STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

APPLICATION OF SANTA FE ENERGY )
OPERATING PARTNERS, L.P. FOR )
COMPULSORY POOLING, LEA COUNTY )
NEW MEXICO )

CASE 10211

APPLICATION OF HANLEY PETROLEUM
~~IN THE MATTER OF THE HEARING~~ INC. FOR
~~CALLED BY THE OIL CONSERVATION~~ COMPULSORY
~~DIVISION ON ITS OWN MOTION FOR~~ POOLING,
~~AN ORDER CREATING AND ASSIGNING~~ )
~~DISCOVERY ALLOWABLES TO CERTAIN~~ ) CASE 10219
~~POOLS IN~~ LEA COUNTY, NEW MEXICO )

REPORTER'S TRANSCRIPT OF PROCEEDINGS
BEFORE: COMMISSIONER J. LAMAY
COMMISSIONER JAMI BAILEY
COMMISSIONER WILLIAM WEISS
May 9, 1991
9:00 a.m.
Santa Fe, New Mexico

This matter came for hearing before the Oil Conservatin Division on May 9, 1991, at 9:00 a.m. At Morgan Hall, State Land Office Building, 310 Old Santa Fe Trail, Santa Fe, New Mexico, befor Linda Bumkens, Certified Court Reporter No. 3008, for the State of New Mexico.

FOR: Oil Conervation Division
(Original)

BY: LINDA BUMKENS, CCR
Certified Court Reporter
CCR No. 3008

# I N D E X

May 9, 1991
De Novo Hearing
Case No. 10211
Case No. 10291

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E X H I B I T S

A P P E A R A N C E S

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COMMISSIONER LAMAY: Good morning to the Oil Conservation Commission. And I'd like to introduce my fellow commissioners. I'm Bill LaMay, Chairman. On my left is the Commissioner Bill Weiss, and on my right Miss Virginia Bailey who is representing Commissioner Baca of the State Land Office, and we welcome you to our current hearing. We will begin by calling Case Number 10251.

COMMISSIONER WEISS: Application of Kaiser Francis Oil Company for a Pool Creation, Eddy County, New Mexico. Application -- applicant, I believe, has requested this case be continued.

COMMISSIONER LAMAY: I have on my notice, Mr. Carr.

MR. CARR: May it please the commission, Kaiser Francis has requested that this case be continued to the next scheduled commission hearing.

COMMISSIONER LAMAY: Thank you. With that suggestion Case Number 10251 will be continued to the June 12th commission hearing. If you make a note on that June 12th date, I believe that's a Wednesday, isn't it? Our contract is usually on Thursday. Case Number 9931.

COMMISSIONER WEISS: Application of Arco Oil & Gas Company for pressure maintenance expansion in unorthodox gas injection well, Eddy County, New Mexico.

MR. CARR: May it please the commission, Arco also requests that this case be continued until the June 12th hearing.

COMMISSIONER LAMAY: Without objection, Case No. 9931 will be continued to Wednesday, June 12th hearing date. Case Number 10193.

COMMISSIONER WEISS: Application of Beach Exploration, Inc., for statutory unitization, Eddy County, New Mexico. I believe it's been requested that this case be continued; is that correct?

MR BRUCE: Mr. Commissioner, I represent the applicant in that case and they requested that it be dismissed.

COMMISSIONER LAMAY: Thank you. Without objection, Case Number 10193 will be dismissed without prejudice to the applicant. Case Number 10211.

MR. CARR: Application of Santa Fe Energy Operating Partners, L.P. for compulsory pooling, Lea County, New Mexico.

COMMISSIONER LAMAY: Call for appearances in Case 10211.

MR. KELLAHIN: Mr. Commissioner, I'm

Tom Kellahin of the Santa Fe Law Firm of Kellahin, Kellahin, & Aubrey. I represent Hanley Petroleum, Inc., and we would like, Mr. Chairman, to have the second case called and consolidated on the commission docket today for that purpose.

MR. BRUCE: Mr. Commissioner, I'm Jim Bruce from the Hinkle Law Firm representing Santa Fe Energy Operating Partners L.P., and we would confer with Mr. Kellahin's request.

COMMISSIONER LAMAY: Thank you. You also, Mr. Carr?

MR. CARR: May it please the commission. My name is William F. Carr from the law firm of Campbell & Black P.A. of Santa Fe. I would like to enter my appearance on the behalf of Corbin E. Yates Company. We confer on the request to continue.

COMMISSIONER LAMAY: Okay. We will call then Case Number 10291.

MR. KELLAHIN: Application of Hanley Petroleum, Inc., for compulsory pooling, Lea County, New Mexico.

COMMISSIONER LAMAY: As we've just heard there's no objections. We shall consolidate Case Number 10291 with with Case Number 10211. Will all those who plan to give testimony please stand and raise your right hand, and we will give that at this time.

(The witnesses were duly sworn.)

MR. STOVALL: Mr. Chairman, before we actually begin, just for the record, I'd like to state a brief procedural background that has been agreed to by the parties and adopted.

This is a De Novo hearing from these cases. Examiners' orders were entered in these cases. I believe Hanley Petroleum has filed the application for De Novo hearing. The parties, as I understand, are prepared to stipulate and agree that the record from the examiner hearing should be presented and incorporated into the record from this case only.

Santa Fe Energy and Hanley Petroleum presented evidence at the examiner hearing, and they have submitted to the Commissioners a summary, if you will, of the evidence which is presented, I think stipulated, as to the essential facts regarding land questions that come up, and there will be no testimony, as I understand, presented pursuant to our prehearing conversation discussion.

The summaries of the geologic and engineering hearing testimony are presented so that we, the commission, can have some awareness of what went on at the examiner hearing making the incorporation of the examiner hearing -- making the incorporation of the examiner record somewhat meaningful, and hopefully making this a more efficient hearing.

I think the parties have questioned and commented, and there is in file notes from the prehearing conference, and the parties will correct me if I'm wrong, one other matter that needs to be addressed. Hanley Petroleum subpoenaed some information, or requested to subpoena for information, from Santa Fe regarding, I believe, the 5-1 well to the northeast of the subject proration unit in accordance and consistent with the commissions order previously issued in this case regarding subpoena.

The commission, in response to a motion to quash by Santa Fe, eliminated certain items of information specifically not requiring Santa Fe to produce a mud log, and requiring only production of information from daily drilling reports with respect to testing. Information which would be available in public record. And other than that, the subpoena was upheld, and I assume the information has been provided in accordance with that. That's just a procedural background which needs to be in the records for --

COMMISSIONER LAMAY: Does that fairly state the -- Mr. Kellahin?

MR. KELLAHIN: When it's appropriate, Mr. Chairman, I'd like to make some opening comments, and then an opening statement with regards to my client's position, but in short response to Mr. Stovall, he is correct. We had received the subpoena documents for the 5-1 well by 11 o'clock on Tuesday this week, and that information has been used by my witnesses.

COMMISSIONER LAMAY: Thank you. Mr. Bruce, Mr. Carr agreed with those stipulated --

MR. BRUCE: Yes, sir.

MR. CARR: Yes, sir, I do.

COMMISSIONER LAMAY: Well, we shall begin with opening statements then. Mr. Kellahin.

MR. KELLAHIN: Let me provide you some background of what counsel have attempted to present today for you. First of all, if you look at the docket for the hearing today, you have been served by ignoring it. It does not now reflect the position of the case before you. It is, in fact, on appeal before you for De Novo purposes based upon the application of Hanley. Hanley was the losing party before the examiner. Either Heyco or Santa Fe Energy sought to appeal the examiner's decisions. There is some complexity to the advertisement, and it talks about pooling of various zones, whether they're the shallow oil zones on 40-acre spacing or the Deeper Wolfcamp on 80-acre spacing.

You may remember this case. It was before you back in January on the subpoena issue. It now is back to you on the merits. As background, we are attempting to present this case a little differently.

Rather than present all of the expert witnesses and all of the factual evidence from start to finish, as we have sometimes done in the past, counsel have agreed to a different presentation in the hopes and expectations that we can more quickly focus on the technical issues by which you can apply your expertise, and not spend your time and energy talking about details for which we can't stipulate, and for which you need not devote your attention.

We have organized the presentations such that Hanley has submitted to you a prehearing filing, or what we've summarized different things about. Mr. Bruce, on behalf of his client, has done something similar. The examiner transcript, and exhibits, and displays, total some four or 500 pages, and so, in an effort to incorporate that record but give you a document that's meaningful to you, Hanley has presented to you a brief, if you will.

The first part of that memo is the stipulated chronology of land events. A comment in my opening statement here in a moment about sequence, very briefly: The bottom line about the land situation is the parties can't agree on either who operates, on what AFE to apply, and where to locate the well.

As a result of that, there are competing force pooling applications before the examiner. The reservoirs involved are a shallow oil prospect in the Bone Springs. There is also substantial Wolfcamp oil potential -- this is the South Corbin Wolfcamp pool-- The acreage in question is a standup 80-acre spacing unit for the Wolfcamp oil, and it would be the west half of the northwest quarter, section 8.

There is Bone Springs production in pools established both to the east and to the west of this track. The Wolfcamp production is to the south.

Hanley has a 40-acre tract in section 8. It's the only acreage that they have in the immediate vicinity. Santa Fe and Heyco control substantial acreage all around this 40-acre tract. And in the fall of last year, in November, submitted to Hanley a proposal to participate in a well drilled on this 80-acre standup unit. Hanley controls the top 40, Santa Fe and Heyco control the bottom 40. Each of those two parties split their share 25/25.

The impetus for Santa Fe's application was the fact that just east of the Hanley tract on the adjacent 40 acres, Santa Fe had just drilled and tested what is characterized as the Kachina 8-1 well -- Kachina 8 Federal 1. That well is a substantial oil producer in the Wolfcamp. Santa Fe presented to Hanley a proposal to participate in that well, but refused to give us data from that well in which to make an informed choice. Thus, the subpoenas, and thus the resulting data submitted to Hanley.

When Hanley received that data, they quickly recognized that in their geologic opinion the preferable optimum location in which to drill the well was on their own acreage in the north 40. Santa Fe proposed in the south 40. We have that dispute to resolve today as where to put the well.

As a result of all the trading of paper and talking landman to landman about who is going to do what to whom, the end result is no one can agree. And so, if the commission determines that an appropriate solution to this dispute is a forced pooling order, you have two to choose from. One is the Santa Fe pooling application which proposes the well in the south 40 under their operation. Hanley proposes, in their competing pooling case, the location of the well in the north 40. The geologic dispute before the examiner was one that had two essential components to it.

One was a structural component. We have summarized in our memorandum the geologic testimony, the first part of which was structure. From a layman's perspective, and I'll try to describe it to you in that essence, the north side of the section represents the reef front of this reef for the Bone Springs, the Wolfcamp, and other horizons, and that off the front of this reef there were debris flows that ran perpendicular to the face of the reef. The reef is running east and west, and the debris flows in geologic time brought materials down to the base of the slope of the reef and deposited our geologic reef system perpendicular to the face of the reef. And as this carbonate was built up over geologic time then.

The notion is that you need to orient your exploration so that you stay in the greatest thickness of the carbonate. That was our geologic presentation, and we'll go through that again this morning. Santa Fe's competing geologic position was that they were free to orient the debris flows of the carbonate in the Wolfcamp in a fashion that was oblique to the reef front. Hanley contended that there was a structural point of importance to the location of the well.

It is undisputed that the Hanley location is superior structurally at both the Wolfcamp and in the Bone Springs. Hanley contends that the structural position is important because it will avoid water in the Bone Springs, and will avoid water on the south side of these debris flows in the Wolfcamp. Mr. Toma for Santa Fe contests that point. We went through a whole days hearing before Examiner Morrow, and at the end he says, "Well, gentlemen, I think I've got it figured out. One of you thinks there's a water problem, and the other thinks there's not, and you guys can talk if you want, but

I understand the problem." Recognizing those kinds of comments from us, the lawyer says, "How are we going to present this to you?" So that's what we've chosen to do is try to summarize the record for you. Give it to you and let you look at it and then focus in this morning on the major geologic points.

The structure, we contend, is important. Santa Fe says it's not. You need to make some judgment about that question. Santa Fe, when they go into the carbonate there at this oblique angle, caused the greatest thickness to be placed on the south 40 and minimized the thickness of the carbonate on the Hanley acreage. We think that's inappropriate and that's a difference.

The other question is engineering, and we have an engineering witness to present to you. He's done a detailed study of the reservoir engineering based upon the decline curve analysis. It is his opinion that the superior location from a Wolfcamp reserve recovery point of view is the Hanley acreage. He contends there is 250 to between 260,000 barrels of oil to be recovered at the Hanley location, while he says at the most the Santa Fe location in the south will log at 130,000 barrels of oil. So it's a significant difference to him because for his company he has concluded that the position of this well may cost Hanley a million dollars, and the federal government 250,000 worth of work. So it's of consequence where we put the well.

The additional testimony from the reservoir engineer is that you have an alternative choice for solution of this case that was not presented to the examiner. Following the examiner hearing we filed a supplemental application setting forth an alternative remedy, and that is to approve the nonstandard proration unit for the Hanley 40-acre tract and let us drill our well. That's permitted under the South Corbin Wolfcamp pool rules. It is rule two and rule three of those rules, and we'll agree with those rules. There is certainly nothing in those rules we contend that preclude us from doing that. We think that is a viable, realistic resolution of this dispute.

If you choose not to try and decide which geology is better, you may have the comfort of choosing both, and let both wells be drilled. We believe the engineering testimony will support that as an alternative remedy.

A few comments on how the book was organized: If there're faults and defects with that organization, they're mine and not my client's. Following the prehearing conference on Friday I took it upon myself to try to implement what I thought we were agreeing to.

The first part of it is the land chronology in which we set forth the sequence of events before the commission, the division, and the land testimony. And then I blocked out the presentation where there's a geologic discussion and engineering discussion. It's from page, I think, 10 to 30 of the memo, and then following that are a number of inserts. The first insert is the examiner order. I would invite your attention to that examiner order because Examiner Morrow summarized both parties' positions. He detailed it in his findings and he says, "Here's the positions." He then went on and reached a conclusion that we disagreed with.

It is our contention that he failed to resolve the case on its merits. The findings in which he resolved the matter of who wins is that he said that it was of importance to him to maintain an 80-acre diagonal pattern to how the wells in the pool were being developed. We're going to talk about that later. That's one of the issues. We contend that he did not decide the case on its merits and chose to decide it on an issue that is not required, not mandated by the rules, and certainly not appropriate in this case.

Following that are the actual orders establishing the rules for the South Corbin Wolfcamp. You can see the sequence of the rules. The first order was entered by an Examiner Catanach in which he denied Southland Royalty's application for 80-acre spacing; said it didn't work. He said there were competing wells on 40-acre offsets. He said they should be in communication with each other and aren't, so he denied it. It was appealed, went to the commission, and the commissioner statements at that time approved it and established 80-acre spacing for the Corbin Wolfcamp. Subsequently, about 18 months later, it was reaffirmed and made permanent on 80-acre spacing. We put those in there for you to look at.

Following that are the Hanley exhibits, the major geologic displays, the engineering summaries, and then I have put in the principal exhibits from Santa Fe on their geologic presentation. And finally, we've taken certain of the letters exchanged between the parties so you could see what their positions were with regard to the correspondence.

I don't propose to present all of my witnesses today to you that were presented at the examiner level, but they are here today to respond to questions should you have any. I'd like to introduce them to you so that you know who they are: Mr. Dave Robbins; if you'll stand up. Mr. Robbins is a geologist. He's president of Hanley Petroleum Inc., and he will be our principal geologic witness today.

Bill Huck is a reservoir petroleum engineer. He testified at the examiner hearing. He will testify today about reservoir petroleum engineering. Brett Bracken. Mr. Bracken was the petroleum geologist that testified before the examiner. Mr. Bracken's testimony is in the transcripts, and he prepared most of the geologic displays you'll see today. Jim Rodgers is the land man for Hanley. He did not testify at the prior hearing, but he's certainly available to answer questions if the commission desires to give him questions.

That concludes my presentation. When it's appropriate, I will call Mr. Robbins as our first technical witness, and we will discuss the geology.

COMMISSIONER LAMAY: Thank you, Mr. Kellahin.

MR. BRUCE: Mr. Chairman, Mr. Kellahin is right about the commission having to make some decision. The parties have been negotiating now on and off for five months, maybe more, and they just can't come to terms. There's two primary issues, well location and cooperating. As far as well location, Santa Fe will present geological evidence to show that its well location is superior geologically to Hanley's location. Santa Fe's geological interpretation is, we believe, the only interpretation that honors well data including data from the recently completed Kachina 5-1 well.

We will show that the data from that well corresponds to our prior geological interpretation, but does not agree with Hanley's interpretation. We believe that the Hanley location is moving toward the Center Wolfcamp carbonate, whereas Santa Fe's location will have been the same carbonate thickness as the Kachina 8 #1 well which offsets this unit to the east, and therefore, is the better geological prospect. Mr. Thoma, our geologist, will also show that there will be no water problem at Santa Fe's location, although it is about 10 or 15 feet lower -- structurally lower -- than the Hanley location.

Perhaps more importantly, Santa Fe will show that its location is better from a reservoir engineering standpoint. This pool is spaced on 80 acres, and there's a reason for that. Southland Royalty Company came in several years ago and obtained 80-acre spacing for this pool and showed that these wells were capable of draining approximately 80 acres.

We believe that if you have a direct offset to the Santa Fe/Heyco Kachina 8 #1 well, which is in the east half of the northwest corner, there would be a severe pressure drawdown which will affect production from both wells and will leave reserves in the southern portion of the proposed well unit which would not be recovered without draining -- without drilling -- at Santa Fe's location.

As to who operates the well, we will get into that in more detail. As Mr. Kellahin has said, this well is a one-shot deal for Hanley. Santa Fe owns interest and approximately 3,000 acres in this area and has drilled two wells; desires to drill this one, has participated with Meridian in about ten other wells in this pool. He believes it is a qualified operator and should be given operator share of this well location. Santa Fe Oil will also show that it has a reasonable well cost estimate, and that it compares with other recently completed wells in this pool.

Mr. Kellahin mentioned something about the commission selecting which AFE should be imposed on the parties. I don't think the commission has to do that. The commission selects an operator, and it uses its own AFE, and if that well cost -- the final well cost -- the actual well cost -- is not reasonable, then a party who disagrees with that can come in after the fact under the terms of the commission order and contest that well cost.

But the commission isn't here today to say the Hanley well cost estimate is reasonable, or the Santa Fe well cost estimate is reasonable. We believe we will show that our well cost estimate is reasonable. I don't think that really is part of the final order which will be decided by the commission.

Finally, Mr. Chairman, we did present -- we do not plan on using any land testimony at this time. I believe that's been covered by the stipulations and parties. I will present three witnesses; geological, reservoir engineering, and drilling engineering witnesses. We have provided testimony outlines, which they will pretty much follow today in their presentation, and we have tried to implicate by reference to prior transcripts where they previously testified about certain issues. They will also be presenting some new testimony based in part on matters they did not anticipate at the first hearing, and also matters that concern the completed wells in the pool. Thank you.

COMMISSIONER LAMAY: Mr. Carr.

MR. CARR: May it please the commission, I represent Harvey E. Yates Company. Harvey E. Yates Company owns 50 percent of the working interest under the southwest quarter of the northwest quarter of section 8. This is one of the two 40-acre tracts that is the subject of the pooling application both filed by Santa Fe and filed by Hanley. And no matter which of those applications you should grant, we would eventually have 25 percent of the working interest in the well.

Unlike the other parties before you,

we're not seeking to operate this well. We could have gone with either, and our concern, I think, is like the concern of the others, that the well be drilled in the best location and operated in an efficient manner, so that all of us derive the maximum benefit from the property.

I will call one witness. This witness has made an independent study of the area, and based upon on this study, we are before you in support of the application of Santa Fe. We will present testimony which will show that we firmly believe that it is not only the best location from a technical point of view, that is the controlling factor in our decision to go with Santa Fe -- not just their track record, which is quite substantial in the area, but we will also show you that we believe that the examiner properly and correctly resolved this matter, not only coming down on the side where the technical case was the strongest, but entering an order that will assure effective and efficient development of the whole rest.

COMMISSIONER LAMAY: Am I correct to assume that you all agreed that the record of the examiner hearing will be admitted into the record in this case?

MR. CARR: Yes, sir.

MR. BRUCE: Yes, sir.

MR. KELLAHIN: Yes, sir.

COMMISSIONER LAMAY: Without objection then, the record of the examiner hearing will be part of this case, and, Mr. Kellahin, you may proceed.

MR. KEHALLIN: Thank you, sir. Before I start, I'd like to call Mr. Dave Robbins. While we're setting up the displays, it has certain of these exhibits in a larger format. We've also distributed to the commission, and to the counsel of record, smaller versions of the same displays, and include a complete copy of the geologic presentation this morning as well as the engineering package of information. Are you ready?

MR. ROBBINS: Yes, sir.

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q. For the record, will you please state your name and occupation?

A. My name is L.D. Robbins. I'm from Midland, Texas, and I'm the president of Hanley Petroleum.

Q. Mr. Robbins, we don't have the benefit of microphones in the hearing room, and so, if you can keep your voice up, perhaps we'll all have a better chance to hear your comments this morning. The background of your experience, Mr. Robbins, would you summarize it for us starting with your educational background and then continuing on with your employment experience?

A. Yes, sir. I graduated from the State University in Baton Rouge, Louisiana, in 1955. I was employed by the Ohio Oil Company now Marathon. I worked for Marathon in various fields, staff, and management positions until 1982 when I retired to take my present position as President of Hanley Petroleum. I have worked detailed geology and managed the exploration of detailed geology in Southeastern New Mexico since 1968.

I'm sure you're aware of Marathon's operation in this area, inland basin, in the Eunice area early on, and while with Marathon, I might add, I've also served on the research advisory committee for the research center at Lincoln, Colorado, for approximately ten years, and in that capacity we developed a set of deposition of models worldwide to be used in exploration and development of oil fields and particularly focusing on carbonate rocks.

Q. Describe for us, what your relationship is with Mr. Brett Bracken, the geologic witness that testified before the examiner.

A. Well, I directly supervised Mr. Bracken and assisted him.

Q. Have you come to certain geologic conclusions, Mr. Robbins, with regard to this prospect that is being proposed by both Hanley and Santa Fe?

A. Yes, I have.

MR. KELLAHIN: At this time, Mr. Chairman, we tender Mr. Robbins as an expert in petroleum and geology.

COMMISSIONER LAMAY: His qualifications are accepted.

Q. (By Mr. Kellahin) Let me have you go back and start at the beginning of how you and Mr. Bracken have analyzed this geologic prospect and commenced with whether or not you have made a literature search -- a reference material search -- to determine the regional geology available to you from which to reach conclusions.

A. Well, going back to the -- years ago into the early '70s -- it became recognized that in the New Mexico part of the Delaware Basin as well as the Texas part of the Midland Basin, which is all part of the greater Permian Basin, that people were encountering, quite unexpectedly, oil pays in the Bone Springs and Wolfcamp intervals, which were essentially dark, black basinal rock, while drilling through them into deeper zones, and it was somewhat difficult to explain how reservoir quality rocks could be deposited in these deep waters out in front of the edge of the reefs which controlled or inringed the edge of the basin. I have an exhibit here which is a contrary map contoured on the Yates, which is a shallow permian marker that has been prepared by the Geomat Company, and it shows a steep dip here turning east/west across the north rim of the Delaware Basin in New Mexico.

Q. How is that identified on the display in terms of a color?

A. It's highlighted in blue, and what this represents is the southern edge of the reef front and shelf edges during the Permo-Pennsylvania time. This trends east/west from here to here, as you can see permulations and various things, but the general trend is from the west toward the east. It brings on down. It goes south down through Carlsbad in the vicinity of Carlsbad, and is exposed in the Capitan Reef. It also swings down and goes down the west side of the Central Basin platform in the Eunice area, but on this northern part here of where we're dealing today, you see a number of hills here that are outlined in green, and these are oil fields that are out in the basin area of the shelf edges and reef fronts. As you can see from the shape that they have, based on the development drilling thus far, they are sort of oriented parallel to the shelf edge and reef front.

Q. Is there general geologic agreement among geologists in current literature, and within the industry, about the location and orientation of this reef face, or the reef front?

A. Oh, yes. And when we started exploring for this in here, in the mid-eighties before we bought our lease here, this was our exploration technique that we used based on studies by scientists of core data and outcrop data that these are, in fact, detrites that are the source on the reefs, and reef front, and shelves, and they're deposited into the basin by density flows -- turbidity flows of this nature. It's the only mechanism to get a rock of this type into this deep water.

Q. To continue with your analysis then of how you ultimately determined that the optimum location for the well to be drilled in this particular case, what is the next thing that you as a geologist examine? Having established the existence of this reef front, recognizing the debris flows down the face of this reef, what then do you do?

A. Well, what you have to do is one, you have to develop a depositional model to explain how the rock got there and what its orientation might be so you might have a better feel or a better look and not only in exploring for it, but once you find it, how to develop it.

Q. Do you have a display that represents the debris flow modeling?

A. Yes, we do, but I might point out to the commissioner before we proceed, here is the South Corbin Wolfcamp field, and here is Hanley's proposed location.

Q. It's identified with the red arrow, is it?

A. You'll notice these fields more or less trend this way. They're not on an echelon in any direction to this --

Q. Reef face?

A. Reef face.

Q. All right, sir.

A. You've been supplied a copy of a paper that was derived by -- written by Carl McDaniel, Lori Pray, Dr. Harry Cook and others where they studied what they term "Allochthonous carbonate debris flows in the Devonian and Alberta and Western Canada." And on outcrop studies they found that here were rocks that you would normally find in shelves, or shallow water deposits, out in deep water surrounded by black, basinal rock. And so how you would get these types of rocks deposited into this water, hundreds if not thousands of feet below any effective wave base that might sort them or move them around, is quite a puzzle, and they developed based on this outcrop study in Canada some models. And what this does is schematically shows a shelf edge or reef front on the right, and deposits emanating from it at more or less right angles down the slope, and the reason they come at right angles is that they're density flows, and this is the way -- this is the path of least resistance for gravity flow is a direct flow. It's not a block to it or anything. It's going to go straight down the hill.

Q. Describe for us how this will relate to the Wolfcamp -- well, describe first of all, as we move down the face of the reef face on this shelf.

A. Un-huh.

Q. And we go into different geologic formations and types and we get to the Bone Springs?

A. Uh-huh.

Q. What do you expect to find as a geologist when you get to the Bone Springs?

A. Well, in the Bone Springs and in the Wolfcamp, you can draw an analogy and they're both basinal rock units and they're black rocks. If you've ever seen them on the outcrop in the Capitan Mountains, and so knowing that they're basinal rocks, when we find that they are of reservoir quality, however atypical they might be, you have to decide on how they got there to be able to explore better for them.

Now, we'll proceed here to the next illustration. This is a schematic from the same paper that I mentioned, and it shows a reef wall, or a shelf edge, and maybe a reef here with this rock and this debris flow going down the hill and being deposited in the Basin. This is a schematic diagram of one of these particular intervals that they studied in some detail.

Q. You're going to have to describe in words when you point to the display. You're now looking at the display on the left side of Exhibit Number 3?

A. Right. And what you have here is an interval that has blocks, some of which are over 30 meters in size, deposited in a matrix of basinal rocks that are swept up and rolled along as this stuff comes down the hill and is deposited, and we have used this in our exploration for the -- both the Bone Springs and the Wolfcamp as a novel to try to explore for this, and also to develop it.

Q. Can you conclude as a geologist that the structural relationship that you mapped for the Bone Springs will be a similar structural relationship that you map for the Wolfcamp, or will they be different?

A. Well, your structural orientation here, as you see from the Yates, and this persists down dip in this section, is more or less a south -- southerly dip of the steeply dipping walls to the north, and so this is the regional structure that is part of New Mexico, and I might add, you also have an abstract from another paper by Dr. Harry Cook, who is also a party to this early paper on northern

Canada titled <u>Sedimentology of some Allochthonous Deep-Water Carbonate Reservoirs, Lower Permian, West Texas: Carbonate Debris Sheets, Aprons, or Submarine Fans?</u> And in this abstract he describes much of what I have alluded to already in that the "shoal-water bank and reef carbonates flow downslope into the Midland and Delaware Basin, forming a wide variety of redeposited lithofacies." And so this is a model that we've used in exploring and developing for this type of field.

Q. Before we leave this display, give us a brief summary, geologically, of where the oil is within the formation. Where are you going to find it?

A. Well, the oil -- you can have indigenous oil in the basinal rocks, but it would be trapped and there's no mechanism for flowing this oil unless you had a crack or something like that. So the oil will be developed in the cleaner shelf edge rocks, so they're redeposited in the basin, and the nature of this porosity or affective reservoir, would be widely differing. It might be-- in some cases if you had intergranule porosity or some debris, or you might have a vuggy porosity or interslab porosity or holes that are preserved in those piles of debris, so it is a very complex system.

It is a system rather than expecting to have a uniform-type of production from wells, you would expect it to be very erratic indeed, and I think that everyone that has played the Wolfcamp in the Delaware Basin of New Mexico knows one thing about it, is where you find it, and you find it essentially by drilling, and once you find it, it may vary widely from well to well. So to apply any sort of average 100,000 barrels per well, or something like this, is something that you would not expect in this type of a depositional system.

Q. When you talk about exploration development in the Wolfcamp and see the widely varying reservoir qualities from well to well, do you see the variations in the wells located as close as 40 acres apart?

A. Well, it's profound, and our next witness will allude to this in some detail.

Q. All right, sir. Let's continue.

A. This illustration of the vicinity of the South Corbin field shows that it's basically a production map. And what we've done is we've colored the various wells that are produced from the various horizons, and starting at the top you'll see in this pink color, production from the Queen/Grayburg which produces here, here, and here on 40-acre spacing oil, which is the same as statewide, 40 acres.

The next one down is production from the Delaware. The next is the Bone Springs and you can see that Bone Springs production to the west of the 80-acre proration unit that's in contest and Bone Springs production to the east, and these are very similar carbonate debris flows to those that are present in the Wolfcamp and are produced in the South Corbin field, which is highlighted here in yellow. Also I would point out that this is the proration unit.

This is the Hanley low recommended location. This is the Santa Fe location here. This is the location 510 feet from Hanley's east/west line of the Kachina 8-1 Wolfcamp oil producer. This is the location of the Kachina 5-1 Santa Fe lower Wolfcamp oil producer.

Q. When you look to the west of the 80-acre tract in question, there are two other circles. What do those represent, Mr. Robbins?

A. These represent locations that have not been drilled yet but permits have been applied for.

This represents, I think, the 29, and this is the number 30, and they are both operated in the Southland Royalty. This one, we understand, the permit has been received. And this one, the permit has been applied for, and these locations are also located 510 feet west of the Hanley lease line here, and also 510 feet from the lease line of the tract owned by Santa Fe and Waco, so -- I'll get to this later, but it looks like there's quite a lot of activity right around here. And for some reason, everybody that's drilling around here wants to get as close to this Hanley lease as the law allows.

Q. Well, there's a geologic explanation, is there not, for that activity?

A. Yes, sir.

Q. And what is that?

A. We'll proceed. Now this is a structure map contoured on the second Bone Springs carbonated base, which is above the Wolfcamp, and what this shows is a structural stripe that trends more or less east/west simulation is this, but if you'll take a structure line and go across the map, you'll see that it trends from the west to the east. The dip is to the south. Again, here's the Hanley recommended location. This is the 5-1 well recently completed by Santa Fe, and you can see it substantially verifies the east/west stripe that Hanley had previously mapped, so these then have been incorporated into our presentation, and are an integral part of it.

Q. Before we get --

A. They also show that this is the Kachina 8 # 1 that is at a subsea depth of 4,580. The Hanley location, this is a 50-foot contour interval approximately, according to this interpretation, 25 feet high to the producing 8-1 to the east. It is 100 feet high to Santa Fe's proposed location here, and we think that this is extremely important in developing the oil production in the Bone Springs.

Q. Why?

A. Because it's higher and it will be out of the water.

Q. Is there a water risk to down structure Bone Springs wells in this area?

A. Yes, sir. You'll see over here to the west that these wells stop more or less right in here following this structural contour.

Q. Which is the contour line you're pointing to that says "right here"?

A. It's 4,600 feet subsea more or less.

Q. South of 4,600 feet subsea is an absence of Bone Springs production because it's now in the water leak?

A. That's correct. And this was also testified to by Santa Fe previously.

Q. Is there any doubt in your mind as a geologist that as to the Bone Springs, the Hanley location is a superior location?

A. No, sir. Our map, together with Santa Fe's map, and we'll show you a comparison of that here shortly that will verify this.

Q. Okay. When we look at the relationship of the Kachina 8-1 well to the Hanley location, you said it was about 25 feet high to the Kachina 8-1?

