got something else.

CHAIRMAN FESMIRE: What can we do about that other hearing?

MR. KELLAHIN: That's a regular Examiner Docket, it's going to have a number of things already on it. It's already been noticed and advertised.

MR. COONEY: We can do the afternoon of the 2nd, I'll explain it to my daughter, if these folks can get here, but I understand it's going to be real hard for them --

CHAIRMAN FESMIRE: What I'm thinking is the afternoon of the 3rd, and trim the Examiner's docket to -- How much do they have on that docket?

(Off the record)

CHAIRMAN FESMIRE: Hang on, just a sec. Are you going to have any questions of this witness?

COMMISSIONER BAILEY: No.

CHAIRMAN FESMIRE: Do you, Bill?

COMMISSIONER OLSON: (Shakes head)

CHAIRMAN FESMIRE: And I'm going to let you off too, because I think I've asked --

THE WITNESS: I'm good for that. I addressed most of my questions -- testimony in the first place, so...

CHAIRMAN FESMIRE: Why don't we go off the record?

(Off the record)

CHAIRMAN FESMIRE: Okay, for the record, the Commissioners had no questions of this witness.

At this time we're going to go ahead and recess until one o'clock Tuesday, the 2nd of January, 2007, in this room. We will finish that day by five o'clock in the afternoon.

With that, we'll be adjourned until Tuesday the 2nd, at one clock.

(Thereupon, these proceedings were continued at 6:16 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 December 26th, 2006.

STEVEN T. BRENNER
CCR No. 7

My commission expires: October 16th, 2006