NEW MEXICO OIL CONSERVATION DIVISION

STATE LAND OFFICE BUILDING

STATE OF NEW MEXICO

CASE NO. 10251

IN THE MATTER OF:

Case 10251 Being Reopened Upon the Application of Kaiser-Francis Oil Company for the Creation of a New Pool for the Production of Gas from the Delaware Formation, Eddy County, New Mexico.

BEFORE:

MICHAEL E. STOGNER

Hearing Examiner

State Land Office Building

October 31, 1991

REPORTED BY:

CARLA DIANE RODRIGUEZ
Certified Shorthand Reporter
for the State of New Mexico

ORIGINAL

A P P E A R A N C E S

FOR THE NEW MEXICO OIL CONSERVATION DIVISION:

ROBERT G. STOVALL, ESQ.
General Counsel
State Land Office Building
Santa Fe, New Mexico 87504

EXAMINER STOGNER: Call next case, No. 10251.

MR. STOVALL: In the matter of Case 10251 being reopened upon the application of Kaiser-Francis Oil Company for the creation of a new pool for the production of gas from the Delaware formation, comprising the southeast quarter of Section 8, Township 21 South, Range 26 East, Eddy County, New Mexico.

EXAMINER STOGNER: This case was heard by David Catanach on October 17th, but due to an advertisement error it had to be reopened and continued to today's docket.

At this time I'll call for any additional appearances and/or testimony.

There being none, Case 10251 will be taken under advisement.

(And the proceedings concluded.)

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 10251, heard by me on 19 91.

, Examiner
Oil Conservation Division

CERTIFICATE OF REPORTER

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

I, Carla Diane Rodriguez, Certified Shorthand Reporter and Notary Public, HEREBY CERTIFY that the foregoing transcript of proceedings before the Oil Conservation Division was reported by me; that I caused my notes to be transcribed under my personal supervision; and that the foregoing is a true and accurate record of the proceedings.

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

WITNESS MY HAND AND SEAL November 6, 1991.

Carla Diane Rodriguez

CARLA DIANE RODRIGUEZ, RPR
CSR No. 91

NEW MEXICO OIL CONSERVATION DIVISION

STATE LAND OFFICE BUILDING

STATE OF NEW MEXICO

CASE NO. 10251 (Reopened)

IN THE MATTER OF:

Case 10251 Being Reopened Upon the Application of Kaiser-Francis Oil Company for the Creation of a New Pool for the Production of Gas, Lea County, New Mexico.

BEFORE:

DAVID R. CATANACH

State Land Office Building

Hearing Examiner

October 17, 1991

REPORTED BY:

CARLA DIANE RODRIGUEZ
Certified Shorthand Reporter
for the State of New Mexico

ORIGINAL

A P P E A R A N C E S

FOR THE NEW MEXICO OIL CONSERVATION DIVISION:

ROBERT G. STOVALL, ESQ.
General Counsel
State Land Office Building
Santa Fe, New Mexico 87504

FOR THE APPLICANT:

CAMPBELL, CARR, BERGE & SHERIDAN, P.A.
Post Office Box 2208
Santa Fe, New Mexico 87504-2208
BY: **WILLIAM F. CARR, ESQ.**

I N D E X

E X H I B I T S

EXAMINER CATANACH: At this time let's call Case 10251.

MR. STOVALL: The matter of Case 10251 being reopened upon the application of Kaiser-Francis Oil Company for the creation of a new pool for the production of gas from the Delaware formation comprising the southeast quarter of Section 8, Township 21 South, Range 36 East, Lea County, which is located approximately seven miles northwest of Carlsbad, New Mexico.

EXAMINER CATANACH: Appearances in this case?

MR. CARR: May it please the Examiner, my name is William F. Carr with the law firm Campbell, Carr, Berge & Sheridan of Santa Fe. I represent Kaiser-Francis Oil Company, and I have one witness.

EXAMINER CATANACH: Any other appearances?

Will the witness please stand to be sworn in.

JAMES T. WAKEFIELD

Having been first duly sworn upon his oath, was examined and testified as follows:

EXAMINATION

BY MR. CARR:

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

A. James Wakefield.

Q. Where do you reside?

A. Tulsa, Oklahoma.

Q. By whom are you employed and in what capacity?

A. I'm employed by Kaiser-Francis Oil Company and I'm a reservoir engineer.

Q. Have you previously testified before the New Mexico Oil Conservation Division?

A. Yes, I have.

Q. At the time of that testimony, were your credentials as a petroleum engineer accepted and made a matter of record?

A. Yes, they were.

Q. Are you familiar with the application filed in this case on behalf of Kaiser-Francis?

A. Yes, I am.

Q. Are you familiar with the subject area and the Delaware wells in this area?

A. Yes.

MR. CARR: Are the witness's

qualifications acceptable?

EXAMINER CATANACH: They are.

Q. Would you briefly state what Kaiser-Francis is seeking in this case?

A. Kaiser-Francis is seeking the creation of a new pool for production of gas from the Brushy Creek portion of the Delaware formation, comprising the southeast quarter of Section 8, 21 South, Range 36 East, in Eddy County, New Mexico.

Q. We're talking about the Brushy Canyon member of the Delaware?

A. Yes.

Q. I think we ought to review the events which have resulted in today's hearing. This matter is originally on the application of Kaiser-Francis, is it not?

A. Yes, it is.

Q. There has been a previous hearing in this matter?

A. There was a previous hearing.

Q. When was that, do you recall?

A. I believe the hearing was somewhere around the middle of February of this year.

Q. At that time did Chi Operating, Inc., oppose the application?

A. Chi Op did oppose.

Q. And what was the result of that hearing?

A. The application by Kaiser-Francis was simply denied. Chi Energy was given a six-month time period to test the Brushy Creek portion of the Delaware formation and to report that data or provide that data to the Commission.

It was also provided that Kaiser-Francis or the Commission could reopen the case at the end of the six months.

Q. And Kaiser-Francis did request the case be reopened, is that correct?

A. Yes.

Q. And a copy of that request letter was provided to Chi?

A. Yes, it was.

Q. To your knowledge, has additional data been filed with the Division pursuant to the requirements of the Order entered this year, Order No. R-9476?

A. I'm not aware of any data being supplied by Chi under that order.

Q. Has there been additional development in the area?

A. There has been additional development. At the time of our application, Chi Energy had drilled and was operating four wells. A fifth well--

Q. These wells were in Section 9 immediately offsetting the proposed Kaiser-Francis acreage to the east?

A. That's correct. I neglected to say that. These wells were in Section 9. There was five wells that had completed and at least tested, and some of those even had production at that time. Additionally they had one well that was drilling, and subsequent to that time they had completed that well and had drilled two additional wells.

Q. Before we get into those, have you or has Kaiser-Francis received any data, since the original hearing, from Chi?

A. From Chi we obtained drilling logs and mud logs on the wells that were completed or drilling at the time of the hearing.

Q. Have you received from Chi any production data?

A. We received production data up through April.

Q. None since that time?
A. None since that time.
Q. Have you been provided or received any test data on any of the Chi wells in Section 3?
A. No.
Q. Have you discussed this case and the development of the Delaware in this area with representatives of Chi?
A. I talked to Mr. Bill Bergman last weak. We discussed the results of their Wiser State #3 well and the fact that they were drilling the Oxy State #2 well along our common lease line, along the west line of Section 9 and the east line of Section 8.

In discussing that with him, he indicated that the Wiser State #3 well had indeed tested a Brushy Creek or a Brushy Canyon zone in the Wiser State #3 well they had filed a completion test on, which showed both oil and gas recoveries. However, that zone did not continue to produce oil and produced a very small volume of gas, and they had plugged the well bag to the Cherry Canyon.
Q. When did you last talk to Chi?
A. Last week.

Q. At that time, did you discuss this hearing?

A. Yes, we did.

Q. Did they indicate to you whether or not they would participate in this hearing?

A. They indicated at that time that they had no further objections to our application and would not appear at the hearing.

Q. The Chi Wiser State #3 well, is that the only well drilled to date into the Brushy Canyon member of the Delaware, to your knowledge?

A. All their wells are drilled in the Brushy Canyon. There have only been two wells that have tested to the Brushy Canyon, the Wiser State #3 and the Hondo Federal #2. In the Hondo Federal #2, they reported no test data at all, just that they perforated it and set a bridge plug above it.

Q. Why don't we go to Exhibit No. 1. I would ask you to identify this and review it for Mr. Catanach.

A. Exhibit No. 1 is similar to the Exhibit No. 1 filed in our previous hearing. I have added, since that time, the additional wells that have been drilled and we've expanded the data to

show completion data on each of the wells that have been drilled by Chi in Section 9.

In general, I would direct your attention to the fact that, starting with the Wiser State #3, which is the well in the southwest of the northwest of 9, this well was drilled down into the top of the Bone Springs. They tested a zone, and if you'll look to the left and above the well, you'll see a line drawn there to the box. That is the completion date of the well. It says "Completed 6-91." Initial potential flowing, 43 barrels of oil and 235 Mcf of gas per day, with only five barrels of water per day, with a gas/oil ratio of 5,455 standard cubic feet per barrel.

The perforation is for 4,073 to 4,087 feet, and this is plugged back. And at the time I made this exhibit, I didn't have any data as to what formations or perforations they had plugged back to. All I had was his word they had plugged back somewhere. Later in our discussion he had said they had plugged back to the very top part of the Cherry Canyon; in other words, just below the Capitan Reef outcrop in that well.

He did not, although he said he was

going to, he has not given me the perforations that were shot, and according to what I can find from the New Mexico state records, he's not filed any change in the perforations that originally were shot in the well.

Q. Now, Mr. Wakefield, if we look at this exhibit, the Kaiser-Francis AM Federal Well No. 1 has an orange square around it which indicates a Bone Springs completion. Since the previous hearing, you have changed that from Delaware to Bone Springs. My question is, in what formation is the AM Federal actually completed?

A. It's actually completed in the Delaware.

Q. Is it in the very bottom portion of the Delaware?

A. The very bottom portion of the Brushy Canyon.

Q. Will you review that with subsequent exhibits?

A. Yes, I will.

Q. What acreage do you propose to be included in this new pool?

A. We're recommending that the Commission incorporate 160 acres, being the southeast

quarter of Section 8.

Q. Is this acreage currently in any Delaware pool?

A. It is not.

Q. What pool are the Chi-operated wells in Section 9 located in?

A. I believe they're in the Cat Claw Draw--pardon me, East Cat Claw Draw-Delaware field.

Q. They're basically Cherry Canyon completions?

A. They are--looking at Exhibit 1 you can see that starting above Section 9 it says: "Perforations are 2,724 to -38." The one immediately above it and to the right, 2,999 to 3,133, the perfs. The box in Section 10, 3,074 to 3,098. The box shown in Section 15 is 2,284 to 2,304. The box in Section 16 is 3,197 to 3,204. All of these zones are in the upper part of the Cherry Canyon, indicating that all the wells today are producing from formations within the Cherry Canyon zone above about 3,300 feet.

Q. Mr. Wakefield, at the hearing in February you presented detailed information on the AM Federal Well No. 1. I think at this point

in time, it's been six months, a few things we might address concerning that well. Basically, when was the well drilled?