A. Yes, sir. We will illustrate that and will summarize this structural relationship for you.

Q. And the relationship then to the Kachina 5-1 well in the Bone Springs for your location to it?

A. We're about 60-70 feet below it down structure.

Q. All right, sir. Let's continue.

A. This structure map, also contoured on 50-foot contour intervals, is on top of the Lower

Wolfcamp, and this horizon is immediately above the interval that is around 700 feet thick that you begin to encounter reservoir quality rocks in the Lower Wolfcamp in the South Corbin field.

Q. Why did you and Mr. Bracken choose to map your structure on top of the Lower Wolfcamp structure as opposed to some other point?

A. Well, we have mapped this. We have mapped it on the base and on the top, and we have presented a map at the last hearing contoured on the base, and this map is contoured on the top, and the reason we're using this map now on the top essentially for two reasons: one, it shows the east/west strip very prominently; it also shows the South Dip. The other thing that we see here that's of importance is, as you contour this, and incidentally, this is the recently drilled 5-1 well of Santa Fe, and you can see the datum here. And the datum here is 6763, and datum on the 8-1 is 6786, so this well is incorporated in and fits quite nicely with this interpretation.

Now, as you come with this south, east/west stripe and south dip off the reef walls and shelf edges to the north, you notice that the contours pull rather sharply to the south, come back in and are re-entered here, come back out again and go around, and this is called in the oil business, a "nose" or "structural nose" or promontory, and what this is is a structural feature that doesn't have structural closure, but yet it is a structural feature, and you can see that this is quite a pronounced feature, and you can also see that there's concentration of yellow dots on this platform-like or promontory area, and we believe that this has great significance, as we will show you with the next illustration.

We believe this to be a structural expression of the deposition of the reservoir quality rocks in the Lower Wolfcamp, and if this is, in effect, a grade structure or a compaction structure over this deposit, and if this is the case, then the isopach map of these rocks should match closely and should trend north/south.

Q. All right. Let's go to the next display.

A. Surprise. This is the isopach map of the Queen carbonate, which is limestone, in the Lower Wolfcamp in the vicinity of the South Corbin field. What this map represents is taking all the well logs in this area and going through this Lower Wolfcamp interval that I mentioned is about 700 feet thick, and I'll show you and define it closely in a cross section shortly, and adding up and counting the gamma ray deflection that represents clean rocks, are the blue, if you will, as you see in the illustration on the easel, and we add all this up and we get a number, and then we contour, so it is the gross reservoir; potential reservoir quality rock or clean carbonate in the Lower Wolfcamp, and as you'll notice the trend of this is essentially north/south, and it narrows the gray structure that I just showed you on the top of the Lower Wolfcamp.

You'll notice access of this deposit is essentially north/south. You have lobes or fingers or distributaries, or whatever they are, turned off of this in certain areas, but as you go from the thick to the thin, to the thick to the thin, this is the axis. The axis is not this way, it is not this way, it is this way. This gets back with the models that we've shown you on outcrop studies, core studies, in the Midland Basin that these optum carbonate debris deposited in the density flows in deep water are oriented essentially normal to their source. They come down the slope, and another thing that's interesting here is where all these wells and proposed wells are located.

They are located along the axis of this thick area where you encounter maximum clean carbonate in the Lower Wolfcamp.

Well, you say, "That's nice, but what does that mean?" Well, when you're dealing with things that are erratic like this and you have one chance, that's a tough deal. But where you have a number of them, which you do in the Lower Wolfcamp, because I mentioned before this thing was 700 feet thick, and you have three, four, five or six, or who knows how many various pieces or flows, or sheets that you can have reservoir quality in, then your best chance of getting one or more of these is where the flow is the thickest.

Q. Does this display integrate the log information available to Hanley from Santa Fe this week for the Kachina 5-1 well?

A. Yes, sir. Here it is right here; 323 feet. It's a thick well along this axis on this lobe here. Thick well down here, and it's 340. It's thicker than this and it is also thicker than the 8-1.

Q. Does that new geologic --

A. Also it thins from 322 down to 119 here, confirming that the axis of this is to the well.

Q. With the new geologic information on the 5-1 well, does that confirm or reject your prior geologic presentation before the examiner?

A. It's essentially the same. The axis is essentially the same. I think it's exactly the same thing.

Q. What does that mean to you now?

A. Well what that means to me, and this gets back to why we did what we did and moved our location here --

Q. From the south --

A. -- from the south to the north after we got the datum from these wells, was that this was the best location to recover the most oil from the Lower Wolfcamp and the Bone Springs.

Q. Summarize for us why it is the better location, geologically.

A. As we'll show you shortly, when you study these wells in the South Corbin field, rather than being an average of 100,000 barrels if you use 80 acres, and 50,000 if you use 40, there is a wide disbursement and distribution. In fact, we'll show you a statistical analysis of it, and there's one thing they're not, and that is 100,000 barrels on 80 acres.

So the other thing we'll show you is that in this particular field there are sweet spots, or pods, where you get the best production, and we have prepared an illustration that will show you that these are very localized, and that they produce water on their south, or their down-dip side, and that doesn't matter whether they're down here or up here, or up here, and they're trapped on the north side presumably by the lack of porosity or the end of the reservoir rock, so for that reason, and this well here being a highly productive well.

Q. You mean the 8-1?

A. The 8-1. The datum shows that the place to recover the most oil is in the closest proximity to that well on that pod, and then if you go to the south, assuming the model is after the other pods, you will encounter water, and this location is higher. Let's proceed with that. Now by way of summary, I know you can't read this. I'll roll through it again.

At the Hanley proposed location, on the second Bone Springs carbonate, we're 30 feet high to 8-11 Kachina. We're 100 feet high to their proposed location on the south 40. On the top of the Lower

Wolfcamp we are 17 feet high to the 8-11, which is the productive well to the east, and also on this productive well to the east, in their completion report, they show two zones above the zones that they are completed in, and they list on this file, documents oil and water, so we think that your best chance of getting these zones higher, and producing water free, and recovering the most oil, is on the Hanley location.

And then when you get down on the south location, what Santa Fe proposes the Hanley location is 21 feet high to it, and on the base of the lower Wolfcamp, the Hanley location is 20 feet -- 21 feet high to the 8-1, and 26 feet high to the Santa Fe location and these. We'll proceed --

Q. Describe this next display to us, Mr. Robbins.

A. This is a montage that is essentially a structural cross section on sea level datum base that runs east/west through the proposed Hanley location straight in here in brown. It flows from a well over here -- essentially it's a dry hole -- up over to the Hanley location and back down to the west to another well that does not produce in the Lower Wolfcamp, and so this sees that compact feature on this thick area of the deposition of clean carbonate of the Lower Wolfcamp.

Now, displayed on this -- shaded on this -- are gamma rays that we mapped in our isopach of the Lower Wolfcamp inflow, and when you study these carbonates, as you expect from our additional model, you fast become confused, because where you see one here, you go over here a short distance and it's gone. You see one here, and you come over here and it looks entirely different.

Q. So this is telling you that these zones do not correlate as you would expect, but there is probably discontinous -- they may go a location or two locations or so, but they do not go distances of miles. They did not possibly deposit one mass of rocks that would go four miles down a line; it just breaks up and the one channel breaks through the one that was developed before, and it's a huge complex of hodge-podge.

Q. How is this information important to you as a geologist in determining the location of the well either on the Santa Fe tract or the Hanley tract?

A. In two ways: one, we want to be put location west of the 8-1 because it's along the axis of the thick in the Lower Wolfcamp to the total clean carbonate, and we want to be at our location compared to theirs in the south, but our location is structurally higher.

Q. Okay. Let's turn now to the next display and have you identify that.

A. Now this location, this montage, again, is a structural cross section, and it is a north/south structural cross section.

Q. Wait just a minute. Let's make sure we've got the display first. Describe for us the point of importance on this exhibit.

A. This is the line of section from the north which is the Kachina #1 directly southeast of the Hanley tract, and down structure. Proceeding south down through -- down along the axis, the thick depth in the Lower Wolfcamp, and as you can see in these intervals above, here's the top of the Lower Wolfcamp interval that you see these steep dips going south, and in this interval this is the base of the Lower Wolfcamp. You have these debris flows that have been defined and they're shaded here in blue and pink.

Again, if you go down this section from the Santa Fe well and see that it produces an interval very close to the base of the Lower Wolfcamp -- and this is shown in black -- you go down to the next well and the bridge plug in the bottom of well, the latter part, does not produce the productions up in this area near the top of this 700 foot interval.

You go down to the next well; there's no production in this upper part. Production is, again, at the bottom. You go to the next well; the bottom production is gone and it's producing in the upper part. Well, this is telling you, as you can see from this, where these wells are located, and they're evaluated while they're drilled, and they're evaluated by the quality of the rock, and they're evaluated as they're tested before they're completed. It shows you variability in the reservoir quality rocks in the Lower Wolfcamp.

Q. We have proposed to the commission an alternative remedy of a nonstandard 40-acre spacing unit consisting of the Hanley tract rather than grant either one of the pooling cases?

A. Yes, sir.

Q. As a geologist, what is the geologic support for approval of a nonstandard 40-acre tract for the Hanley well in the Wolfcamp?

A. Well, when we have a well that is producing -- has been producing for some months now directly east of our tract 510 feet, we're fixing to have another one right here.

Q. West of the 40-acre tract?

A. West of the tract, and if we don't drill here to recover these reserves, it's our reservoir engineer's opinion that these reserves will be recovered by offsetting operators, and we will be draining.

Q. Geologically, can the Hanley tract be protected from the Kachina 8 well or the Meridian wells to the west if the well is, in fact, drilled to the south 40 acres?

A. No, sir. Because the south location is low.

Q. What about the continuity or discontinuity of the reservoir from that 40-acre offset location to the 80-acre offset location to the south?

A. Mr. Huck will explain this in detail to you, but what we found on this pod, or these sweet spots, which is where the Wolfcamp is highly productive, that on the south part of these they tend to produce high water cuts, and therefore, low oil recovery, and as such, and the other point is that if we cannot find one place in the field to date for a southwest diagonal offset to one of these high potential wells has produced a significant amount of oil as compared to the high potential wells. The production drops drastically as you go from south of these high production wells.

Q. Is there a geologic explanation for the fact that you can't achieve production from the wells?

A. As we showed you on the plotted curves, as the water balances up, that's what does it.

Q. The geologic explanation for what the reservoir engineer sees, though, is the fact that both vertically and horizontally --

A. Yes.

Q. -- these zones in the Wolfcamp don't go very far?

A. No, they do not, and this picture that shows this, which is derived by the ultimate recovery of each well as estimated by decline curve analysis and not volumetrically. This would be a nightmare to try to figure volumetric reserves; I mean, it would be meaningless because you don't know the area of it.

Q. As an exploration tool you've got a structural map, and you've got a net clean carbonate isopach, if you will. How does that aid you then in finding the optimum location?

A. Well, we propose to -- we think our location is as good as the Kachina 8 because it is along the axis of the maximum deposition of clean carbonate, and therefore we should have the potential for finding production in the most number of these various carbonate intervals that produce. We may lose one; maybe we'll pick up another one.

Q. Turn to the next display. I've asked you as part of your presentation, Mr. Robbins, to take Santa Fe's geologist, Mr. Thoma's presentation at the examiner level, and make displays of that information so that I might ask you your geologic opinion about Mr. Thoma's interpretation. Have you done that, sir?

A. Yes, we have.

Q. And have you completed that review of information?

A. Yes, sir, we have. And basically this montage, which is of the Bone Springs, which was above the Lower Wolfcamp, which is also carbonate debris, is in agreement with our interpretation, our deficit model, and the way we map the structural stripe is more or less east/west, and the dip is to the south. We incorporated results from the recent well map. The well came in at 4,486; quite a bit higher than he had it mapped, but nonetheless, it makes a strip even more east/west

COMMISSIONER LAMAY: I don't think we have this in our folder. Do we have that in the folder?

MR. KELLAHIN: No. It's part of previous testimony.

COMMISSIONER LAMAY: I'm sorry. Let's stop a moment.

MR. ROBBINS: It was part of previous testimony at the previous hearing.

COMMISSIONER LAMAY: We'll stop for a moment.

MR. KELLAHIN: May we take just a moment and see if we can get one of those?

COMMISSIONER LAMAY: Okay.

COMMISSIONER WEISS: It should be in our book.

MR. KELLAHIN: If I might ask you to share, here's one of the large displays from the examiner hearing of this exhibit. It will also be in the briefing package that we presented.

MR. ROBBINS: It's in our packet there.

MR. KELLAHIN: Here's the full copy.

MR. ROBBINS: The other thing --

MR. KELLAHIN: Wait just a minute, Mr. Robbins. All right.

Q. (By Mr. Kellahin) Let's confine ourselves then to the Bone Springs. Mr. Thoma's interpretation, first of all, for structure on top of what he calls the Sniper dolomite, the isopach for this Sniper dolomite, and your comments as a geologist with regards to his interpretation with regard to this Bone Springs dip.

A. Yes, sir. This is the isopach of the dolomite in the Bone Springs, and as you'll notice, these thick intervals that he's contoured trend north/south, and this is the wave of the datum in case it should be mapped, and this is the wave, this is the way we've mapped it clear across this front of New Mexico. So we have a spawn about this. It shows this essentially trending north/south as they should from their providence to the north.

The other thing that he has on this map that is of importance, is that part of this structure map is shaded green and part of it is shaded blue, and the difference is that the green is oil and the blue is his interpretation of where you encounter water. And you see this trends right through the south edge of the Hanley tract, so the Hanley tract by using Mr. Thoma's map, which is identical to ours, shows the up-dip position of the Hanley tract.

Q. So at the examiner hearing then it was agreed upon by the geologist that the Hanley location, at least in the Bone Springs, is going to have an oil potential that the Santa Fe well location will not have because it will be too low and therefore, wet?

A. Right. Yes.

Q. All right. Let's turn to the next page.

MR. KELLAHIN: Mr. Chairman, we have a copy of Mr. Thoma's montage with regards to his interpretation of the Wolfcamp from the examiner hearing. I have reproduced in the briefing book smaller copies of various sections of his display, and I hand you an up close example of the full-size map.

Q. (By Mr. Kellahin) All right. First of all, Mr. Thoma has elected to separate out the Wolfcamp into various zones, did he not?

A. He did as shown here on this cross section, which is not a structural cross section.

This cross section, I believe, based on what he says here, is compared based on a datum of the base of the Lower Wolfcamp shale, and superimposed on these well logs are some colors that go east/west, but go horizontally across this and in between other intervals that have been shaded blue. Now these blue spots correspond to clean gamma ray as much as Hanley counts them. You'll notice when you track one of these layers that this is blue, this is blue, that's blue, this has holes in it here, productive. This has blue, no production. Similarly here.

You'll notice here there's a lot of blue. As you go over here the blue's almost gone, and yet the curve persists, and so what this is is the manifestation of these zones or layers, or what I call "slices," that have been run thorugh this Lower Wolfcamp and then maps have been manufactured on these various slices.

Q. Let's talk a moment about the differences in methodology supplied by Mr. Thoma and the ones supplied by you and Mr. Bracken.

A. Well, basically our depositional model -- of which fits the structure and thickness of clean carbonate in the Lower Wolfcamp -- and ours is based on more surface geological studies and subsurface geologic studies, indicate these are discontinuous deposits, and that they may go a location or two or more; certainly they do not go miles, and to correlate these no matter what, and map them, you would have to look at that map to see what it shows you, and we'll do that in a minute.

Q. I've asked you to take Mr. Thoma's interpretation, and you as a geologist then, try to find oil with his interpretation and relate it to the well bore information that you find in this area. Have you done that?

A. Yes, we have.

Q. Let's turn the display and we'll show an example.

A. The next map, incidentally, is Mr. Thoma's top of the Lower Wolfcamp "AF" carbonate which shows a stripe in this direction and dip to the south, and he's showing our structure that we talked about, which is a manifestation of this thick channel or deposit of clean carbonate, and this is the 8-5-1 which was just drilled, the datum from well log supplied by Santa Fe, 7199. The map shows 7130, so this 7200-foot contour shown to bulge down here, goes on up this way like it did on the Hanley map. That's the only change that's designated on his map.

Q. He's mapped the top of the structure in what he's identified as this "AF" carbonate. You've mapped the top of the Wolfcamp structure at the top of the Wolfcamp?

A. Yes, sir.

Q. Is there a material difference between you and Mr. Thoma on the structure of the Wolfcamp regardless of where you choose to map it?

A. Well, we think that we're showing the maximum drape or the top of this interval that produces, which is traditionally where you map structure for reservoirs.

Q. So there is a difference?

A. Yes. But, again, he's still showing this low base feature associated with thick deposits. One other thing I might say is, when you're dealing in exploration, quite often you can tell what people think by what they do. In the old days we used to make block lease maps, and we'd draw circles around people's blocks, and you can put a pencil in the circle of that block and that was their hotspot, that's where they liked because that's were they bought their acreage because this was their recommended areas as the job was called.

Well, when you do that in this particular area and you draw a line around Santa Fe's leasehold that we were told is in the order of 3,000 acres, and you put a dot in the center of it, lo and behold, it's right where they drilled their wildcat well, this Kachina 8 #1, 510 feet from Hanley's location. Also, you'll see that these wells have been drilled -- are going to be drilled there too.

Q. Meridian's location is to the west?

A. Yes, right here. And so, regardless of what is being said, where the money is being spent, and where the wells are being drilled are here, and so this reaffirms our interpretation and our picture, because Santa Fe, we're told, has an interest in these wells something on the order of perhaps 19 percent. I'm not sure, but they have an interest. They didn't have a majority interest; therefore they didn't operate the well, but they do have an interest.

Q. Let's go on to the comments you have with regard to whether or not you can use Mr. Thoma's carbonate isopachs and find oil. What's the first isopach that you show?

A. Well, this is of an interval that's called the "AE" carbonate. From looking at the cross section, it's in the upper part of the Lower Wolfcamp, and this is one of these slice maps that I mentioned where you just take an interval across there and add up all this and contour.

Q. All right. Mr. Thoma's mapped his isopach where it has a northeast/southwest orientation to those carbonate pods?

A. Yes, sir. You can see it here. You can see it here. You can see it over here. In fact, it's the entire green of this map, and it is also oblique to the way he mapped the Bone Springs above and it's, I believe, to the way Hanley has mapped it, and this map shows that as you go from Kachina 8 #1 towards the Hanley location, that you'll be encountering less carbonate, and by the analogy, less chance of production. I might add that the wells over here that they had interest to are even thinner on this interpretation than the Hanley location, but they still have working interest in these, and also in the last hearing there was testimony by Santa Fe witnesses that if the well is indeed drilled at the Hanley location, they will participate.

Q. Let's go to the south location for the Santa Fe location. What happens under Mr. Thoma's interpretation of the "AE" carbonate?

A. It shows that it is thick and only trends to the 8-1, so this would make you think that this was the best place to drill for reserves in whatever interval this is. Now I might add that we've incorporated Santa Fe's results from the drilling of the 5-1 on their map from the last hearing, and at this location with our count, and assuming we're able to define this zone, if you will, we had 33 feet. This map showed that there would be 25 feet, so it was substantially thicker than it was shown here on this map.

Q. Now, having analyzed this interpretation, have you determined whether or not you had oil producers in the Wolfcamp that corresponded to the thicker carbonate intervals that Mr. Thoma had mapped?

A. Yes, we have. And what we've done is start an analysis. A lot of times -- incidentally, in the Permian Basin I used to be head of a committee that compiled drilling statistics for the American Association of Geologists, and it would always come up that approximately 62 percent of all the wells drilled in the Permian Basin, which included New Mexico and Texas, well, that's 62 percent oil wells, you know, so that's rather profound. This includes all wells drilled, development and wildcat, so we look at this, and what we've done on this particular zone in terms of whether this finds oil or not is, we've put red dots where there are dry holes, and we put green dots where there are producers, and they're -- according to our last count -- there are four producers and 29 dry holes. This isn't even the basin average, so what I'm concluding from this is not only is it a poor technique that maps something that is not genetically related, but it also doesn't find any oil.

Q. Let's turn to the next display. Have you examined Mr. Thoma's "AF" carbonate in the Lower Wolfcamp?

A. Yes, sir.

Q. And what is the orientation of carbonate pods with regards to the "AF" carbonate?

A. Exactly the same as it was on the previous display. Northeast/southwest, not north/south.

Q. In relation to the carbonate thickness in the "AF" carbonate, what does that do when you examine the Hanley tract versus the Santa Fe tract?

A. It shows the Hanley tract being in the direction of thinner clean carbonate, and the Santa Fe location being essentially the same. Incorporating the results and the recently drilled 5-1, they show that this point at 75 feet and the well had 103 feet, so it's was substantially lower than this map showed.

Also it showed these locations over here that are soon to be drilled. These wells cost about 700,000 or so each to drill as being in an inferior location like the Hanley location.

Q. Is the purpose of the display in finding oil to penetrate the point of greatest thickness of the carbonate?

A. One of the things that -- yes, it is. One of the things we've found with this interval, why, you've got 700 feet, and you've got various zones in this that produce -- and they're erratic -- is the best chance you have of getting the most will give you the best chance of making successful completion.

Q. Can you use Mr. Thoma's 'AF' carbonate isopach to find oil there?

A. Here again, we've highlighted the dry holes with red dots and the producers of oil green, and there were 18 dry holes and 15 producers; not up to 50 percent yet.

Q. In both the "AF" carbonate and the "AE" carbonate that you've displayed before, is there a relationship on Mr. Thoma's analysis between points of greater thickness and finding oil at those locations?

A. No.

Q. With these wells?

A. No.

Q. There's no pattern there?

A. The pattern is that you have thinner intervals in some places where you have the most productive wells, and Mr. Huck will cover this in detail.

Q. Let's go to the next display. Have you reproduced Mr. Thoma's "AG" carbonate isopach?

A. Yes, sir. And this is the interval that's at the very base of the Lower Wolfcamp, and it is the one that produces in Kachina 8 #1, and this location, according to Mr. Thoma's count, there were 31 feet. At the new well that was drilled at 5-1 they showed 10 feet. The well, in fact, had 33 feet, and this zone was perforated and tested, and failed to produce, and so one of the -- as I understand -- one of the key things in this hearing that they had to get this acceptable location for this well, was this map showing this thick carbonate up here in this zone produced in their well, and they got the thick zone, but they didn't get any oil. So, again, those maps are not answering the picture, and --

Q. Have you examined the maps to see whether there is a relationship in terms of the carbonate thickness that Mr. Thoma maps for the "AG" carbonate and the fact of the abilities of wells to produce oil out of that zone?

A. It's unpredictable because --

Q. Let's see the overlook.

A. Here you have 31 feet in oil, and here you have 33 feet and no oil, and, again, highlighting the producers and the dry holes, there's 12 producers and 20 dry holes.

Q. Is there a relationship --

A. And you can see right here. Here's a thick pod.

Q. Let's talk about that pod for a minute. You're looking at the pod that's oriented northeast to southwest across section 7?

A. Yeah. And here's a 42-foot penetration here, and it's a dry hole.

Q. Well, stop just a minute, Mr. Robbins.

COMMISSIONER LAMAY: Section 9, I think.

MR. ROBBINS: Yes, sir, this is 9.

MR. KELLAHIN: I'm sorry. I went the wrong direction. That's Section 9.

A. Yes, sir.

Q. (By Mr. Kellahin) When we look at that pod, do you find well control that demonstrates a thickness of 50 feet?

A. There's a well -- no, sir. But there is one that is 42 feet, and he's confirmed another contour that would bring it up to 50, but this is the axis to the pod.

Q. When we're looking at that pod, is that the thickest pod that you can find on that "AG" carbonate?

A. There's one over here that goes up to 67 feet right here.

Q. You're looking at Section 9. The next thickest one is this 50-foot pod?

A. Well, this 50 one here, yes.

Q. All right. So we're looking --

A. One here and one here.

Q. We're looking at that pod. The test

zone of the pod is the well in the north half of Section 9 with what results?

A. It's a dry hole. And conversely, when you get down here where there's 21 feet, and going from the thick pod to the thin pod, you have an oil well.

Q. What do you conclude?

A. Well, it's confusing. Just as an examiner to test the contouring, what's essentially been done with this technique -- hold this up -- is that in preparing these maps, Santa Fe has contoured Hanley out of the deal, contrary to where their lease play is, contrary to where they're drilling their well, and contrary to where they're participating in these wells over here.

Q. I've asked you to take that datum point --

A. Yes, sir.

Q. -- for this isopach, and see whether you can honor the datum point and come up with a different contour than Mr. Thoma.

A. Yes, sir, I have.

Q. Have you done that?

A. Yes, sir, I have. And from experience with slice maps, if you will, that are not related to any form of depositional model, you can essentially contour these things as you please, and I've just arbitrarily recontoured this as an examiner and posed a strike 90 degrees to that one that was imposed by Santa Fe, and you have the same thing at 90 degrees, and this hand tracks along the axis instead of along the thin, and so are these other wells that have been staked over here, and it fits the center of Santa Fe's lease block.

Q. Can you, in your professional opinion as a petroleum geologist, map the carbonate isopachs without regard to the orientation of the structure of the Wolfcamp?

A. Well, this structure on the top of the Lower Wolfcamp seems to drape over this thick axis of deposition of Lower Wolfcamp carbonates, and it is derived separately from the isopach map, but they do match. Now, I think this is significant.

MR. KELLAHIN: I wonder if we might have a break at this time, Mr. Chairman?

COMMISSIONER LAMAY: Well, finish up his testimony, and we'll take a break before cross. Did you want a small break, counsel?

MR. BRUCE: For a couple of minutes.

(Short break taken at 10:30 a.m.)

MR. KELLAHIN: Thank you, Mr. Chairman.

COMMISSIONER LAMAY: Yes. You may continue, counsel.

MR. KELLAHIN: That concludes my direct examination of Mr. Robbins. We would move the introduction of Exhibits 1 through 16.

COMMISSIONER LAMAY: Without objection, Exhibits 1 through 16 will be admitted into the record.

COMMISSIONER LAMAY: Let me ask a couple of questions. How many witnesses do you have, Mr. Kellahin?

MR. KELLAHIN: I propose to present Mr. Huck, and that will stop if there's some geologic details that Mr. Bracken has worked on we might call him later in the day, but I propose to rest my direct case after Mr. Huck. I would expect that it may take us an hour to get through his testimony.

COMMISSIONER LAMAY: Do you have some cross that you would like to proceed with at this point?

MR. CARR: The cross that I have is very brief, and I think the same applies to Mr. Bruce. I'd like to keep the witness going before the break.

COMMISSIONER LAMAY: We'll proceed with

cross-examination.

MR. BRUCE: Very briefly, Mr. Chairman.

CROSS-EXAMINATION

BY MR. BRUCE:

Q. Mr. Robbins, do you recognize what I'm holding up here?

A. Yes, sir.

Q. I'll represent to you that it's Hanley's Exhibit Number 2 from the -- from the examiner hearing in this matter. Would you agree?

A. Yes.

Q. Looking at your isopach -- now this was before the Kachina 5-1 well was drilled; Kachina 5-1 well is indicated there, and according to Hanley's prior map, Hanley predicted thinning to the east of the proposed unit, and that Kachina 5 would have about 150 feet of clean Wolfcamp carbonate; is that correct?

A. That's what the map shows.

Q. And what's the actual -- the actual -- what did you say it shows now?

A. We have 300-and-something, as I recall. Would you like to see our map?

Q. It's okay. Three hundred-and-some is fine. So this map was substantially incorrect, wasn't it?

A. It was incorrect as to the value that you mentioned, but it's still correct as to the axis of this thick deposition in that these wells down here that show 340 feet are still there.

Q. But you would agree that there's thickening to the east; is that correct, on the proposed well?

A. Yes. There is a lobe like these that comes down to there.

Q. Thank you. I have nothing further, Mr. Chairman.

COMMISSIONER LAMAY: Mr. Carr.

CROSS-EXAMINATION

BY MR. CARR:

Q. Mr. Robbins, I guess I'd like to look just briefly at your Exhibit Number 2. At the examiner hearing I couldn't get it straight in my mind, "perpendicular versus vertical," as you might recall. I think this addresses it. If I understand this, what we have is the front of the reef on the righthand side of the diagram; is that correct?

A. This area right here is what's labeled Basal Margin Facies.

Q. So that would be the front of the reef, and these debris flows are the result of material running off of that front and being deposited basically perpendicular to it; is that correct?

A. You can see that they have several different models here. One they call a Megabreccia sheet, one that's shown as a channel, and one that's shown more as a sheet deposit, and within these are blocks of rock that are shown as blue on the easel here, and in between these two there's a matrix of probably basinal very fine grain carbonate debris and rocks that were in the basin mixed in with it, and so they're not reservoir.

Q. If I understand then, when you go out and try to drill a well in this area, what you're trying to do is hit one of these debris flows; is that correct?

A. What we're trying to do in the South Corbin field is that we have an interval that's almost 700 feet thick. That is a lot of these different debris flows superimposed on one another. There must have been some sort of canyon or something to the north in the shelf area of the reef wall where this was a preferred place for these flows to occur, and they stacked up in there as subsidence occurred, and so what we're trying to do is find where the most of these are present to give you the best chance of making an economic completion because of the fact that they're erratic.

Now these things might occur one afternoon, and then at some period in the future another one might go through it and scour out part of this and put a new one in there, so it's a complex system. It's a very, very complex system.

Q. And I'm not trying to put words in your mouth on any of this. I think you testified basically, it runs perpendicular to the edge of that reef shelf; is that right?

A. Well, I'd say that if, you know, if this is -- if this is the shelf, this is the orientation that you're shown, and this is what -- indeed, if you read the paper -- occurs.

Q. And what you're trying to do when you -- you would agree with me that even though the general orientation is perpendicular, they do tend to meander as evidenced by this diagram of a channel, this edge?

A. Well, if we'll get back to this that was used, if you'll just hand me that, I'll illustrate that for you.

Q. Sure.

A. It is sort of a flow like this. You can have a main axis for it, but you can have -- in other words, you might have something piled up here and the next one comes down and hits that pile, it might shoot off a little bit to the side, but the axis of the deposition of the major part remains much the same.

Q. So the general axis remains north/south depending on how these things are laid down. The individual debris deposits may intend to meander somewhat?

A. I think that the well completions in the South Corbin field show this.

Q. Let's keep this up, and if we could, let's turn to your Exhibit Number 7, which is the, I think, the new map of the same interval. As I understand these, Mr. Robbins -- correct me if I'm wrong -- what you're trying to show here are basically the thickness of the Lower Wolfcamp carbonate; is that correct?

A. Well, what we are mapping here is the -- we take one of these well logs, and this is the discovery well in this northern area that was drilled by Santa Fe, Kachina 8 #1. This is the top of the Lower Wolfcamp, and this is the base. Because these are basinal rocks, these are basinal rocks, we have a pretty good degree of confluence in these particular markers. In here we don't because of the hodgepodge nature, so what we did was we took these areas that are blue and we counted the feet of that, and we added it up and we contoured it to see what it looked like, much like we took the structural datum and contoured it to see what it looked like, and we got a pattern of two -- of a structural realm overlaid on this thick axis, and as you'll see, when you go to the thick, you go to the thin, you go from the thick and you go to the thin, and so this is what we did because we didn't feel like that we could accurately correlate these individual intervals.

Q. Well, now look at these two maps -- if I could see this first one again -- is your objective what is mapped in the center of these contours, does that show the thickest Wolfcamp carbonate in the area; isn't that what that's designed to show?

A. That's what the map shows.

Q. And when the Exhibit Number 2 in the original hearing was prepared, you didn't have datum from the well in the southeast of section 5 at that time; is that correct?

A. Yes. If I remember -- It may not have been drilled.

Q. Had not been drilled. When you testified at that time, your testimony was then as it is today, that the axis here remains north/south; correct?

A. Correct.

Q. And at that time Mr. Thoma was actually contending that the axis was somewhat more northeast/southwest; isn't that right?

A. Well, Mr. Thoma -- I don't recall him submitting a total map. What he submitted were these intervals, or "slices," as I call them, he referred to as "zone," but I do think he did testify, and I'm just stacked on my memory. If you would stack, these it would show the same.

Q. And since the first hearing, has there -- this was constructed just from well information, wasn't it? You didn't have seismic or anything else to integrate?

A. No, sir. We don't have any seismic today to be integrated.

Q. And the only new point is this new point on the southeast of section 5 where you've shown 322 feet of, I believe, it's clean Wolfcamp; is that right?

A. Yes, sir.

Q. And so you -- the way you have in your experience mapped this is by simply pulling the thick area off to the right and bending it to the right; is that correct?

A. And this is modeled much after these down here to the south because there is no control between these two wells, but as you'll notice, with 119 here, and 322 feet there, and 266 feet there, and 168 feet here, and 340 feet here, that's the way the datum contours.

Q. If this formation was being laid down virtually perpendicular to an east/west reef shelf, wouldn't you expect, if this map was correct, to have your debris -- also -- pod be thicker as it heads off to the south and the east?

A. Well, you know, all I'm saying is that what these well penetrations show is this, and then I'm trying to interpret that. If you'll move over, there are some other places over here where they're 77 feet thick and then 194 feet thick, and then back to 119, and there's not a lot of well control there, but you go from thin to thick to thin again, and so this seems to us to be a logical way to treat the datum.

Q. Wouldn't it also be logical to treat the datum on the new well in the southeast of 5 as indicating actually a northeast/southwest trend on the axis in this particular area?

A. Not at all. I think that the imposition of these northeast/southwest contouring on these sliced maps are not able to capture the depositional axis because they're not depositional units. They're a lot of things.

Q. In terms of the sufficiency of the well control you have in this area, could you indicate for me which wells, say, in the north half of 8, the north half of 7 and south half of 5 and 6, have actually penetrated this particular formation?

A. The Wolfcamp producers are shown in yellow.

Q. Okay.

A. And so you'll notice right here there's a well that is not colored yellow, so it did not produce, and it has NDE on it which means it did not leach, and this well over here that says NDD which means not deep enough encountered nine feet, but it did not completely penetrate the Lower Wolfcamp, it stopped before it got to the basinal part that this well over here is perforated.

Q. The well just due south of that in the southwest of seven, does that -- was that deep enough?

A. I don't think this well has been drilled yet. I think this is a location.

Q. Okay. And then the two wells offsetting unit in Section 7 haven't been drilled, the two spots that we're talking about; this proration unit, haven't been drilled either?

A. Well, the information that we have gotten from the Department of the Interior, Bureau of Land Management indicate -- I have a copy of the application and the number 30, which is this well, and we understand this permit has been approved. The 29 up here has been applied for, but at last count -- the last check we made, they did not have their permit yet, but I think that they're past their 30-day interval, and I suspect they're pretty close to having it. Both of these wells, incidentally, were permitted 510 feet from this lease line, and so both of them were designed to get as close as they possibly could without having to have a hearing.

Q. Who is the operator of those wells?

A. They're both Southland Royalty which --
Q. Would be Meridian, perhaps?
A. I think it's Meridian, but for some reason I think they're using it as the old name.
Q. Have you had any communication with Meridian or Southland on their well proposal?
A. Not to my knowledge.
Q. Do you know if they intend to drill both of those wells?
A. I don't know what their intentions are. All I know is that they have applied for these two permits which would indicate that they're planning to drill these wells.
Q. Okay. Thank you.
COMMISSIONER LAMAY: Any questions here, or do you want to presume?
MR. KELLAHIN: Just one point of clarification, Mr. Chairman.

FURTHER EXAMINATION

BY MR. KELLAHIN:
Q. When we look at the data on the Kachina 5-1 well, Mr. Robbins, as a follow-up to Mr. Carr's question about that thickness and how it has affected the interpretation of the Wolfcamp on the log for the Kachina 5 well, when we look at the

Wolfcamp section, where is the point of greatest thickness for the Kachina 5-1 well?

A. It's in a -- it's right at the top of the interval, and it's sort of a new mass of clean carbonate that has appeared, and it's also on our maps. It came in thicker than we'd predicted it. It also came in thicker than we'd predicted as we've seen on the various zone maps that we had gone through that Santa Fe had prepared before the last hearing.

Q. When we look at the greatest thickness on that Wolfcamp section though, it's in the higher portion of the Wolfcamp?

A. Yes, sir.

Q. And what accounts for the greatest amount of change on the isopach is this upper zone that is not on any of the rest of Mr. Thoma's maps when he did the individual zones?

A. Well, this -- these rocks are very, very erratic, and it's very complex, and when your knowledge about them is directly proportional to the number of penetrations that go through it, and so you know, New Mexico for years was drilled on 40-acre oil. Most of the important Devonian fields were developed on 40 acres maximum penetration, and so when you have 80-acre well control with things that are erratic like this, there are times when you get more datum, you keep them turning.

Q. When we look at the isopach then, there is a similarity in thickness between the Hanley location, and the Santa Fe location, and the Wolfcamp on the isopach?

A. This one and this one?

Q. No, sir, the Santa Fe location to the south.

A. This one, yes.

Q. When you look at those there are similar thicknesses on the carbonate?

A. Right. The interpretation of this blob is that they're both essentially on axis.

Q. The choice then of the Santa Fe location and the Wolfcamp is not erraticated exclusively on thickness, but upon location in structure?

A. Yes. What we did, again, as an independent study; we mapped the structure independently, and we mapped the rock independently, and they fit. Mr. Huck then took the decline curve analysis of every well in the field and plotted the oil production, and water production, and extrapolated this to get an idea of what the ultimate recovery of each well would be, because we had been told and read through certain parts of field hearings of things of 80 acres, 100,000 barrels; 40 acres, 50,000 barrels to see just what the distribution of the wells were, and when we did this we were struck, perhaps dumbfounded, by these blobs that showed up where 40, 50, 60 percent of the oil were out a very small number of wells, and so we then took these MERs or Maximum Effective Recovery for those wells and we contoured it, and we got some blobs. We got -- Huck will show the map -- we've got a blob down in here, we've got a blob in here, we've got a blob over here, and because by analogy with the high rate and pressure, the Santa Fe 8-1 is going to be a blob up here, and you can see these wells that are fixing to be drilled, and there's a lot of other people that believe --

Q. Geologically, though, when you have identified these concentrations of high growth in the productivity in the Wolfcamp, have you found a relationship that when you're on the south side of those productive pods, that you have a component of water that infuences these wells?

A. Comparing these data back to the isopach map and the structure map, we found that they were oriented along the thick axis, and they were somewhat -- the productive areas -- were somewhat normal or that they trended sort of east/west and we don't know why, but that's the way they are, and as you go south of this on the south side as the decline curves will show, you have water. You get water cut.

Q. And so when we look at the Hanley location versus the Santa Fe location within this pod, it is your conclusion there's a preference for the Santa Fe location -- the Hanley location because the Santa Fe location has got a water risk to it?

A. Yes. When you look at these pods down here, you're struck by the fact that one, if you move away from that, you're going to lose productivity quick, but your best chance of getting productivity is along the east and west direction, and that if you go south, you're going to, one, hit water or less productivity, and this is, like I said, if you'll look at the map when you get there, there's not a place on the field to date where you have a southwest diagonal offset that you even closely approach the high productivity in the pod of the sweet pod or whatever they are.

Q. Thank you, sir.

COMMISSIONER LAMAY: Mr. Weiss.

COMMISSIONER WEISS: In this diagram over here -- fill material around the blocks, is that permeable?

A. The rocks that are shown in the blue is an admixture of various kinds of rocks depending on the source. Some of it is reef rock and it has indigenous porosity permeability.

Q. But you're submitting not the blocks?

A. No, sir. That is whatever is swept up that was there, fine, dark clastic, rocks that were on the bottom as this thing roars down. It all kind of mixes up in kind of a wave, and the only way that it's not permeable in these outcrops, no.

COMMISSIONER WEISS: And you think that this reservoir might be called naturally fractured?

A. There's a lot of mention of fracture in the Lower Wolfcamp, indeed in all carbonate rocks, and as a geologist we often use "fracture" to explain what we can't explain, and in the case of the testimony of the last hearing at this particular well, the 8-1, which is highly productive, if you look at the logs you say, "Hey, where is the oil coming from?" Well nobody knows, so we say, "it's fractured."

So you go up here and you drill this well, and you have more rock, but it doesn't produce. So you say, "it's not fractured," and this may be, but there are problems with this in that how do you fracture something that's out in the middle of a basin tectonically without fracturing everything including the fine grain rocks around it, which are the seal? So that's a problem.

The rock on the shelf before it was moved could have been fractured. So fracturing there's certain log techniques to try to detect fractures, but it's more complicated and complex than just saying what is fractured. We think, and I think everyone thinks that deals with this, because there's problems sometimes with explaining why something produces that you invoke the term "fracture."

EXAMINATION

BY COMMISSIONER WEISS:

Q. And then one other question. If I'd done my homework I guess I'd have known, but have you owned the lease there prior to these Kachina wells being drilled?

A. Yes, sir. We bought our lease in 1986. I think Santa Fe bought their leasehold in 1990 or something like that, or '89, somewhere in four or five years probably.

COMMISSIONER WEISS: Thank you.

EXAMINATION

BY COMMISSIONER LAMAY:

Q. I've got a couple of questions here, Mr. Robbins. We'll start with the first one. You had a map there on the pay interval that in the second Bone Springs pan there's a carbonate in the pay in the Bone Spring interval. You feel confident in being able to expend a carbonate pay over that large an area as far as your mapping surface goes?

A. I think when you use the logging parameters, you can. In other words, you're counting so much feet of log response in Bone Springs Goldmine contour of this, but when you start talking about whether it's all effective reservoir, I don't think you know until you drill and test it.

COMMISSIONER LAMAY: Have you run the samples on any of the logs, or the wells, or examined any cores in the area to look at these?

A. To my knowledge there are no conditional cores in the South Corbin field. I have looked at cores over the years in the Scharb and other Bone Springs and Wolfcamp detritus, and what you see when you go through it is this black rock, and then you start seeing light rock, and it's upside down and things like that, and it was hard to interpret back in the '60s and '70s when we started. Incidentally, that's why this stuff is being developed now. It's hard to find.

COMMISSIONER LAMAY: How about samples? Have you looked at any of the samples in the South Corbin?

A. I have not personally looked at any samples in the South Corbin field.

Q. You testified as to the type of rock. When you said "carbonate," are you talking about carbonate lime, fossiliferous lime, or dolomite, or what?

A. Yes, sir. We're talking about black rock which is mikrite which is a very fine-grained carbonate rock. The lighter colored rock is associated with the reservoir rocks or limestones. Conversely in the Bone Springs, the reservoir rocks are dolomites for some reason, and the one possible explanation is polodus. Maybe the Bone Springs was developed; was shed from dolomite deposits, and the other from limestone and Wolfcamp limestone deposits, but that's all I can tell you.

Q. Well, I'm trying to visualize the reservoir rock. I know it's difficult. You said it's limestone. Is it chalky lime? We're talking about the pay intervals now and what are considered the erratic clean Wolfcamp sections.

A. Like I said, I have not personally examined any samples in the Lower Wolfcamp of the South Corbin field. I could not testify whether it was chalky lime or not.

Q. Again, trying to zero in on the reservoir rock, you've mentioned that these are "pods." The reservoir -- are we talking about the number of individual fields comprising one lobe of green here on your first exhibit, or are we talking about a number of reservoirs individually, because we're talking about a number of rocks each of which composes a separate reservoir?

A. What you said is what we believe. Those fields, incidentally, colored green there invoke the Wolfcamp and the Bone Springs fields. They are both carbonate debris. Now, the outlines in green --.

Q. Well, use just South Corbin.

A. We believe that what we have here in this Lower Wolfcamp are a series of very, very small reservoirs that are part of a system of reservoirs, but they are not all pressure connected, and they're not all one quote "reservoir" unquote, but they're a series of things, and when I call them pods, I'm just referring to these things that you contour up when you contour MERs, and we interpret those as being a concentration of reservoir detritus of some kind.

Q. But the number of wells within one of these pods, would it be fair to say that if the pressure communicated to a part of the same pod or part of the same block, if they're pressure communicated, that's obvious on some tests and Mr. Huck will do that?

A. Yes, sir, Mr. Huck will. And I think what we'll find is that like we show it on the cross sections, that the reservoirs are variable from well to well, and you'll have wells in one of these so-called "pods" which is contouring maximum MER that are not perforated in zones that are in the same interval, so it's -- and when you drill down through it and they may perforate two or three of these things and start flowing it, you don't know what all's coming from what. You just know what --.

Q. So it is fair to say when you're trying to find a reservoir, you're talking about a pod -- a mass of rock, or one rock, all of which may or may not be connected in the same well bore, or which may or may not be all offset with each other?

A. I think the more we know about this the more complex we think it is. The salvation is that there's a number of these 700-foot intervals that you might encounter.

COMMISSIONER LAMAY: I think that's all the question I have. Additional questions of the witness?

EXAMINATION

BY COMMISSIONER BAILEY:

Q. Looking at these pods and looking at this isopach of the clean areas, I see very little correlation between the thickness and the distribution of those pods as compared to the thickness and the axis of these that you've given us here. Do you have an explanation for the occurrence of these pods?

A. I would like to -- I wished I had the map that Mr. Huck is going to show delineating these pods where I could show you, you know, their location and what their geometry is. Our explanation for it is -- and this is purely our interpretation -- is that for some reason along these thick axes in an area right in here, right in here, and right in here, there was a concentration of produceable reservoir rock. They sort of tend to trend east/west and they have sharp boundries north and south, and the only explanation that we could say is that when these flows start, for some reason at these spots, for whatever reason, due to decreased energy or maybe a big block piling up the other stuff around it, that's where they are, and that's all I can tell you.

Q. Okay. But there's no real correlation between the productivity of the pod and the -- that they have to be centered on an axis of these thicknesses?

A. What we found when we compared this contour map of MERs from which we've defined these pods, is that they correlate and associated along this thick axis, and along this thick axis. They're not off of a thick axis. That's why when we got the datum on this well, we changed our location from here. Santa Fe proposed up to here because we're convinced -- we're looking at these maps -- that the chance of making the most oil is close to one of those pods as you can get.

COMMISSSIONER BAILEY: That's all I have.

EXAMINATION

BY COMMISSIONER LAMAY:

Q. I've got to ask one more question. I hope we don't get into a long discussion on it, but it's more curiosity. You have a Perm-Penn reef trend. Is that the Abo reef trend? Have you got something in the Wolfcamp that you map?

A. That particular line, Mr. Chairman, is sort of the south edge or culmination. I think it's pretty close to where the up-dip limit of Morrow line is or the Delaware line is, and as such, it's pretty close to the Abo reef front right there where we're drawing it, but there are shelf carbonates and reefs north of that up at Kemnitz and in there.

Q. Well, as you well know, the shelf edge will migrate throughout the Permian. I was trying to define a period of time within the Permian and or Wolfcamp edge that you're mapping there if that is what you're drilling.

A. I think that is the break in the Yates, which is draped over the Abo early/late Permian shelf edge, and, of course, you know, as you're aware of, the Abo reef front is white, sir.

Q. Right. The Wolfcamp detritis is what I'm trying to get at. You have limestone blocks.

You wouldn't assume those would be erroded from a dolomite Abo reef would you?

A. No, sir.

Q. So they would have to come from some Wolfcamp shelf edge that would be north of those blocks?

A. Yes, sir.

COMMISSIONER LAMAY: You're talking about a shelf edge, or do you really see a reef in that area?

A. We think it's a combination. It's a carbonate shelf edge with reefs along it. There's a number of those there. Kemnitz has been studied in detail with cores. It describes a reef wall, and so it's a combination of these, but one thing we know, and the people have interpreted for years, how deep the Delaware Basin was. A lot of people say it was pretty deep. Not hundreds of feet, but thousands.

COMMISSIONER LAMAY: Thank you very much. Additional questions of the witness? You may be excused. Let's take about a 15-minute break.

(Break taken at 11:10)

COMMISSIONER LAMAY: We have Mr. Kellahin.

MR. KELLAHIN: Thank you, Mr. Chairman, I'd like to call at this time Mr. Bill Huck.

DIRECT EXAMINATION

BY MR. KELLAHIN:

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

A. My name is Bill Huck. I'm a petroleum engineer.

Q. And where do you reside, sir?

A. I live in Midland, Texas.

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

A. I am employed by Hanley Petroleum as a reservoir and operations engineer.

Q. Did you testify before Examiner Morrow in the consolidated hearings before him on these competitive pooling cases?

A. Yes, sir, I did.

Q. Have you, as a reservoir engineer for Hanley, made an examination and reached engineering conclusions about your opinions concerning the optimum place to locate the well in the spacing unit being discussed?

A. I have.

Q. Have you also reviewed, analyzed, and rendered your opinions on the cost for drilling and completing this well?

A. Yes, sir, I have.

Q. And you've also made some recommendations to the examiner concerning an allocation formula for allocating the cost between the formation and among the working interest owners?

A. Yes, sir.

MR. KELLAHIN: Mr. Chairman, we tender Mr. Huck as an expert petroleum engineer.

COMMISSIONER LAMAY: His qualifications are acceptable.

Q. (By Mr. Kellahin) Mr. Huck, let me start back with the reservoir engineering work that you've done. Having been involved with Mr. Bracken in reviewing the geology, from your perspective, how do you go about analyzing the issues and formulating a methodology that in your judgment was an appropriate one to apply for an understanding of this particular reservoir in deciding where to locate the well?

A. Starting in the beginning, after reviewing the overall structural and pay thickness pictures that were prepared by Mr. Bracken and the theory behind the deposition, the next step would be to form some sort of production expectations on any wells that you might drill here, that we would drill -- log for oil -- what kind of reserves we could expect.

You could try to use volumetrics, or you would try to use decline curve analysis. In this case the very nature of the rock in the field and the abundance of production datum from the wells drilled to the south of this location led me to use decline curve analysis as the preferred method of engineering analysis.

Q. In choosing a methodology to estimate ultimate recoveries from these wells, it didn't take you very long to exclude volumetrics as a reliable means by which to determine oil per place and then the recoverable oil for spacing unit?

A. No, sir, it did not. I might show you Exhibit 17.

Q. All right. Let's turn to that. Exhibit 17 is the first one of your displays, is it?

A. That's true.

Q. What are we looking at?

A. It would be an east -- more or less east/west cross section through the South Corbin Wolfcamp field. It would be the last cross section before the black book, section C. Cross section C-C'. I think it's marked Exhibit 16.

Q. Now we may have misnumbered some of the exhibits at this point, but we're looking at C-C' cross section?

A. Yes, sir.

COMMISSIONER LAMAY: Go ahead and describe what you prepared.

A. What you're looking at is a east/west structural cross section across the South Corbin Wolfcamp field. It starts on the east side of section 8 and -- some pretty rocky drive holes -- moves southwest through Southland's West Corbin Number 11 and Southland's West Corbin Federal #8, and West Corbin Federal #5, and those all are in section 17, and moves west of the Section 18 and through West Corbin #1 and their West Corbin Federal -- I believe it's Number 18, and ending with their West Corbin Federal #24, at the very west edge of the field. The purpose of this cross section is to show the different completion intervals.

As you move from well to well across the field, you'll see on the east side, again, is a dry hole. Moving to the next well, it has a limited well. Number 11 here in the south end of Section 8 has a limited number of perforations in the upper part of this Wolfcamp interval. This well would expect to cum a little over a quarter of a million barrels of oil. It's already produced over a 170,000 barrels of oil.

Q. The cumes are shown in red on the bottom of the log of the cross section?

A. Yes, sir, that's correct. These numbers represent estimated oil recovery from these wells based on decline curve analysis. As you move from well Number 11 to well Number 8, you see a well that tested various zones in the Wolfcamp finally completed in the uppermost time and encounter, and this well produced about 30,000 barrels of oil before watering out. Right now it's temporarily abandoned.

COMMISSIONER LAMAY: We might just mention, we don't have those cumes on our exhibit provided. They were left off.

A. Well, this well produced 30,000 barrels of oil, and it's abandoned, that would be its ultimate recovery. We move from well Number 8-C on the southwest. You've got well Number 5 on the west side of Section 17. This well is completed lower down than the Wolfcamp. We expect it to accumulate some 237,000 barrels of oil. It's already produced 213,000 barrels of oil. You move west from well Number 5 to well Number 1-H here on the east side of

Section 18. Incidentally, that is a direct 40-acre offset. You see well Number 1-H is completed again, lower down in the Wolfcamp but not the same interval as well Number 5. We expect it to accumulate 168,000 barrels of oil. It's already produced something like 140,000 barrels of oil out of the Wolfcamp.

We move west from that well to well Number 18-F and Section 18. This well is a fairly new well. It is completed in the lower most lime encountered in the Wolfcamp. We expect it to accumulate at least 146,000 barrels of oil. It's already produced some 70,000 barrels of oil. Again, it's a fairly new producer. It's still making better than 100 barrels a day as well as number 18-F. The far western well, again, I'm fuzzy on the number, Number 24, I believe, has completed in the uppermost. You notice it's a 40-acre direct offset to 18-F. It was dry in all of the Lower Wolfcamp members, or lower members of this Wolfcamp as completed in the very uppermost lime. It potentialed for about 50 barrels of oil and 400 barrels of water a day, just recently within, I'd say, the last month.

COMMISSIONER LAMAY: That would be cum or estimated total?

A. No. Cum or estimated total. If I was to estimate something based on what I see over the rest of the field maybe, 20,000 barrels out of this well.

Q. (By Mr. Kellahin) What's the point of comparison to?

A. Again, the point of this cross section addressing Commissioner Lamay's concern about the variance and what these individual pays look like, as you move across the field, they vary in thickness. They obviously vary in aerial extent, and they vary in quality of pay within the lime once it's encountered. You can encounter the lime, but not have the porosity present in order to make a commercial well.

For this reason the assumption volumetric parameters, or parameters needed for volumetric calculations like aerial extent, pay thickness, porosity, water saturation, you have to assume then uniform over a certain area. In Santa Fe's case, they're applying them over at least an 80-acre area around these wells, and it's just not happening in this field. Your only tool left to you in that case is decline curve analysis and production histories on the wells in the field, and that's what I rely on.

Q. Let's turn now to the next display, Mr. Huck. Identify and describe this display for us.

A. Exhibit number -- you have it as 17 or 18?

Q. I have it as 18 in my book, and let's stop for a moment.

COMMISSIONER LAMAY: It's page one in this black book.

Q. (By Mr. Kellahin) I think black book is identified either as Exhibit 17 or 18.

A. The black book.

Q. And in the black book we have numbered each of the displays as a page number. My copy says Exhibit 18, so let's use that for the moment and we can solve it later. There, in fact, may not be an exhibit 17.

COMMISSIONER LAMAY: This one says 18.

Q. (By Mr. Kellahin) Okay. Let's start with page one of Exhibit 18.

A. And this map would be the first page in the black book.

Q. All right, sir.

A. What I have mapped here is the -- this map shows south and north end of the South Corbin field next to each -- the Wolfcamp completions are shown and circled in yellow next to each one; there's an upper right. There's a number. This signifies the estimated ultimate recovery for that particular well from decline curve analysis. This is expressed in thousands of barrels. For instance, well Number 11 in the south end of Section 8 here has an estimated ultimate recovery of 257,000 barrels of oil. Immediately below that EUR number is a blue number. This one is that well's 1990 average water production expressed as a percent.

For instance, well Number 11 had a 5 percent water cut in 1990. I went through and plotted decline curves on each well in the field and based on the concurve analysis, obtained an estimated ultimate recovery for each well in the field and posted these on the map and contoured them in 50,000-barrel intervals, and in order to better estimate when and where the reserves are occurring in the South Corbin Wolfcamp. We haven't really established with the deposition and looking at the geology other than over gross lime thickness, we hadn't really established any correlation between production and reservoir rock.

After contouring these cumes or estimated oil recoveries, I found that you have definite areas of high production and high oil accumulations in the field. There's basically four areas on this end of the field that are typified by the very good well with reserves on the order of a quarter of a million barrels, then as you moved away from it, you rapidly digress down to wells with EUR's of 50 to 70,000 barrels, and then further down to wells with 20,000 barrels and less in ultimate recovery.

The other thing I noticed, and once I plotted these, or once I got these oil accumulations identified, is that it was an occurrence of water in the field, significant occurrence of water in the field. On an overall basis it happened to occur on the south side of these pods as they laid in there.

I might add, going back to the pods themselves, they did -- especially on the south side here where we had to control -- they did conform to the north/south axis of our depositional thick on our isopach. There's some displaying, again, on the isopach here on the south end and also subsequent lengthening in the shape of this production pod, but for the center of the axis and the center of these pods, they overlay fairly accurately. These pods seem to be bounded on the north side by the absence of porosity within these lime blocks, either the block itself not having any porosity or this basinal rock surrounding it actually performing the pinch out.

On the south side or down-dip side of these pods, you have a combination of either the absence of porosity or the presence of water. I think that matches these shapes and make them appear the way they do once you've done your mapping. The extra presence of water does limit you on the south side.

Q. Before we leave this display, Mr. Huck, let me ask you some background questions, and then some specifics about Mr. Morrow's finding in the examiner order on a preference for the Santa Fe location because it maintained this 80-acre diagonal pattern. Have you reviewed the rules for the South Corbin Wolfcamp pool?

A. Yes, sir, I have.

Q. Do you find any restriction within the rule that would preclude a well being drilled in the north 40-acre tract on the Hanley properties?

A. No, sir, I have not. As a matter of fact, in the past history of the pool there are numerous instances where wells have been drilled effectively as direct 40-acre offsets without special hearing. Pool rules stipulate only that a well has to be 150 feet from the center of a quarter quarter section. It doesn't specify which quarter quarter section it has to be in, but if you notice in the south of the one that probably gets the most attention here is in the west half of Section 17 and east half of Section 18.

You have three wells there that are essentially 40-acre offsets to each other, and, again, over here in the west half of Section 18 you've got two wells that are 40-acre offsets. Two more industry locations, and that's employed by Meridian, that would be in 40-acre offsets to those wells.

Over here in the southwest corner of Section 16 you get three wells that are essentially 40-acre offsets. You move down into Section 21, you've got three wells lined up in a row. North/south, again; they're effectively 40-acre offsets. Keep in mind each well has its alloted 80-acre assigned to it, but its position relative to the wells around it is still an effective 40-acre offset.

Q. Have you also examined the examiner transcripts and records that were made with regard to the spacing cases that establish the spacing for the South Corbin Wolfcamp pool?

A. Yes, sir, I have.

Q. Did you look for engineering calculations and information concerning what was reported at that time on drainage areas or recovery numbers?

A. Yes, sir, I did.

Q. How did that assist you in informing yourself about the potential for the recovery of hydrocarbons at the various locations within this spacing?

A. Basically, the transcripts of those hearings -- for a little background -- Southland applied for 80-acre special pool rules in this field back in 1976 after drilling their West Corbin Number 5-E, and their Huber 17 Number 1-M. They argued that they had 300 pounds less bottom hole pressure in this well, and therefore it was being drained by the Number 5-E, and, therefore, 80-acre proration units ought to be assigned for the field. They also pleaded that they had lease explorations that was going to require them to drill wells they didn't feel like drilling.

The result of that hearing was that the examiner recommended, and the commission denied, the application based upon the fact that there was already a 40-acre offset here between the 1-H and the 5-E, and the 1-H has been there for some 15 years, 12 to 15 years. The 5-E came in beside in potential flow and top viable with original reservoir pressure. The resulting -- the conclusion being drawn that there was no interference between 40-acre offset. The full-commission commission De Novo hearing, the field rules were granted basically based on the same argument. They were granted and made temporary with the stipulation they'd be reviewed in 18 months.

Q. Have you as a reservoir engineer looked at the performance of those wells and constructed decline curves for those wells?

A. Yes, sir, I have.

Q. Okay. Let's go to talk about the decline curve issue, if don't you mind. It's in your exhibit book, I believe. Let's go -- before we hit the decline curves, let's talk about the estimate for oil recovery on the spacing units.

A. In their case number 8822 reopened,

Meridian defended their 80-acre locations in 1977 by estimating ultimate recoveries for these wells in Section 17 that were then drilled, and using volumetrics and log calculations they backed out a drainage.

If you will go to page 27 in the black book, again, Meridian, in their testimony, took this well, the West Corbin Number 1-H, West Corbin Number 5-E, West Corbin Number 8-C, Huber 17 #1 and #2, and then the State 16 #1, which was billed over here in Section 16.

They took estimated ultimate recoveries based on data that they had in 1977 and listed them. You'll see that in the third column there, Meridian testimony, 10 of '87. Their estimated ultimated recovery from decline curves for each well. They took volumetric calculations from their log analysis and backed out a drainage area for each of these wells. That's expressed in the fourth column. You'll see it more or less approximates 80 acres, and their recoveries more or less approximate or average out to 100,000 barrels. Based on this testimony, the commission made the field rules permanent.

Well, since that time, that four-year

interim, we've gotten a lot more production data in on those particular wells. Now I've updated the estimated ultimate recoveries and showed that in column number five, and then since the volumetrics won't change the parameter that you use, you'll pay high pay thickness, porosity, water saturation will not change.

You can back out a revised drainage area for these wells, and what you see is the one exception of the State 16 #1 over here. The rest of these wells produced substantially less oil than what was originally predicted for them, and their actual drainage area is much closer to 40-acres, particularly on the marginal wells here through the center of the section. Those wells have drainage areas of 24 acres, 38 acres and 54 acres respectively. The two wells that happen to now approach 80 acres in their drainage area are the 5-E and the 1-H of the wells that are direct 40-acre offsets.

The conclusions drawn from each well in the field seemed to produce this particular share of the reserves regardless of how closely or how densely the wells are populated around it. There's probably, you know, reserves that were originally assumed to be drained by these wells probably still out there, but this is consistent with the depositional model you see on the far side of the room. These reservoirs are small. There's a bunch of them. You know every well encounters some of them, but they're not necessarily connected. Any connection that there is is incidental and over a short area within the field. There's very, very few instances where you can see interference between wells even on the 40 acres being offset like this, and this.

I also noticed on plotting up the decline curves, and plotting up water productions, a clear water, clear concern or evidence of water production being a problem for different wells in the field. You see again on the map that I've put the water cut produced in 1990 by these various wells. I've colored those dots blue in relation to that water cut just as a visual aid. What you see on the south side or down this side of these pods, a prior instance overall of water currents and water being a problem. If you can --

Q. Let's take a moment and let me ask you based upon your re-examination of the performance of some of these early wells in the field, what conclusion can you reach about the granting of Hanley's request for a nonstandard proration consisting of the 40-acre tract rezoned by Hanley?

A. My conclusions are that it would actually recover more oil than the well on the south end. I also conclude that it will not promote any kind of waste, and that it will be recovering reserves that might not be recovered by any of the offset wells. If there is any interference, it will at least be competing on equal footage with the wells that are hugging its lease line on the north end.

Q. Let's go to the decline curves and have you cite for us specific instances that have confirmed for you.

A. Okay.

Q. I'm going to go to that water question on your decline curves. Can you show me some examples on the decline curves?

A. Well, the most obvious, if you'll turn to pages six and seven of the black book -- the way you see on page six is the Meridian State 16 #2-N. That would be in the south end of Section 16 on the south side -- down dip side of that lobe. This well was potentialed in 1988 flowing 344 barrels of oil a day. It was water free. The water cut increased dramatically starting about in late '88, early part of '89, and correspondingly the oil rate dropped off dramatically. Dropped in half and then dropped even further. The water cut from there was about 20 percent to 75 percent there in six months, and now the wells make some 35, or less than 35 barrels of oil a day.

Apparently there was an attempt to shut the water off in late 1990. They lost a little bit of oil production as well as some of the water production. But it was a definite example or evidence of water encroachment or nearness to a water lake within one of these producing pods. Water drive is not a primary drive mechanism in this field, but water is present in these isolated reservoirs, and if you're down dip, you'll be nearer to the water. If you can turn to page seven -- this is the West Corbin Federal Number 5-E. It's the well on the west side of Section 17 that's going to produce some 230,000 barrels of oil.

This well was completed in 1985 flowing 380 barrels of oil and 155 barrels of water a day. That water sort of dried up and it rocked along producing about a 10 percent water cut for about eight months in 1986. The water cut increased to 30 percent and the oil rate dropped from 300 barrels a day down to 100 barrels a day. I think at that time the well had to be put on a pump and it produced 30 to 35 percent water cut for another two years, and now it produces about a 50 percent water cut. Again, you know, the well was flowing top viable oil until the water hit, and I think definitely when you move down dip, you increase the instance of this water or risk of encountering it, and it can be a significant problem with production of these wells.

Q. Without specifically discussing them in detail, show us the page number for all those decline curves that in your opinion represent a water problem in that well.

A. Starting with page five, the decline curve runs through page 23. You'll see significant water production on 14 of those 18 pages. It's outlined in blue, the oil production outlined in black. The dash line represents the projected future oil stream that those EURs came from.

Q. Let's talk about ultimate recoveries. At the examiner hearing, Santa Fe's engineer, Mr. Offenberger, was using approximately 100,000 barrels of oil per 80-acre spacing unit. Have you examined whether or not that is a reliable, realistic assumption for a recovery per well in this particular pool?

A. Totaling up all the EURs for all the wells in the pool, you get a fieldwide estimated ultimate recovery of some 3.2 million barrels for the South Corbin Wolfcamp.

Q. Let's go to --

A. Turn to the field map.

Q. Let's go back to the field map and if you'll look in your exhibit book, Exhibit 18 page 2. Let's go through some of the projections on reserves.