A. The well initially was drilled by Coquina as a Morrow test.

Q. When did Kaiser-Francis acquire this well?

A. About 1984, I believe, 1985. At that time it was producing as a Morrow gas well.

Q. What happened in the Morrow zone?

A. The Morrow depleted. Then, in November of 1990, Kaiser-Francis recompleted the well to the lowest most sand in the Brushy Canyon or Delaware formation and made a gas well out of it.

Q. You tested it at that time?

A. Yes, we did.

Q. What kind of a test was it?

A. We, at the last hearing, presented the documents showing that the well had produced at a rate of 973 Mcf of gas per day, three barrels of oil, and four barrels of water per day. The flowing tubing pressure of 1,118 pounds, which is approximately 320,000 gas/oil ratio.

Q. This was a shut-in test run in November of 1990?

A. Yes. The resulting gas in flow is about 3,500 Mcf per day.

Q. Is the gas produced from this well sweet or sour?

A. This is a sour--this well has H_2S in it which must be stripped out before we can push it through the pipeline.

Q. Let's go to Exhibit No. 2, and I would ask you to identify that for Mr. Catanach.

A. Exhibit No. 2 is a structure map on the top of the Bone Springs lime. It shows that the high part of the structure is in Sections 5 and 6 of 21 South, 26 East, and it dips to the east and south at about the rate of 3- or 400 feet per mile.

What I want to draw your attention to is the fact that this is about as far--our well in Section 8 is about as far northwest as you can get and still find Delaware production in this part of the basin because you're at the margin of the shelf where the Delaware would begin to be laid down. You have a very thin section of Delaware compared to as you would if you went out even another township to the east or township to the south, where it might be another

thousand-foot deep or thick.

It's significantly more difficult in this immediate area to correlate particular zones between wells. The continuity of wells in a given zone are not even correlative on 40 acres. So in an area of rapid deposition, you're at the margin edge where it's difficult to get large reservoirs that have any continuity.

Q. You're having small, isolated reservoirs? Is that what you're saying?

A. The tendency is to have small, isolated reservoirs.

Q. Let's move to Exhibit No. 3. Would you identify and review that, please?

A. This is a cross-section running from left to right, it would be from west to east, with the AM Federal--

Q. We might compare that with Exhibit No. 1 and just run through the line of cross-sections.

A. Right. Referring to Exhibit No. 1, the AM Federal No. 1 is located in the southeast quarter of Section 8. The second log in the cross-section, the Wiser State #3, is in the southwest of the northwest of Section 9. Wiser

State #1-F will be in the southeast of the northwest of Section 9, and the Hondo Federal #3 is in the southeast of the northeast of Section 9.

I've given you the four wells, that if you were to also look at your cross-section, would be going essentially downdip in the reservoir. The cross-section has on it different colors, trying to show you the correlations that I feel are representative for this reservoir, between the different wells, and has an orange line drawn on it to show or highlight kind of the difference in deposition at the Bone Springs-Delaware interface.

Now, that orange line, for instance, in the Wiser State #3, shows the sand that they tested in the Wiser State #3 as being yellow with a red line around it. That should be at a depth of 4,073 to -87 feet. That zone, I believe, correlates to a shown in the AM Federal No. 1 that is colored yellow, with it's base also being on the orange line.

This zone is not tested in the AM Federal yet. It appears it has a show in it from the mud log but it did not have any significant

show and is not part of the DST interval when the well was drilled, and had not been perforated to date. The zone that we're producing from in the AM Federal, is the zone shown below there, below the orange line which, again, is colored yellow. Both the gamma ray side and porosity side is colored yellow in that, and that is the zone that's testing gas in our well.

The zone that was tested in the Wiser State #3 well, tested at the rate of 43 barrels of oil, and 235 Mcf a day. It got depleted quickly and has now been plugged off by Chi, per my phone conversation with them.

If you go continuing to the right, the Wiser State #1-F and then subsequently to the Hondo Federal #3, the Wiser State #1-F, in looking at the mud log on that well, had an oily type profile show at the sand. It's about 4,100 feet, colored yellow on their plat. I do not correlate that as being any particular sand in the Wiser State #1-F. Notice again there's a difference in distance between the orange line in the zone that's colored blue in all three wells. Again, it's very difficult to correlate these logs and it's very difficult to say what is

necessarily correlative. This is just my interpretation at the moment.

Also note the Honda Federal #3 did not get down to what I would call the Bone Springs interval.

Q. How easy is it to determine the boundary between the Delaware and the Bone Springs in the area?

A. It's my opinion, in studying the logs, that the flesh-colored or light-orange-colored zone is probably the top of the Bone Springs. The difficulty in correlating the logs and knowing where the Bone Springs is at on the Chi logs, is that they didn't go deep enough to really get a good log reading across the Bone Springs intervals. They typically stopped at a point they thought they were into the Bone Springs, but their first log readings generally weren't deep enough to catch the top on the logs, so it's difficult to say what factor works out.

Again, because the logs are difficult to correlate, it's difficult to tell exactly which zones are what.

Q. In your opinion, is the Kaiser-Francis AM Federal #1 completed in the Delaware or in the

Bone Springs?

A. It is my opinion that it is a Bone Springs sand because--

Q. A Bone Springs sand?

A. Pardon me, a Delaware sand, because you are coming strictly out of a limestone interval on the logs, into something that is a sandstone interval.

Q. But it's in the sort of gray area right at the top of the Bone Springs and the bottom of the Delaware, is that fair to say?

A. That's true, but it appears to be a sand and appears to be analogous to the sands above it.

Q. In your opinion, has Kaiser-Francis discovered a separate gas pool in its AM Federal Well #1?

A. It's my opinion that there's a separate gas pool developed at the AM Federal well.

Q. Are you able to make any estimate as to the size of this particular reservoir?

A. Again, based on our analysis, we're at the margin edge of the reservoir. We're small. That the air extent is limited, and that the well is dumped between two wells that don't even

correlate, it is our opinion that the reservoir will be less than 160 acres.

Q. What is the current status of the AM Federal Well #1?

A. It's shut in.

Q. Why is it still closed?

A. We were given the option at the conclusion of our hearing in February, that we could produce it at the rate of 160 Mcf per day, which would be the equivalent gas volume for an oil well. However, the well is located near some houses, I think about five houses. Due to the fact that it's sour gas, we're going to have to have an amine plant installed, which will be fairly expensive, and to the extent that we need to know what the gas producing rate was going to be on a long-term basis, i.e. the allowable, we did not choose to produce the well and set a plant that would handle 160 Mcf per day, if indeed this Commission would permit us to space at 160 and produce it at its allowable rate of perhaps a thousand Mcf per day or 800 Mcf per day.

The cost of a plant is very expensive, in the vicinity of $100,000, so rather than

inappropriately spend our money, we decided not to spend any money until this could be reopened in six months.

Q. In your opinion, will the approval of this application for the creation of a new gas pool in the bottom of the Delaware formation, be in the best interest of conservation, the prevention of waste and the protection of correlative rights?

A. Yes.

Q. Were Exhibits 1 through 3 prepared by you?

A. Yes.

MR. CARR: At this time, Mr. Catanach, we move the admission of Kaiser-Francis Exhibits 1 through 3.

EXAMINER CATANACH: Exhibits 1 through 3 will be admitted as evidence.

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

EXAMINATION

BY MR. CATANACH:

Q. Mr. Wakefield, Chi originally came in and said that the correlatable zone was present in its Oxy State Well #1 and Wiser State Well #1.

Neither of those wells have been tested in that zone, to your knowledge?

A. No, they have not. The Wiser State #1 log is on the cross-section. I would draw your intention to again, they're talking about being in the Brushy Canyon at 4,100 feet. 4,100 to 4,110, that scale is fairly small, but can you see that?

Q. Shown in yellow?

A. Yes. And if it's correlative at all to sands in the AM Federal, I believe it would be the sand at above the orange line, with the green marker just above it. Again, I think it's an oil sand in our well, but I'm not indicating that it's correlative. I don't believe it's correlative. I don't think you can correlate these things past wells on 40 acres, looking at all these logs and all the cross-sections. It's extremely difficult to correlate them.

Q. Chi tested that zone in the Wiser State #3 from 4,073 to 4,087?

A. It's the one shown in yellow with the red outline on it. It's hard to read the log, but I believe it's the sand.

Q. You don't believe that that interval is

correlatable to your interval in your well?

A. I don't believe it's correlatable. I think it's another sand. The reason I say that, I went back and looked at the monthly reporting forms where you report production, the C-115. For the month of June, that well produced no oil and 5,740 Mcf of gas for that month.

Then, the next month it produces 868 barrels of oil, 6,415 Mcf of gas, and the subsequent month, August, 661 oil, 4,137 Mcf of gas. It was their report to me on the phone that the reason they plugged off that zone, which based on the production I assume it happened sometime in June, was that it quit making oil and the gas was depleted. In other words, it had a very limited reservoir.

Q. So, is it your opinion now that that zone basically is not present in any of Chi's wells?

A. That's my opinion, as it was at the first hearing. I think another way you can see that is by looking at the cross-section. If you'll look at the Wiser State #3 log, about halfway down the page there's two green markers marked on the gamma ray log. If you'll look to

the left on the AM federal and look to the right on the Wiser State #1-F, and then look at the distance between that marker and what I would call the Bone Springs, which is the flesh-colored or light-orange-colored zone immediately below the orange line, you can see there's a considerable difference in thickness there because, again, we're so close to the edge, it's not able to--typically in the Delaware you have a basin and get these constant thicknesses between markers, but up here you're so close to the edge margin that you don't get that. You have to be right in line for that deposition off that margin. We're not able to do that here.

You can tell in the Wiser State #3 and the Wiser State #1-F, on 40-acre spacing there's almost a 100-foot difference between those markers. So, there's considerable variance in deposition between the wells which, I think, isolates each well's producing zones.

Q. The zone that was tested in the Wiser State #3, was that the zone that Chi originally contended was the same zone?

A. The Wiser State #3 wasn't drilled at that time. The only well they had at the time we

had the previous hearing that could have possibly been one that they would have said would have been that zone, was the Hondo Federal #2, which is in the northeast of the southeast. It did test to zone 4,122 to -55 that is in the Brushy Canyon, but it's a zone that would not have been equivalent to our zone because it was above it quite a bit.

It's kind of like this log, the Hondo Federal #3, where the yellow zone end and there's nothing down to the orange line on the cross-section. It was kind of that way on the Hondo Federal #2. On our structure map, the Hondo Federal #2 and #3 are shown to be about equivalent depths structurally, and you can see that a depth of 4,122 to -55 would have put it down lower in the section, probably about down to the Bone Springs level. We're talking about something right at the top of the Bone Springs.

Q. Do you know why Chi would not have tested the two wells they originally contended contained this producing zone?

A. We went back and looked at the mud logs they sent me on those, and indeed the Wiser State #1 did have an oil show that was fairly

significant. The others had no oil show that was significant. The Wiser State #1-F is the only mud log they sent me that had any significant shows in the Brushy Canyon. All the others had no shows at all or very minor shows.

The Wiser State #1 well has produced about 10,700 barrels of oil per day and 41 million cubic feet of gas from the perfs at 2,724 to -38. Those shows at that level were in excess of the shows that they had in the Brushy Canyon. They simply were going after the best looking oil zones. They wanted wells that made oil, not gas.