A. Okay. Again, the field EUR I estimate to be 3.2 million barrels. I've done a technical summary of all the wells in the field, and the occurrence of each reserve category. If you flip over to page 2 you'll see a histogram of the occurence of each reserve category for the wells that you drilled in the field. There are no definite, typical wells in the field.

Santa Fe's testified that 100,000 barrels of oil per 80-acre well would be typical. The only thing that looks like there is a majority of are these wells that produce less than 50,000 barrels.

In fact, if you take out the four highest wells in the field, the four wells with roughly a quarter of a million barrels of reserves, you're left with 2.2 million barrels to scatter between 34 wells. That averages out to about 60,000 barrels per well in marginal economics for the majority of the wells in the field, but even more to me, states the necessity for hugging up to the sweet pods production when you find --

Q. If we maintain this hypothetical 80-acre diagonal spacing and assume a 100,000 barrels of oil recovered for each of these wells in the pool, are we going to be effectively and efficiently recovering the maximum volume of oil for the Wolfcamp?

A. No, sir, you will not. First of all, from the histogram it's, again, Santa Fe would have you believe that 100,000 barrels would be recovered by every well on 80-acre spacing. This red line represents approximation of what that would look like on the statistical average. It's just not happening. There's not even a cluster of wells around this reserve area. These wells produce for the most part a numerical average much less than 100,000 barrels and drain much less than 80 acres.

Q. Let's look at the next display and talk about the tabulation of the --

A. This is basically a numerical tabulation of the same data that's on the histogram showing the estimated ultimate recovery and 10,000-barrel category, the number of occurrences, the percentage of frequency percentage of that occurrence, cumulative, and then cumulative frequency going from zero to 100 percent. You can look at the summary at the bottom and see if you need a 100,000 barrels of oil, which Santa Fe has defined as the break-over point for an economic well out here, and I pretty much agree with that number. Your chance of getting that are 30 precent no matter where you drill in this field.

If you look at the figure of 100,000 barrels of oil, up here on the percentage of frequency, you'll see about 13 percent of the wells around there might produce that amount. While up here in the less than 30,000 or less than 40,000 range, that amount which would be required to pay out a well, you've got an accumulation of some 40 percent of the wells that are drilled out there on these 80-acre spacing are not ever going to pay out. So drilling on 80's does not necessarily assure you of an economical well in this field.

Q. Okay. Turning to page four of the exhibit book, identify, of course, what you've summarized on that page.

A. Page four is the summary of the decline curves and the overall data and conclusions that I've drawn from them. Most of these wells will exhibit a steep initial decline within the first year somewhere on the order of 60 percent. They seem to flatten out after 12 to 18 months to about a 23 percent decline over the rest of the 12-year life.

As I stated earlier, of the 18 wells shown here with enough data to establish a decline, 14 show a certain amount of water, anywhere from a trace up to 85 percent. There are wells in the field that cease production due to the amount of water that they produce. Again, clearly there's a water presence near some of these wells and logically, if you can stay up dip within a producing pod or within a lime member, your chances of producing water free are greatly increased.

Q. Based upon this data, Mr. Huck, how did you determine the amount of reserves available for the spacing unit if the well is drilled first at the

Hanley location and at the alternative at the Santa Fe location?

A. Turn back to the field map. After contouring in these EURs, again, on 50,000-barrel intervals, you see a certain size and a certain shape to these pods as they occur. Most of them with the exception down here on the south end, there's wells close enough that you can see an east/west elongation and a little bit of agreement in reserves encountered as you move east away from this sweet as well.

I've mapped the size of this pod on the north end roughly to match the size and shape of the pods on the south end. It's separated from this pod on the south end of Section 8 of the West Corbin Number 26 drilled here. We've been chasing this well for a couple of weeks trying to get datum on this. We know that it's completed pumping some 90 barrels of oil a day marginal by the standards for which these other wells in the field are completed.

Q. What's the name of that well again?

A. Meridian or Southland West Corbin Federal Number 26.

Q. Number 26 well?

A. Yes.

Q. Let me ask you some questions about that well. In your opinion as an engineer, is it necessary to locate the Santa Fe -- the well as Santa Fe proposes it -- in the south 40 in order to avoid any competition that that well 26 would pose to the south 40-acre spacing unit reserves? Are you at risk?

A. In my opinion you're not at risk in drainage from that well. Again, if you look at 80 acre -- or moving diagonally on these pods -- if you move to an 80-acre diagonal location, you see a great reduction in the number of reserves that are accumulated on one of these pods. It drops off dramatically. The volumetric as compared down here on the south end show roughly a 40-acre drainage. This well being completed and pumping 90 barrels of oil from what we consider to be the entire Wolfcamp interval, they've opened every zone available to them. It's going to be a marginal well at best, and I don't believe there will be any interference to the north.

Q. Well in terms of competition for reserves, the wells competing with each other will simply respond to the distance between wells and are not going to recognize whether the offset is diagonal or direct?

A. That's correct. They'll respond if there's an extension of the pay between them. We haven't seen anything over about a quarter of a mile that we'd call any form of interference in this field.

Q. Let's go back now to how you have assessed the recoverable reserves if the well is drilled at the Hanley location or in the alternative at the Santa Fe location.

A. Again, modeling this north pod after the shape and the size of the ones to the south, we think that due to the structural position and proximity to the Kachina 8 #1, that we will have reserves at least approximating the reserves of that well.

We give their well a quarter of a million barrels of oil as completed in the first of at least three lime members that appeared to be productive in that well. It has the highest potential of any well in the field. It's already -- since January the 15th -- produced some 40,000 barrels of oil, and it's still flowing top allowable. Again, it's not going to be a typical well in this field. It's going to be a high-end well, one of these in the quarter-million-barrel range at least. We think being a direct offset to it gives us our best chance, and gives us a good chance of probably maximum reserves.

If you move to the south to Santa Fe's approved location, or the Santa Fe proposed location, you're moving down dip. You're moving away distance wise from that well. We've seen to the south that moving in that direction, that amount of space moves you out of the reserve picture for that pod. The only instances we see where you can match those kind of reserves are to stay as close as possible preferably in an east-and-west direction to that. I've estimated our reserves to approach the quarter-million-barrel range. I've estimated the reserves of the Santa Fe location to be on the order of 130,000 barrels maximum.

Q. Does it change your conclusions or alter your analysis to have integrated the information on the 5-1 well into your iso production?

A. No, sir, it doesn't. We've assigned 125,000 barrels of oil to the 5-1. It's just barely been completed. It's already struck out in the same zone -- the basal zone that's producing in the Kachina 8 #1. It's moved up to a zone that's had a good potential flow. Tubing pressure seems to be dropping. It's lost about 100 pounds in tube pressure out there in a week or two weeks.

Q. What do you mean "struck out" in the zone that's comparable to the 8-1 well?

A. They've perforated that zone. They had 33 feet of lime, clean lime, very clean lime, they stimulated it and swabbed it dry, stimulated it again, swabbed it dry, you know, had trouble pumping into it, basically even to stimulate it. We refer to it as "tombstone." It's so tight it's not giving up anything.

Back to the issue of porosity occurrence here. The different porosities that you can have, as Mr. Robbins referred to in this field, it varied so greatly.

You can have matrix porosity from these lime chunks that they develop while they were up there on the shelf edge. You can have rubble-type porosity created by the impact and subsequent cracking of some of these rocks. Maybe you might call it fracturing. You can have void-type porosity of the ledges, rocks falling together, and actually those spaces being preserved.

I believe the Kachina 8 #1, that's what

they've stimulated into. That well's swabbed down. They acidized it, and it kicked off flow, and they haven't looked back since. It's an excellent well, but I think they've stimulated into an area of either voidal or crack-type porosity.

Q. Mr. Offenberger, at the examiner hearing for Santa Fe, contended that you needed to keep the wells on this diagonal pattern to avoid the effects of pressure interference between lobes.

A. Yes, he did.

Q. Do you agree with that conclusion?

A. In essense, no. No, in the sense that there's basically, for the most part, no connection between wells here, even 40-acre wells. Any interference that might occur is incidental just because of the well locations. You get them close enough together, sooner or later you're going to see one well producing out of the same, or being connected up somehow with another well.

Mr. Offenberger quoted an example some five miles over to the west here in the Young field where two wells were drilled 40 acres apart. The first well was completed pretty much top allowable. The second well come in, again, at top allowable, because in the bottom hole pressure that was about

1,100 pounds less.

What he neglected to mention, they offset that well a third time, again, on 40 acres, and that well is dry. It encountered no pay in the Wolfcamp member. It's been recompleted up hole somewhere. Any interference you'd get would be incidental. You hope for continuity here, but it just hasn't happened in this field the way these lime blocks have been placed down through this fairway. It's just whatever -- if it happens -- again, it's clearly coincidental. You get into a block or member that's connected to another member.

Q. Having assigned an estimated ultimate recovery for the spacing unit assuming the various locations, have you completed an economic analysis to see what the dollar impact is?

A. Yes, sir, I have.

Q. Is that on page 23?

A. Yes, sir. It is page 23 in the black book.

Q. Is this the same presentation you made for Examiner Morrow?

A. Yes, it is.

Q. Run through the highlights for me.

A. Basically comparing a well of Santa Fe's proposed location to a well at Hanley's proposed location, estimating ultimate recovery at the Hanley location at 260,000 barrels compared to 130,000 barrels at the Santa Fe location, assuming the same net investment for Hanley of $333,000, it would take roughly the same amount of oil to pay the well out, only a well at the Santa Fe location would take twice as long, eight months as compared to four.

The big difference is in the cash flow and the resulting economic picture to Hanley. Pretax cash flow of a well at Hanley's location net investment would amount to roughly 1.6 million dollars compared to $600,000 for a well at the Santa Fe location. The net present value corresponding to those numbers is 1.2 million dollars as compared to $450,000 per well at the Santa Fe location, and the difference being, in undiscounted dollars, about a million dollars.

Likewise, Hanley's royalty owner, the federal government, would -- their pretax cash flow from a well at the Hanley location -- would amount to some $500,000 compared to between $222,000 for a well recovering the reserves at the Santa Fe location, a difference of about a quarter of a million dollars.

Q. Let me make sure I understand your point. Let me clarify something with you. Are the reserves shown on 23, are those independent of the acreage assigned to the well?

A. Yes, sir, they are.

Q. Would a well drilled in both locations, each one have the reserve assigned you've shown on page 23?

A. Yes, sir, it could.

Q. So, if the well is drilled on the Santa Fe tract, it could be done so at a profit? It would pay for its well cost, won't it?

A. It would be a good economic venture for whoever drilled.

Q. Conversely, another well could be drilled in Hanley's 40-acre tract, could it not, with this analysis?

A. Yes, sir, and be an excellent economic venture to whoever drilled it.

Q. A dollar impact to Hanley on this net of investment between the two locations is approximately a million dollars, is it not?

A. That's correct.

Q. Did I read that display right?

A. That's correct.

Q. Turn to page 24 and identify and describe what that is.

A. Page 24 is simply a hypothetical decline curve that was used, or I used, to obtain the reserves that we've mentioned in the previous exhibit. This decline curve was modeled after those that I saw on the wells in the field. The good wells, producing a quarter of a million barrels, match pretty much with the upper curve. The mediocre wells, or less productive wells, produce at 130,000 barrels of oil, match up pretty well with the lower curve.

Q. Let's touch on two other topics and then we'll conclude, Mr. Huck. Let's have you summarize, if you will, the allocation conclusions you reached before the examiner so this commission will have an understanding of your position. Let's go to page 25. In summary fashion give us the position that you had before Examiner Morrow, what your conclusions were.

A. It's Hanley's position that there are shallow zones that are potentially productive on either location. There's the Bone Springs, there's the Delaware, there's the Queen -- they all produce in this immediate area, and regardless of where the well is drilled, there needs to be an allocation formula established at this hearing, or established prior to the drilling of the wells, that would allow for the recovery of cost to the people involved in the deeper horizon that are not involved in the shallow horizon.

Again, it is Hanley's contention that the shallow zones that are prorated on 40 acres should not be arbitrarily force pooled and shared the same as the deeper horizons that, at this point, is prorated on 80 acres.

Q. There is an established industry procedure and practice in a Copus bulletin to determine the allocation vertically when you have a separation either in ownership of formation or in supply?

A. Yes, sir, there is. This Copus bulletin Number 2 is based on vertical separation of ownership within a well. It's been referenced before, and its outline is used by the commission in cases of this nature. Basically, Hanley proposes that these costs be allocated using actual well cost that would be amortized down the road at the point at which the well was recompleted or plugged back to a zone of different ownership.

The method we propose, which has been used by the commission before, where the drilling pay rate ratio for the well was used in relative depth for tangible materials was used to establish these costs.

Q. Does the examiner order set off findings and ordering provisions that addressed the allocation issue?

A. In the previous case?

Q. Yes, sir.

A. No, sir. The examiner order force pooled all zones from the ground to the base of the Wolfcamp and ignored the allocation question.

Q. Let's turn to the analysis of the AFE. Have you set forth that comparison on page 26?

A. Page 26?

Q. I'm sorry. Page 26 is the allocation calculations to show the dollars assigned to the Bone Springs versus Wolfcamp.

A. If I might comment on page 26, that's an example allocation using the parameter proposed by Hanley just to draw your attention to the instance shown here would be -- the two instances shown -- would be drilling a Wolfcamp test here, then recompleting to the Bone Springs if the Wolfcamp was dry or if the Wolfcamp is productive and you recompleted it sometime down the road, some years down the road.

If I draw your attention to the total drilling cost, which is hard to see because it's in the binding, but it would be the first total there about halfway down the page.

You see, for a Wolfcamp well the dry hole cost is $453,000 and the amount of that at cost attributable to a 9,000-foot Bone Spring well is $278,000. This compares to a dry hole cost of $287,000 that Hanley had on an 8,700-foot Bone Spring test three miles to the south, and compares to $262,000, an equivalent dry hole using the cost and daily drilling data from the Kachina 8 #1, when they passed this depth and their evaluation cost, etcetera.

We think it's a fair and equitable way of reimbursing any participant in the deep test for his investment should the well be recompleted to different ownership.

Q. Page 27, again, is your re-examination of the ultimate recoveries estimated for some six wells in the pool?

A. That's correct. Basically, it's shown to refute the testimony relied on by Santa Fe that Meridian put forward that these wells would in effect drain 80 acres. As an addition to that exhibit, we moved to page 28. It's a list of the field -- Wolfcamp producing fields -- along this trend. You have the Scharb and the Scharb SE, the Airstrip, Airstrip N. Over here is South Corbin. You have the Young, you have EK. Lusk is back in here someplace. So basically all the wells on this trend, with the exception of South Corbin, are statewide and are prorated units, 40 acres per well. South Corbin is the only one at this point in time in this area that is afforded an 80 acre proration unit.

Q. I direct your attention now, Mr. Huck, to page 29. Identify that for us.

A. Page 29 is a comparison on Hanley's form of the Santa Fe AFE versus the Hanley AFE. We've got a few differences, but nothing really major. What I might point out, highlighted in orange, are those items that Santa Fe included in their AFEs that were not included in the Hanley. These items -- to name them off -- fencing, inspection, jumping down to completion parts, inspection and testing, and extra rentals there, are all items that Hanley includes on their contingencies in their AFE.

Santa Fe includes overhead, charge of $4,600 for drilling, $4,600 for completion. Santa Fe proposed -- Hanley's proposed operating agreement to Santa Fe includes -- incorporates these overhead charges into the supervision of the well. They propose that all overhead charges include first, line supervision and engineering. They've allowed for the supervision in another portion of the AFE, and that amount, the sum $11,000 -- $11,200 more than covers the overhead that Santa Fe proposes to charge.

In addition to the first-line supervision Hanley had a couple of problems with Santa Fe's AFE in that they -- first off, they included conductor, we did not. Sometimes conductor pipe is necessary in this particular area it's not -- and usually the drilling contractor sets that -- and what we have done out here in the past has gotten along without it until our surface cases are set. Our intermediate casing, they're designed -- it calls for setting 24-pound piping at 3,000 feet. We'd like to see something heavier than that below 2,200 feet.

Basically, that's all the differences

except for production casing. We would set a heavier production casing due to the possibility of up-hole completion and stimulation down the casing. In both of these instances Hanley would furnish this pipe at a cheaper cost than what it was proposed to Santa Fe.

Q. When you complete the analysis, what is your conclusion about the total cost of Santa Fe's AFE related to the Hanley AFE?

A. The Santa Fe AFE is $757,000 compared to the $668,000 for Hanley. Difference of some $90,000. To move on past that to page number 30, we believe our costs are in line for this area. Page number 30 is an AFE versus actual cost for the Bone Springs well that we recently completed in Section 24, three miles to the south of this field. We AFE'd that well for $536,000. We believe it's $542,000. We overspent by $6,000 or $5,600, roughly one percent. Hanley has drilled, again, this well in Section 24. We have an 8,700-foot Bone Springs well to the west in Section 7 of 18 south, 31 east. We have an 11,600-foot Marrow test further to the west in 19 south, 29 east.

In my previous employment with Marathon I participated in drilling numerous wells in this area. There's a Wolfcamp test at Section 15 immediately southeast of a proposed location. There's a Wolfcamp test in Section 3 of 1832, numerous Bone Springs tests over here in 1831. Our experience -- we've been in this area of Southern New Mexico for -- Hanley themselves have been active since 1983. I myself have worked in it since 1977. We're perfectly able and willing to operate this well.

Q. And you seek to be designated operator?

A. Yes, sir, we do.

Q. That concludes my examination of Mr. Huck. We move the introduction of his Exhibits 17 and 18.

COMMISSIONER LAMAY: Without objection these exhibits will be entered into the record. Mr. Bruce.

CROSS-EXAMINATION

BY MR. BRUCE:

Q. Just very briefly, Mr. Huck. Look at the first page of your Exhibit 18. I think that's the -- what you've called the iso production map?

A. Yes, sir.

Q. That reflects the production from different zones in the Wolfcamp?

A. This is total production. This is estimated ultimate recovery based on the production from each well and their history as reported by the gas engineer. It would be regardless of the design prorated.

Q. And I believe you've already testified looking at the well in the southwest of the northwest of Section 17, and the offsetting well in the southeast of the northeast of Section 18, and those are producing from different zones, aren't they?

A. You say southwest and northwest of 17, the #5-E?

Q. Yes. The Number 5 as compared to the Number 1 well?

A. We can show it on this cross section here. Here is the Number 5-E. Here is the Number 1-H in Section 18. Number 1-H is producing out of a lower lime member that's some 80 feet thick. The 5-E is producing out of the upper part of another lime member that's some 150 feet thick over gross intervals. Number 5-E was completed a few years -- a number of years after the Number 1-H in came flowing.

Q. Okay. Does your iso production map also reflect or take into account pressure information?

A. There is no pressure information that's included in the well other than -- I've looked at pressure information in the field. You see a big variance, again, going from well to well. You see, for instance, well Number 8-C in the north end of Section 17, this well has three different pressures in it ranging from -- 8-C is shown here as the third well in the cross section. Also it tested different zones in the well. It had pressures ranging from 1,400 pounds to 2,100 pounds to 4,000 pounds for one zone. Number 5-E, when it was completed, had 4,000 pounds roughly of bottom hole pressure. Going back --

Q. That being 4,000 pounds approximately would be virgin pressure in this hole?

A. You see up to maybe 4,300 pounds in this pool. What you would classify as virgin pressure, I don't know. The Kachina 8 #1 up here in Section 8 has roughly 3,500 pounds of bottom hole pressure. I may be off a hundred pounds or so there.

The Kachina 8 #2 tested tight in that same zone, or in the basal zone. When we moved up the hole it's got a bottom hole pressure of 2,400 pounds, and there's not a well within a mile of it producing, so what classifies as virgin pressure, I think, varies from zone to zone.

MR BRUCE: Thank you, Mr. Chairman.

COMMISSIONER LAMAY: Mr. Carr.

MR. CARR: I have no questions.

EXAMINATION

BY COMMISSIONER BAILEY:

Q. On page 23 of the black book.

A. Yes.

Q. You said that the ultimate recovery for each of these locations was independent of the assigned acreage that would be --

A. Yes. I believe a well at the south location would recover about 130,000 barrels at the most, regardless of what acreage that's assigned to it. The well with the north location would recover reserves more approximately with the Kachina 8 on the order of over a quarter of a million barrels. Again, regardless of what acreage is assigned to it.

Q. What variables do you use in order to come up with that?

A. Basically just the shape of these producing pods, the isolated occurrence of these quarter of a million barrel reserves, and how quickly we can move away from them. You lose those reserves. I made this pod a little bit thicker. It may not be this big as far as the outer limits of economical production.

Q. Okay. That's all I have.

COMMISSIONER LAMAY: Mr. Weiss.

EXAMINATION

BY COMMISSIONER WEISS:

Q. In Section 17 there, the well to the north, and then that other good well down on the west side, yeah. Are they completed in the same zone?

A. Well, Number 5-E, again, going back to the cross section. Well Number 5-E is perforated over a rather large interval here in the center of the rows --

Q. Which one is that now?

A. That's the good well.

Q. Okay, yeah. I got you.

A. That would be right here on the west side of well number 8-C. This completed after testing some lower lime intervals was completed in this upper zone. Incidentally, it came in at flowing some 300 barrels a day, initially looking like a pretty good well, but that has produced

30,000 barrels since it has ceased production.

Q. Well to water?

A. Basically fine water cut was about 85 percent.

Q. In some respects I wonder if a person could view this thing as a reservoir with a normal water drive in a different zone?

A. The decline on it that you see on this steep initial decline followed by a flattening out are more indicative of a solution gas drive or a solution gas expansion. There's water there, and you get a certain amount of expansion in the water leg as you get some of this depletion, and it can overcome if you're close enough to it. It can overcome your oil.

Q. Also on page -- I guess you say you don't think it's a conventional water drive?

A. It's not a dominant water drive. It may be a minor amount of water drive, but I don't think it's dominant.

Q. And then on page 23, what did you use for oil prices?

A. Oil price on page 23. I have the runs in my files. I believe it's either $18 or $20 a barrel. Gas price is about $2.35.

Q. $18 to $20 a barrel?

A. Yes.

Q. Okay. That's the only questions I have. Thank you.

EXAMINATION

BY COMMISSIONER LAMAY:

Q. I just have one here. In the cross section I don't really see any drill stem tests. Have you noticed -- Is that a common procedure to drill stem test these wells on the way down?

A. Sometimes they're tested. This well that was drilled in the east side of Section 8 drill stem tested down here in the basal part of, or the lower part of this lower Wolfcamp member. They've got some gas to surface and then 2,100 feet of oil/gas cut formation water at this interval, and then at this interval they got 651 feet of slightly oil and gas cut, mud, and their sample changes recovered some 1,300 cc's of oil and 50 cc's of mud, but there's not that many bsc's on these wells that Meridian has completed or Southland basically. They, according to previous testimony, they started at the bottom to test and perforate until they get production. Santa Fe has been bst's. They attempted to BST their Kachina 8 and Kachina 5 #1.

Q. I guess the reason for my question is it seems to me that one way to evaluate it would be any pressure lost between initial and final pressure -- stemic pressures -- as you test these zones if they're small and discontinous, I think you could see a pressure decline on a drill stem test.

A. If they're small enough you could. They'd have to be awful small, and, again, because there're so many of them, you know, where one might appear tight, a little bit of stimulation might put you into some fairly decent rock, or connect you up with some better quality reservoir.

Q. So there -- so you don't have that kind of pressure information to tend to try and fit together which of these things are continuous over any distance and which are not?

A. No, sir, I do not.

Q. You only have what might be considered interpretive skills in those kinds of things?

A. Yes, sir. We have some pressure reported. Again, I was quoting on that Number 8, not on what happened on the Number 5-E here. It had an initial pressure of about 4,000 pounds. At the time it was completed the well to the west had a pressure of about 1,000 pounds. You know, this well here was completed. Initial volumetric pressure was some 400 pounds less than 5-E as reported. That's reported. Some reported shutting barnacle pressure.

Q. Let me reverse that question. Is there anything on this map that you have here that could show that there are any two wells on this map that are pressure continuous?

A. That are?

Q. That aren't. If you could point to and say, "Yes. This is the same reservior in these two wells."

A. Based on pressure information, no, sir, I cannot.

Q. Isn't that the only way you can truly identify reservoirs as being in communication as to pressure information?

A. Pressure information, and then their relative position in the section.

Q. But if you have two blocks and they're deposited in the same section, isn't it possible that you can correlate them on 40 acres and yet have those two blocks be separate blocks entirely?

A. It could be separate. You know, these two zones that are completed here are not that far apart, and one had 3,400 pounds or 3,500 pounds, and one had 2,400 pounds.

Q. That's the only questions I have.

COMMISSIONER LAMAY: Any additional questions of the witness? You may be excused, thank you. Let's take a break for lunch and we'll come back. You have additional witnesses?

MR. KELLAHIN: No, sir. That completes our presentation.

COMMISSIONER LAMAY: We'll come back for Santa Fe's presentation and then we'll take an hour.

(Recess for lunch at 12:45 p.m.)

(Hearing resumes at 1:45 p.m.)

COMMISSIONER LAMAY: We shall resume.

DIRECT EXAMINATION

BY MR. BRUCE:

Q. Thank you, Mr. Chairman. First we call our geologist to the stand, Mr. Thoma. Would you please state your name for the record?

A. John Thoma.

Q. Where do you reside?

A. Midland, Texas.

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

A. Santa Fe Energy Resources as a senior geologist.

Q. And have you previously testified before the division or the commission as an expert and as a petroleum geologist?

A. Yes, I have.

Q. And were your credentials as an expert accepted as a matter of record?

A. Yes, they were.

Q. And are you familiar with the geology involved in these cases?

A. Yes.

MR. BRUCE: Mr. Chairman, I submit Mr. Thoma as an expert and authority in geology.

COMMISSIONER LAMAY: His qualifications are accepted.

Q. (By Mr. Bruce) Mr. Thoma, if you could refer to Hanley's 12, 13, and 14, do you have those in front of you, Hanley's Exhibits 12, 13, and 14? On those exhibits, Mr. Thoma, there's a couple of locations marked in the east half of the northeast quarter of Section 7. I think they were referred to as Southland Royalty or Meridian locations. What do you know about those locations?

A. We met with-- myself and the Santa Fe engineers -- met with Meridian on the 19th of April. Four of Meridian's engineers were present, Mark Petrochek, David Parker, Terry Hookton, and Bill Brown. We discussed these two locations with them, and they stated that Meridian will drill either the 29 -- the West Corbin 29 -- which is the well located in the northeast -- northeast of section Seven -- or the West Corbin 30, which is the well in the southeast of the northeast of Section 7, pending the outcome of the commission hearing we're involved in today.

They also indicated to us it was their intent to honor the diagonal 80-acre spacing pattern that's been established in this pool.

Q. So both of those wells will not be drilled to the best of your knowledge?

A. That's correct.

Q. Okay. And we'll keep those exhibits handy. Mr. Thoma, we'll get back to those in a minute. Referring to Santa Fe Exhibit A, B, and C, which have been put up on the board, will you discuss, in a very brief fashion, the Wolfcamp geology and the productive intervals in the Wolfcamp?

A. We have a elected to segregate the Wolfcamp -- the Lower Wolfcamp -- Section 7 in the South Corbin area into five distinct detrital intervals. I've labled them on the cross section B to B prime which is an east/west cross section -- actually south-- starts in the south at point B here in the Southland Royalty West Corbin Federal Number 9, and southwest southwest of Section 8, runs up through the proposed Santa Fe Kachina 8-2 location through the existing Kachina 8 location, and terminates in the Oxy USA Federal AG #2.

On that section I've highlighted four or five shales which are regionally correlative shale marker beds in the Lower Wolfcamp interval. They're highlighted in brown. The intervening carbonate intervals are labled the "AC," "AD," "AE," "AF," and "AG" from top to bottom. Those five intervals are the productive intervals in the South Corbin Wolfcamp field area.

Q. How does Santa Fe refer to those five intervals? What nomenclature, lettering?

A. Santa Fe; the "AC," "AD," "AE," "AF," and "AG."

Q. And what is the deepest zone?

A. The "AG."

Q. Okay. Can you predict with accuracy what type of reservoir occurs in that particular location?

A. In the Wolfcamp it's highly variable. You can do two things to reduce your risk in the Wolfcamp. First you can map, as we have, and as Hanley has done to a certain extent, the carbonate -- the clean carbonate in the field area. To date, no production has been established outside of these clean carbonate thicks. Within the clean carbonate thicks, the reservoirs vary depending upon fracturing and matrix porosity development.

The fracturing is probably the most difficult characteristic to predict, but yet it's probably the most important. I believe that you can discern beds which should be fractured from beds which should not be fractured based on the minerology and differences in minerology of those beds.

It is demonstrated in various places, not only around the Permian Basin, but around the country in oil-producing regions, that fracturing is dependent upon minerology, and the reason -- when a section of rock fractures, it doesn't fracture from top to bottom is because you have different rock types within that section that have different characteristics, different hardnesses, and different susceptibilities to being broken by flecture.

In this area, in the "AG" in particular, which is shown on the upper right-hand corner, that reservoir is typically in the area of a nonporous reservoir. It exhibits virtually no matrix porosity and consequently the reservoir, when you find it, is a fractured reservoir.

I've looked at samples in the "AG" zone across many of wells in the South Corbin and the conclusion that I'm coming to, and we're still studying it, but it appears that there is a balance in the minerology that when you have 100 percent chirt in this section -- the higher the percentage of chirt above about an 80/20 percent between chirt and limestone, when you get above that or below it with chirt and limestone, that the rock is either ductile and won't fracture, or it is too hard. If you get too much chirt it requires a much higher stress to fracture it. This area is not a heavily deformed area structurally. There are certain features in this area which certainly have significant structural movement -- Devonian features.

In this particular area there are not any major Devonian features, so the structural stresses that were placed on these rocks during Wolfcamp in time and probably throughout time, in this particular area, I believe were moderate, and that's why you need a certain percentage of limestone to somewhat soften the hardness of the formation -- of the chirt formation -- in the "AG" zone.

In the 8-1 well, we encountered about an 80/20 split of chirt and limestone in that well bore. In the 5-1 we encountered clean carbonate, or I should say "clean rock." It's really mostly chirt -- quartz -- but the percentage was different. There was a greater percentage of chirt in that well bore, and consequently it was not fractured. However, as you move up Section 7, the 5-1 well, which I don't have on the section, but essentially the -- basically we've got AF pay -- this is the 8-1 -- we have "AF" pay, "AE" pay and "AC" pay. And we're perforated in the "AF," which in that well is, in fact, productive, and in the 8-1 well, calculates to be productive.

Q. So what you just said is the 5-1 well is -- what zone is it producing from now, the recently completed 5-1?

A. The 5-1 is producing from "AF."

Q. What other zones are prospective in that well?

A. The "AE" which is also present in the 8-1, and the "AC" which is very poorly developed in the 8-1.

Q. What is the Kachina 8-1 well producing from, which zone?

A. The "AG," the basal zone.

Q. Is it prospective in any other zones?

A. Yes. I believe it's prospective in the "AF," and" in the "AE."

Q. But it's not producing from those zones?

A. No, it is not.

Q. At this time?

A. That's correct.

Q. Now what about the West Corbin Federal Number 26 well? Where's that well?

A. The West Corbin 26 is located in the northeast of the southwest of Section 8.

Q. In that a recently completed well?

A. Yes. That well was completed, I believe, in early April.

Q. What zone does that well produce from?

A. That well produces from the "AC," dominantly from the "AC."

Q. Okay. Now, would you refer back to Hanley Exhibit 12 through 14? It was Hanley's testimony that the red dots on those maps indicated that those wells are dry in the indicated zones. Would you comment on that, please?

A. Yes. I believe those maps are somewhat misleading in that many of these wells which Hanley believes are dry in these zones are, in fact, untested in these zones. Two cases in point are the Kachina 8-1 and the Kachina 5-1. The Kachina 8-1 clearly has -- we're looking at a porosity log on the left and the recently completed well on the right, clearly in both of "AF" and in the "AE," both of these zones have very attractive reservoir characteristics, bottom matrix porosity. There is some indication of fracturing on the electric logs with spiking of the mud in there. There is very good invasion profiles on the electric log separation between the recividity curve and significantly both of these wells calculate productive.

They calculate both volume water numbers below .03, and in these particular reservoirs in the "AF" and the "AE," which are typically chalky limestone reservoirs, the irreducible water saturation we believe to be around an 03,.03 --.025 to.03, and that's based on purical datum from many wells we've looked at to the south. Both of these zones calculate below those bulk lime water values, so we believe that both of these zones are productive. They just have not been tested. Hanley believes that these zones are dry. I would disagree with that, and I think that most of these red dots on these maps, if one were to look very closely, one would find that, in fact, the zones have not been tested.