Q. But if they had an oil show in the Brushy Canyon, why wouldn't they have tested it?

A. It wasn't as significant as the other zone. They went after the most significant one.

Q. They could come back at a later time and test that, conceivably?

A. Sure, they could.

Q. You still contend it's not the same correlatable zone that you're producing from?

A. I would say it's not the same correlative zone as was tested in the Wiser State #3.

Q. And Chi has said they don't have any

problem with you?

A. Do whatever we want, they said. They're convinced it's not worth fighting for.

EXAMINER CATANACH: Okay. I believe that's all I have.

EXAMINATION

BY MR. STOVALL:

Q. Chi was objecting because they were afraid you would take all the gas out of their reservoir so they couldn't produce their oil? Wasn't that, theoretically, what they were concerned with?

A. Yeah. I think what they wanted had to do was drill wells on our lease line, on 40 acres, and complete that zone in their well and hope that the gas/oil ratio would be low enough that they would produce back from three or four wells on oil from the upper zone. It turned out, he hasn't sent me the logs in the Oxy State #2, but it states there isn't anything in the Brushy Canyon at all, and that all they have is a very thin zone in the top of the Cherry Canyon well.

MR. STOVALL: That's all I have.

EXAMINER CATANACH: There being nothing further, Case No. 10251 will be taken under

advisement, and this hearing is adjourned.

(And the proceedings adjourned.)

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 10251, heard by me on October 17 1991.

David R. Catanach, Examiner
Oil Conservation Division

CERTIFICATE OF REPORTER

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

I, Carla Diane Rodriguez, Certified Shorthand Reporter and Notary Public, HEREBY CERTIFY that the foregoing transcript of proceedings before the Oil Conservation Division was reported by me; that I caused my notes to be transcribed under my personal supervision; and that the foregoing is a true and accurate record of the proceedings.

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

WITNESS MY HAND AND SEAL October 20, 1991.

Carla Diane Rodriguez

CARLA DIANE RODRIGUEZ, RPR
Certified Shorthand Reporter No. 91

STATE OF NEW MEXICO COUNTY OF SANTA FE

OIL CONSERVATION DIVISION

EXAMINER HEARING

Case: 10251

AUGUST 29, 1991

BE IT REMEMBERED, that on the 29th day of August, 1991, the following case came on for hearing. This hearing was taken at the Oil Conservation Division conference room, State Land Office Building, Santa Fe, New Mexico commencing at 1:31 p.m.

A P P E A R A N C E S

OIL CONSERVATION COMMISSION:

WILLIAM J. LEMAY, Chairman
WILLIAM WEISS, Commissioner
GARY CARLSON, Commissioner Designee

KAISER-FRANCIS OIL COMPANY:

CAMPBELL, CARR, BERGE AND SHERIDAN, P.A.
Attorneys at Law
P.O. Box 2208
Santa Fe, NM 87504-2208
BY: WILLIAM F. CARR

I N D E X

CHAIRMAN LEMAY: Case number 10251, De Nova application of Kaiser-Francis Oil Company for a pool creation, Eddy County, New Mexico. Is there a motion to be continued on to the September 12th hearing?

MR. CARR: May it please the Examiner, Kaiser-Francis requests that that case be continued to September the 12th.

CHAIRMAN LEMAY: Without objection, case 10251, De Novo Application of Kaiser-Francis, will be continued to the Commission hearing of September 12th.

(Hearing Adjourned.)

STATE OF NEW MEXICO)
COUNTY OF SANTA FE)

I, PATRICK M. MALONE, RPR-CP-CSR, and Notary Public, DO HEREBY CERTIFY that I did report in Stenographic shorthand the questions and answers set forth herein, and the foregoing is a true and correct transcription of the proceeding had upon the taking of this hearing.

I FURTHER CERTIFY that I am neither employed by nor related to any of the parties or attorneys in this case, and that I have no interest whatsoever in the final disposition of this case in any Court.

I FURTHER CERTIFY that I have retained the original copy of this deposition to seal and deliver to The Oil Conservation Division.

WITNESS MY HAND AND SEAL
this 28th day of September, 1991.

Court Reporter & Notary Public
Certificate No. 412
My Commission expires 2/1/93

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

IN THE MATTER OF THE HEARING CALLED BY THE OIL CONSERVATION DIVISION FOR THE PURPOSE OF CONSIDERING:

APPLICATION OF KAISER-FRANCiS OIL COMPANY FOR A POOL CREATION, EDDY COUNTY, NEW MEXICO

CASE NO. 10251

REPORTER'S TRANSCRIPT OF PROCEEDINGS

EXAMINER HEARING

BEFORE: DAVID R. CATANACH, Hearing Examiner

February 21, 1991
1:00 p.m.
Santa Fe, New Mexico

This matter came on for hearing before the Oil Conservation Division on February 21, 1991, at 1:00 p.m. at Oil Conservation Division Conference Room, State Land Office Building, 310 Old Santa Fe Trail, Santa Fe, New Mexico, before Paula Wegeforth, Certified Court Reporter No. 264, for the State of New Mexico.

FOR: OIL CONSERVATION DIVISION

BY: PAULA WEGEFORTH
Certified Court Reporter
CSR No. 264

I N D E X

February 21, 1991
Examiner Hearing

CASE NO. 10251

* * *

E X H I B I T S

A P P E A R A N C E S

FOR THE DIVISION:	ROBERT G. STOVALL, ESQ. General Counsel Oil Conservation Commission State Land Office Building 310 Old Santa Fe Trail Santa Fe, New Mexico 87501
FOR THE APPLICANT:	CAMPBELL & BLACK Attorneys at Law BY: WILLIAM F. CARR, ESQ. 110 North Guadalupe Santa Fe, New Mexico 87501
FOR CHI ENERGY, INC.:	KELLAHIN, KELLAHIN & AUBREY Attorneys at Law BY: W. THOMAS KELLAHIN, ESQ. Santa Fe, New Mexico 87501
FOR SANTA FE ENERGY OPERATING PARTNERS, LP:	HINKLE, COX, EATON, COFFIELD Attorneys at Law BY: JAMES BRUCE, ESQ. Santa Fe, New Mexico 87501

* * *

EXAMINER CATANACH: We will call the hearing back to order and at this time call Case 10251.

MR. STOVALL: Application of Kaiser-Francis -- that's K-a-i-s-e-r Francis -- Oil Company for pool creation, Eddy County, New Mexico.

EXAMINER CATANACH: Are there appearances in this case?

MR. CARR: May it please the examiner, my name is William F. Carr. I'm with the law firm Campbell & Black, P.A., of Santa Fe. I represent Kaiser-Francis Oil Company, and I have one witness.

MR. STOVALL: Other appearances?

MR. KELLAHIN: Mr. Examiner, I'm Tom Kellahin of the Santa Fe law firm of Kellahin, Kellahin & Aubrey. I'm appearing on behalf of Chi Energy, Inc. It's C-h-i, is how you spell it. I have one witness to be sworn.

EXAMINER CATANACH: Any other appearances?

Will the two witnesses please stand and be sworn in?

(Whereupon the witnesses were duly sworn.)

JIM WAKEFIELD,

the Witness herein, having been first duly sworn, was examined and testified as follows:

* * * * *

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DIRECT EXAMINATION

BY MR. CARR:

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

A. My name is Jim Wakefield.

Q. Mr. Wakefield, where do you reside?

A. I reside in Tulsa, Okalahoma.

Q. By whom are you employed and in what capacity?

A. I'm employed by Kaiser-Francis Oil Company as a reservoir engineer or petroleum engineer.

Q. Have you previously testified before the New Mexico Oil Conservation Division?

A. No, I have not.

Q. Would you briefly review your educational background for Mr. Catanach?

A. I attended the University of Tulsa and received a B.S. in engineering in 1972. I was employed initially in the oil and gas industry by Gulf Oil Corporation in Odessa, Texas, for three and a half years.

I then went to work for Skelly and then later Getty through their merger at Duncan, Oklahoma, through 1979.

I then worked for Grace petroleum Corporation as a reservoir engineer and subsequently as a vice president of engineering through 1982.

I then was employed by Lee Keeling & Associates as a consulting engineer from 1982 to 1985, and since 1985 as a petroleum engineer for Kaiser-Francis Oil Company.

Q. Does your geographic area of responsibility for Kaiser-Francis include southeastern New Mexico?

A. Yes, it does.

Q. And in all the jobs that you've summarized were you employed as a petroleum engineer?

A. Yes, I was.

Q. Are you familiar with the application filed in this case on behalf of Kaiser-Francis Oil Company?

A. Yes, I am.

Q. Are you familiar with the portion of the Delaware formation involved in this case?

A. Yes, I am.

MR. CARR: We tender Mr. Wakefield an expert in petroleum engineering.

EXAMINER CATANACH: He is so qualified.

Q. (By Mr. Carr) Mr. Wakefield, will you briefly state what Kaiser-Francis seeks with this application?

A. We seek the creation of a gas pool for production of gas in the Delaware formation comprising the southeast quarter of Section 8, Township 21 south, Range 26 east, of Eddy County, New Mexico.

Q. Have you prepared certain exhibits for

presentation in this hearing?

A. I have.

Q. Would you refer to what has been marked as Kaiser-Francis Exhibit No. 1? Identify that and review this for Mr. Catanach.

A. Exhibit No. 1 is a plat that indicates the nine section areas surrounding Section No. 8 in which the AM Federal No. 1 well is located in southeast quarter of that section. On this plat is shown all the wells that are drilled and completed to date in the Delaware formation and then four locations that Chi has indicated they intend to drill to this formation.

The plat has certain data presented on it. For instance, if we direct your attention to the AM Federal well located in the southeast quarter of Section 8, you'll see in the little box below it with a line drawn to the well spot that the well was completed 11/90 in the Delaware formation from perforations at 4046 feet to 4062 feet with an initial potential flowing of 973 MCF of gas per day, three barrels of oil per day and four barrels of water per day, resulting in a gas-oil ratio of in excess of 300,000.

Similar data is presented for the three Chi wells, the Wiser State 1, Oxy-State 1 and Wiser State 2 wells that are completed in the west half of Section 9. And each of those wells show the completion information for

those wells, and specifically the Wiser State No. 1 was perforated at a depth of 2724 to 2738; the Oxy-State 1 at a perforation level of 3774 to 3098; and the Wiser State No. 2 completed at a level of 3197 to 3204.

These wells have flow rates varying from 33 to 41 barrels of oil per day with gas-oil ratios of 1128 to 2000.

Q. Is the acreage in Section 8 currently dedicated to any Delaware pool?

A. Not that I know of, no.

Q. And what pool is the -- are the Chi wells dedicated to? Do you know?

A. They are dedicated to the East Catclaw Draw Delaware field.

Q. What acreage is included within the defined boundaries of that pool?

A. It is my understanding that the defined boundaries is the west half of Section 9 of Township 21 south, Range 26 east.

Q. What acreage do you propose to be included in the new pool for the Kaiser-Francis AM Federal No. 1?

A. It's our proposal that the 160 acres contained within the southeast quarter of Section 8 of Township 21 south, range 26 east be incorporated into this proposed field.

Q. Mr. Wakefield, let's now go to Kaiser-Francis Exhibit No. 2. Would you identify that and review it for the examiner?

A. Exhibit No. 2 is the State of New Mexico's Oil Conservation Division's Form C-102. On this, we are indicating that the Delaware formation is perforated at a depth of 4046 to 62 feet, and that we are willing to incorporate into that acreage dedication the 160 acres in the southeast quarter.