Q. Okay, Mr. Thoma. Moving on to the mapping, why did you map each zone, or each carbonate interval, separately as opposed to Hanley's method of a gross map?

A. Because we believe, and Randy Offenberger, the reservoir engineer, will testify to this further, later on, we believe that by so doing we can isolate individual reservoirs, and that we can demonstrate through pressure data that these are, in fact, individual reservoirs that are in pressure communication, that the correlations I'm using on these in here are substantiated by pressure data -- can be substantiated by pressure data.

Q. Do the intervals vary in thickness pools along each individual interval?

A. Yes, they do.

Q. Now what -- as far as the depositional strike -- what direction do you think is appropriate for the Wolfcamp?

A. The direction I believe is appropriate is the direction that I have mapped, and that is northeast to southwest. I'd like to go back to Hanley's exhibit -- I believe it's Exhibit 1 -- which is a regional map showing what they believe to be the Permo-Penn reef trend. I very much disagree with their interpretation of the Permo-Penn reef trend.

What they have highlighted approximates the Abo reef trend, and it in no way approximates the Strawn shelf edge. It in no way approximates the Wolfcampian shelf edge, which most professionals that I've met and most publications -- technical publications -- believe to be well to the north and more along the trend of Kemnitz production, which is located in the township 16 south, 33 east and 34 east. There's a diagonal trend of production along the south edge of those two townships which are believed to be -- or that the Wolfcampian production along that trend -- is believed to be Wolfcampian shelf edge production.

Furthermore, I believe that there is a significant difference between the Wolfcampian shelf edge and the Bone Springs shelf edge, not only in terms of the position and the orientation, but also in terms of the vertical magnitude of the shelf edge.

The Wolfcampian shelf edge I believe -- from my own work and from references that I've looked through over the years -- it's probably a much lower relief shelf edge, and probably exhibits relief on the order of two to 300 feet vertically at the shelf edge, whereas the Abo -- actually the Leonardian shelf edge -- was a much more vertically extensive reef complex, and the actual magnitude -- vertical magnitude -- from the base of the shelf edge to the top of the reef, was probably more along the line of 1,000 feet.

Q. How would that affect depositional strike?

A. Well, the primary difference would be in the adjoining four-reef slope. I believe that the Wolfcampian four-reef slope, since it is associated with a much lower structural profile shelf edge, would be more ramp-like. It will have a much lower angle from the edge of the shelf out into the basin.

In the Bone Springs I believe you've got a very steep reef face and consequently a very steep slope in front of the reef. This is important because I believe that there are two factors, among others, but probably the two most important factors, in my estimation, that would influence deposition of detritus -- carbonated detrius -- being shed from any shelf edge -- whether it's the Bone Springs, the Wolfcamp, the Pennsylvanian, one is the angle of the four-reef slope, and the second is the, or are the ocean bottom currents.

Certainly we are below wave base, but that doesn't mean that sediments are not reworked. Sediments are reworked in a submarine setting and this is documented in several settings off of current day -- or several current-day depositional settings off California that sediment and water as deep as 2,000 feet are being moved and transported by ocean bottom sediment, or ocean bottom current. If the ocean bottom current exceeds the velocity of the sediments which are being carried down the slope, then the ocean bottom -- the ocean bottom current is going to be the dominant factor controlling the distribution of those sediments.

In the -- during Wolfcampian time, since you're dealing with a low relief, I believe a low relief slope, the velocity of those sediments being shed from the shelf and moving down into the basin would be much lower than they would be during Bone Spring time. Consequently, I think that Wolfcampian sediments are much more likely to be influenced by other circumstances. One would be the ocean bottom current.

Q. Okay, Mr. Thoma, before we get into that a little bit more, would you just briefly identify what Exhibit A is, and that's the map on the upper right of the board.

A. I'm sorry. Would you repeat that?

Q. Exhibit A. Just identify what that map is and when it was prepared.

A. Exhibit A. It's a montage of the Wolfcamp.

Q. Exhibit A. This one.

A. Oh, I'm sorry. It's two maps that were prepared by me prior to the drilling of the Kachina 8 #1.

Q. I see a date on this one of August 6, 1990. Is that the approximate date this was prepared?

A. Yes.

Q. And this shows your depositional strike in a northeast/southwest fashion; is that correct?

A. That's correct.

Q. And Exhibit B. When was this map prepared?

A. This map was prepared in April following completion of the 5 #1.

Q. And would it also include data from the 8 #1 well?

A. Yes, it would.

Q. And finally, what is Exhibit C?

A. That is an isopach map of clean carbonate in the "AC" zone.

Q. Okay. Now, you've already discussed the depositional strike. How did the new wells drilled by Santa Fe affect your original mapping done last August?

A. Well, it's evident that it does not substantially alter the geometry of the original mapping.

Q. Okay.

A. As a matter of fact, it confirmed the mapping. You can see the orientation of the thicknesses that we originally mapped through the prospect area, and you can see the resulting maps with the new control, and there is -- there are minor differences of thickness, but the orientation and the trend has not changed at all.

Q. Looking at the 8-1 well, which is in -- which offsets Hanley's acreage directly to the east, which direction do you expect thickening of the Wolfcamp carbonate to occur?

A. I'd expect thickening to be to the southeast.

Q. And what about to the west and towards Hanley's acreage?

A. I expect it will be thinner.

Q. Now, in preparing your maps on depositional strike, what did you use? What was the primary tool you used in forming that northeast/southwest axis?

A. Existing well control. I used the subsurface isopach values, and I allowed them to tell me what the direction of the strike is rather than trying to impose a preconceived idea of what it should look like.

We have enough control in the area to establish a strike, so it's not entirely necessary to apply models. While they're useful, I think if you've got the control, you should rely on the control. And on the "AF" -- prior to the drilling of the 8-1 and the 5-1, we had a strike set up in numerous wells to the northeast. We had 99 feet in the "AF" 99 feet, 107 feet, 116 feet, 122 feet; clearly a northeast trend.

Q. And you're referring to the Wolfcamp "AF" zone?

A. That's correct.

Q. And the well controlled does establish a clear northeast/southwest trend?

A. That's correct.

Q. Okay. Would you please look at -- this is Hanley's Exhibit Number 2 from the examiner hearing. Would you please comment on their map and how it's affected by the 5 #1 well?

A. Well, Hanley was predicting approximately 150 feet of clean carbonate at their location, or -- I'm sorry -- at our Prime 1 location. They believe that the detritus were thin to the east and northeast. In fact, I was being a little bit conservative. I gave them feet. By their own testimony they have an excess of 300 feet of clean carbonate at this location. If you can compare our projections -- subsurface projections with their subsurface projections, and we're providing you with our original interpretations even prior to the 8-1, the thick has developed along the strike we projected, and, in fact, their well -- all right.

If you compare the thickness in the 8 #1 with the thickness in the 5 #1, there is, on their two maps, 266 feet in the 8-1, and I've got 295, 300-plus feet in the 5-1. They're even demonstrating thickening to the east by their own maps.

Q. So their prior prediction was incorrect, was it not?

A. Yes.

Q. Based on Santa Fe's success in the 5 #1 well, does Santa Fe anticipate drilling any other wells in Section 5?

A. Yes. We've currently -- we have plans to drill the 5 #2 in the northeast of the southeast at a standard 198650 location. On a standup, I believe it's a standup, along a diagonal 80-acre development line, and that well will probably be drilled within the next month and a half.

Q. What has Santa Fe's success rate been in drilling or participating in wells in the South Corbin pool?

A. To date we have drilled or participated in 12 wells, and this includes the Kachina wells and other wells on our block to the south, which is operated by Meridian. We've completed 11 of those wells as commercial producers with one dry hole. That is a 92 percent success ratio.

Q. That is substantially higher than just predicted by Hanley, is it not?

A. Yes, it is.

Q. Why don't you move onto Exhibit D -- or excuse me. Do you have any further comments on Exhibit A, B, or C, Mr. Thoma?

A. No, I do not.

Q. Okay. Let's move on to Santa Fe Exhibit D, and please identify that for the commission.

A. Exhibit D is a table which I put together which highlights several aspect of each of these producing reservoirs in the prospect area, and actually throughout the South Corbin pool.

Q. Are the wells separated by productive zones?

A. Yes, they are. They are separated by productive zones. You can see each at the heading -- at the top of each grouping there's a label, "AG" reservoir, for the first group. "AF" for the second group, "AE" for the third group, and "AC" for the bottom group. The wells are ordered structurally with the highest well in that particular pool at the top of the list.

For example, the "AG" reservoir. The Kachina 8-1 is a structural position if you go over to the third column -- from the third value from the left -- its structural position is minus 7179, and that's on top of the "AF" carbonate. I'm using this structure map which is on top of the "AF" carbonate, which is basically on this shale marker there. If you go down the list, the West Corbin 18 is at 7246, and I've got a parenthesis after the structural value. The footage low that that well is to the highest well in the pool is the Kachina 8-1.

In the case of the 18, we're 67 feet low, and then on down the list. West Corbin 12 is 78 feet low, West Corbin 10 is 91, the Corbin State 16-2 is at 214 feet down dip from the highest well in the pool. I've also highlighted, or I'm showing the historical water cut, which is the cumulative oil produced to date, plus the cumulative water produced to date. That number is divided into the cumulative water, and I'm coming up with a historical water cut. That's the second column from the left.

The first column is the January 1991 water cut. If you look at these water cuts, you're going to notice something that's extremely interesting and extremely diagnostic in telling about these reservoirs. The Kachina 8-1 was completed in January -- in January of 1991. The West Corbin 8 -- it had an original water cut of 2 percent. All right? To date, right now, we are not producing any water from that well. It has dried up. The West Corbin 18, which is 67 feet down dip from the Kachina 8-1, started out with a 13 percent water cut. It is not producing any water now. The water has dried up.

Going 78 feet down dip into the West Corbin 12, the historical cut is 19 percent, the current water cut is zero. It's not producing any water. Go 91 feet down dip into the West Corbin Federal Number 10, the historical cut is 58 percent, the current cut is zero. Again, it's dried up. The only well that's producing water currently is the Corbin State 16-1, which is 214 feet down dip, and that's going from a 33 percent cut to a 46 percent cut, and I'd like to point out one other aspect of these numbers, which is not clearly evident here.

The West Corbin State 16-2 is only producing probably 5 or 10 barrels of fluid a day. So when Hanley speaks of water hitting, it's not like the ocean is coming to seethe these wells.

Basically what's happening, the wells are depleting, and the total -- the ratio is changing, but the total volume of fluid is dropping, so you're not seeing encroachment of water as such. You're just seeing the reservoir depleting, and I believe the reversal in these water cut numbers from historical to present, suggests that what we're seeing is a solution gas drive reservoir, and expansion reservoir as was testified to before.

I do not believe there is any element of a water drive on this reservoir that is based on these numbers, and I also don't believe that -- actually -- I'm sorry. I believe that this reversal is telling us that we're -- we are producing off the connate water fairly early on in the life of these wells, and that after roughly 12 months or so of production, you've produced the water out of the reservoir, and you're just producing oil at that point.

Q. You were talking about the "AG." Is that same performance reflected in the other productive zones in this pool?

A. Yes, it is. If you look at the "AF" reservoir below that, you'll see the same phenomena. You've got to go roughly 217 feet down dip before you see significant water cut. Again, you're looking at low volumes. You see the same general phenomena in the "AE" where you have to go 270 feet down dip. The "AC" is the only reservoir that shows significant water cut on the order of anywhere from 5 up to 90 percent. However, if you look at this table, you'll see that the highest well --

MR. KELLAHIN: Mr. Chairman, I've been patient, but I'm going to object. This witness is testifying beyond his experience. He's not been qualified as a petroleum engineer. We devoted our petroleum engineer's discussion to the water encroachment production questions, and yet we've got a geologist now talking about engineering issues, and we object to this as beyond his expertise.

Q. (By Mr. Bruce) Let's me ask one question. Mr. Thoma, you personally reviewed the well water productional figures?

A. Yes, I did.

MR. KELLAHIN: Same objection.

COMMISSIONER LAMAY: I don't think there's any problem with him testifying to what he's observed and what he has calculated. If he's holding himself out as a geologist, he can certainly calculate water. Now when we get an engineering calculation you may be right, and I'll decide that issue, but if he gets beyond what I consider a geologist's prerogative. He can talk about water.

A. Let me finish this point. I think I may be getting long-winded about the water. The conclusion here; one is the fact that we're not looking at a water drive because of the water cut.

The second, if you look at "AC," I was about to say that the highest well in that pool at 7187 is the West Corbin Federal Number 26. If you go to the lowest well in that pool, which is the West Corbin 14, which is 135 feet down dip, it has a lower water cut then the highest well in the field structurally, and that's the difference of those. It's really structural. Water production is not related to structural position.

Q. Well, let's get back to the structure. Mr. Thoma. What amount of structural advantage does Hanley's proposed location have over Santa Fe's proposed location in the Wolfcamp?

A. In the Wolfcamp it has approximately 10 feet.

Q. Much less than the 200 feet that seems to be a problem?

A. Yes.

Q. In your opinion, is the Santa Fe proposed location superior geologically to Hanley's Wolfcamp location?

A. Yes, it is.

Q. Couple of final issues before we move out of the Wolfcamp and into a brief Bone Springs discussion. Would you please identify Exhibit E, which I believe is on the small board in front of me?

A. Exhibit E is a two-well cross section. It exhibits the same correlations as shown on the same vertical scale as the cross section on Exhibit A.

Q. Which wells are involved?

A. It involves the Aztec Oil and Gas, West Corbin Number 1, which is located in southeast/northeast of Section 18. That's located on the lefthand side of the cross section. On the righthand side of the cross section is the Southland Royalty West Corbin Federal Number 5, which is located in the southwest of the northwest of

Section 17.

Q. Okay. Will the reservoir engineer further discuss these wells?

A. Yes.

Q. And looking at Exhibit A -- a few miles to the west are some wells in Section 16. I guess that's 18 south, 32 east. Would you briefly discuss those wells for the commission?

A. The two producers in Section 16 in the northeast/northeast, and in the southeast/northeast were drilled by Mitchell Energy in -- I'm sorry. By Merdian on a Mitchell farmout. They are producing from the basal Wolfcamp "AG" reservoir, which is the same reservoir which produces at the Kachina 8-1.

Q. Are those wells based on 40 acres?

A. Yes, they are.

Q. And will our engineer further discuss those wells as well?

A. Yes, he will.

Q. Well let's move on to the Bone Springs, Mr. Thoma, and I refer you to Exhibit F, and briefly discuss what you foresee in the Bone Springs.

Q. In the Bone Springs there are two primary pays. In the Young North and South Corbin area, they're shown on the cross section, which is an east/west cross section. The point A' is over in the Young North field, traverses two wells in the Young North -- actually three wells in the Young north pool: the Santa Fe Energy Sharp Shooter 2 Number 1, the Southland Royalty West Corbin Federal Number 19 and Southland Royalty West Corbin Federal Number 7 -- and then it jumps over into the Santa Fe, the proposed Santa Fe Kachina 8-1 location -- 8-2 location, excuse me -- runs north through the Hanley, east through the Kachina 8-1, and northeast into the Kachina 5 Number 1. And what we see are the two pools in the North Young field area. The upper member I'm calling the Sniper dolomite. The lower member is the Young Deep.

The oil/water contact in the Young North and the Sniper pool is at (-4604') The oil/water contact in the Young Deep is at (-4645'). These two maps at the top right lefthand side of the montage show the top lefthand map is an isoporosity map, and the Sniper dolomite using 8 percent neutron cutoff, and it shows a distribution of the Sniper dolomite in the Young North area. Moving on to the east in the Kachina area, I'm showing the distribution in that area as well.

The company map is a structure map

prepared on top of the Sniper dolomite, and the two wells on the righthand side of the montage address the Young Deep pool. The green coloring on the montage is highlighting the oil pool, or the prospective oil pool, in the case of the Kachina prospect area, and the water column in both pools in both the Young Deep pool and the Sniper pool.

Looking first at the Young Deep pool you can see immediately that the Young Deep pool trails off to the southeast and essentially is wet across both the Hanley location and the Santa Fe energy location.

On the other hand, the Sniper pool -- originally we had projected -- we had projected this pool to extend -- to extend right across this acreage and be one continous reservoir, and you saw that montage this morning. Because of data we've now acquired in the 5-1, I believe they are not -- the Sniper is not one continuous pool, but rather is segregated. That there is, in fact, an area of nondeposition, of breach, between a pod of Sniper dolomite developed in the Kachina area and the productive pod developed in the Young North area. The reason I've drawn this conclusion is because the oil/water contact --

Q. Just for a minute, Mr. Thoma, back up and state what you found in the 8 #1 well.

A. All right. In the 8 #1 well, we penetrated about ten feet of dolomite pay which calculates productive. We did not test it, but it calculates productive. On top of approximately 50 to 60 feet of fractured -- fairly tight, but fractured dolomite, we believe that this entire section was the equivalent of the Sniper dolomite to the west, so we correlated those -- we brought those together and we included this upper bed, which I'm now calling the Sniper shingle -- in its entire interval.

Well, if you follow that logic across this structural cross section, we should have had approximately 50 to 60 feet of oil column in the five line. In fact, we got a lot of water contact, which we based on calculations in the vicinity of porosity capacity zones, which is at 4513, which is significantly above the low proven oil that we see in Sniper shingle in the 8-1 well. Consequently, I believe this shingle is a locally isolated pod of dolomite, which is just laying on top of the Sniper dolomite proper, and if you look at the structure section, or the structure map, on the Sniper, and you use the projected Sniper oil/water contact of 4513, you'll see that it skirts the very northern edge of the Hanley lease, and it looks now like Hanley's location, as well as ours, will both be wet in the main Sniper body.

The only objective I believe they have remaining in the Sniper, or in the carbonate, is this shingle. It will be up dip to our well, the 8 #1, our first well, but I might point out, this shingle does not appear in any other wells out there. If you go to the 5-1, you have a clean carbonate here but it's tight. There's no porosity developed in it. If you go west to the Southland Royalty West Corbin Federal Number 7, the nearest well to the west, it's not present there. It's also not present in the West Corbin 26, the nearest well to the south.

The other point I might make is that we haven't established where the oil/water contact is, in this shingle, so there's two variables. One is how big is it? And two, where is the oil/water contact? It's possible that we may encounter oil at our location because we don't know where the contact is, but certainly, Hanley has probably the lower risk because it will be high. The question is whether or not this well develops in a geographically significant area, whether it's a significant pool -- commercially significant pool.

Q. Finally, Mr. Thoma, could you make a recommendation in regards to the risk penalty for the well to be drilled?

A. I would like to see a 200 percent penalty established.

Q. And what do you base that on?

MR. KELLAHIN: We'll object Mr. Chairman.

COMMISSIONER LAMAY: On what point of order?

MR. KELLAHIN: Mr. Hanley was the appellant with regards to the order. Santa Fe Energy did not appeal it. They accepted the terms and conditions of the examiner order. The examiner found 100 percent risk-factor penalty. They are stuck with it. This testimony is irrelevant to that issue. They have conceded the point and waived the opportunity to complain.

MR. BRUCE: This is a De Novo hearing, Mr. Chairman. Everything is up for grabs.

MR. KELLAHIN: On my application, Mr. Chairman --

(Discussion off the record between Mr. Lamay and Mr. Stovall.)

COMMISSIONER LAMAY: Deny your request. We don't accept that. De Novo is open, so proceed with your comment on the risk penalty.

A. I believe the risk penalty should be 200 percent because of the risk associated with drilling for the Wolfcamp well. We have five objectives in the Wolfcamp. There are many instances that both Hanley and Santa Fe have cited where 40-acre offsets do not encounter the anticipated reservoir conditions, and based on this reservoir variability, we would like to see a high risk assessed.

Q. (By Mr. Bruce) What is the proposed depth of either of the two proposed locations -- depth of the well?

A. Our proposed depth is 11,450 feet.

Q. Were Exhibits A through F prepared by you or under your direction, Mr. Thoma?

A. Yes, they were.

Q. And in your opinion, does the granting of Santa Fe's application and the denial of Hanley's application stress the conservation and the prevention of waste and the protection of drilling rights?

A. Yes.

MR. BRUCE: Mr. Chairman, I move the admission of Santa Fe's Exhibit A through F.

COMMISSIONER LAMAY: Exhibits A through F will be admitted into the record without objection. Mr. Kellahin.

MR. KELLAHIN: Thank you, Mr. Chairman.

CROSS-EXAMINATION

BY MR. KELLAHIN:

Q. As long as we have the Bone Springs display up, Mr. Thoma, let's spend a few minutes about the changes in the interpretation you've made from the examiner hearing to now with regards to the Bone Springs.

A. All right.

Q. At the examiner hearing, what was the structural relationship between the Hanley location and the Santa Fe location in terms of vertical distance in Bone Springs?

A. Structural position?

Q. Yes, sir.

A. I believe -- I don't recall, Tom. I don't recall.

Q. Approximately 100 feet, I think it was, if I'm not mistaken. I don't want to misunderstand your display.

A. Yeah. This map hasn't essentially

changed between those two locations. The 5-1 did come in substantially higher to where I had it. You can see that I've had to pull this contour down to honor that point, but to answer your question, yeah. It looks like we're still about 100 feet low to the Hanley location.

Q. Okay. When we were at the examiner hearing and we were talking about the Lower Bone Springs -- the Young Deep dolomite -- you conceded at that point that Hanley enjoyed a structural advantage in the Young Deep, but based upon log calculations principally derived from your analysis of the information on the 8-1 that both the Hanley and the Santa Fe location should be west; is that a correct recollection?

A. That's correct.

Q. What is the lowest oil contact in the Young Deep that's actually been penetrated, tested, to determine whether or not that we can produce oil in the Young Deep?

A. Where there's actually been a contact in oil over water contact?

Q. Yes, sir.

A. On a log?

Q. Not on logs, but actual drill stem tests or production tests. What is the lowest structural interval?

A. The lowest structural point in time would probably be our Sharp Shooter 5 number -- Sharp Shooter 2 Number 5, and the southeast/southeast 2, and the oil/water contact is in that well. We perforated and tested the Young Deep zone in that well.

Q. Okay. And as you follow then the line of contour for the structure, you have no reservation that the Young Deep is going to be wet in both the Hanley and the Santa Fe location?

A. That's correct.

Q. When we moved up in the Bone Springs and got to the Sniper dolomite that you've identified at the examiner hearing, you assigned a difference there because as a result of structural position and using the 8-1 log on log calculations, you anticipated that the Hanley location would be oil productive.

A. In the Sniper.

Q. In the Sniper, right, and that lowering the structure in the Santa Fe it would be wet?

A. That's correct.

Q. All right. When you look at the Sniper, what is the lowest tested oil in the Sniper dolomite?

A. The lowest tested oil in the Sniper is in the well. There's two answers to that question. Okay? It depends on what vintage of oils you want to look at. The lowest structural position was over here on the Heyco base, and Heyco can testify to this later if they so choose, but we drilled the West Corbin Federal Number 19 with Meridian and encountered an oil/water contact in the Sniper -- in that well. It's been perforated, tested, and it tested a perforated porosity oil/water contact. As a result, we're producing significant volume of water with a small volume of oil.

Q. Using that well as the control, what is the structural point at which we have the oil/water contact in that well?

A. 4604.

Q. And as we follow the 4604 contour line, at the examiner hearing then, that line almost cut the north 40 from the south 40 at that structural point, didn't it?

A. That's correct.

Q. And so south of the line was wet because of the control from the Heyco well. North of it was potentially oil productive, and you had made long calculations on the 8-1 well, which you had at that time, and it calculated to be oil in the 8-1, did it not?

A. Right. In this upper shingle.

Q. Now the new data is the 5-1 in which we have another control point that is north and east of the 8-1 well.

A. Right. Correct.

Q. The Hanley location and the 5-1 are separated by the 8-1, right? Physically, I mean, on surface, horizontally, you see just adjusted positions of the well. When we look at the 8-1 on log calculations, that position should derive oil in the Sniper dolomite; right?

A. Where are we going with this?

Q. Answer my question, Mr. Thoma.

A. If you assume that this reservoir -- that the shingle is in communication with this reservoir, yes.

Q. Okay. When we get to 5-1 -- there's no test on the Sniper dolomite -- you have a log calculation again, don't you?

A. That's absolutely correct.

Q. Okay. And that 5-1 is at a higher

structural position than either the 8-1 or the Hanley location?

A. That's absolutely correct, but we have participated in a number of wells in the Bone Springs area. We have come to the empirical conclusion, and we've tested this conclusion through production testing, that if you have a log with indicated permeability in the dolomite -- the Bone Springs dolomite -- and they exhibit recividities regardless of the porosity; less than 100 ohms. It's wet. If your bulk volume water numbers are less than .015, maybe .02 at the most, it's wet. That's why Meridian came over here and tested the water, because they saw 90 percent porosity. They calculated it out, 20 percent water saturation. That should be productive; it's not wet.

Q. When we look at the 8-1 well on log calculations, that calculation hasn't changed, has it? It's still oil, isn't it?

A. Not in the shingle it has not. The shingle has oil in it, but the shingle is not in the reservoir's communication with the Sniper.

Q. And you now have contoured this so that this Sniper shingle doesn't extend over into the Hanley location?

A. It may very well. I'm not saying that it doesn't, Tom. I'm saying I don't know. There are no control points out there. I mean, I certainly could say, "Well, it's going to be deposited in a north/south direction off of the Bone Spring range," which it probably is. Okay?

Q. I'm trying to understand your position, Mr. Thoma. At the examiner hearing, we have a well test that gives us the lowest oil/water contact in the Heyco well. You've got a log calculation for the Number 8-1 well that hasn't changed, that shows the Sniper dolomite to have oil in it. The Hanley well has a structural advantage to the Heyco in the 8-1 well, and you conclude it should have oil in the Sniper dolomite. Now tell me what has changed.

A. We drilled a well up dip of the Hanley location, and up dip of the 8 #1, which encountered the Sniper.

Q. Okay.

A. The Sniper oil/water contact in that well is above the oil/water contact if you were to pick it in this area, so you have to perform a minor miracle for those two reservoirs to be in communication. You've got water above here.

Q. So that does not dispel the fact that this Sniper shingle, as you've so identified it in the 8-1 well, is the oil shingle in this upper Sniper that could extend into the Hanley location?

A. It certainly could.

Q. Let's take that down and go to the Wolfcamp, if you please.

A. But by the same token, if you're going to play that game, Tom --

Q. I'm not playing games, Mr. Thoma. I'm just asking you some questions. If you'll respond to my questions -- the comments from the witness are not responsive.

COMMISSIONER LAMAY: He is responding.

Q. (By Mr. Kellahin) Mr. Thoma, when we look at your three isopachs on the Wolfcamp carbonate, am I correct in remembering from the examiner hearing, the "AF," the "AE," and the "AG" had an orientation to it. It was a northeast/southwest orientation to the thickness of that carbonate; correct?

A. Yes.

Q. Okay. And you and the Hanley geologists disagree about the orientation. They had made it perpendicular to what they thought was the reef front on the structure, and you have got an orientation that is northeast to southwest; right?

A. (Witness nods head.)

Q. What is your explanation for the fact that in each of the three Wolfcamp carbonate's isopachs that they have a similar orientation? How does that happen?

A. It's a function of the data that's there, Tom. We can -- it's not a function of the acreage position. If our map is a function of our acreage position, I'm afraid I'd be unemployed. I think our success ratio in here testifies to the fact that we are, in fact, evaluating specific objectives.

Q. The data gives you an orientation northeast to southwest? Is there a geologic explanation in how that deposition occurred with that kind of orientation to the carbonate picture?

A. Sure.

Q. What is it?

A. I went into it at length just a few minutes ago. If you believe that the Wolfcamp slope has a low angle as it flows, and that the velocity of the sediments being transported down that slope was less than the velocity of the ocean bottom currents, then the more quality of the resulting deposits when the sediments came to rest does not necessarily have to reflect any specific alignment with respect to the original shelf edge, and, in fact, if you look at the orientation of Kemnitz field, which is a Wolfcamp shelf edge reef, you'll see that the orientation of that is northeast/southwest.

Assuming normal deposition -- or deposition normal to that trend, perpendicular to it, both my interpretation and Hanley's is wrong. The fact of the matter is, the carbonates are developed in a northeast/southwest direction. The data supports that conclusion, and our drilling that supports that conclusion.

Q. If we look at "AG" and the "AF," they're the only ones I can see clearly here, the "AF" has the same orientation as the "AG," right?

A. (Witness nods head.)

Q. When you as a geologist are exploring for carbonate for the production in the Wolfcamp, am I correct in knowing that your objective is to penetrate one of these isopachs at the point of greatest thickness; true?

A. Provided the spacing allows it, correct.

Q. Okay. The idea is you have the greatest chance to get the best kind of well if you get to the thickest point in the carbonate; right?

A. Right.

Q. And so the device is for the geologist to find some reliable information that he has confidence in and to map an isopach; right?

A. Right.

Q. When we go to the "AG" carbonate and we find the "AG" zone in the 8-1 amount well, that's the productive carbonate that's now producing in the 8-1 well; isn't it?

A. The "AG."

Q. The "AG."

A. That's correct.

Q. How many feet of thickness of net clean carbonate do you have in the "AG" zone in the 8-1 well?

A. The thickness in the 8-1 is very close to the same thickness that you have in the 5-1, which is nonproductive. The reason the 5-1 is nonproductive is because of the difference in minerology.

Q. What is the thickness of the carbonate in the "AG" zone?

A. 31 feet.

Q. On the "AF" isopach?
A. That's on the "AG" isopach.
Q. On the "AG" isopach?
A. Do you have that on your map?
Q. No, sir.
A. The "AG" is 31.
Q. Okay. We find the 5-1, we get approximately the same thickness, and it doesn't produce. The drill stem test, it doesn't produce?
A. It doesn't have fractures.
Q. Okay. When we look at the location in the southeast of the northeast of Section 8, that's a Wolfcamp test, is it not?
A. That's correct.
Q. And that well was drilled by that operator, and they tested the "AG" carbonate and abandoned that zone, did they not?
A. They did, but not without encountering significant shows of hydrocarbons. They elected not to complete, and I might point out that that well was drilled prior to probably 80 percent of the activity in the Wolfcamp in this area.
Q. All right. When we look at your three isopachs on the carbonates, and we look at the Meridian/Southland Royalty locations, they've stayed

in the east half of Section 7. How would you rate the northeast versus the southeast of that section?

A. The northeast/northeast versus the southeast --

Q. Southeast/northeast. Which is the better location?

A. The better location would be the southeast and the northeast.

Q. Why is that the better location?

A. Right now because of the thickness -- the reservoir thickness.

Q. Okay.

A. It does not mean that we would drill it, though.

Q. I understand, but based upon reservoir thickness then, if Santa Fe's locations is approved, the Southland Royalty location is going to be a direct west offset based on thickness, isn't it?

A. No, because Meridian is the operator and they've already indicated to us that their intent would be to honor 80-acre diagonal spacing.

Q. What is Santa Fe's intent? Does Santa Fe propose that they will participate in either one of those wells?

A. We have not received a proposal from

Meridian yet. We have not evaluated the proposal. The offset is a 40-acre offset to the west. I think we will probably not participate. It would be my recommendation as a geologist that we do not participate based on the engineering pressure data that I've seen in the area -- not based on geology, but based on engineering.

Q. So your recommendation is that Santa Fe would not participate in the direct west offset to the Santa Fe location?

A. It would be my recommendation that they not participate. I don't know what Santa Fe will do.

Q. I like your recommendation, Mr. Thoma. What about the northeast and the northeast of 7, would you recommend participating if that was the location?

A. Right now, no, I would not.

Q. When we look at the "AC" isopach, it's your Exhibit Number C.

A. I'm sorry, Tom. Yes, sir.

Q. The Exhibit C isopach, which is "AC" carbonate, that's the top zone that you isopached in the lower Wolfcamp, is it not?

A. That's correct.

Q. Okay. The orientation of the thickness of that "AC" carbonate is north and south, isn't it?

A. It's in between north/northeast, south/southeast here.

Q. Well, I don't want to quibble with you, Mr. Thoma, but it is substantially far north and south?

A. That's correct, it does. It does have a substantial north/south.

Q. And it's substantially different than the orientation that you have selected for either the "AF," the "AG," and the "AE," isn't it?

A. Yes.

Q. How does that happen?

A. Well control.

Q. What geologic phenomenon has caused the depositing of these lens or members of the Wolfcamp so that you can't map them with the same orientation in the "AC" that you've mapped the other three?

A. Well, I argued that orientation is only slightly different than the orientation on the other maps. We're talking -- this whole argument about the orientation is entirely overrated as part of this discussion, I believe. Because if you believe the data, which you have before you on the map, and the history of our program, it is telling you where the thicks are, whether they're north/south, whether their northeast/southwest. The thick is to the east and southeast of the wells we've drilled to date. Whether that thick is north/south to the east, I don't know. I don't believe it's to the west, but it may be north/south to the east, but it is to the east.

Q. In mapping the isopachs, because of the orientation, your maps will show lesser thickness on the Hanley location than on the Santa Fe location in all instances of your maps; is that not true?

A. That is correct.

Q. And conversely, with Mr. Robbins' and Mr. Bracken's orientation of the isopachs, they will get an orientation where the north 40 and the south 40 in question have comparable thicknesses; true?

A. True. But their predictions to date haven't been terribly accurate; ours have.

Q. Okay. How many wells does Santa Fe operate?

A. In the South Corbin pool I believe we operate two wells right now. The balance of those are not -- the balance of the 12 are nonoperated.

Q. Thank you, sir.

COMMISSIONER LAMAY: Thank you. Commissioner Bailey.

COMMISSIONER BAILEY: At one point you commented about the water drying up in the wells. Was there reworking or squeezing done on this well to enhance that phenomenon, or was that a naturally occurring phenomenon?

A. I can't give you a 100 percent answer. Some of those wells -- most of those wells, I believe the water has dried up naturally. A couple of those wells, one well in particular that Hanley referred to this morning, I believe it was the 21 -- West Corbin 21-- has a -- had a very high original water cut. They had a channel. They went back and squeezed, and that now has a much lower water cut.

We don't have all the workover data on the Meridian operated well to the south. I am going on the assumption that most of the reduction in water cut we're seeing is natural reduction and not the result of workovers.

The well that we've been in with Meridian to date, as I testified to earlier -- I think that's 10 -- only one of those wells has the water reduction been the result of mechanical procedures. The balance of those wells, the reduction is natural.

Q. In the Bone Springs, that's a water drive reservoir?

A. No. I believe that is an expansion reservoir also.

Q. And there is Bone Springs production to the east of this general area; is that correct?

A. Yes, there is.

Q. Did you try to make any correlations with the Sniper shingle or the Sniper formation towards the east also?

A. Yes, I have. I have. I believe that the pay in the Mescalero leach field, which is approximately two or three miles east of our lease here, is producing from a stratigraphically higher dolomite than the Sniper. It's producing from a dolomite which -- but it's basically probably 10 or 20 feet out from under the first Bone Springs sand.

As you recall on my display, I had a sand -- this is a Bone Spring sand -- here's the Sniper, and the pay of the Mescalero is much higher. It's up here 10 or 20 feet below the base of that first Bone Springs sand.

Q. So there really is no correlation?

A. I don't believe there is, no.

Q. Can you comment on Hanley's page one that shows the production pods in the area, how they will relate, or how they do relate to your orientation of the thick?

A. We have not specifically prepared a GUR map with respect to each one of these pods or intervals. What we do have, and our engineer will get into that later, is pressure data that shows that the reservoirs are in communication, that from well to well, individual zones are in pressure communication, not vertically, but laterally. I really have no comment on their map.

Q. That's all I have.

COMMISSIONER LAMAY: Mr. Weiss.

EXAMINATION

BY COMMISSIONER WEISS:

Q. You mentioned earlier where you picked the oil/water contact in Section 2 of the Bone Springs. Was it sitting right on top of it, or was there separation between the two; some streak of shale or something, and can you produce it?

A. Can we produce it? Yes, we can. I think our test rates were around 50 barrels a day. We shot -- it was probably -- this is an estimate -- I believe we had roughly 20 feet of oil column over water.

Q. Over water. And there's nothing separating them?

A. Over water. And we shot the very top of it -- gave it a light treatment -- and it produced approximately 50 barrels of oil a day.

Q. Still?

A. No. We moved up. We just wanted to test it, verify that it was productive; came up to the Sniper, which was the competitive reservoir.

Q. Thank you. That's all I have.

EXAMINATION

BY COMMISSIONER LAMAY:

Q. I probably have just one, Mr. Thoma. The correlations you used, you mentioned you looked at some samples in the AFE zones; chalky lime, some chirt, I take it in the, or silica certainly, in the lower "AG" zones. What about "AC," "AD," "AE," have you looked at any cores in the area or looked at any samples of those?

A. There are cores -- not to my knowledge -- none in the South Corbin pools -- There are cores from the "AG" on those -- one of those Mitchell wells -- Meridian wells -- in the Section 16 off to the west. They cored the chirt, the "AG" zone, but to my knowledge, have not cored the "AF," the "AE," the "AC" or the "AD."

Q. Did you look at that core? Have you seen it?

A. I have not seen it. I have spoken with the geologist and he just described it as chirt, so he didn't give me any percentages of lime or --

Q. What I'm trying to get at is trying to visualize the characteristic of this reservoir, you know, previous testimony is talking about pods, blocks, and you seemed to have zoned this and treat it more of a zonation of Wolfcamp carbonate rather than a conglomeritic or disoriented assemblage of carbonate rock. Do you have anything to say about the reservoir itself?

A. Stop me if I'm not answering your question. I think the difference -- I view the Bone Spring as a conglomeration of detritis that is located probably within a mile to a mile and a half in front of the reef, and basically that debris, I believe, was just dropped off the reef, settled at the base of the slope, and it's just a pile of garbage, basically. It busted off the reef. The Wolfcamp, I believe, assumes -- and let me back up -- and consequently the Bone Spring trend in general, the dolomite detrital trend, I believe, runs more in an east/west direction some parallel beyond the shelf edge, and probably runs in a band of roughly two to three miles wide.

The Bone -- the Wolfcamp. I look at the deposition more as submarine fan-type deposition where you're actually developing low bay geometries, because you are further from the shelf edge. I believe the shelf edge is in attendance what is approximately 8, 9 miles north of the South Corbin area, so you are much further from the shelf edge in the Wolfcamp than you are on the Bone Spring. So consequently I reviewed the deposition in the Corbin Wolfcamp pools, or reservoirs, as being more submarine-fan like rather than talus slope-type deposit.

Q. But a combination of blocks within a shaley basin-type matrix or some different configuration, if we don't have any cores -- I guess we're doing this to supposition chalky lime -- I don't know if that's part of a block or if that's a uniform methology throughout your interval. Are you interpreting that?

A. How do I answer that? It's an admixture. I don't believe you have blocks. The samples that I've seen certainly have indications in them that they are derived from the shelf, and that they are fairly fine grained -- the detritus is fairly fine grained rather than massive blocks or chunks of debris that's rolling, or being carried, out into the basin. I believe that the sediment is a much more fine-grained sediment to start with. The detritus is much more fine grained and that's why we've got a higher percentage of chalk.

Q. But what greater degree of uniformity would that be then?

A. I believe that there's a -- I don't know if I can draw that conclusion. I really don't because there's an awful lot -- the actual sediment itself is uniform, but the development of reservoir qualities -- properties -- within those sediments varies greatly. You can take a tight well -- look at samples from a well that has low porosities and compare them to a well that has good porosity like the 8-1. Compare these two wells. The 8-1 and the West Corbin Federal Number 9, which really doesn't have much porosity, there's a lack of matrix porosity, but the rock itself is the same.

Q. Which is what?

A. It's cemented. It's cemented.

Q. What, it's a chalky lime?

A. It's a limestone and it is chalky. The porosity -- I'm using -- I guess I'm using the word "chalky" more in a poor filling context -- a textural context -- that when you look at samples from productive matrix, there's chalk. There's very, very fine-grain interstitial linings. You know, you can generally -- you can't see that certainly in samples, but you can observe it from the texture of the samples.

Q. With a lack of crystal underneath, you say?

A. Yes.

Q. Fossils?

A. Yes.

Q. And some chirt?

A. Not in the "AF." Not generally in the "AF," "AE," "AD," or the "AC." It's not a hard-and-fast rule, but I'd say 95 percent of the reservoir that sits out there in those intervals does not have chirt.

Q. Predictable reservoir quality from well to well?

A. Unpredictable.

Q. Unpredictable. Thank you.

COMMISSIONER LAMAY: Any more questions of the witness? Thank you. You may be excused.

(Recess taken at 3:10.)

DIRECT EXAMINATION

BY MR. BRUCE:

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

A. My name is Randy Offenberger.

Q. Where do you reside?

A. Midland, Texas.

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

A. I'm a senior reservoir engineer with Santa Fe Energy Resources in the Midland district.

Q. And have you previously testified before the board as a resource engineer?

A. Yes, I have.

Q. Were your credentials accepted as a matter of record?

A. Yes, they were.

Q. Are you familiar with the reservoir engineering matters connected with these two cases?

A. Yes.

MR. BRUCE: Mr. Chairman, I would tender Mr. Offenberger as an expert in reservoir engineering.

COMMISSIONER LAMAY: His qualifications are acceptable.

Q. (By Mr. Bruce) Referring to Mr. Thoma's Exhibit B, especially the upper lefthand corner, Mr. Offenberger, would you describe the spacing in the pool and the well development of the pool?

A. Okay. On Exhibit B, what we've got here is a voluntary development pattern. It has been exhibited here in the South Corbin Wolfcamp field. What we have here is an 80 acre, northeast-to-southwest development pattern demonstrated by the highlighted lines drawn diagonally through here.

Q. There are maybe one or two exceptions to this pattern, are there not?

A. Yes, there are.

Q. In particular the Number 1 and Number 5 Corbin wells?

A. West Corbin Number 1 and Number 5 are exceptional wells to that pattern. They are direct offsets -- 40-acre offsets-- to one another.

Q. Okay. And we'll get to that in a minute. Would you please refer to Santa Fe's Exhibit G and discuss what that is for the commission, and your conclusions regarding drainage and recovery of oil from wells in this pool?

A. Exhibit G is a table with composite of the well summary report put together by myself; indicating each well in the field with the exception of the West, or the Kachina 5 #1. In there on that report we show well name, location, the IP for oil, gas, and water, first production date, flowing tubing pressure. Some of the Wolfcamp zones that we've identified as being separate. We also show cumulative production for February of this year. We're showing current production for January of this year, and the next column is an estimate, or an EUR estimate, based on decline curve analysis.

What I've done is, from all the wells that we had production history on, which are all the wells in the field, I did a decline curve analysis for each of the wells and came up with a total field recovery of 3.29 million barrels, which is comparable to the recovery stated earlier in Hanley's reservoir testimony.

Moving on over, there was a remarks column, and we also have a perforation H net. What we've done here, since the majority of our activity is in the northern portion of this field, we went to scout card information and pulled up the amount of footage from each of the wells, and that's what that column represents is the net pay that was perforating in each well bore.

Next column is the map column which we didn't get to due to time constraint. Next column we have porosity and water saturation. These numbers are identical for every well. Instead of doing well-by-well, foot-by-foot, well-log analysis, we used a general summary realizing that somewhat greater porosity will offset some with lower; some with higher water saturation will offset some with higher, and based on that and the formula at the top of the page is the volumetric calculations formula that we utilize on a spread sheet to go in and calculate the average area drained for each of the individual wells.

We have "DH" designated there to indicate those wells that just do not conform to the fact that you could have maybe 300 foot of pay and essentially recover less than 1,000 barrels of oil or so, meaning that they are essentially designated dry holes and don't conform to the volumetric calculation.

At the bottom of the table, what we've

done, we've totaled up every column underneath of there, and from our approach in this whole trend has been a statistical approach, primarily from the inability to predict from well to well, actual geologic performance and reservoir performance.

At the bottom there we show a typical well in this area to come on at maybe 300 barrels a day. 277 MC per day, 72 barrels of water, cume to date out of all these wells is 61,000 barrels of oil. The significant number there, and more or less supports our other testimony at the examiner's hearing, is an estimated EUR of 106 MBOs per well in the South Corbin field.

Moving on over to the last column -- Doing the volumetric analysis, we also come up with an average drainage area of 70 acres for each of those wells, realizing that there are some that are much larger than that. Some are smaller, but like I mentioned, we're approaching this thing from a statistical perspective.

Q. Based on this exhibit -- now take a step back. These figures I estimated off of the recovery, do they pretty much correspond to Mr. Huck's?

A. Yes, they do. The individual wells correspond to the south here, pretty much well below. I don't have much problem with discrepancies. That's just interpretative-type discrepancy. I think the fact that we've come up with a total field recovery that's essentially similar I think further supports the validity of the information.

Q. Based on this exhibit in your studies, what do you anticipate happening if the well -- the proposed 8 #2 well is drilled at Hanley's location as opposed to Santa Fe's location?

A. I believe there would be a significant pressure drop realized from the direct 40-acre offset well in the Wolfcamp formation. That's based on the occurrence, or what we call models, of this situation occurring in two other areas.

Q. Okay. And will a well drilled at Hanley's proposed location adequately drain the reserves in the southwest of the northwest of Section 8, which is acreage owned by Heyco and Santa Fe?

A. I don't believe it would.

Q. What do you estimate as far as reserve loss?

A. Based on interference work that we've done, it appears as though -- and also keeping in mind the timeliness of the drilling of the well -- we estimate approximately 60,000 barrels when we left, with the drilling of the Hanley location.

Q. Okay. Now you mentioned pressure draw down. Let me refer you to your Exhibits H and I, and also to Mr. Thoma's Exhibit E, and discuss the conclusions you've reached regarding pressure draw down in the South Corbin pool.

A. Okay. What we have here on Exhibit E are the two exceptional wells to that northeast/southwest development pattern. The west Corbin Number 1 is located in the southeast and the northeast of 18. West Corbin Number 5 is located in the southwest and the northwest of 17.

The two wells in question, in obtaining relevant information from Meridian, the fact that the West Corbin 1 well was drilled and started producing in 1981 out of the "AF" interval, indicated this interval right here. Subsequently it produced 106,000 barrels out of recovery to date, at which time they added the "AB" carbonate to that production stream and they comingled both intervals together.

COMMISSIONER WEISS: Where did that happen?

A. When?

COMMISSIONER WEISS: Where is that on here?
A. On Exhibit H I annotated at the top showing the initial production of one of 82, or initial bottom hole pressure of 82 of 4,000 pounds. Out to 2 of 88 which is when they added the AD carbonate.
Q. (By Mr. Bruce) What was the "AF" pressure as of 1988?
A. The reservoir pressure to the bottom hole pressure, as of 10 of '85 after the well had produced 70, 80,000 barrels of oil. It dropped to 4,000 pounds down to 1,000 pounds indicating that the reservoir is significantly depleting; essentially 75 percent depleted. When they added the perforation, they added the "AD" interval. There was not a significant pumpup in production in the well. Then the offset well -- the offset 40 acre direct -- was drilled by Southland Royalty. It's a West Corbin Federal Number 5, and it came in and they opened up the "AC" carbonate.
Q. So it was not initially producing from the same zone as the #1 well, was it?
A. That's correct. And I believe the pressure information supports that data. As shown on Exhibit I is the production curve for the West

Corbin Federal Number 5, showing that that well was originally completed in the "AC" carbonate, and the official production of 8 of '85 with an initial bottom hole pressure of 42,065 pounds further supporting the isolation of the carbonate intervals that John had mentioned earlier.

Within the year and a half the well had produced 145,000 barrels of oil and had sustained essentially 75 percent draw down in reservoir pressure, also down to 1,000 pounds of audible pressure. At that point, or at 3 of '87, Southland came in and added the "AF" and the "AE" carbonate zone as indicated by this number 2 mark right here.

Q. And you're referring to Exhibit E?

A. That's correct, opening up to competitive zone that was originally producing by the offset well in the #1. If you look at the production curve about 3 of '87, there is a slight bump up in production. Realized from this added perforations to isolate which interval it came from, "AE" or "AF," I think is minor, but the fact that the reservoir's drained. The AF interval in an offset 40 direct is drained. There is no significant bump up in production.

Q. So in your opinion, extrapolating this to the 8-1 and 8-2 situation, the Hanley location is proved, and it produces from the same zone as the 8 #1 well, will there be pressure depletion?

A. I believe there will with the fact that you can see up to a 3,000-pound drop within a year and a half.

Q. Has this pressure depletion been shown in other Wolfcamp wells in this area?

A. Yes, it has. As mentioned in the original examiner's hearing, there's also two wells off to the east approximately two to three miles.

Q. To to the west?

A. To the west, I'm sorry. Shown by this exhibit --

Q. A.

A. Exhibit A.

Q. Section 15 and section 16. Meridian came in and drilled the Mitchell state #1 as shown on Exhibit J -- or, I'm sorry -- Exhibit K. That's the production of that well.

Q. What was the initial pressure of that well?

A. Initial pressure was approximately 4,000 pounds annotated on the bottom.

COMMISSIONER WEISS: 4,030 pounds?

A. That's an extrapolated Peace Star, based on build-up analysis. And that was 2 of '90. Meridian came in and involuntarily drilled a direct 40-acre offset.

Q. You say, "involuntarily." Why is that?

A. Under their farmout obligation with Mitchell Energy they were forced to drill 40-acre offsets.

Q. Okay. Go ahead.

A. Shown on Exhibit J is the 40-acre direct offset.

Q. Are those two wells producing from the same zone?

A. Those two wells are producing from what John has shown as the AG carbonate, which is the lowermost interval. The significance of this is the fact that you see a substantial pressure draw down on offset 40-acre direct wells. The pressure in the No. 2 well when it had come on initially was 2,906 pounds, showing about approximately 1,100 pounds drop in the reservoir pressure realized from a direct 40-acre offset well.

Q. And that 1,000-pound or 1,100-pound pressure drop, what period of time occurred before that pressure drop?

A. That's four months.

Q. Okay. Now, I don't know if you have it in front of you, Mr. Offenberger, but Hanley has presented an isoproduction map which indicated estimated ultimate recoveries of the Kachina 8 #1 at 250,000 barrels, and for the Kachina 5 #1 at 125,000 barrels. For a well at Hanley's I believe they estimated 250,000 barrels and also I believe added another 130,000 barrels at Santa Fe's location if all those wells were drilled. Do you agree with that?

A. I disagree strongly with that. The fact that the isoproduction map does not incorporate any of the pressure information that we've seen out here in this area with the fact that we have a direct 40-acre offset.

Q. And does that map take into account production from separate zones?

A. No, I don't believe it does.

Q. Finally and very briefly, Mr. Offenberger, what is your opinion regarding the commissional allowing the nonstandard 40-acre units?

A. I believe by permitting a direct 40-acre offset, that there will be undrained reserves in the southern half of the northwest quarter of section 8.

Q. Another well would have to be drilled perhaps on Santa Fe's acreage in the southwest and the northwest for recovery?

A. To recover the reserves, but economically whether we would take that position, likely not to the fact that it would be close to marginal economical wells.

Q. Mr. Offenberger, were Exhibits G through K prepared by you or under your direction?

A. Yes, they were.

Q. And your opinion is to grant Santa Fe's application and for denial of Hanley's application conservation and preservation of waste and the protection of drilling rights?

A. Would you repeat that, please?

Q. Is the granting of Santa Fe's application and the denial of Hanley's application interest in the conservation and the prevention of waste?

A. Yes.

MR. BRUCE: Mr. Chairman, I move for the admission of Exhibits G through K.

COMMISSIONER LAMAY: Without objection, Exhibits G through K will be admitted into the record. Mr. Kellahin.

MR. KELLAHIN: Thank you, Mr. Chariman.

CROSS-EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Offenberger, in response to Mr. Bruce, you've said based upon interference work, you estimate that if the Santa Fe -- if the Hanley location for the well is drilled, and there will be 60,000 barrels of oil left in the reservoir?

A. Yes.

Q. Is that interference work in the Corbin Wolfcamp confined to an analysis you've made on pressure communication between the Corbin 1 and the Corbin 5 well that we've seen on the cross section? I think that was -- what was that, Exhibit H? So I can keep the record straight here, let me see what we've got.

COMMISSIONER LAMAY: I'm sorry -- Exhibit E, the two well cross sections.

Q. (By Mr. Kellahin) Is that the interference work that you have based your conclusion that if the Hanley location is drilled, there will be 60,000 barrels of oil left in that spacing?

A. It's not based on those two particular wells. It's based on the equivalent interval that's produced in the Mitchell 16 well, section 16 of 1833.

Q. That's in the Young Wolfcamp, isn't it?

A. Yes.

Q. Okay. Can we look at the Corbin Wolfcamp? The pressure information that's available is confined to the Corbin 1 and the Corbin 5, isn't it?

A. That's correct.

Q. Lead me through the analysis now. When we look at those two wells, the -- I forgot the sequence. Was the number 5 the first well?

A. Generally Southland has developed wells in the numerical sequence. West Corbin Number 1 well is the first well.

Q. All right. It says, "Aztec." I assume that was a different operator?

A. Aztec was a predecessor to Southland Royalty which was the predecessor to Meridian.

Q. I'm with you. All right. The #1 well is the first well. They drilled that well and it is perforated where in this Wolfcamp, which one?

A. Indicated as the #1 alongside the perforations.

Q. All right. So we have the first

perforations down in the "AF" carbonate in the Number 1 well, and they produced that, they get oil out of that?

A. That's correct.

Q. In sequence then are they still producing out of the AF carbonate when the number 5 well is drilled?

A. Are they producing out of the AF carbonate when the number 5 was drilled?

Q. I'm trying to get the chronology.

A. Yes, they are.

Q. All right. So they're producing out of the AF carbonate in the #1 well. The number 5 well is drilled by Southland, and I assume that they continued with their methodology of testing the lower and working on up?

A. No.

Q. They didn't do that here?

A. No they didn't.

Q. Where did they first perforate?

A. They started out the "AC" carbonate indicated as the #1 beside the perforation.

Q. All right. I'm with you. They started at the top and they perforated and are producing out of the "AC" carbonate?

A. That was their initial completion interval; that's correct.

Q. Did they produce out of it?

A. Yes, they did.

Q. So when these two wells in 40-acre offsets are competing, the Number 5 is competing for the "AC" reserves at the same time the #1 is competing for the "AF" reserves?

A. That's correct, and they are isolated.

Q. Okay.

A. The pressure data that we've seen.

Q. Okay. When the next -- what is the next completion? Is it the second zone in the Number 5, or the second zone in the #1?

A. Okay. The "AF" interval was added in the Number 5 well first, then the "AD" interval was added in the #1 well.

Q. All right. So the third completion in the two wells is the "A" carbonate in the Number 5 well?

A. In a well. It's perforated into the top.

Q. Why is it adjusted to the top?

A. Because it's communicated.

Q. All right. And your conclusion then is because of that relationship to those completions, those two -- the "AE" and the "AF" are communicating, and you saw pressure draw down in from the other?

A. Could you restate that?

Q. Well, I don't want to put words in your mouth. Which one was -- which of the carbonates was pressure depleted in the #1 well -- by the #1 well when it was perforated in Number 5?

A. The #1 well had realized a 4,000 to 1,000-pound drop. Five was drilled, completed in the "AC," came back up in the "AE" and "AF," and there was no pause in production -- significant drop in production. At the same time they had run bottom hole pressure before they recompleted to the "AD" in the #1 well, showing that the pressure dropped to 4,000 pounds. The fact that you saw that much pressure drop in a short period of time, plus the fact that you saw no production pump up with the addition of the "AF" interval would indicate to me pretty strongly that you've seen some interference in drainage within the "AF" interval, within the two wells.

Q. And that's all we got to work with in terms of pressure interference with the pool?

A. No.
Q. In this Corbin?
A. In the South Corbin field, yes. Keep in mind that our geologist has stated the fact that the "AG" interval that you're looking at in the Mitchell is comparable to what we're looking at in the South Corbin Wolfcamp.
Q. Okay. We've got the #1 and the Number 5. The #1 is in section 18. We've got the Number 5 in Section 17. 40-acre offsets to the number 1 well is also a Wolfcamp well. Was there pressure interference between those two wells?
A. I'm not aware that there was any pressure information obtained from the south offsets Santa Fe gave us, or Santa Fe -- I'm sorry. Meridian gave us all the pressure information that they had on the South Corbin field, and that was one of the wells that was not in that information.
Q. Let's go to Exhibit G, if you will, please, Mr. Offenberger. Mr. Thoma just told us that on his geologic analysis we can go to a 40-acre offset, and we don't always encounter the same reservoir rock. You agreee, don't you?
A. Yes. Reservoir quality.
Q. Correction. When we look at your

reserves assigned to the 8-1 well, what's the ultimate recovery?

A. I haven't assigned reserves to the 8 #1 well. I haven't indicated in that exhibit, Tom, that 8-1 had reserves assigned to it.

Q. Could you tell us what you calculate to be the ultimate recovery of reserves from the 8-1 well?

A. I treated that as a typical well with approximately 100,000 barrels or 106,000 barrels of oil.

Q. And what area will they capture this 106,000 barrels of oil?

A. From the 80 acres of drainage that it would realize.

Q. Is it going to drain in the square?

A. Drain in what?

Q. Is it going to drain in a square or rectangle?

A. The drainage pattern that would be realized?

Q. Yes, sir.

A. No. I believe what you will see is a type of a lobe-drainage pattern, the fact that there has been an established diagonal pattern within the field. Typically the wells that are further apart will see a larger radius, or ellipse, as opposed to the direct. You'll see it narrower, so you'll get sort of an optical-type drainage pattern.

Q. That optical -- that's "elliptical"?

A. "Elliptical," I'm sorry.

Q. That eliptical drainage pattern will conform to the geology of the reservoir, will it not?

A. We hope it does.

Q. It will have to, won't it? The configuration of the oil and how it's produced by the well will conform to the containment that it's in?

A. That's true.

Q. Subject to interference by the wells?

A. True.

Q. If there's no well drilled in the west half of the northwest that we're worried about, that the 80-acre standup were fussing with?

A. (Witness nods head.)

Q. What well is going to get the oil?

A. If there's no well drilled in the west half of the northwest, a large portion, or I should say, a portion of the reserves that will be attributed to a well drilled there would be captured by our well.

Q. The 8-1 well is going to get it?

A. No, I said a portion of it.

Q. A portion. What percentage of those reserves are going to be produced by the 8-1 well?

A. Maybe 30 or 40 percent.

Q. What tells you that percent?

A. The fact that we've looked at two wells in the Young Wolfcamp field, and looking at the production performance on those. Realizing the interference is included, and it's shown on the production curves clearly, you can see that there is a shift in recovery realized by direct 40-acre offsets.

Q. So when we look at the 60,000 barrels of oil that are going to be left in the spacing unit if the Hanley well is drilled at their location --

A. Approximately.

Q. -- what volume is recovered by the Hanley well at the Hanley location?

A. I've estimated between 40 -- 45 to 60,000 barrels of oil.

Q. How did you get that number?

A. Two methods. Well, two methods to arrive at that number: one being primarily -- there's a timing function involved here, and as you've seen here, that there's a significant pressure drop of the 40-acre direct offsets. We had looked at these Mitchell wells and realized that you have two wells there that were drilled within four months, essentially. We're now approaching 8 months to where an offset would be drilled, which is twice as long as what's been experienced over here.

Looking at the offset well that was drilled subsequent to the initial well, you're looking at about 80 to 100,000 barrels of oil in the Mitchell well. Because this has drug on, the fact that it has, and there's been some drainage going on, I think with the time element and the interference element both incorporated, we're looking at approximately 45 to 60,000 barrels if the well is drilled. I estimated by October.

Q. When we look at Exhibit G, are the assumptions made in this display such that you're assuming the same porosity value for each of these wells?

A. Like I had mentioned earlier, I feel that there will be wells that have higher porosity, there will be wells that have lower. Instead of

John going through a foot-by-foot analysis, we used what he felt was a statistical average of what he's seen out here in the area.

Q. Okay. When we come to the thickness, have you used perforated pipe?

A. That's what I had mentioned, yes.

Q. How does that reflect thickness in terms of pay quality for these wells in the Wolfcamp?

A. The majority of these wells were drilled by Meridian, and we feel comfortable with the fact that they're perforated, what they feel is productive pay, and we made that assumption when we ran this analysis.

Q. Okay. When we look at the last column in the analysis, it says, "area acres." If there's not an entry at that point, do I understand that that well has no area of drainage applied to it?

A. Correct.

Q. I count 13?

A. I don't come up with the same number that you do.

Q. Out of 37 wells I get about 13 that only have 40 acres. Is that about right?

A. I don't know. Without doing further analysis I don't --

Q. Out of 37 wells I can find only four that have about 80 acres. How many do you get?

A. 70 acres. You mean the average?

Q. Approximately, plus or minus 80 acres. I see there's only about four of them.

A. I think -- I come up with six.

Q. I separated some out. I had five that I had over 100 acres. Maybe I miscounted. Have you had a chance to look at Mr. Huck's statistical analysis that he prepared in his list?

A. Just briefly. This is the first time.

Q. Have you an opportunity to determine whether or not you have any disagreement with how he has interpreted and reached his conclusions about that information?

A. No. I think it supports what we've seen so far also.

Q. You my talk that they're going to have a difference of opinion, don't you?

A. It appears that way.

Q. Thank you.

MR. KELLAHIN: Mr. Chairman.

COMMISSIONER LAMAY: Well then, Commissioner Bailey?

EXAMINATION

BY COMMISSIONER BAILEY:

Q. This is just an added clarification. The current production, is that barrels of oil per month, or is that barrels of oil per day?

A. That's per day. I'm sorry, yeah. It's per day, not per month, as indicated.

Q. I'm done.

COMMISSIONER LAMAY: Mr. Weiss.

EXAMINATION

BY COMMISSIONER WEISS:

Q. You mentioned that you estimated Peace Star and buildup. What did you get for KH?

Q. I didn't get a KH. I didn't go through that analysis. I was just interested in Peace Star.

COMMISSIONER WEISS: Thank you. That's all I have.

EXAMINATION

BY COMMISSIONER LAMAY:

Q. Going back to Exhibit G just to follow through more on Mr. Kellahin's question here: If you have -- assuming the 24 wells you have listed under area acres -- I count 12 that are greater than 40 acres, 12 that are less than 40 acres. What I'm getting at is we have a reservoir here that you say will not drain the 80 acres that are assigned to it, or do you feel that it will, or that -- can you count on that?

A. I think it's highly variable. I feel that the statistics show here that we have random distribution. Show that you feel somewhat certain that you're looking at a typical well each time you drill one out there, and the average that we come up with is approximately 70 acres in each well.

Q. Do you have an average, but when you look at each individual well, a certain percentage of them fall above a number, and a certain percentage below it? It looks like maybe half of them will, according to your analysis that we've seen here, and half of them won't?

A. Right.

Q. So the average -- I guess is kind of meaningless if you're looking at the variation of production. You have some wells that produce a quarter of a million barrels, you have some that make, you know, 10,000 to 5,000, and the reason why I'm breaking this up, we're assuming with the testimony that we have a heck of a generous reservoir, or block. You take two wells -- let's take your example of the Aztec West Corbin 1, Southland Royalty West Corbin Number 5. If you take that thickness which looks substantial in the West Corbin Number 1, the perforated interval, and take the porosity there, you could get quite a bit of oil out of there, can't you, with a relatively small area of drainage?

A. With that thickness I believe, yes.

Q. With that thickness. That's what I'm getting at. If you have a real thick interval, you don't need a lot of variable extent, do you, in order to drain that?

A. That's correct.

Q. So is it possible that we're looking at situations that have -- I mean, when they perforated this down here, they didn't get a bump, but, my gosh, there's only a little bit of porosity to account for thing because it used to be that well's strike, the West Corbin 5. What leads you to believe that there's a reservoir continuity between those two wells in the AF zone?

A. Just interpretation, geological interpretation.

Q. It looks like four feet of pay -- I mean, if you're going to call that pay -- right at the very top. A little bit of limestone as, you know, kind of low recividity, but you're coming off a shelf kick there too, above it. I mean, if you're saying they perforated the same reservoir and they showed completion, I question whether there's any reservoir there to be connected to that main zone. Just look at that perforated interval in the log interpretation, or however you want to interpret that.

A. Right. I think log interpretations significantly out here have not been totally conclusive. We've seen wells where we've had certain development on recividity porosity lobes that you would think is productive, that is not productive. So even though, you know it does not appear on the log to be productive, it could have been productive.

Q. Could have been?

A. Yeah.

Q. I don't know how with just that kind of information you could say it's reservoir rock or it is not reservoir rock. You don't see a bump, so you're assuming, okay. You may not have a reservoir at all?

A. That's possible, but I think the pressure draw down here demonstrates that you've seen significant drops in reservoir -- overall reservoir energy within a short period of time.

Q. On the West Corbin #1. You've covered a lot of oil. You also got a thick section. Could it not be that you've just depleted one of those blocks with a very thick section, that it doesn't extend very far?

A. That's possibly true.

Q. I asked this question of the other engineer. You've somewhat answered it, but your conclusion seems to be -- and I don't want to put words in your mouth, but there are definite areas where you have proved communication between wells out here. Pressure comunication between zones?

A. Between well bores.

Q. Between well bores?

A. Yes.

Q. How common would you estimate that would be? The rule or the exception to the rule?

A. There's been --

Q. On 40-acre offsets?

A. There's been limited -- well, as you can see, the predominant pattern has been 80 diagonal. Where there has been direct 40, there has been pressure information in only two cases that we know out of the total 38 wells that we drilled.