Also, on this plat shows that the well, the AM Federal No. 1, is located 660 feet from the south line and 1980 feet from the east line of Section 8.

Q. Is that a standard location for a gas-oil space, 160 acres?

A. It is.

Q. Would you now go to Exhibit No. 2 and identify that, please?

A. Exhibit No. 2 is Form 3160-4 of the United States Department of Interior Bureau of Land Management, and we are submitting this as validation of the test data that we have experienced for the recompletion to the Delaware zone.

Again, we show that the well was initially drilled back in 1975 and produced from the Morrow zone until its recompletion to the Delaware this past November.

And again, the rates at the bottom, where it says "Production," about on line 33, about two-thirds down the page, the well was flowing and had the rates that we had discussed earlier on Exhibit 1 of 973 MCF a day with a GOR in excess of 300,000.

Q. Let's now go to Exhibit No. 4 and again I'd ask you to identify this for Mr. Catanach.

A. This is a State of New Mexico form to report multipoint and one point back pressure test for gas wells. We indicate the exact flow rates that were used to determine the AOF of this well, and the AOF is determined at the bottom of the page, where it says AOF equals Q times a quanity, equals 3.498 MCF of gas per day at absolute open flow.

The well made three barrels of oil during this test at 50.2 API gravity condensate and had four barrels of nitrogen -- -- four barrels of water. I'm sorry. It's a mistake on the typing. Four barrels of water.

Also, the well had quanities of carbon dioxide, nitrogen and HSTM.

Q. Mr. Wakefield, now let's go to Kaiser-Francis Exhibit No. 5, the drill stem test summary. Would you identify each of the pages in this exhibit and then review the information contained thereon?

A. These are two pieces of paper from the files

that we obtained when we purchased our interest from Coquina, who drilled this well initially. Coquina, in drilling this well, encountered a significant gas show and gas test mud in drilling through this interval of the Delaware that we've recompleted, and they DSTed a zone from 4040 to 4081 feet.

They experienced gas to surface in two minutes with a maximum rate of 652 MCF a day during the initial flow. On the second flow they had 723 MCF a day decreasing to 452 after 35 minutes, 430 MCF a day after 60 minutes.

In particular, I direct your attention to the fact the initial shutting pressures and final shutting pressures were approximately the same: 1753 psi for the initial shutting pressure and 1738 psi for the final shutting pressure.

We also recovered 140 feet sulfur water on the test.

On page 2, which at the top of the page it says, "Permian Testers, Inc." -- they were the people that ran the DST for Coquina. The rest of the data that we have presented on the first page is simply a drawn-out of the information that's on this page just to make it easier for you to see.

Q. And is it this information that caused Kaiser-Francis to go back and attempt a recompletion in

this particular Delaware zone?

A. It was.

Q. And what do those pressures say to you, the 1753 and the 1738?

A. It was our opinion that these pressures were very close to virgin for that zone, that zone that was DSTed.

Q. Let's now go to Exhibit No. 6, and I would ask you to first identify what this is and then review the information on this Exhibit for Mr. Catanach.

A. In testing the well, we had Laboratory Services, which is the name of the company that did the work, perform a gas analysis of the well. We were concerned for several reasons about the well, one of which was it was determined that the well had hydrogen sulfide gas and we wanted to quantify how much. Also, we were interested in how rich the gas was, if there was any liquid to be recovered.

Basically what the Laboratory Services analysis of the gas indicated was that we had a gas that was essentially a very lean gas with only a small amount of liquid available that was sour.

Q. Now, what is the significance of that?

A. Well, it is our opinion that this is a gas -- the gas analysis indicates this is a gas from a gas zone.

Q. And not a gas cap above an oil zone?

A. In our opinion, that's true.

Q. Anything else on Exhibit No. 6?

A. No.

Q. Let's move now to Kaiser-Francis Exhibit 7. Identify that and then review the entries on this exhibit for the examiner.

A. Exhibit No. 7 is a page -- or copy of a page from our daily work-over report when the well was being tested. The perforations occurred prior to 11/20/90.

In particular, what I wanted to show you was, beginning 11/29/90 we ran a pressure test in the bottom of the hole to determine if we were losing bottom hole pressure at an alarming rate, because we were seeing shutting pressures that -- starting on 11/20/90 were 1600 pounds, and by 11/28/90 they were 1325 pounds.

In running the bottom hole pressure, we determined that we had a bottom hole pressure of 1848 pounds. And what -- it is our opinion that we have lost some pressure that is not an appreciable amount.

By comparing this to the DTS pressures that were measured on this well initially, you can see that the pressure at that time was measured to be 1753 pounds, which we feel the two pressures are fairly comparable, not knowing the accuracy -- relative accuracy of either tool -- it's probably within the range of their measurement

accuracy in the first place -- to indicate that both wells still -- both tests still indicate the reservoir to be undrained and near its virgin pressure.

Q. So there is no evidence based on this pressure information of depletion by any offsetting well?

A. Not that we could find, no. It's still virgin.

Q. Is there anything else you want to cover with Exhibit No. 7?

A. Again, the -- on 12/5/90 is the test data that was then utilized to calculate the AOF, which was discussed earlier on one of the other exhibits.

The well has been shut in since 12/19/09.

Q. Mr. Wakefield, let's now go to your Exhibit No. 8, a cross section. Was this prepared by you?

A. Yes, it was.

Q. Would you probably refer back to, I would think, Exhibit No. 1 and just review for the examiner the line of cross section?

A. Exhibit No. 1 indicates the location of three of the wells that are shown -- of the logs that are shown for wells on Exhibit No. 8. The AM Federal No. 1 is the well spot shown in the southwest of the southeast of Section 8.

The Chi Operating Wiser State No. 1 is the well located in the southeast of the northwest of Section 9. The Oxy-State 1 is the well located in the northeast of the

southwest of Section 9.

And the final log presented on the cross section is of the BQ 2 Federal Company No. 1, which is located in the southeast quarter of Section 9. That well spot is not shown on Exhibit 1 because it is not a well producing from the Delaware. It's a well producing from the Morrow.

Q. All right. Let's go to the exhibit now, and I'd ask you to review what you attempt to portray with these log sections.

A. On Exhibit No. 8 -- I might just say before I begin that at the bottom of each of the logs is completion information about each well for your referral without having to go to other exhibits.

Starting at the bottom of the log and going up, the Bone Spring top is marked by a black line running horizontally -- roughly horizontally across the page.

And then at the top of the exhibit there's another line that is essentially completely horizontal, and I have named it the Bell Canyon as the topmost member of the Delaware present at this location. That would represent the top of the Delaware formation. This gives us an interval that is fairly consistent in thickness between these four wells about 1500 to 1600 feet thick.

Within this interval it is my opinion that there are three fairly distinguishable cycles of deposition that

should be broken out such that we have at the base, colored green on your cross section, what we would call the Brushy Canyon at Kaiser-Francis. The red represents the section we call Cherry Canyon, and the blue the section we call Bell Canyon. These are consistent with pay picks that we have made on Delaware zones in other areas of New Mexico.

It is our opinion that -- based on these designations, that there are significant differences in productive capacity of these different intervals.

For instance, the Bone Springs top, as you see it -- I would direct you to the AM Federal No. 1, which shows in red the interval perforated in the AM Federal No. 8 well at a depth of 4046 to 62 feet. You will notice that that is at the very base of the zone colored green on your cross section.

Also, you'll notice that the two Chi Operating wells, as you come to the right, their log, particularly the second log, the one of the Oxy-State No. 1, the data does not indicate graphically the top of the Bone Springs because of where their logging tool picked up. I think you also have some problems with that on their other well. I'm using the pay picks from their data to depict the Bone Springs tops on both those wells.

The Bone Springs section perforated -- the Delaware section perforated in the AM Federal, you will

then note, is significantly different in stratigraphic depth than the formations or the zones perforated within the Delaware in both the Wiser State 1 and the Oxy-State 1.

Directing your attention to the Wiser State 1, you'll notice that the perforations there shown in red occurred at a depth of 2724 feet to 2738 feet and had an initial potential of 33 barrels of oil per day with a GOR that was previously indicated to be 1924 standard cubic feet per barrel.

The Oxy-State No. 1 well is perforated in a -- at a different level within the Cherry Canyon section. It is perforated at a depth of 3074 to 3098 feet. It too has an initial potential flowing, it says, of 36 barrels of oil per day, 72 gas and 52 barrels of water a day, with a gas-oil ratio of 2000.

You'll note that both of those zones are oil. They have GORs of less than 2000. Secondly, they are at -- they are 300 feet difference in elevation between the two of them, indicating that they are not stratigraphically equivalent zones even within the Cherry Canyon, and in comparison to the zone perforated by Kaiser-Francis in the AM Federal No. 1, which is purely a gas zone with a 300,000 gas-oil ratio.

It is our opinion that these intervals in this area within the Brushy Canyon, Cherry Canyon and Bell

Canyon zones are not directly correlative to each other, that the reservoirs being produced are articular and limited in oil extent.

We have -- I have examined all of the logs within about a six-mile radius of the AM Federal well and really find no wells with a similar-looking zone as far as porosity and water saturation is concerned. There are one or two wells -- most closely to us would be the dry hole that was drilled in the north half of Section 8, which is not shown on this plat, Exhibit 1, which was drilled by Coquina called the Arco Federal No. 1.

It does have a correlative zone to the zone perforated in the AM Federal No. 1, but it does not look to be productive. It does not have porosity attributes comparable to what is seen in the AM Federal No. 1, nor did it have any distinctive gas shows or oil shows.

Q. Mr. Wakefield, based on the differences in elevation between the completed intervals in the wells which you've discussed and the pressure information available to you on this well, have you been able to reach an opinion as to whether or not Kaiser-Francis has discovered a zone in the general Delaware structure which is completely separate from any other zone in the Delaware?

A. That is our opinion.

Q. And do you believe you have discovered a new

pool in your AM Federal Well No. 1?

A. Yes.

Q. Is Exhibit No. 9 a copy of an affidavit confirming that notice of today's hearing has been provided as required by OCD rules?

A. Yes.

Q. In your opinion, is the new well -- the well which you have completed, the new zone in the AM Federal Well No. 1, a gas well?

A. Yes, it is.

Q. And you recommend that the 160 acres being comprised of the southeast quarter of Section 8 be included within the new pool boundaries?

A. Yes, I do.

Q. In your opinion, will granting the application be in the best interest of conservation, the prevention of waste and the protection of correlative rights?

A. Yes.

Q. Were Exhibits 1 through 9 either prepared by you or compiled under your direction and supervision?

A. Yes, they were.

MR. CARR: At this time Mr. Catanach, I move the admission of Exhibits 1 through 9.

EXAMINER CATANACH: Exhibits 1 through 9 will be admitted in evidence.

(Whereupon Applicant's Exhibits 1 through 9 were admitted into evidence.

MR. CARR: That concludes my examination of Mr. Wakefield.

EXAMINER CATANACH: Mr. Kellahin.

MR. KELLAHIN: Thank you.

MR. STOVALL: Mr. Examiner, I think Mr. Bruce wandered in late and --

MR. BRUCE: If I could, Mr. Examiner, I would like to enter an appearance on behalf of Santa Fe Energy Operating Partners, LP.