Q. So it's really more of how you feel because you've only got two examples to say, "Yes, there is communication," or "There isn't." Is that what you're saying or am I misinterpreting what you're saying?

A. Well, I'm not sure.

Q. I'm not sure. What I'm trying to find out are the examples that -- you've listed this one here that I guess I have some problem with whether those truly are connected. Are there other examples where there are definitely pressure communication on offsets that has been measured that you can point to on the map today?

A. On the South Corbin there hasn't. The Mitchell wells that are producing from the same interval there has been, which are off to the west.

Q. So there is, but there's probably lack of data, would you say, in the the South Corbin to say there is or is not pressure communication with offsets?

A. Comprehensively I'd say there isn't. It's just been lately that Meridian and us have taken the approach that bottom hole pressures are going to be kind of a routine completion procedure. The fact is that when they first set up the rules and established the 80 acre, there was limited pressure data. We hope with further development of the field that we can obtain that and justify our 80-acre pattern.

Q. Right now are you uncomfortable with the 80 acre pattern? Do you think it would make -- maybe 40 would be more appropriate to drain the oil, or do you feel that 80 is the appropriate spacing at this point?

A. I still feel that 80 is the appropriate spacing.

COMMISSIONER LAMAY: Mr. Weiss has another question. That's all I have.

EXAMINATION

BY COMMISSIONER WEISS:

Q. Again, on the pressure build-up data, perhaps an explanation for some of this. What was the general character of the build-up curve itself? "Corner plot," I guess you used.

A. Yes, corner plot.

Q. Did it look like a naturally affected reservoir?

A. I haven't look at the build-up data on the Mitchell 16. I was calculating the number that Meridian provided to us, and the Peace Star's within a few percent of the flattened-out pressure, and we have done some build up analysis on the Kachina 8 #1, and it does indicate that there's dual porosity system producing.

Q. Well, that would explain some of this, you know. Where those things show up is anybody's guess. I mean, how do you find the fracture -- the density fracture area? I certainly don't know how, but that kind of information might be useful in the future. That's all. Thank you.

COMMISSIONER LAMAY: The witness may be excused. Let's take a 15-minute break.

(Recess taken at 3:55 p.m.)

(Back on the record at 4:10 p.m.)

MR. BRUCE: I have one more witness, Mr. Chairman.

DIRECT EXAMINATION

BY MR. BRUCE:

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

A. It's Darrell Roberts, and I live in Midland, Texas.

Q. And what is your occupation, sir?

A. Drilling engineer.

Q. Whom do you work for?

A. Santa Fe Energy Resources.

Q. Are you familiar with the engineering matters -- the drilling matters related to the proposed Santa Fe well in these cases?

A. Yes, I am.

Q. Have you previously been admitted as an expert drilling engineer before the Oil Conservation Division previously?

A. Yes, I have.

Q. Mr. Darrell Roberts, would you outline your experience in drilling wells in this specific area?

A. Okay. In 1981 I was employed by Southland Royalty. Starting in 1982 my area of assignment was southeastern New Mexico and specifically in the area of 18 south, 32 east and 18 south, 33 east. I've drilled -- or involved in the drilling of the 16 Wolfcamp wells, and since 1982 with being employed to Southland Royalty and Meridian and now Santa Fe. I've been involved in -- let's see. Around in the 36 wells in this area. In this area -- I guess I'll just stop there.

Q. Okay. In the area of 18 south, 32 east and 1833?

A. Right.

MR. BRUCE: I tender Mr. Roberts as an expert drilling engineer.

COMMISSION LAMAY: His qualifications are accepted.

Q. (By Mr. Bruce) First off, Mr. Roberts, would you tell us just briefly about additional wells drilled in the pool since the examiner hearing and Santa Fe's plans for additional wells?

A. Well there has been alluded to in the cross section. We've drilled -- we've drilled the Kachina 5-1, and we stated and sent in a permit for the Kachina 5-2 in the northeast quarter of south quarter section five, and then also Santa Fe participated in the Corbin 28, West Corbin 28, operated by Meridian, which is in the northeast quarter of the northeast quarter of Section 17.

Q. Okay. Did Santa Fe ask you to be the named operator of the well in these cases?

A. Yes.

Q. Next, Mr. Roberts, would you move onto Santa Fe's Exhibit L and describe that for the examiner?

A. This is a cost comparison that I prepared to try to compare Hanley's cost estimate to a cost estimate that I prepared, and in doing this

I've made it in a format of Santa Fe's cost estimate. And in previous testimony we submitted an AFE for the Kachina -- a cost estimate for the Kachina 8-2, which is -- we took into account that -- we didn't take into account the fact that we would be using a time battery. I assumed they would be using a common tank value from the 8-1, and I've since learned that wouldn't be possible because of a royalty interest, so I guess to make a long story short, I've added around $35,000 to the Kachina 8-2.

Q. The original AFE?

A. Right. To make two comparisons of the cost estimates equitable, comparing apples to apples.

Q. Okay, now looking at Exhibit L is there much difference in the dry hole cost of both Hanley and Santa Fe?

A. No, there's not.

Q. Where do the differences come from then?

A. It's mainly in the completion and the facilities part of the, you know, making a producer out of a dry hole.

Q. Would you go through the main items and describe why you think the well cost -- the well cost estimates of both Hanley and Santa Fe are both

roughly equivalent?
A. Okay. If you look at this comparison log on the far righthand column, the variance, which is comparing the variance of the Santa Fe producer versus the Hanley producer, there's some items there that are highlighted in orange, and these are items that we've not included in our cost estimate that I did not see that Hanley had included in their cost estimate. Would you like me to go through these?
Q. Yes, very briefly.
A. The first one is conductor casing, which is $3,000, and I think this is necessary since we're drilling in a sand dune environment on the surface and it's a common practice.
Q. Does Meridian use conductor casing as well?
A. Yes, they do. The second item is a $15,000 under lease facility cost, which is roustabout labor to install the facilities and flow line, stuff like that which I think is -- everybody will agree is necessary -- fencing. Santa Fe puts chainlink fence around all their batteries and -- I think we do a very good job of doing that, and so that is a cost that we incur and that I included.
If we have inspection of tangible items,

which we inspect our casing before we run it in the hole -- We also have drilling equipment rentals, which is the $3,000, and then we also have completion tool rentals drilling out a BV tool, and stuff like that.

We have also from $9,200 for administrative overhead. This is stuff that we list because it's not like leases or something like that that we've already spent the money for. This is a cost that will be incurred to drill a well, and we present this to give our managers the options to decide whether to drill a well or not. And then the last item is the $5,000 for testing. And as you can see, we're more into voluble pressure testing and trying to find out what exactly is going on with the reservoir.

Q. Okay. Now this $757,000, completed well cost for Santa Fe, is that -- Santa Fe tends to put these well costs on a liberal side as far as well cost estimates?

A. Yes, we do. We use book values for the casing and stuff like that. We give a high side estimate, so that we -- so we don't have to supplement an AFE for being overextended. We do it at a high side and also it gives us -- gives our partners an idea of, you know, of an outside -- a high limit of what's going to be spent on the well.

Q. Do you expect final well costs to be lower than that $757,000 figure?

A. Yes, I do.

Q. Would you please move on to Exhibit M and describe some of the recent well costs in this pool?

A. Okay. I've prepared this. It's just a listing of actual well costs in section five, seven and eight of 18 South, 33 east, and these are all 11,500-foot, South Corbin Wolfcamp wells, and I've got here they were all drilled in 1991, and that's not true. The Kachina 8-1 was drilled in 1990, so I'd like to make that correction. But in the Kachina 8-1 the final well cost was $705,437. This was listed on actual cost on the drilling reports.

The Kachina 5 Federal #1 was $738,625, according to Meridian, the drilling reports that we received because we were a partner in the West Corbin Federal Number 26 in Section 8 of 18 south, 33 east. The final well cost was $713,261, and then off the air drilling report, the West Corbin 25 was $600,781, but that does not include facilities, pumping unit, and stuff like that which they've allotted $94,000 on their cost estimate for that.

So if you added all that in there together there, they're all in a range from $700,000 to $750,000, and I'd like to add that back on the previous exhibit. If you added all those orange items together, it totals up to be $48,400, and if you added that to the $667,782, which is Hanley's producing cost, that comes to $716,182, which is in the same range that we are.

Q. That must be the average of the last four completed well costs?

A. Exactly.

Q. Does Meridian operate most of the wells in this pool?

A. Yes, they do.

Q. Please refer briefly to Exhibit N and describe that for the commission, please?

A. This is a copy of an award that the BLM gave to Santa Fe Energy. It's called an Environmental Initiative Award for last year, and this was -- this is an annual award that they have been awarding, and Santa Fe received this because of our initiative that we take to comply and conform to their rules and regulations, and I think it's just another example of another governmental body that thinks that Southland or Santa Fe does a good job.

Q. Okay. Mr. Roberts, there was a land chronology submitted to the commission, and it had approximately two months' delay between the completion of the Kachina 8-1 well and the time when that well began to produce. Could you describe why that two-month interval occurred?

A. Yes. Mainly we -- I'd just like to give you some dates based on our drilling report, which we've supplied to Hanley. The Kachina 8-1 drilling rig was released on 10-31-90. We moved in a completion rig on November the 7th of '90, and then we had made the completion and made -- the initial pencil test was performed on November the 15th of '90, and then the well was shut in pending connection to a Conoco gas line, and it was connected to their low-pressure gas line on January 12th of '91, and then production -- and it was commenced on January 13th of '91.

Q. Okay. And finally, on some archaeologic matters. Has Santa Fe's proposed location been approved from an archaeologic aspect by the federal government?

A. Not by the federal government.

Q. Has it been cleared by your

archaeologist?

A. Yes, it has. We asked our archaeologist only to go out and do a prestaking survey of the west half of Section 8. West half of the northwest quarter of Section 8, and the information he told me was that the northwest quarter of the northwest quarter has a significant archaeological site over that area.

Q. And that's Hanley's location?

A. Right. And that's Hanley's particular location in that area, and it appeared to him that they were having trouble finding a site because of the archaeology. He also alluded -- Meridian has alluded to the fact that there is an archaeological site over in Section 7.

Q. The east half of the northeast?

A. Right. And he also looked at our location which would be the southwest quarter of the northwest quarter, and said there's no archaeological site there.

Q. Were Exhibits L through N prepared by you or compiled from company records?

A. Yes, they were.

Q. And in your opinion is the granting of Santa Fe's application in the interest of conservation and the prevention of waste?

A. Yes.

MR. BRUCE: Mr. Chairman, I move for the admission of Santa Fe's Exhibit L through N.

COMMISSIONER LAMAY: Without objection, L through N will be admitted into the record. Mr. Kellahin.

MR. KELLAHIN: No questions.

COMMISSIONER LAMAY: Commissioner Bailey?

EXAMINATION

BY COMMISSIONER BAILEY:

Q. Exhibit L, are these actual costs including all of the orange-highlighted costs of Exhibit L?

A. Except for the overhead, administration overhead.

COMMISSIONER BAILEY: That's all the questions I have.

COMMISSIONER LAMAY: I have no questions. You may be excused.

MR. BRUCE: I rest my case.

COMMISSIONER LAMAY: Thank you, Mr. Bruce. Mr. Carr.

MR. CARR: We have a cross section to put up.

DIRECT EXAMINATION

BY MR. CARR:

Q. Please state your name for the record, please?

A. Larry Brooks.

Q. Where do you reside?

A. Artesia, New Mexico.

Q. Mr. Brooks, by whom are you employed and in what capacity?

A. Harvey Yates Company, exploration geologist.

Q. Can you briefly summarize your educational background for the commission, please?

A. Yes. I have a Bachelor of Science in geology with a combined science major in chemistry and math, New Mexico, Highlands University.

Q. When was that received?

A. 1978.

Q. Since graduation, for whom have you worked?

A. I worked for the state engineer's office as an engineering technician. I've have also worked for the oil conservation division as a district geologist in Artesia for five years, and I have now worked for Heyco for over five years as an exploration geologist.

Q. Are you familiar with the Wolfcamp and the Bone Springs formation in southeastern New Mexico?

A. Exclusively.

Q. And are these formations in this particular area a primary part of your assignment for the Harvey Yates Company?

A. Yes. It is my daily debt.

Q. On how many wells have you actually been the geologist that have been drilled to these formations in southeastern New Mexico?

A. 56.

Q. And have you made a study of these formations in the area which is the subject of this hearing?

A. I have.

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

A. Yes.

Q. Have you testified before the division as an expert geological witness?

A. I have.

MR. CARR: Are the witness' qualifications acceptable?

COMMISSIONER LAMAY: His qualifications are acceptable.

MR. KELLAHIN: Point of inquiry, Mr. Chairman. I noticed Mr. Brooks' package of exhibits he has -- when he was nominated -- as effective drainage area displays. I might inquire as to whether Mr. Brooks is purporting to provide testimony as an expert reservoir engineer on drainage issues for that display.

MR. CARR: May it please the commission. We can address that now or later.

Mr. Brooks has prepared certain exhibits on which he has placed circles which encompass 80 acres which are a reflection of the area that a well is presumed to drain based on 80-acre spacing. He has not made any calculations. He's not done engineering calculations to support that. We would stipulate that the circles are that and are not even contoured to reflect the characteristics of the geology, which would tend to affect the drainage pattern by simply that representations of what an 80-acre radius around the well bore would drain. If at the time we bring them up Mr. Kellahin wants to object to the use of those, we can present that testimony when we insert that cross section.

COMMISSIONER LAMAY: Is that acceptable,

Mr. Kellahin?

MR. KELLAHIN: I'm happy to accept Mr. Carr's stipulation, Mr. Chairman, with those conditions. We have no objection to Mr. Brooks' qualifications.

COMMISSIONER LAMAY: Thank you. We realize what when a geologist gets into addition/subtraction, he's qualified. Multiplication is a little beyond. He can draw circles, but if he's going to qualify those circles with any sort of scientific validity, we may disqualify him.

MR. CARR: We hope you disqualify the circles and not the witness.

COMMISSIONER LAMAY: We certainly will. We will tend to qualify the testimony. Mr. Brooks, I hope you know this was all in jest, and you know that you're a qualified witness.

Q. (By Mr. Carr) what is the interest of Harvey Yates Company in this case?

A. We want to drill the best location to drain the Wolfcamp formation and produce the maximum amount of reserves.

Q. What is the ownership interest of the north half of section 8 of Harvey Yates Company?

A. We have joint interest in that lease of

50 percent working interest with Santa Fe with the exception of the northwest quarter of the northwest quarter.

Q. Have you prepared certain exhibits for presentation here today?

A. I have.

Q. Would you identify what has been marked as Harvey E Yates Company Exhibit 1, and review this for the commission?

A. Okay. Exhibit 1 is a cross section that runs across the Young Deep unit through the proposed Santa Fe well at the actual Kachina 8-1 location.

What I've done is, I've found two identical producing horizons that are the same producing horizons that the Kachina 8-1 is producing, and I've run this cross section from a point at 1650 from the north by 90 from the east section 15 down to the 1832, to the offset well, which is 494 from the east 554 from the north same section, due north 40-acre offsets, up through our Young Deep 31, which would be the Wolfcamp well drilled -- well, actually strawn tested, but we look at the Wolfcamp on the way down, and through the Young Deep 1, which is a Wolfcamp producer.

The next offset is the Young Deep 34,

which has the identical chirt lime that it's producing offsets in the Meridian 16-2 and 2, and is a recompletion attempt to assume production decline to 100 barrels a day in the Bone Springs. I then go across the South Corbin 7 well. I did not add it on the cross section, but it is there, xeroxed for reference, and then I go straight into the Kachina 8-1 well. I will discuss the Corbin 7-1 a little bit later.

Q. And what interval are you trying to depict here?

A. I hung this stratigraphically on what I correlate as the E zone. It's really basic. I, for simplicity, used A, B, C, D, E carbonate. That corresponds to "AC," "AD," "AE," "AF," and "AG" of Santa Fe.

Q. You're talking about the "E" interval. What does that correlate to in the presentation made by Santa Fe?

A. The "E" interval correlates to the Kachina 8-1 producing zone occurrence.

COMMISSIONER LAMAY: Which is the what?

A. The lowermost facies or the "AG."

Q. (By Mr. Carr) Now you've got some orange lines running across this cross section?

A. Right.

Q. What does this show?

A. The orange lines show the A carbonate at the top, the "B" carbonate the "C" carbonate, the "D" carbonate, and the "E" carbonate. They are all separated basinal solutions of middle mudstone and calcareous shells.

Q. Let's go now to what has been marked as Heyco Exhibit Number 2. Would you identify that, please?

A. This is a structure map based on the top of the Penn shale or the base of the "E" carbonate.

Q. Now what does this generally show you about the structure in the area?

A. Well, essentially what that shows me is that you have a saliceous basinal bottom. The structures where the thickest carbonate in the "E" zone are found are deposited in the lobes of the structure. I feel that from the orientation of the structure, that the Kachina 8-1 will be a long depositional strike to the well in the "B" spot of Section 18, which also has produced from the "AG" or "E" zone.

I feel that it sets up your debris network into which accumulation of whether by direct fall off the shelf or ocean bottom, conditions will accumulate in them because structural highs in any school of debris flow exploration is a very poor choice for looking for structural highs to say, "Hey, we've got structural high here. This is where we're going to have an accumulation."

What I've found in the Young Deep, I feel that depositionally the Bone Spring is equivalent to the Wolfcamp, and I'll refer to the Bone Springs for a moment. The best producer that I've found is structurally low to where the bottom has been scoured out and the deposits have infilled the bottom. Differing minerologically than the saliceous dolomid stones that surround the debris flows, when what have -- our best producers with fractures and with larger allots in this debris deposited in these.

Rather we grade into a tight soliceous, dark, dense, dolomid stone. I think the Wolfcamp is doing the same thing. This bottom reflects the basinal structure. I have isopach to follow.

What I see is structural highs. You have a higher percentage of chirt in almost all wells, and by looking at samples on over 56 wells, and thin sections, I've found that these reservoirs grade from the base to the top, less saliceous as you go up. The Kachina 5-1 is a prime example of that. The top carbonate, which was limestone in the 8-1, is 100 percent dolomite.

Q. So basically what conclusion can you draw about the importance of structural position in making a commercial well in these particular pools?

A. I feel structurally you have a disadvantage. If you climb on to a structure, you have a tendency to form carbonates that you're looking to accumulate. 99 percent of our wells -- I can give a prime example in the Young Deep. We have three wells and we feel, "Hey, this is great. We're gaining structure here. We're going to move up the slope. We're going to get barn burners." We had three wells down below that were 56 foot lower. They had beautiful well-developed porosity. We moved 56 foot up structure, we lost all the porosity -- absolutely no porosity. We moved an offset west, the Young Deep 12, which is on this structure map to follow, we lost 73 foot of structure and it came in at 600 barrels a day.

Q. Why don't we move to the Exhibit Number 3, Heyco Exhibit Number 3 to your isopach?

A. This is the isopach of a gross fee

permit. This is not the net. It's just based on the clean porosity at the top of the datum which I hung to the top of the Penn shale. It includes varying degrees across the cross section, 10 to about 25 foot of dolomite limestone, which I use as an instructive key to find when I'm in the reservoir and when I'm out of the reservoir proper for the chirt zone. What I'll show you -- the Kachina 8-1 had 58 foot of this carbonate. The well in section 18 in the V spot had 40 feet. The well in the 8 spot of 18 had 60 feet and the due offset to that had 65 foot, which also produced chirt material, and there are some definite mineralogic differences between H and J spot -- H-I spot, excuse me.

Q. Anything else you wanted to review with this exhibit?

A. With the cross section and with some of the things that I've alluded to already, I'd like to really discuss the nature more about the lithology. What I found is these carbonate fairways on this E carbonate facies showed three distinct well-bounded facies. Porosity development for the most part appears to be within the reef channel along the mineralogic alterations bands especially in the chirt, not necessarily in the carbonate above. This is all deposited on -- I'm looking at the bottom -- for a prime pictorial example of how many bottom you can look at the Sandia Mountains, at the foothills there, and that is how much they deposited.

I feel all across the slope the structure of the Penn shale shows how much feet topography. Basically your debris is in the infill in and around. However the currents are, wherever they come, it's a tortuous pass to get out. What I find is that the lowest being the most unstable debris as they're mixed; varying percentages of chirt.

Wells that tend to be 100 percent chirt require more stresses to fracture. The chirt is therefore to avoid a fracture. Wells that go the other end of the spectrum of 80 percent, or better limestone, also tend to be void of fracture because they're more ductile. A constant mineraology between 50 to 80 percent of chirt mixed with limestone will yield fracture.

We've also done significant studies on cores, as well as specialized studies across the basin from the Bone Springs and through the Mississippi, and have determined fracture direction and trend. We have three primary shelves, and this is a complex reservoir by any means. Any lateral variations east and west in this case make for very nonporous, nonfractured reservoir, and I think this is your entrapment for these reservoirs. The facies changes in the chirt or limestone that's tight are your entrapment factors.

Q. Let's move now, why don't we, to your next isopach, Exhibit number 4, and identify that and review that for the commission?

A. Exhibit 4 is prepared under the same premise as Hanley's. It is the next clean carbonate isopach in the Lower Wolfcamp correlating with the spot of the -- with the Kachina 5-1 data on it.

What I have is the Kachina 8-1 to be essentially along the depositional strike to the well in the B spot, section 18. I believe it's the Corbin 16 well due north of the well in the B spot thins considerably. You lose about 70 feet of that carbonate thickness.

I would expect about a similar loss of a minimum of 40 feet in the Hanley proposed location well. I would say it would still be on depositional strike and have the same thickness of the Lower Wolfcamp carbonate in the 8-1 -- 8-2 location at the southwest of the northwest. What it shows, if you compare that to the structure map, really is not a direct indication, but where you have structural lows on the east shale or on the Penn shale, you also have a thickest debris lobes, if this is one of the thickest debris lobes. I don't believe that it's one pulse that interrupted.

Q. Based on this interpretation, how does the location proposed by Hanley, in your opinion, compare to that proposed by Santa Fe?

A. Well, due to the -- comparing the structure and the isopach, I consider it's climbing up dip, and I would expect the reservoir facies at least in the "E" zone to be dying out and thinning out and losing the reservoir quality of the debris. The debris, I might mention, is more in the microscale. It's not blocks, it's not large glass. From the grain of the thin sections that I've run of some of these wells, the debris is a likeness. It's a light-colored dolomite, and a light-colored carbonate angular to subrounded fragments with some fracture in the lower standards.

There are fossil-depth assemblages which are quite broken up. Poor preservation of the hard parts. It's a general fall-out over a long, general, dipping slope. It's not like the Bone Springs where we had class rings the size of this room that will come in about 2,000 barrels a day for one day and that's it, and down to the size of -- say the stamp -- the rubber stamp for the exhibits. On all the cores we've seen, the average reservoir size were those size of class. There are some a half inch in diameter.

Q. Basically in this area, do you see from a geologic point of view, any general trends of direction to the depositional trend?

A. Yes, I do. Based on the new information from Kachina 5, I also see that they're deposited northeast to southwest. As I have a larger map if we can refer back to the isopach map on the gross "E" carbonate facies, it covers three and a half townships. It's for the purpose of this testimony and other prospects that we still have. I've only shown a portion of it.

Q. And in terms of obtaining commercial production by developing these formations, what is it in summary that you need to find?

A. In summary, I have several points.

Q. Before we get to that, though, before we get to the general summary, what are you trying to -- when you're trying to find commercial production, Mr. Brooks, what are you looking for?

You're looking for what particular thing?

A. You're looking for a general matrix porosity of greater than 4 percent. You're looking for that to be interconnected with a fracturing. You have to have a density porosity from the exhibits here of about 10 percent with a crossover to about 3 percent, and if I might add, if you look at all these wells we've drilled north of the Mitchell wells, they did not quite have that porosity developed nor of the Young Deep 4. Rather, our Young Deep 4 has 11, 13 percent density porosity.

Q. Let's move now to Exhibit 5, and I'd ask you to identify that, please.

A. Okay. Exhibit Number 5 is a structure map on the top -- let me find it first -- this is our structure map on the top of the Penn shale in the base of the E carbonate in the Young Deep. I think this is an important area, and next to the Corbin here, as you have two producers in section 16 that are draining the chirt from the present, you also have three dry holes surrounding it.

Primarily you have two east/west and one to the north. This highly suggests that there is alternated mineral bands. These reservoirs are spotty. They're not large continuous reservoirs over full sections or half sections. I think from my mapping I'm expecting them to be 60 to 70 acres wide. Now they may be a mile and a quarter long, but they are 60 to 70 acres wide, and that's why I'll say that they tend to drain elliptical because they run elliptical.

And our Young Deep 31 -- we thought was going to be great. In fact, we encountered the same exact section as the Meridian 16-1 and 16-2 locations.

Q. And where is your Young Deep well?

A. The Young Deep 31 is located 1980 from south, 660 from east, section 9.

Q. Okay. And then the Meridian well that you're talking about?

A. Or due south offsets. 16-2 is an 80-acre offset northeast/northeast of 16, and the 16-1, the discovery well, was southeast of the northeast. And it was offset to the east by Santa Fe who drilled an east offset. They encountered thin chirt zone. There is a nice structural nose there, and the seismic bears out a nice, strong high underneath this Penn, so it's primarily why. You thin going in that direction because it's in a novolus node.

To the west of the discovery well, Meridian drilled the 16-3 well. They went 1650, 2310. They were hoping to get into the same thing because of the Number 2 discovery. They had also thinned considerably. Both of these wells had a real high percentage of chirt; so did our Young Deep 31.

Another well on the cross section that was a strong test was in the northwest of the southwest. It encountered --

Q. Of which section?

A. Of section 9. It encountered a 10 percent chirt and the rest limestone. We went into this well, which was structurally high, and it was wet.

Q. You're talking about your well in the southeast of 9?

A. That's right. Southwest of 9.

Q. Correct. Were you present today when there was testimony presented about the absence of wells on the northeast/southwest diagonal where you had a good well offsetting a good well?

A. Yes, I was.

Q. And in your experience, do you know of wells in the area where you have a good producer and offset in that pattern?

A. Yes, essentially what Meridian set up, even though it's on the 40-acre off center diagonal well bores.

Q. And you're talking about which wells?

A. The Mitchell 16 State #1.

Q. Which is located where?

A. 1650 from the north, 990 from the east, section 9.

Q. Okay.

A. I mean, section 16. And the Mitchell 16 State Number 2, which is 494 from the north, 554 from the east of the same section.

Q. And both of those are shown in the northeast quarter of section 16 on your structure map marked Exhibit Number 5?

A. That's correct.

Q. And both of those wells were good producers?

A. That's right. They're top liable.

Q. Now, at this time, let's go to Exhibit Number 6. I'd ask you just to identify what that is?

A. Okay. This is a geologic graphing of the distance between well bores.

Q. And the circles that you've placed on this show what?

A. Exactly the distance between well bore to well bore, and that was the radius for the point with the compass.

Q. And they are not designed to show actual drainage areas in the reservoir?

A. No.

Q. And they've not been contoured to take into account the structural configuration?

A. No, they haven't.

Q. All right. Now what does this show?

A. Well, what 6A shows is that 1,254 foot between the well bore within the same reservoir. By the time the well was first drilled in 2-20 of '90, the bottom hole pressure was 3,979. Three months later the bottom hole pressure of the same well bore was 2,838. Four months later, well, one month after that on 6-23 '90, Mitchell had completed the 16-2 well, and reservoir pressure in that well was 2,906.

Q. Now, do you have these wells on your cross section?

A. Yes, I do. They're the first two wells.

Q. And what zones were open and producing in those wells?

A. The chirt zone.

Q. And are those comparable zones from a geological point of view?

A. Yes, they are.

Q. And so what you have is a second well being drilled four months later. How far from the original well?

A. 1,254 feet.

Q. And what was the pressure differential encountered?

A. 1,000 pounds plus. 1,075.

Q. Now let's go to the second page of this exhibit. Would you identify that, please?

A. That is the proposed Hanley location before they changed it to 530 or so from the west and 730 from the north.

Q. And what is the purpose of this page of this exhibit?

A. Well, it shows that there's 1,155 foot between well bores.

Q. And that compares --

A. I'm just saying if any fractures were going to be which I doubt, because if any they would be well with inside that drainage area or that wing that Meridian had found 1,254 feet versus 1,155 foot, so if these had bottom hole pressure hops, I'm sure those would.

Q. What about the last page of this exhibit?

A. The last page shows -- taking basically the same 1,155 foot -- I could have made this different, but it would have shown pretty much the whole 160 wiped out because I took 1,155 foot between my compass to the center of our proposed location and the Kachina 8-1, and that's what I came up with.

Q. What conclusions can you reach from the data on Exhibit 5 and 6?

A. Well, graphically, in the addition and subtraction phase of geologist, which aren't allowed to get into the realms of calculus, because we'll screw it up, is each one of these squares represents .625 acres.

It's gridded out in that fashion, and I just added up the grids and found out how many acres I thought would be intersected with the two well bores based on the two different exhibits, and it's an amazing comparison because it's simple addition and subtraction. I found that the south half of the 160 was the one that suffered the least drainage.

Q. You're familiar with the rules that

govern development in this pool?

A. Yes, I am.

Q. And what is the -- you have an opinion on whether or not, or what spacing pattern was most effective between the reservoirs?

A. I think the commission was right.

MR. KELLAHIN: Objection on the expertise of this witness.

COMMISSIONER LAMAY: Want to rephrase your question, Mr. Carr?

Q. (By Mr. Carr) Mr. Brooks, based on your geological study of the reservoir, in your opinon would wells spaced on 40-acre patterns have a reasonable chance of encountering the same producing intervals in the Wolfcamp and the Bone Springs formation?

A. They could.

Q. And in your opinion, would there be less of a chance if the wells were located on an 80-acre diagonal spacing pattern?

A. I don't think they'd have a less chance, no. I think it depends on where you spot your well. And I think if you're going along the trend of your maps, you're trying to get as far away from the next well bore to drain the most of the reservoir you're hoping of getting.

Q. Basically, what conclusions have you reached as a result of your study of this reservoir?

A. I think it's highly elliptical, and I think it does trend northeast/southwest, and from analyzing the thin sections of the well logs and coming up with the idea of the formation from the base up, it seems that all depositional lobes, or all structural lobes, is where the maximum deposition occurs. In this fashion they run northeast/southwest.

Q. Any other conclusions?

A. Yeah. I have nine points. The productive fairways in the Lower Wolfcamp, essentially the E zone, are quite narrow. I think laterally -- I can show easily that east/west as well as north, or due north variations, get out of those productive fairways due to mineralogic changes. Mineralogic changes prohibit or enhance fracturing, depending on their position.

The presence of apparent structural advantage does not usually infer better quality reservoir rock up dip to water, rather, thinning of the carbonates with reservoir quality rocks is expected. Reservoir size can be quite small, yet apparently can intersect on the addition part of the drainage.

I'm trying to say that they seem to fit an 80-acre pattern. The reservoir size of section 8 is considerably larger than the North Young/Wolfcamp, but yet trends in a similar direction, and I think they are correlatively the same, and I feel that due to the fact that the Hanley well is pulling up structure and there will be thinning, we run a greater risk of losing Wolfcamp reservoirs at least in the "E" zone.

I feel the proposed location, which is a diagonal offset, as exemplified by the Mitchell 16 State 16-2 wells -- and there are other producers immediately west of those wells out of the chirt zone -- show that in a diagonal pattern is where the reservoir is going to be in simply that fashion. You get out of the fairway, it's gone.

Q. Now were Exhibits 1 through 6 prepared by you?

A. Yes, they were.

Q. When you prepared these did you have the information available to you on the recently drilled and completed 5 #1 well?

A. Definitely.

Q. Were your -- was your mapping of the formation and your construction of the isopach maps done independently of what was done by Santa Fe?

A. They definitely are two different companies.

Q. Has Harvey Yates Company agreed to participate in well voluntarily with Santa Fe, or the well that Santa Fe is proposing?

A. Yes, we have.

Q. And have you accepted their AFE calls?

A. Yes, we have.

Q. Baically, do you have a recommendation to give to this commission?

A. I think we ought to drill the well in the proposed Santa Fe location because we, you know, when we're in a joint partnership there you have to map. John has been mapping the Wolfcamp, I've been mapping the Wolfcamp, and when it gets down to staking a location, it's kind of interesting that in this case we came up with the same spot independently of each other.

Q. At this time, may it please the commission, we would move the admission of Heyco Exhibits 1 through 6.

COMMISSIONER LAMAY: Exhibit 1 through 6 will be admitted into the record without objection. Thank you.

MR. CARR: That completes my my direct examination.

COMMISSIONER LAMAY: Thank you, Mr. Carr. Mr. Kellahin.