CROSS-EXAMINATION

BY MR. KELLAHIN:

Q. Let me move up here so we're not talking so close together, Mr. Wakefield, and perhaps we can all hear.

Let me have you put before you, Mr. Wakefield, your Exhibit No. 1 and then your cross section, Exhibit No. 8.

A. (Witness complied.)

Q. Let me share with you my client's concern, Mr. Wakefield. There is certainly no question in your mind when you look at the information from Exhibit 8 as to the Chi wells, look at the gas-oil ratios displayed on Exhibit No. 1, that within some portion of this Delaware they have oil wells, correct?

A. Yes, sir.

Q. I share with you their concern that you now have a gas well in the Delaware which in their mind exposes them to a potential risk to their oil production because of the close proximity of the gas well to the oil wells in the Delaware pool.

You understand that position?

A. Okay.

Q. All right. When we look at the Delaware pool, you said you have examined in some six-mile area other Delaware wells?

A. Yes, sir.

Q. In that examination, did you find any gas wells?

A. No, sir, found no wells at all producing from the Delaware other than the ones here.

Q. How long have you been involved, Mr. Wakefield, in Delaware production in Eddy County, New Mexico?

A. Oh, probably over the last three years, four years.

Q. Are you aware of any instances where the oil commission treats the Delaware production in segments smaller than the total Delaware interval?

A. I don't know of any.

Q. Do you know of any instances where we have Delaware oil pools that have gas wells in them or adjacent

to them in the Delaware as well?

A. I do not. Excuse me; I do not know.

Q. When we look at your AM Federal No. 1 well, that was originally drilled by someone else in -- what was it? -- 1975?

A. It was drilled by Coquina.

Q. Drilled by Coquina in '75. That was drilled as a Morrow test, was it not?

A. Yes, sir.

Q. Did they produce out of the Morrow?

A. Yes, sir, they did.

Q. And upon the depletion, did they abandon the well?

A. No, they did not. We purchased the well from Coquina a number of years ago.

Q. So you took over operations, then, from Coquina, completed production out of the Morrow?

A. Yes, sir.

Q. And then abandoned the Morrow and were looking for other zones as you moved out of the well bore?

A. We targeted the -- this particular interval in the Delaware when we purchased the well. We knew it was there.

Q. And then you had the Permian Tester results from '75 to give you some clue that you had a gas show in the

Delaware in this zone?

A. Exactly.

Q. In looking at the logs for this well, do you see any log potential for hydrocarbon production in any other portion of the Delaware in this well?

A. The well does not have a good or a well-developed Delaware Section. I do not have great confidence that there are zones that will produce beyond the one that's producing right now.

Q. Logs show no potential for other hydrocarbons in the Delaware?

A. Very poor shows.

Q. You don't have any drill stem tests or any other type of production test on any other zone in the Delaware?

A. No, sir, I do not.

Q. The only test you have is in the lower portion of the Delaware just above the top of the Bone Springs?

A. Yes, sir.

Q. Is it possible that there could be a miscorrelation here and that you've got a Bone Springs gas well as opposed to a Delaware well?

A. It's a sand sitting on top of the limestone, which indicates that it's not Bone Springs sand. Usually you do not find Bone Springs sand on top of the Bone Springs lime. You find Delaware sand on top of the Bone

Springs lime.

Q. So that Bone Springs line marker that you've used to correlate your logs is a pretty good marker, isn't it?

A. Typically.

Q. And in your log section particularly it's a good, identifiable marker that you can correlate that log to other logs?

A. Typically.

Q. And specifically with regard to this well, you can do that?

A. I have used it, yes.

Q. And you've got good confidence that you made a nice correlation?

A. Except in the two Chi wells. I don't have enough logs to tell for sure they are into the Bone Springs.

Q. When we look at the Wiser State 1, the next one to the right, that's a good log. It shows a nice top on the Bone Springs lime, doesn't it?

A. I can't really tell from this, but it seems to me that the logs that we had -- the first log data available from pick up off bottom was fairly inconclusive as to whether or not they were actually seeing Bone Springs on the logs.

Q. When we go to the third well, the Oxy-State No. 1 --

A. It's obviously too high there.

Q. The last one is not on Exhibit No. 1. That's an Arco gas well somewhere down in --

A. It's in the -- I believe it's in the west half of the southeast quarter of Section 9 in between where there are -- on Exhibit No. 1 there are two Chi locations to be drilled to the Delaware in the southeast quarter.

Q. Somewhere in between those two?

A. Yes. So it's close to it.

Q. You didn't pick up a correlation on the Wiser State No. 2? You didn't use that log to correlate with to make the cross section?

A. The Wiser State No. 2 log that I had -- the data I have on the logs came from the log library, and their names -- I discussed this with Chi Operating the other day -- are not straightforward in that they have log headings that are not necessarily -- or in fact are not -- do not go with the logs that they are attached to. And we have -- do not have a log in our possession of the Wiser State No. 2 well.

Q. When we look at your log for your well, the AM Federal 1, we've got the Bone Springs marker. We go to the top where you've drawn a line and said "Brushy Canyon"?

A. Yes, sir.
Q. How confident are you that you can make --
A. Maybe plus or minus a little bit. It's --
Q. Plus or minus how many feet?
A. Oh, I don't know. 50 feet maybe. We feel pretty confident it's right close to where we've picked it in each well.
Q. Are you reasonably confident that you can make a good correlation to find the top of the Brushy Canyon when we go from well to well?
A. It's difficult, but I feel that this works pretty well.

If you'll look -- address yourself to looking above there into the interval that's colored red, for instance, take the Oxy-State No. 2 well to a depth of about 3150 and proceed down hole to about 3400 feet, and if you'll look at both wells immediately on each side of that log, you have a fairly well-defined interval between those three wells.

You lose that correlation a little bit going over to the AM Federal No. 1, but it again appears that -- at least to me, in my correlation, that you can still find that same interval between about 3125 and 3400 feet.

Q. Okay.
A. And using that, then, I also come down and pick

a little bit of a benchmark on the shale, a hot shale running through there. It's not as -- because the logs are not calibrated all the same, it doesn't appear the same, but I feel the correlation is fairly good.

Q. Would it satisfy Kaiser-Francis' purposes if the vertical limits for your gas pool are confined to the Brushy Canyon interval of the Delaware?

A. I thought that was our proposal as stated here today.

Q. Well, I'm trying to clarify that. The docket that I looked at indicated a Delaware gas pool, and my notion of the Delaware would be that it included the Brushy Canyon, the Cherry Canyon and the Bell Canyon.

A. I'm sorry. We should amend it to say the "Brushy Canyon." I thought that's what we were doing.

Q. So it would accomplish your -- Kaiser-Francis' purposes to segregate out the gas-producing interval of the Delaware by confining the vertical limits of your pool to the Brushy Canyon as you've shown on your log?

A. Yes, sir. That was my intent at this hearing.

Q. Let's look now within the Brushy Canyon.

Do you see any log potential to perforate any other portion of the Brushy Canyon for potential hydrocarbon production?

A. I do not.

Q. Within that particular zone, then, that's perforated, what would you attribute the thickness for that zone?

A. Excuse me. Repeat your question.

Q. Yes. What is the net thickness of that lower portion of the Delaware that's contributing to production?

A. That's contributing to production?

Q. Yes, sir.

A. We have perforated an interval that's approximately 16-foot thick.

Q. If I'm going to use a -- do a volumetric calculation of your potential gas reserves, what would I use for the height?

A. 16 feet.

Q. Do you have a porosity value that I should use for calculating your gas reserves? What would you use?

A. I believe I used 14 percent. I don't have those with me so I'm talking off the cuff.

Q. Have you calculated gas reserves for your well out of this zone?

A. We don't know the oil extent since we haven't -- I do not see it in any of the wells offsetting this, but I anticipate it will be fairly small, somewhere in the neighborhood of maybe 80 to 160 acres.

Q. Give me the gas volume.

A. Pardon me?
Q. What's your gas volume?
A. I anticipate we'll have somewhere between a half a BCF and a BCF of gas.
Q. Half a BCF to one BCF -- is that recoverable gas or gas in place?
A. Not a lot of difference between those two. Either one would be fine.
Q. You get a -- what? -- 85 percent gas recovery out of this?
A. You're going to get down to fairly low. We can call it gas in place, I guess would probably be a better determination of that.
Q. What would you use for a recovery factor?
A. Probably around 85 percent.
Q. Other than running the state-required 4. test on your zone, do you have any other kind of pressure test?
A. Other than the initial DST, no.
Q. You don't have any pressure-draw-down tests or pressure-build-up tests?
A. The data presented on Exhibit 7 constitutes the universe of data along with the DST.
Q. And that's all the test information you have?
A. Yes.
Q. Looking at your cross section, it appears that

in the Brushy Canyon you do have a higher structural position in your Brushy Canyon than Chi has in their offsetting portion of that reservoir.

A. It is my opinion, based on the structure map I've made -- I didn't present it as an exhibit -- that dip is to the west -- pardon me -- to the east.

Q. You've got dip to the east. Approximately how many feet vertical in displacement of structure do you have between your well and the closest producing Chi well?

A. I think there's about 200 feet. I can tell you real quickly by looking at the log.

It's about 200 feet. Yeah, 200 feet would be close.

Q. You made mention on Exhibit 7 to the fact that in '73 there was pressure information that was slightly less than the pressure information from this zone that you received recently?

A. The DST information was from, of course, DST tools, and I don't know the accuracy of their tools. I don't know how to calibrate the work, nor do I know how accurate the calibration was on the tools they ran for us in 1991.

So I feel that the pressures are fairly comparable. I don't think the reservoir has gained 100 pounds pressure in 15 years.

Q. Well, that was my concern, that you've got faulty data.

A. I don't think that. Now, I think I stated earlier I thought they were comparable pressures.

Q. You have some confidence in the bottom hole pressure, the 1848 number?

A. I believe it's between 1750 and 1850, somewhere in there.

Q. What would be virgin pressure for a gas well at this depth?

A. This is slightly overpressured. I believe it's very close to this, in my opinion. 18 -- if it was 1850 -- we're at a depth of 40,050 feet, that's a .456 gradient. In places where I am familiar with the Delaware, it is slightly overpressured, and that represents a comparable pressure that I would expect hitting a virgin zone in the Delaware.

Q. Your well was completed in November of last year. Have you had any gas sales?

A. It is -- I think I said earlier that it was shut in for Exhibit 7 on 12/19/90.

Q. Do you have a market for your gas production?

A. Yes, we do.

Q. It's sour gas, isn't it?

A. It's sour gas.

Q. You don't have any production history, then, by which --

A. No, sir, we do not.

Q. From the information derived, it's not possible for you as an engineer, using this information, to know what the boundary limits are for your gas reservoir being produced by this well, are there?

A. There's insufficient data at the moment.

Q. In order to obtain production out of the Brushy Canyon, did you have to stimulate or fracture the well?

A. Yes, and I believe that's shown on Exhibit 7.

Q. Okay.

A. Maybe not. Let me take another look at it.

Q. Help me find it.

A. No, it's not on it. It's presented on Exhibit No. 3, which was the BLM well completion -- or recompletion report and log. About halfway down the page, line -- they designate line 32 -- shows the well was perforated and then it was treated with 1600 gallons of 7 and a half percent acid and 22,000 gallons of 60-quality foam and 38,000 pounds of 6/30 mesh sand.

Q. Why is it necessary to stimulate the well in order to get it to flow?

A. It had a skin factor build-up. It had been behind pipe since '75.

Q. Is there a permeability problem?
A. There's a skin factor problem, I believe.
Q. I understand the difference. What do you anticipate to be the permeability of the reservoir?
A. I don't have enough data to calculate that.
Q. What would be characteristic of the permeability for a Brushy Canyon gas-producing well?
A. I would think it would range from nothing to a hundred millidarcies, probably, in certain places, as it would for any formation around.
Q. Well, some formations are characteristically tight or have low permeability and others typically the engineer can expect to have good or better permeability. Is there a way to quantify or estimate --
A. That's a debatable point at best, and I don't think you can characterize.
Q. So we don't have any information yet to determine what in your opinion is the permeability?
A. No, I don't.
Q. If the Brushy Canyon has oil in the Chi acreage, and by the time it gets to you we have gas in that same correlative interval, what is it about the gas composition analysis that can tell you conclusively that in fact you don't have a gas cap, if you will, in an oil reservoir?
A. Most gas caps carry significantly more -- gas

caps of oil reservoirs carry significantly more liquid than this does, usually in the neighborhood of nine or ten --

Q. Is there any other --

A. -- gallons per million.

Q. Is there any component of the analysis other than liquid content that you --

A. High degree of methane. 73 percent.

Q. In a typical gas cap gas well in an oil pool, what would be the average methane limit?

You know, what would you see that would say, "Oh, well, that's a gas cap well"?

A. I like to see gas cap -- I like to see methanes in the neighborhood of 70 percent or better.

Q. If it's 70 percent or better, that would be a factor in telling you you have a well in the gas cap of an oil pool?

A. I misunderstood your question. Repeat your question, if you can.

Q. Yes, sir. You've indicated that there are a couple of components in the gas analysis that give you a clue as an engineer that you're not dealing with a gas well in a gas cap. One of those was the liquid content. The other one was the methane percentage.

A. First of all, I want to point out that this well gas has about ten percent of non-hydrocarbon gases in it,

which makes the overall methane content, when you look at it as a percentage of the overall hydrocarbon, closer to 82 percent, 83 percent.

And what I meant to say a moment ago was that I like to have methane contents in excess of 80 percent for gas zone gases.

Q. Okay. And with that adjustment, then, you think the methane would be in that range to give you --

A. Yes, I do.

Q. Any other component of the gas analysis?

A. No.

Well, again, the gas -- the liquid ratio or the liquid content here is quite low. You don't have any heavies to speak of, and usually in gases associated with oil reservoirs, particularly significant oil reservoirs, you'll always see a high quantity of liquids associated therewith, particularly in the heavier "anes."

Q. Would it make a difference that the oil in the Brushy Canyon has not yet been produced? Would that have an effect on the gas composition?

A. Shouldn't.

Q. Would the distance between the gas well and the oil well have an effect on the gas composition?

A. Could have some effect.

Q. Would the permeability have an effect on the gas

composition between the gas well and the oil well?

A. If there's a permeability barrier between the two of them, then you would have a gas cap separate from the oil zone.

Q. But if there is limited permeability yet pressure communication --

A. You still have a gas cap with respect to an oil zone if you have limited permeability. You wouldn't have a communication factor; i.e., if you have a low-permeability reservoir, if that's what you're getting to, you'd have separate reservoirs, if there's a low permeability between the two of them.

MR. KELLAHIN: Thank you, Mr. Examiner.

MR. BRUCE: Mr. Catanach, could I just ask one follow-up question?

EXAMINER CATANACH: Yes.

CROSS-EXAMINATION

BY MR. BRUCE:

Q. On Exhibit No. 6, just following up on what Mr. Kellahin asked you, I was pretty unclear on what number you finally said. You said like to have 80 percent or better --

A. Right.

Q. -- methane? And is that for gas-cap gases?

A. Gas-cap gases.

Q. Okay. Thank you.

A. I think it's -- an attribute of a gas-cap gas is that the methane content is usually quite high and that the quantity of liquid propane, butane will be there, but your heavier "anes" -- your hexane, heptane pluses -- will also appear in significant quantity.

And here we see no hexane pluses, heptane pluses at all and only a trace of the i-pentanes, n-pentanes and hexanes, which to me indicates they are not associated with a significant oil reservoir which would then vaporize those components into the gas cap.

MR. BRUCE: Thank you.

EXAMINATION

BY EXAMINER CATANACH:

Q. Mr. Wakefield, is it my understanding that now you're requesting that the gas pool consist only of the Brushy Canyon member of the Delaware formation?

A. Evidently I didn't make that clear earlier.

Yes, sir. The application should be limited to the Brushy Canyon, which would be called the Avalon-Brushy Canyon zone, Brushy Canyon field.

Q. Did you state that in the AM well there's no potential for any other Delaware production?

A. In my opinion, looking at the logs, there's very limited shows and very limited potential for additional

production within the Delaware interval. This was by far the most outstanding zone.

It had a considerable drill-off gas show while drilling. The up-hole zones, particularly those in the Cherry Canyon -- there were some oil shows noted, but they were not significant -- or noted as being significant by Coquina.

Q. How about in the remainder of the southeast quarter of Section 8? Do you anticipate any Delaware production that your company might drill any more Delaware wells in that quarter Section?

A. It is our plan not to drill any more wells in the southeast quarter of Section 8.

Q. Was it also my understanding that you assessed that the Chi wells to the east don't really have a potential for production in the zone that you're perforated in?

A. That's my opinion.

Q. You don't really have any control except for -- except towards the east on whether or not the reservoir is very large.

A. Yes, we do. I didn't bring with me a plat that shows all the wells, but essentially the Morrow has been drilled here on 320s, and there's a considerable number of wells within this non-section area. In fact, there's two

per section. There's wells drilled in 16 and 17 that do not show this same zone. There are wells also to the -- to the west.

The only well, again, that I found that has what I consider to be an equivalent zone to what we're producing from the -- in the AM Federal is the Arco Federal well drilled by Coquina in the -- I believe it's located in the southwest of the northeast quarter of Section 8. And they did not encounter any significant shows in that zone, and they drilled it -- date-wise, I'm not sure. I don't have the information when it was drilled.

It was before or after the AM Federal.

Q. Between the various producing zones within the entire Delaware formation, are there barriers or separations to prevent communication between the zones?

A. I think there is. In fact, if you look at Exhibit 8, I'm quite curious as to, given the perforated intervals reported by Chi operating, if they found some zones that were productive in one well, they didn't pop them in the other one.

And if you'll notice that they have very limited perforations across specific bodies that are isolated by -- appear to me at least to be isolated by shales above and below the zones.

For instance, the perforations in the Wiser

State No. 1 at 2724 to 38, if you look, there's a shale apparently at 2720 and another one that's significant at 2765 to 75. Both of those appear to isolate that one particular sand member from everything else.

Now, that sand is difficult to correlate across to the Oxy-State No. 1 log. I do not have great confidence that I could pick that particular interval on a 40-acre basis as being correlative to that zone.

Come down to the zone perforated in the Oxy-State No. 1 at 3074 to 98, it has a a shale immediately above it at 3070 feet and another immediately below it at 3110, again isolating that zone from other entities up and down the well, if they have good cement jobs in both wells.

However, I can -- that particular part of the Cherry Canyon zone from about 3000 to 3500 is fairly correlative between the two wells, yet they did not perforate that correlative interval, which I would estimate to be about 3100 to about 3120 in the Wiser State No. 1, and perhaps they didn't get mud shows in it or they just didn't -- they had adequate porosity. You know, there is something in their thinking that resulted in them not testing those zones.

Similarly, if they had significant shows that were better than these down hole and the Brushy Canyon didn't perforate it, they must have had reasons for doing,

but the implication to me is that they chose the best zones to perforate in each well to give them the greatest amount of production. They had the choice of anything within the Delaware zone and chose instead to perforate isolated intervals.

I would assume if they'd had a significant gas show similar to what we had in the AM Federal that those zones would be perforated in their wells.

Q. Is it your opinion that this is basically going to be a one-well pool?

A. Yes, sir, it is.

Q. And that allowing you to produce as much gas as you can is not going to affect Chi in any way, adversely affect their zones?

A. In our opinion, it has no effect at all on Section 9.

EXAMINER CATANACH: I have no further questions.

MR. CARR: No further questions.

EXAMINER CATANACH: The witness may be excused.

MR. CARR: I have nothing further, Mr. Catanach. That concludes our direct presentation.

MR. KELLAHIN: I'd like to call Mr. Michael Hayes.

We're ready, Mr. Examiner.

EXAMINER CATANACH: Okay. You may proceed.

* * * * *

MICHAEL D. HAYES,

the Witness herein, having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Hayes, for the record, would you please state your name and occupation?

A. Michael D Hayes. I'm a petroleum geologist with Chi.

Q. Mr. Hayes, on prior occasions have you testified before the division?

A. No, I have not.

Q. Give us a summary of your educational background and employment experience as a geologist.

A. I received a bachelor of science degree from Saint Lawrence University in Canton, New York, bachelor of science in geology with honors. And then I received a master of science degree in geology from the University of North Dakota in Grand Forks, North Dakota.

Q. In what years did you obtain your degrees?

A. The B.S. was in 1981 and my master's was completed in 1984.

Q. Describe your employment experience.

A. The first year out of graduate school I was self-employed as a consulting geologist in Denver for about

a year and then I started with Exxon in their Andrews office, and upon closing of the Andrews office, I was transferred to their Midland office, and I was there for approximately five and a half years. And since that time I've been working with Chi.

Q. Are you familiar with the oil production out of the Delaware in Eddy County, New Mexico?

A. Yes, I am.

Q. Have you been specifically involved as a geologist in Chi's exploration and development of Section 9 for the Delaware production?

A. Yes, I am.

MR. KELLAHIN: We tender Mr. Hayes as an expert petroleum geologist.

EXAMINER CATANACH: He is so qualified.

Q. (By Mr. Kellahin) When you look at your geology that you have developed, examined and studied in the area of Section 9 and 8, when we look particularly at the Brushy Canyon member of the Delaware, have you been able to find with confidence as a geologist that you can locate well to well the top of the Bone Springs or correspondingly the base of the Brushy Canyon?

A. Yes, I can.

Q. Demonstrate to us on your Exhibit No. 1, starting off with the Kaiser-Francis well, the information

available to you that gives you that confidence in finding the top of the Bone Springs.

A. The data is based on several sources. One is the electrical logs that are shown on the cross section. The cross section runs from west to east, roughly, from the Kaiser-Francis well over to the Wiser State No. 1. The top of the Bone Springs is a distinctive marker, fairly confident in its correlation because of its change in lithology from a limestone or carbonate, certainly, at the top of the Bone Springs into a sandy or silty or shaley zone at the base of the canyon. It's distinctive on the logs and it's distinctive on the mud logs that we have in the field area on the --

Q. Mr. Wakefield apparently didn't have available to him the mud logs for your wells and could not make the correlation as confidently as you have, apparently, for this Bone Springs?

A. That's my understanding, yeah.

Q. What type of log have you shown for your two Chi wells?

A. On the Oxy-State No. 1, I've shown a resistivity log. I believe the Kaiser-Francis exhibit showed a porosity log on that, and one of the reasons that I show that resistivity log has been noted here. It is a little difficult to tell on the porosity log because of the tool

pickup. You can't really make a distinctive call on it. But on the resistivity log that log got a little bit deeper, and it's a little better pick on the resistivity log.

And with the mud log the samples are distinctive in that you go from a carbonate, roughly, into a sand and shale -- a sand, actually, at the base there.

Q. Mr. Hayes, I recognize you haven't had a chance to look at Mr. Wakefield's cross section. Let me ask you to take a moment. On short notice, can you make the necessary adjustments between his cross section and yours to demonstrate to the examiner the differences?

If you cannot, we'll go on to something else.

A. Grossly, the picks seem to be pretty much the same; I mean, from my examination of it, but I haven't examined in great detail.

Q. Let's stay with your display, then.

When we look at the stratigraphic equivalent for the Brushy Canyon in the Kaiser-Francis well and that interval in your wells --

A. Uh-huh.

Q. -- what do you find? Are they the equivalent?

A. I feel that they are very correlative. Yes, I do believe they are equivalent, stratigraphically equivalent.

Q. What is your assessment as a geologist about the continuity of the Brushy Canyon between the Kaiser well and the Chi wells?

A. Based on the data we have, they appear to be very continuous.

Q. When you look at the Chi wells in the Brushy Canyon, am I correct in understanding that you have yet to perforate in your wells the Brushy Canyon interval?

A. That's correct.

Q. When you look at the log potential, looking at your electric logs or your mud log, would you analyze for us as a geologist your assessment of the hydrocarbon potential in the Brushy Canyon?

A. Using electrical logs on -- I'll focus on the Oxy-State No. 1, the closest well in the cross section.

It calculates, using SW calculations, log calculations, about 37 percent SW, which indicates that it's hydrocarbon productive. At that point, based on the mud log shows, it looks like they are reaching for some of the details of it because I consider them significant in that within the basal Brushy Canyon section that correlates over the Kaiser-Francis well, there is a dirty yellow, dull to yellow fluorescence of fair to good fairly fast yellow cut and a better cut dry. There's fluorescence in approximately 20 percent of the samples.

The chromatograph analysis of the mud log as you drill through it has C-1s through C-4s, which is a fair indication that there's probably liquid hydrocarbons in that zone oil.

And the better cut, the better dry cut, there seems to be significant in that that is often used as the stronger criteria of oil productivity as opposed to gas productivity in that zone.

Q. When you look at the rest of the log information, are there any other factors that cause you to conclude that you have an oil zone potential in your wells in the Brushy Canyon?

A. From that specific zone, that is the basis of the data. However, I'm using analogies from up hole. Those caliber or type of show are similar to shows that we have in zones that are producing oil in these wells.

Q. So by analyzing the similarity in those potentials, you can relate that to an upper zone that has actually been perforated and tested using those values and have shown it to be oil productive?

A. That's correct.

Q. Explain for the examiner the operational choices that Chi has made in selectively perforating the Delaware and why, for example, you have yet to get to the Brushy Canyon oil.

A. Essentially, the attempt was to try to hit the most oil-productive zones that we could by identifying the most prospective zones and perforating those intervals in order to produce hydrocarbons. We have tested some zones where we have produced some significant gas and have squeezed those off in order not to produce gas from some of those associated zones.

Q. In the Delaware?

A. In the Delaware.

Q. In the Delaware you have perforated zones that were too gaseous to let you -- to continue to produce?

A. That's right. That's right.

Q. Now, what's your acreage position in Section 9?

Do you control Section 9, or what portion of Section 9 do you control?

A. Let me see if I can see on this map if we have details on that.

Yes, essentially we control Section 9. That's correct.

Q. You have the flexibility or the good fortune to control all the Delaware in Section 9?

A. Uh-huh.

Q. And therefore you can selectively perforate your wells to get the maximum recovery per zone per well?

A. That's correct.

Q. The plan, then, for operation is to select certain zones in each well, and when they are depleted you would go to other zones?

A. That's correct.

Q. But there is potential, in your mind, for oil production out of the basal Brushy Canyon?

A. That's correct.

Q. What's the structural difference between your wells in that zone and the Kaiser-Francis well?

A. Let me take a look here at some of my notes.

On the three wells that we have out there right now, or the four that are shown, it's approximately -- we're about 40 to 200 feet down dip from the Kaiser-Francis well.

So the structural advantage is 40 to 200 hundred feet.

Q. As a geologist, what's your concern about Kaiser-Francis producing a gas well in the Brushy Canyon?

A. Well, if they were to deplete the reservoir pressure in producing the gas, it may affect our ability to recover oil from our zone.

Q. Mr. Wakefield describes in his opinion he thinks that the Delaware zones are discontinuous to some extent from well to well. Are you finding that to be true, that the oil zones tend to be discontinuous?

A. The correlations are difficult, as he's noted. I believe there is a combination of both continuous zones and discontinuous zones within the Delaware, and in this particular zone it appears to be continuous, the ones we are focusing on, the basal in Brushy Canyon.

Q. Do you have a recommendation, Mr. Hayes, of what the examiner might do to satisfy your concerns about having a gas well producing out of the Brushy Canyon zone that has oil potential for you and your part of the reservoir?

A. I would say at this point, with the limited data that both Chi has and Kaiser-Francis has presented that I'm familiar with, it would appear that we need more data before we could confidently change established field rules, at least within the East Catclaw Draw on the west half of the Section 9.

As a recommendation, I would leave the rules as they are continuous over into the Section 9 if that becomes productive, too.

Q. In effect, treat this Brushy Canyon as if it were an associated gas and oil pool for that reservoir?

A. That's what I believe.

Q. With some type of limitation on the gas producing rate for the Kaiser-Francis well?

A. That's correct.

Q. Was Exhibit No. 1 prepared by you, Mr. Hayes?

A. Yes, it was.

MR. KELLAHIN: We move the introduction of Exhibit No. 1.

EXAMINER CATANACH: Exhibit No. 1 will be admitted as evidence.

(Whereupon Exhibit 1 was admitted into evidence.)

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

EXAMINER CATANACH: Mr. Carr.

CROSS-EXAMINATION

BY MR. CARR:

Q. Mr. Hayes, did Chi drill the Oxy-State No. 1 and the Wiser State No. 1?

A. Yes.

Q. And you obtained the log information which is shown on your exhibit at the time these wells were actually drilled?

A. Yes.

Q. And it's my understanding that -- from your testimony that the way you have approached these is you have singled out zones in the Delaware that tend to at least indicate to you that you can obtain the highest production from those and those are where you have first perforated and attempted to complete and produce the well?

A. That's essentially correct, yes.

Q. And what you have done in each case with both the Oxy-State and the Wiser State is in fact you have gone in and tested up hole first; isn't that right?

A. That is correct.

Q. And by doing this haven't you made it difficult, if not impossible, to subsequently go back and test the deeper zones in the well?

A. Our operating idea on that was to produce the zones that we thought would flow oil at a maximum rate that would be allowable and then at a later date add perforations and probably put them on pump or flow or whatever happens at that point.

At this point, the wells are basically making about at allowable, so we're limited to going in any other zones right now.

Q. Was it your testimony that when you looked at these logs you concluded that there was actually a potential for oil production in the zones which are correlative to the zones that are now open in the Kaiser-Francis well?

A. Yes, particularly in the Oxy-State No. 1. That's correct.

Q. And yet you did not test those at that time?

A. That's correct.

Q. Now, when we look at the zones on the logs, they

have in fact some hydrocarbon show down there; isn't that correct?

A. That's correct.

Q. Does the term "C-4" mean anything to you?

A. The way that I keep in mind on those is that essentially the higher the number, the heavier the hydrocarbons, indicative of liquid hydrocarbons.

Q. And when you say the "heavier liquid hydrocarbons," what does that mean? I don't understand that.

A. I'm not an expert on the range from C-1s to C-5s.

Q. If we take a look at -- I guess it's the log of the Oxy-State No. 1 well and we go up that log, you have C-4s throughout the interval, do you not, as you move up that log?

A. Yes. That's mostly continuous from what I can see right here.

Q. And as you move all the way up the section that's shown, as we get up to the uppermost portion between 3400 and 3500 feet, we still have C-4s; isn't that right?

A. That's correct.

Q. Does that indicate to you that this entire interval is something that ought to be perforated and potentially productive?

A. I don't think the entire interval is potentially productive.

Q. Could this just be some sort of a residual oil show in this area and not indicative of production?

A. Perhaps. The increase in total gas within that zone also is indicative of that.

Q. Now, if we go to the Oxy-State No. 1, you singled out and perforated a certain interval in that well which from your initial information showed it was probably the best or most productive zone in the well; is that right?

A. That's right.

Q. How long has this well been on production?

A. Oh, I believe it's in the last fall -- September, October -- range.

Q. Since that time, what kind of production rates have you obtained out of this zone?

A. I don't know exactly. For the wells that are producing in the field right now, it's a total production of around 170 barrels of oil a day.

Q. 170 a day, and so that, in your opinion, is the best zone in the well?

A. Yes.

Q. What kind of gas production are you getting?

A. I do not recall.

Q. Substantial gas?
A. From the three wells, it's -- I believe it's on the order of about 300,000 cubic feet, as I recall.
Q. That's the three wells combined?
A. That's right.
Q. If we go to the Wiser State No. 1, what kind of oil production are you getting out of that well?
A. I believe that's 40 to 60 barrels, something like that.
Q. Now, you perforated different zones in each of those wells; isn't that correct?
A. Uh-huh.
Q. And those are on offsetting 40-acre tracts; is that right?
A. Yes.
Q. And did one of those zones look better to you -- why don't you perforate the same zone in each of those wells?
A. Based on the quality of the shows, we made a judgment that the one zone is better than another.
Q. If we take a look at the resistivity curve on the log on the Kaiser-Francis AM well, can you tell me what kind of a resistivity figure you get?
A. I believe it's a density neutron log.
Q. Do you have any information on that?

A. Yeah. I'm not familiar with it right now.

Q. What kind of resistivity are you getting on your State No. 1? Can you tell that from this log?

A. No. Well, I can take a look at it.

It appears it's about ten to 15 or so ohms.

Q. Does that tell you whether or not this zone is oil productive?

A. No, that does not tell you whether it's oil productive.

Q. What would that tell you?

A. That tells you that it's hydrocarbon -- or you can use that data to interpret that it's hydrocarbon productive.

Q. Does that tell you whether it's hydrocarbon or water?

A. It can, yes.

Q. Does it?

A. In my opinion, it tells me it's hydrocarbon productive, yes.

Q. Can you compare the porosity between the AM Federal and, say, the Oxy-State No. 1 from these logs?

A. Yeah. They are roughly equivalent, approximately 14 to 15 percent porosity.

Q. The same in both wells?

A. Yes, essentially.

Q. When we go to the exhibit and take a look at the zone you have shaded in yellow across the bottom of the exhibit, what is that yellow band and what is it intended to show?

A. It's really intended to show the correlation of that basal Brushy Canyon sand unit.

Q. And when we look at the logs, sand is indicated -- and I'm a lawyer, not a geologist -- by a stippled area, is it not?

A. Let me take a look at it. Yeah, that's right.

Q. And why do you limit it just to this area? Why don't we include the stippled area that goes on up the well bore? Why do you limit it to just that portion of the reservoir?

A. That's also based on the porosity and resistivity character of that zone.

Q. But you would agree with me that the sand is present, but you're excluding it based on other calculations or other considerations?

A. I'm not sure -- that the sand is not present where it's --

Q. The sand is present throughout the interval that you've shaded in yellow?

A. Yeah.

Q. But you're discounting the sand that's above

that area for other factors?

A. Uh-huh.

Q. In your opinion, would that indicate separate zones in the Delaware?

A. Yes.

MR. CARR: We have nothing further.

EXAMINATION

BY EXAMINER CATANACH:

Q. Mr. Hayes, what is the Oxy-State well No. 1 currently producing?

A. As I said, I'm not sure exactly on that. I believe it's in the 50 to 60-barrel-a-day range.

Q. What is the allowable for this pool? Do you know that?

A. I believe it's 73 barrels -- 82.

Q. What would your company's -- or what would the plan be to -- would the plan be to deplete the single zone before you go and attempt to recomplete in a different zone?

A. When you say "delete (sic) it," you mean squeeze it off or something like that?

Q. Deplete it. I mean deplete that zone and then go to another zone.

A. At this time, that's the intent, yes.

Q. So you don't have any plans to attempt a

completion in this basal sand for a period of time?

A. A period of time, that's correct.

Q. How long might that be?

A. It's difficult to tell how long that zone is going to produce.

Q. Don't you have any decline curves on the upper zone in the Oxy-State?

A. It's not declining very much, but it also hasn't been producing for very long.

Q. How about in the other two wells? Is that also the same case: It will be quite a while before the basal zone is considered for production?

A. It could be, that's correct.

Q. Would it be feasible to test the well -- or to test this zone and then, if you wish not to produce it, just to leave it for a while?

A. To test the lower zone right now?

Q. Right, the basal zone.

A. Operationally that would be difficult, and that would probably have to squeeze off the upper zones and go back and perforate and treat the lower zones. That, operationally, would be somewhat difficult.

At least, that's my understanding.

Q. Does your company intend to drill any more wells in between the Kaiser-Francis well and the currently

producing wells?

A. At this time, that looks as though it may be prospective, yes.

Q. I mean, between, say, the Wiser State 1 and 2 and the Kaiser-Francis well, in that area in there?

A. That's -- there's potential for that, yes.

Q. But you have nothing planned?

A. Not at this moment.

Q. When do you plan to commence drilling your four other proposed locations?

A. The Hondo Fed No. 3 right now is testing. The Hondo Fed No. 2, we just drilled and set pipeline in the last several days.

We're -- our plan right now is to evaluate similar production on those wells and establish where we'll go from there.

Q. Now, those two wells you just referenced are located where?

A. The Hondo Fed No. 3 is in the east half, the green dot in the east half of Section 9, and then the -- up on the wall it's perhaps easy to see. And then the open circle -- the open circle to the south of that is the Hondo Fed No. 2.

Q. Have you looked at the log for the well No. 3, Hondo Federal No. 3? Has that well been logged?

A. Yes, it has been logged.
Q. Does that have the same zone in it that the Kaiser-Francis well is produced from?
A. It doesn't appear to be as well developed.
Q. So that that's not going to be a planned completion in that well?
A. It doesn't look that way to me right now.
Q. And the other well to the south is still drilling, you say?
A. Just drilled and set pipe, I believe, maybe like last weekend, I think, is the correct time.
Q. Has that been logged?
A. It's been logged, yes.
Q. How about in that well? Does that zone show up on that well?
A. I have not seen the log on that well.
EXAMINER CATANACH: I believe that's all I have. Is there --
MR. KELLAHIN: I have some follow-up questions to Mr. Hayes.

RE-DIRECT EXAMINATION

BY MR. KELLAHIN:
Q. On the Exhibit No. 1, the Kaiser-Francis exhibit, they show -- and I'll hand it to you.
A. Okay.

Q. They show some locations for you. There are four of those in a vertical row.

A. Uh-huh.

Q. All right? Which of those have not yet been staked or drilled?

Have they all been staked?

A. Staked, I'm not certain of. Drilled, the northernmost proposed location and the proposed location that they are showing in the southeast quarter of Section 9 have not been drilled.

Q. You have not -- have you drilled the farthest south proposed location in that row?

A. No.

Q. Is there a geologic difference to cause you to drill that location as opposed to drilling the southwest southwest 40 that would give you a well between your producer and the Kaiser-Francis well?

A. If you could restate that, perhaps I'd understand it better.

Q. You've got a drilling program in Section 9?

A. Yes.

Q. You've got two open locations that are planned to be drilled that have not yet been drilled?

A. That's correct.

Q. Is there an -- is it reasonable to suggest that

you could substitute a different location for one of the two remaining?

A. Yes.

Q. And move yourself into a protection well position along the boundary, the western boundary, of the section, either the northwest of the southwest or the southwest of the southwest?

A. That's feasible. That's possible.

Q. And with a new well bore, then, that would give you the potential to complete, first, the deep Brushy Canyon interval of the Delaware so that you could be in competition with Kaiser-Francis for the hydrocarbons in that zone?

A. That's correct.

MR. KELLAHIN: No further questions.

FURTHER EXAMINATION

BY EXAMINER CATANACH:

Q. Mr. Hayes, is the current GOR for the pool -- is that 2000 to one?

A. I believe that's correct.

Q. And the oil allowable you weren't sure on?

A. I think it's 80, around 80. I think it's 82 barrels. I don't know exactly at the moment.

Q. Does it concern you that if the application in this case is denied that they still will be able to produce

casing and gas allowable? Does that concern your company at all?

A. No. I don't believe that is a concern of ours right now.

Q. It would still result in depleting the gas cap but at a much slower rate?

A. That's correct.

EXAMINER CATANACH: I have nothing further. Anything further of this witness?

He may be excused.

Oh, Mr. Bruce, did you have something?

MR. BRUCE: I have nothing further.

EXAMINER CATANACH: Do you want to make brief closing statement, Mr. Kellahin?

MR. KELLAHIN: I share with you, Mr. Catanach, the fact that I don't have a clear solution to what I think is a potentially difficult problem. I can't think of a situation in recent memory where we have had to deal with this problem. I think the geology clearly demonstrates the correlation between the basal Brushy Canyon and the Kaiser-Francis well and the Chi-operated wells to the east.

The fact that the plan of operation for Chi has not currently included opening up the oil potential in that zone complicates the matters further. It seems to me to be unfair to ask Kaiser-Francis to shut in their gas-produced

production. They need to have some source of income to repay the costs of their recompletion. And yet I'm very concerned that they are in a place in the structure of the reservoir that they can deplete the gas-drive mechanism in the reservoir at the expense of the oil zone that would not otherwise ever be recovered if gas drive is gone.

I would suggest that you strike a careful balance and construct an order so that there is a limitation on the withdrawal rates for the Kaiser-Francis well, so that it is treated in fashions not dissimilar to gas wells in associated oil-gas pools where their gas withdrawal rate is pegged to some oil volume, and that that volume stay in place for a certain period of time.

What that will do is provide an income stream for Kaiser for a limited period of time. It will give an opportunity to Chi to exercise a choice to drill a protection well, if you will, at a 40-acre offset to the gas well, and they can then start producing the oil out of that zone and not run the risk of losing the upper producing oil zones in the offsetting Oxy-State well.

You squeeze the oil zone and you might not get it back trying to preferentially produce the lower oil zone.

And I think we need to rely upon your expertise to strike a fair balance between Kaiser-Francis so that we have a limited gas withdrawal rate applied against

Kaiser-Francis in order to give Chi the opportunity to capture their share of the hydrocarbons in that oil zone and not let this gas well be produced as a conventional gas well.

If you don't limit it, it's going to cause waste, and the potential for violation of correlative rights is very apparent. And I can't think of any other way to address it except to give Chi the chance to protect themselves and correspondingly control the Kaiser-Francis well for some reasonable period of time until Chi can exercise its opportunity to protect itself.

EXAMINER CATANACH: Mr. Carr.

MR. CARR: May it please the examiner, we would hope that the order entered in this case would be based on the evidence in the record made in this proceeding. Kaiser-Francis has come before you with information which, we submit, establishes that the AM Fed Well No. 1 is a gas well, it's a conventional gas well and should be spaced on 160-acre spacing.

Chi opposes us. Chi has come in and they have said they drilled the wells, they got the logs, they evaluated the logs, and they picked the best zones. But they didn't do what other operators do; they didn't test lower zones first.

They've now created a situation where, although

on one hand they say they need data, they didn't get it when they had the opportunity to go down and test these zones. I wonder why. Were the zones as attractive then as they were when somebody found production on an offsetting tract? Perhaps not.

But I would submit to you that the zones may correlate across the interval. But just as Mr. Hayes discounted part of the sand zone in the Oxy No. 1, for some reason when he looked at the logs he discounted this zone when the time came to initially test the well.

We submit to you that the evidence before you is: On the Chi side, "We need more data. We didn't test, and now hold up someone else so we can maybe -- although we won't tell you we will -- maybe some day drill a protection well. In the meantime, hold back the other guy."

I don't think that's what the record in this case would support. The record before you shows that we have completed a well in a separate and distinct gas zone. There is no production in this zone for miles. There is nothing -- no vertical interval for hundreds of feet above the well that would suggest that it is in communication with any other interval in the Delaware.

And with this before you, then the question becomes: Well, perhaps it's a gas cap. Look at the information on the composition of the gas itself. When you

look at the liquids in the gas, when you look at the methane content -- and these are the kinds of things that we bring to you because you're a petroleum engineer and can evaluate these things. These are the things we bring to you and ask you to apply your expertise and call them for what they are; and what they are, we submit, is a true conventional gas well that should be developed on 160-acre spacing. That's why we have asked for the creation of a gas pool in the Delaware.

EXAMINER CATANACH: Mr. Bruce.

MR. BRUCE: Mr. Examiner, I'm here on behalf of Santa Fe Energy, which is a working interest owner in at least some of the Chi wells. We are here to support Chi Operating's position. Santa Fe Energy, just like Chi Operating, is afraid of depleting the reservoir energy if the Chi wells are oil productive in the Brushy Canyon zones.

Furthermore, the Chi wells are developed on 40-acre spacing, and we just don't want approval of the Kaiser-Francis application to impair further development by Chi Operating.

Thank you.

EXAMINER CATANACH: Thank you. Anything else in this case?

There being nothing, Case 10251 will be taken

under advisement.

(The foregoing hearing was concluded at the approximate hour of 3:00 p.m.)

* * *

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

REPORTER'S CERTIFICATE

I, PAULA WEGEFORTH, a Certified Court Reporter and Notary Public, DO HEREBY CERTIFY that I stenographically reported these proceedings before the Oil Conservation Division; and that the foregoing is a true, complete and accurate transcript of the proceedings of said hearing as appears from my stenographic notes so taken and transcribed under my personal supervision.

I FURTHER CERTIFY that I am not related to nor employed by any of the parties hereto, and have no interest in the outcome hereof.

DATED at Santa Fe, New Mexico, this 20th day of March, 1991.

Paula Wegeforth
PAULA WEGEFORTH
Certified Court Reporter
CSR No. 264, Notary Public

My Commission Expires:
September 27, 1993

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 10251, heard by me on February 21 1991.

David R. Catanach, Examiner
Oil Conservation Division