CROSS-EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Brooks, if the commission approves the Hanley location and force pools you and Santa Fe, will Hanley participate in the well at the Hanley location?

A. Could you rephrase that?

Q. I'll repeat it for you. If the commission approves the Hanley forced pooling application and the well is drilled in the north 40, will your company go nonconsent, or you will you participate in the well?

A. I really don't know. George dictates the management on that, George Yates.

Q. Let's look at some of your circles.

A. Okay.

Q. Mr. Carr didn't help you with the circles, did he?

A. No.

Q. I'm not sure which one is this one. I think it's Number 6, roman numeral 6?

A. Well, it should say which one.

Q. Well.

A. Just turn it around. It looks like the Santa Fe. Yeah. It's the Santa Fe proposal. That's 6C.

Q. You talked about the circles, and your opinion would be elliptical?

A. Uh-huh.

Q. Circles are circles, aren't they?

A. Yeah, but you can draw your maximum ellipse through point A at the top of the top circle down to the bottom southwest corner of the bottom circle.

Q. If the Santa Fe location is in the center of a 40, the distance between the proposed Hanley location, and the Santa Fe location is going to have that 1320 --

A. That's correct.

Q. -- distance?

A. That's correct.

Q. We look at the relationship between Hanley and the Kachina 8-1. The radius of the circle is 1155?

A. That's right.
Q. And that's because the Kachina 8-1 well is 510 from the boundary residenting the center of its 40 acres?
A. That's right, within the 150 foot of the center of the quarter quarter.
Q. So the circle of overlap to which the Kachina 8-1 well is overlapping the Hanley tract is based in part because of its encroachment towards the Hanley tract?
A. Well, I think there was a, if I'm mistaken, if I'm wrong, wasn't there a problem out there on the location because of the pipeline?
Q. Regardless of that fact, it's not in the center of the 40. And so it has shifted the circle for that well over towards the Hanley tract?
A. Okay.
Q. When we looked at this one?
A. It's on there somewhere.
Q. It's the one that shows the Mitchell comparison. You've got the three Mitchell wells on there?
A. Right. It's the one that has the -- it says something on it. It has the pressure drops and all of the other wells.

Q. All right. Which one of the wells experienced the pressure drop?

A. The 16-1 and the 16-2. Actually the 16-1 had it within three months in its own well bore.

Q. All right. So we've got the 16-1 and the 16-2, each of which -- has the same radius for its circle?

A. Right. 1,254 feet in two locations.

Q. So despite the pressure drop, you're giving each circle the same area?

A. Essentially from a geologic standpoint. However, the well and the well that's spotted -- the number 3 well that's spotted in the southwest of the northeast did not have the reservoir in it.

Q. Let me ask you to explain the Exhibit Number 3. It is your gross isopach on this "E" zone?

A. It's the gross -- Exhibit 3 is the gross isopach of the "E" carbonate.

Q. E carbonate, okay. Here is Mr. Thoma's display of Santa Fe -- I think they were using letters. Is it a B? When he maps the "AG" is it -- this is the same interval that you're making the gross E map on?

A. Essentially it is.

Q. Okay. When we look at your Exhibit Number 3, did you attach significance to the structural position of the wells in Section 8?

A. Yes, I did.

Q. And am I correct in remembering that it was your conclusion that we should find better Wolfcamp wells lower down in the structure?

A. That's correct.

Q. So when I moved to the south of section 8, the wells in the south should be better geologically to those in the north?

A. It should have better accumulations unless it's climbing onto a structure or the mineralogy hasn't changed significantly.

Q. And on your Exhibit Number 3, looking at Section 8, and finding the Kachina 8-1 well, you've got a gross "E" carbonate thickness of -- is that 58 feet?

A. That's correct.

Q. We go down to that Corbin 26 well in the northeast of the southwest. It's got 61 feet on it?

A. That's correct.

Q. What is that well doing now in terms of its performance, do you know Mr. Brooks, the 61 well?

A. The 61 I believe is the one completed in a different zone, but it's also climbing onto a structural nose there.

Q. So how do -- how do you explain the fact that Exhibit Number 3 appears to have an orientation north/south that more closely fits Mr. Robbins' orientation of the carbonate? It appears to be dissimiliar to the orientation that Mr. Thoma has utilized when he did the net map of the same interval.

A. Well, I can truthfullly say that there's probably only 10 degrees differenc in rotation along that trend between Thoma's and mine as opposed to about 20 or 30 degrees of differentiation between Hanley's and mine. I mean, we're going from a northeast to the thickest part of it all. The thickest part, you can lay a pencil up there and have about a north 30 east trend with this north 45 maybe, and with Hanley it's just due north.

I think each geologist, depending on how much experience he has of an area, is going to be able to map things slightly askew, but not to the point where you've changed your whole geologic construction of an isopach map to come in from a totally different -- a totally different pattern. At least what we're saying with recession of Abo reef is, as an regressive reef goes out, the reef becomes, develops deeper into the basin. Well, the Abo reef was a regressive reef. The Wolfcamp reef was a transgressive reef. At some point in time these alternated. John has talked to you about low release structures. The Wolfcamp reef front is further north. As that reef would come down through the constraints, it should deposit these things in a side manner and then are reworked by ocean -- I mean, bottom currents.

Q. Let me ask you to explain that.

A. Okay.

Q. You've got ocean currents on the bottom of the Delaware basin?

A. You've got the bottom of the sea floor.

Q. We've got sea floor?

A. We've got sea floor during the Pennsylvania shale times. You've got a deep bottom. It's quite deep. As the water is moving under the land, this water is getting deeper. Your reefs are up here to the north during Wolfcamp in time. To get the Abo shelf, which Hanley showed on his exhibit as a Permo-Penn shelf, which truly marks the Abo, the water tended to seethe out of that shelf to form the reefs. They grew across it during Abo age. At that time you brought detritus from the north down in a diagonal manner because the reef trend is up through Kemnitz, which is also more confined to the delineation of these deposits. The Kenmitz trends -- here is the Abo reef. This is east/west, essentially east/west.

Q. Okay. As you have the debris flows?

A. The Kemnitz reef is in the northwest.

Q. Let me ask you a question. You got this reef front running east/west?

A. That's true.

Q. All right. And as --

A. For the Abo.

Q. For the Abo. And as the reef face is eroded, the debris material will fall down the face of that reef or that slope?

A. That's what we see in Bone Springs which runs most close to parallel.

Q. Do you see that in the Wolfcamp?

A. Santa Fe is a totally different configuration.

Q. All right. Are you telling me the change in configuration for the --

A. Due to reef facies of the Wolfcamp, during Wolfcamp in time.

Q. All right. During that time, is there a displacement by wave action of that Wolfcamp material?

A. No. I don't think so. I think the immediate front of that because that's where you're going to get your blocks and your bigger talus, but I think as you get in front of that, I think you're still going to have a ramp that this stuff is coming down. It's still going to be parallel to the existing Wolfcampian reef front. It's still going to be parallel to that. There's going to be some interaction of bottom currents. It would tend to be -- depending on the part of the basin -- probably more to the southwest instead of to the due south

MR. KELLAHIN: Thank you, Mr. Chairman.

COMMISSIONER LAMAY: Do you have any questions? Mr. Weiss, any questions? On your analogy, if you can, Mr. Brooks, refer to that Young Deep structure map. I don't know if I have Exhibit 5. You showed the two Mitchell wells; they're good wells. How about the one on the 15?

A. Both wells in -- well, the well in 15 and also the west offset to the Mitchell wells are

both dry in that interval. They were tight.
Q. They were tight. So the only two producing wells you have are those two Mitchell wells and the east half of the northeast, I guess?
A. Right. Of 16. There are two more producers in Section 8.
Q. Which ones are those that are producing from the "E" interval in Section 8?
A. The "E" interval of Section 8 would be a well that Meridian drilled 1,980 feet from the west and about 660 from the south, and Amoco tested about 300 barrels a day in the due north offset.
Q. 1,980 from the west, 650 south. What's the other one in there?
A. It would be the 1,980 from south, 1,980 from west due north.
Q. Okay. Those don't exhibit any kind of a structural trough like you showed all these other wells out in here having this regional drift?
A. Yeah, just regional drift. I have to admit that. However, there is a trough that is trying to form down here. We have another well which will work. Arco just drilled a well in section 17 and it did complete in the Wolfcamp. The reservoir over here, even though it's present and much

smaller, I think that well only made 32,000 barrels out of that chirt zone.

Q. Which one?

A. The Meridian well of 1980 from the east, 660 from south, and then they also had a thick Bone Springs carbonate, so it's top viable on the Bone Spring. What I'm seeing is a successfully smaller reservoir moving west in that E zone or chirt zone.

Q. And you're mixing, again, if you're coming off that Wolfcamp reef, and I'm assuming you're saying it's not a shelf edge, but a true barrier reef like the Abo?

A. I think Kemnitz has a lot of documentation. It's got well-developed fossil assemblages. It's a smaller reef. It's not near as thick as the Abo. It's two to 300 foot --

Q. How about back-and-forwards relationships?

A. The back reef, behind it you move. The Wolfcamp dies out as you go north towards Chavez County. All of a sudden you're pinching out. If you get up to, say, up to Roswell, you have also a truncation east.

Q. Now I was trying to refer to the geometry of the reef, as you called it. I mean, assuming Kemnitz is the thickest part of the Wolfcamp, are you making a relationship that that's a reef or a shelf edge, or a barrier or what --

A. It's think small -- a low-relief reef, and that you have a shelf, a total slope in front of that reef, and as things perforated south to where the Abo is, I think it carried sediments with it.

Q. Would you expect an orientation without rework of a northwest/southeast alignment to that kind of shelf edge?

A. Northeast/southwest. Kemnitz is running -- of course, Kemnitz is running like this down through the Empire.

Q. Right.

A. And that's where the Wolfcamp -- you also have Wolfcamp reefing in the Empire Abo, below it. I feel there's a departure along that reefing.

Q. But for the record, are we talking about that reef now being aligned in a northeast/southwest direction, the reef, the shelf edge?

A. I think so.

Q. Going from Ikes and Kemnitz on down to Empire Abo?

A. Right.

Q. And then you're going to take talus

along that slope and make it perpendicular to that; wouldn't that be a line in a northwest/southeast alignment without rework?

A. Without reworking, yes. Without reworking it would be, and I think some of these were reworked. That's why the bottom currents come into play.

Q. So if you're going to align these reservoir rocks in the northeast/southwest alignment, you'd have to -- wouldn't you have to assume that that was done to rework and not to any initial relationship with the reef or the dip slope?

A. Possibly so. I think there's a lot -- since there's no well control north of these wells until you get into the Kemnitz and where there's production you can assume an awful lot, but I do feel that there's about an eight-mile to six-mile span. And they are now starting to come down from the Townsend Wolfcamp and find detrital production.

There are several wells up there. I didn't realize I'd have to go that far north, but there are two new completions in the county that are essentially the same chirt intervals and carbonates that are in two offsets I know are on direct northeast-to-southwest alignment, but they were just recent completions about two months ago. I don't have too much data because I really haven't looked at them. I just said, "Ah ha. We found a chirt zone up there too." That's about three or four miles up front.

COMMISSIONER LAMAY: That's all the questions I have. I'm just trying to clarify. Additional questions of the witness? If not, you may be excused.

You gentlemen want to sum it up, or do you have any witness, or any redirect or anything else?

MR. KELLAHIN: Two comments to try to complete it this afternoon, Mr. Chairman: one, I represent to you that Hanley has an approvable location that complies with BLM requirements for a well to be located on their tract. I don't propose to go through the exercise to demonstrate that to you, but there was a comment made by the drilling engineer for Santa Fe that questioned whether or not we'd have an approvable location. We, in fact, do, and I make that representation to you. Rather than trying to recall any of my witnesses as rebuttal to their presentation, I would simply invite the commission, if they desire to have further discussion on either engineering topics or geologic questions, that my witnesses are available to answer these claims.

COMMISSIONER LAMAY: At this point, can I ask my fellow commissioners whether they would like the witnesses recalled for any clarification? No. I think we appreciate your offering the witnesses. I think we've heard enough testimony to make up our minds.

MR. KELLAHIN: We're prepared to conclude the hearing in whatever fashion you'll permit us.

COMMISSIONER LAMAY: Well, you certainly sum up if you wish, or you can submit written comments, or you might want to leave it as it is. That's your choice.

MR. KELLAHIN: Just refer to Mr. Bruce and Mr. Carr however they want to close this. I prefer to make a short statement if that would help them decide what they'd like to do. We always want to accommodate Mr. Kellahin. I assume a short statement would also need to be last since he went first.

MR. KELLAHIN: I think that's my privilege to go last because I have had to go first.

MR. STOVALL: Mr. Chairman, I can assume Mr. Carr wants to make a statement.

MR. CARR: May it please the commission, this has been a long hearing and I will be short. When you cut through all the various geological interpretations that have been presented to you and submissions which I think were probably inappropriate like the AFE cost, it really isn't that complicated. You have a case that I think is basically geological.

We have both heard the testimony that has followed within that expertise. When you look at that testimony you find Hanley comes before you talking about a general northeast trend to these Wolfcamp debris flows, and we've been talking to you, and to an examiner some time ago, about flows in this particular area by zone that tended to go northeast/southwest. We're all looking for the same thing. We're looking for the thickest section of the section that is -- that will best enable us to develop the reserves under the same -- we submit -- 80-acre tract.

Since the examiner hearing has only been one bit of evidence that's come before you and that's the new information that resulted of the drilling of the well in section 5, the 5 #1, we submit to you that when you look at the geological exhibits you're going to see that when you look at the thickness that was encountered in that well, it confirms the interpretation that was presented to you and presented to Examiner Morrow, and, in fact, you have a thick that is off to the east of the Hanley location.

When you look at the exhibits they presented in the original hearing, their exhibit Number 2, and then you look at their Exhibit Number 7 -- today, those were the isopachs maps on the primary Wolfcamp intervals that we're talking about -- you see that they've done the only thing they can do. They take their maps and when they maybe get up to where the number five is, the new data, they just say it turns straight east. And I say it's perpendicular of what they say the trend is, and they have to.

Because if they don't map it that way, they have to move the thick off of their acreage to the west, move it to the east on the datum points, and we submit to you from our case as we believe the datum on the 5 #1 well which confirms our case. There's been some pressure information here and we, again, submit that to you. You're well equipped to judge the pressure data to conclude it; in fact, this is an area where 80-acre spacing is appropriate. We submit to you that it is.

We think we've made a full record, and we now turn the case over to you and request that you enter an order affirming the decision of Mr. Morrow, who we believe correctly honored the technical data that's been presented to you, the data we submit that has been confirmed by supplemental information applied during the last three months. And furthermore, affirming his order will result in an efficient and economic development of this particular portion of these reservoirs.

COMMISSIONER LAMAY: Mr. Bruce.

MR. BRUCE: Mr. Chairman, commissioners. As you know, the parties are here on competing application to force pool the west half of the northwest quarter of Section 8. We believe that the issues to be decided by the commission are first, well location; two, who operates the well, three, well cost apportionment, if that's proper, and four, risk penalty.

Looking at well location I will just second what Mr. Carr said. You have two competing geological interpretations in the Wolfcamp. I believe Santa Fe's interpretation is correct and honors the most recent data, the data from the 5-1 well. The depositional trend is northeast/southwest, and therefore, based on that trend, Santa Fe's location will have the thicker carbonate. Moving the well to Hanley's location, you move to a thinner carbonate, and there is water reducing the chances of success of the well.

Structurally, the Hanley location has only a minor advantage over Santa Fe, as Mr. Thoma testified, that will have absolutely no effect -- adverse effects -- as far as water production is concerned. Basic conclusion is that Santa Fe's location is geologically superior to Hanley's location in the Wolfcamp. This interpretation, this geological conclusion, is reinforced by the reservoir engineering.

Mr. Offenberger has shown that average wells in the pool drain about 80 acres, and if indeed, looking at Santa Fe's Kachina 8 #1 well, that is not an average well. It will be draining substantially more than 80 acres. He has also shown that direct offset wells in the Wolfcamp result in severe pressure draw down. While there's limited data in the South Corbin Wolfcamp, these parties are trying -- I should say the operators in the pool --

are trying to develop more of that data. We believe it's pressure draw down as shown clearly by the Mitchell wells in the Young Wolfcamp.

Based on this evidence, allowing the well to be at Hanley's location would cause rapid -- well interference and rapid pressure draw down, and we believe that would result in loss of reserves both at the 8 #1 well and at the proposed 8 #2 location if it's drilled at Hanley's location. We also believe that 40-acre nonstandard unit is improper. Basically what all you required is that two wells will be required to be drilled on the west half of the northwest quarter at $700,000 a well. And we think that is improper and will cause economic waste.

As far as who operates the well, we have a problem in this particular well because 50 percent of the interest wants Hanley to operate and 50 percent of the interest wants Santa Fe to operate.

Both companies, Santa Fe and Hanley, operate large numbers of wells, and there's no question that either company could drill and operate the well. But as to a well in this particular pool, we believe that Santa Fe is the logical operator.

Santa Fe owns interest in 3,000 acres in this area, and Hanley owns solely this 40-acre unit, this 40-acre quarter quarter section. Santa Fe operates two wells in the pools, has participated in about 10 other wells with Meridian, and also plans to drill additional wells in this pool, has substantial undeveloped acreage and they've already testified that they would build a Kachina 5 #2 well in the northeast and the southeast of section 5.

We believe that Santa Fe's greater experience, greater acreage interest in the area, mandated by Santa Fe being made the operator, we believe it's respectfully so that the commission chooses Santa Fe's well location.

As to AFEs: The commission can make its decision, as I noted at the opening of this case. The commission really doesn't select an AFE. The compulsory pooling order doesn't state a well cost. Rather, the operator named in the order uses its AFE if a nonoperator is unhappy with the actual well cost under the expressed terms of the compulsory pooling order and can later challenge those well costs.

As to well cost apportionment, Mr. Thoma's testimony shows that really in those wells the only logical -- the only proven objective is the Wolfcamp, and therefore we don't believe cost apportionment is proper. If there is apportionment I think it would have to be done in a prospective nature because obviously people are -- if people can drill a well and complete in the Wolfcamp, it will be quite some time before they try to recomplete a well.

And finally, as to risk penalty, Mr. Chairman, I think both parties testified that there is a substantial risk going from location to location in the Wolfcamp. Santa Fe does have a high success rate, but you never know. The fact that you can move 40 acres away, or 80 acres away and not get a good well, we believe indicates for the maximum risk penalty of 200 percent. Furthermore, there is a 500-foot test on these deep wells. Of course, there's always potential for mechanical problems, and once again, we would ask for the 200 percent penalty. Thank you.

COMMISSIONER LAMAY: Mr. Kellahin:

MR. KELLAHIN: Thank you, Mr. Chairman. I will not presume to second guess your expertise on the technical matters presented either before Examiner Morrow or before you today.

We have put together in our briefing book the details of things that we thought were important for you to consider. While we have spent virtually no time today talking about the chronology of negotiations between the parties, do not misunderstand the significance of what occurred.

From my perspective I perceive the little guy being beat on by the big guys. It is of importance to me to know that Hanley was there first with a 40-acre federal lease. We've been involved in exploration.

What are Mr. Robbins and his people going to do with 40 acres? It's awful tough. They can spend their resources and they can drill a well, and if they're successful they have no development potentials in which to share in that risk. They are in a dilemma in that they have Bone Springs pools to the east and to the west of them, and they have a Wolfcamp pool to the south. What you do is what they did.

After acquiring their lease they bid on the rest of the half section, the north half of section 8 at the time Hanley acquired their lease. It was unleased federal acreage. What do you do? You don't drill that exploration well on your 40 acres and prove up undeveloped federal acreage. You hold your cards and you wait to see if you can get some more property to give yourselves some room to work in.

They went to the lease sale in August of 1990, and they were outbid by Santa Fe and Heyco.

And look what Santa Fe tells you. They control interest in some 3,000 acres. They're irritated that we're here at all. What did they do? The chronology is really very interesting. They drilled this Wolfcamp well, the Kachina 8 well, they set down there and they take a production test on this and say, "Do we have a wonderful well, or what? " They don't complete it. They don't follow these reports. They take this potential, and the next thing they do, they fire off a letter to Hanley on November 12, 1990. They don't worry about the rest of this orderly development in the Corbin Wolfcamp on 80-acre diagonal spacing and go about drilling these other wells.

They've got their Kachina 8-1 well in which they have 50 percent, Heyco has 50 percent, and the next thing they do is send Hanley a letter saying, "Farmout out and join us or participate." And what does Hanley do? Seven days later they ask them back and say, "We're considering the Bone

Springs on our 40 acres. Would you please tell us a little bit about the 8-1 well so we can make an informed judgment about whether we should contribute our acreage with yours in the south half? What should we do?"

The next thing that happens is they write them back and say, "No. You can't have the information; choose." And so Hanley must choose in a vacuum. Well they don't choose. They again ask for data. The next thing that happens in the sequence? Santa Fe hits them with a compulsory pooling application. What do we do? We have to come to the commission to get a subpoena to get the information on the 8-1 well so we can make an informed choice. That's what's going on out here.

Hanley wants to develop their acreage, but they would like to do it in an informed way. The compulsory pooling case is right after us. It's docketed for the 10th of January 1990. We have no choice but to respond. We want operations, we want a chance to participate in this, and so we file a competing pooling application, absolutely blind, without data or information. We want to give the examiner a choice.

As a result of the subpoena we finally

get some of the information. We get some more on the 8-1 well and some production information, and when we have that information, Mr. Robbins says, "It's obvious to me. Holy smokes. My 40 acres is terrific. That well ought to be on my tract."

And we immediately do that. He fires off a letter and we ask them to move the well location. "We want to operate. Let's put it upon us. Let's have the best chance for success in this risky area." "No. We don't want to do that." So we finally get down to Examiner Morrow and we do the same thing we've done here today, except he didn't decide the case on the merit. He accepted this diagonal 80-acre offset hypothetical pattern as the deciding component in this case. What a terrible disappointment.

What do we do? We come up to the commission and how do we get information on the next well, Santa Fe, the 5-1, the next key well that helps us determine some of the orientation, some of the key things we've been fussing about?

Some of the things Mr. Thoma has used and integrated in his geologic displays he showed you today. We've got a subpoena again. And we get the logs and some of the data on Tuesday at 11 o'clock.

We think the solution is to split this acreage and let us drill our 40 acres, and let them drill theirs. You don't have to decide the geology. Let these people put their money where they think their technical data demonstrates they ought to put it.

Mr. Robbins is willing to put his money on his 40-acre tract. Let him put it up there and lose it or win. Let him have his chance. It's his only chance, and let Heyco and Santa Fe do whatever they need to do in the rest of this 3,000 acres. But this is a unique problem that demands a unique solution, and have we caused waste with that solution? I think not.

Mr. Huck tells us he believes not, emphatically not. He has determined for you that he has some 260,000 barrels of oil he thinks he can recover at his location. It's terribly important to him. These pods we've talked about have significance to him because he wants to be on the northern side of these pods. The south side, he says, is a tremendous risk. He's got a water problem that he's got one shot to deal with, and he wants to deal with it on his best structural campian.

These pods have an interesting

orientation to it. There may be a thickness in the carbonates north and south, but look at the east/west relationship. Isn't it only fair that Hanley gets to have a west offset to the Kachina 8-1 well? And is that going to matter? It doesn't matter to Mr. Huck. He says that based upon his analysis of the performance of these wells, few are developing 80 acres. A substantial number are doing 40. There's tremendous thickness.

Santa Fe engineers want you to believe based, upon a one sample in this pool of interference for which Mr. Lamay had some concerns, that, in fact, it may simply be a time zone you're seeing. And they want to tell you that we oppose of this to them and put the well in the wrong place. I think not. Let us have that chance.

You can see from your own geology and from your own experience, this is a terribly complicated area. Penetrations, whether diagonal on 40 acres, or direct on 40 acres, every one of these well bores is encountering a different Wolfcamp creature when it finds it. Give us our chance. Give Mr. Robbins a chance to make that million dollars he thinks that he can earn off of this well.

Correspondingly, Mr. Huck says there is

potential in the south 40. His economics, if you believe him on anything, you need to follow that to it's logical conclusion. He says there's 130,000 barrels of oil for Santa Fe at their location. That's economic. Let them do it down there, but isn't it wonderful that they have the opportunity to spread their risk? They can spread it throughout this pool on some 3,000 acres, and yet they won't give us a chance on our 40 in which they will have 25 percent at the same time they continue to produce this wonderful well immediately to the east of us which they have at 50 percent.

But I think it's only fair to deny both of these applications and let us have a chance for a nonstandard proration unit. If you look at the rules, the rules say that's a fair chance. If you look at the transcripts on this spacing case, it's a fair chance. Look at rule two and three, the very language of the rule.

It doesn't say you're going to have stand up 80s and you'll have these wells in the diagonal 40-acre tract. We've got some of those rules around. You don't have it here; rightfully so. It's terribly complicated. These things don't have large aerial extends. In the rule itself, it's an interesting rule. It's not very complicated. Rule two: "Provided, however, that nothing contained herein shall be construed as prohibiting the drilling of a well on each of the quarter quarter sections in the unit." Please give us that chance.

COMMISSIONER LAMAY: Mr. Kellahin, are there additional statements in this case? If not, we shall take it under advisement. Thank you, gentlemen.

(The foregoing hearing was concluded at the approximate hour of 5:30 p.m.)

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION COMMISSION

IN THE MATTER OF THE HEARING DENOVO CALLED BY THE OIL CONSERVATION COMMISSION FOR PURPOSES OF CONSIDERING:

CASE NOS. 10211 AND 10219
ORDER NO. R-9480

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| APPLICATION OF SANTA FE OPERATING PARTNERS, L.P. FOR COMPULSORY POOLING, LEA COUNTY, NEW MEXICO | CASE NO. 10211 |
| APPLICATION OF HANLEY PETROLEUM INC. FOR COMPULSORY POOLING, LEA COUNTY, NEW MEXICO | CASE NO. 10219 |

**HANLEY PETROLEUM INC.'S**
**SUMMARY OF**
**EXAMINER HEARING**

COMES NOW HANLEY PETROLEUM INC. ("HANLEY") and in accordance with the stipulation of the parties at the pre-hearing conference of this case held on May 3, 1991, presents to the Commission its summary of the Examiner Transcript, Exhibits and Order.

## BACKGROUND

1. On March 7, 1991, the Division held a consolidated hearing of the HANLEY compulsory pooling application (Case No. 10219) and the SANTA FE Energy Operating Partners, L.P. ("SANTA FE") compulsory pooling application (Case No. 10211), in which each sought to pool the other.

2. HANLEY, with a 50% working interest, sought to be named the operator of a stand-up 80-acre spacing unit for Wolfcamp oil production and based upon its geologic evidence proposed the well be located in the north 40-acres on the HANLEY tract at an estimated cost of $667,782. HANLEY further proposed a split cost allocation between the shallow 40-acre oil potential in the Bone Springs formation and the deeper 80-acre oil potential in the Wolfcamp formation.

3. SANTA FE, with a 25% working interest, sought to be named operator of the same spacing unit but proposed the well be located in the south 40 acres on a tract owned 25% by SANTA FE and 25% by HEYCO for a well at an estimated cost of $721,942. HEYCO has agreed to participate with SANTA FE. (pages 66-67) (SF Ex. 4 & 5) SANTA FE also agreed they would participate if the well

were drilled at the location proposed by HANLEY. (p. 95, lines 10-24)

4. On March 29, 1991, the Division entered Order R-9480 granting the SANTA FE application and denying the HANLEY application based upon the Examiner's conclusion that while either location would result in a successful Wolfcamp completion, the SANTA FE location is more appropriate because it conforms to an 80-acre diagonal spacing pattern and therefore SANTA FE's application should be approved with a risk factor penalty of 100%. The order named SANTA FE operator and pooled all horizons contrary to SANTA FE's testimony that they were seeking only force pooling for 80-acre spacing oil zones. (p. 81, lines 3-13)

5. On April 8, 1991, HANLEY filed its application for a DeNovo hearing before the Commission.

6. On April 11, 1991, HANLEY filed a Supplemental Application in Case 10219 (DeNovo) requesting the alternative remedy of a 40-acre non-standard proration and spacing unit (being the HANLEY tract) for the Wolfcamp in accordance with Rule 3 of the South Corbin-Wolfcamp Pool Rules.

<u>CHRONOLOGY</u>
<u>AND</u>
<u>SUMMARY OF LAND TESTIMONY</u>

This summary of chronology and land testimony is based upon the Division/Commission case files for these cases. All references are to the Examiner transcript and exhibits or the OCD case file.

1. The 80-acre spacing unit in dispute is the W/2NW/4 of Section 8, T18S, R33E, Lea County, New Mexico. (page 66, lines 17-23)

2. The primary target for production by both HANLEY and SANTA FE is the Wolfcamp formation which is subject to the South Corbin-Wolfcamp Pool Rules which provide:

> Rule 2. Each well shall be located on a standard unit containing 80 acres, more or less, consisting of the N/2, S/2, E/2 or W/2 of a governmental quarter section; provided, however, that nothing contained herein shall be construed as prohibiting the drilling of a well on each of the quarter-quarter sections in the unit.

3. In addition, the Pool Rules provide for a procedure for obtaining a 40-acre non-standard proration and spacing unit. (See Pool Rule 3, Han. Ex. 11)

4. With the exception of the HANLEY 40-acre tract, SANTA FE and HEYCO control all of the working interest in the Wolfcamp in the N/2 of Section 8 and all of Section 5, and SANTA FE has working interests in over 3000 acres in this area, including all of the spacing units surrounding the HANLEY tract. (SF Ex. 2)

5. HANLEY owns 100% of the working interest in all depths in its 40-acre tract but has no other acreage in the immediate area. (p. 298) (SF Ex. 2)

6. HEYCO owns no interest in the S/2 of Section 8. (page 72, lines 21-24)

7. In 1986, HANLEY acquired its 40-acre federal oil & gas lease with a sliding scale royalty on oil production varying from 1/8th on daily production not over 50 barrels to 1/4th royalty for daily production over 400 barrels and then attempted to acquire other unleased acreage in Section 8 before commencing drilling. (p. 298)

8. In August, 1990, by successfully outbidding HANLEY, SANTA FE acquired its federal 1/8th royalty lease in N/2 of Section 8, the working interest of which is divided 50% to SANTA FE and 50% to HEYCO (page 72, lines 6-19)

9. On September 29, 1990, SANTA FE spudded the Kachina 8-1 well in the E/2NW/4 of Section 8 with the well located at a standard location 510 feet immediately to the east of the HANLEY tract. (Han. Ex. C)

10. On October 30, 1990 SANTA FE releases the Kachina 8-1 rig. (Stipulated)

11. On November 12, 1990, SANTA FE writes HANLEY and proposes a well in the subject 80-acre tract. No data on the Kachina 8-1 well was provided to HANLEY. (Han. Ex. 19, p. 4)

12. On November 13, 1990 SANTA FE ran its first production test on the Kachina 8-1 well for 411 barrels of oil a day and 577 mcf of gas with 59 barrels of water. (Han. Ex. C)

13. On November 26, 1990, HANLEY replied to SANTA FE with a request for data and information by which to evaluate the SANTA FE proposal. (Han. Ex. 19, p. 7)

14. On December 3, 1991, SANTA FE writes HANLEY refusing to provide HANLEY with the requested data and proposing to take a farmout from HANLEY. (page 69, lines 20-25)

15. By Application dated December 11, 1990, SANTA FE files its compulsory pooling application as to all

depths against HANLEY seeking approval for the well in the south 40 acres of an 80-acre spacing unit. The case is docketed for an Examiner's Hearing on January 10, 1991. (OCD case file)

16. On December 17, 1990, SANTA FE writes to HANLEY advising HANLEY that SANTA FE has docketed a compulsory pooling case for January 10, 1991 hearing and offering a farmout or participation in the well. (Han. Ex. 19, p. 12-13)

17. On December 17, 1990, SANTA FE also writes HANLEY offering to show HANLEY data on the Kachina 8-1 well if HANLEY will commit to either joining in the well or farming out its interest. HANLEY rejects the offer. (page 69, lines 20-25; page 70, lines 1-13)

18. On December 19, 1990, HANLEY writes SANTA FE and renews its request for data from SANTA FE. (Han. Ex. 19, p. 19)

19. On December 20, 1990, SANTA FE sends a proposed operating agreement to HANLEY and HANLEY acknowledges receipt. (SF Ex. 3) On January 2, 1991, HANLEY subsequently proposes modifications to the agreement, including substituting HANLEY as operator, but terms have

not yet been reached. (page 70, lines 14-21; page 86, lines 8-19) (Han. Ex. 19, p. 65-69)

20. On January 2, 1991, HANLEY proposes to SANTA FE that HANLEY operate the subject well. (Han. Ex. 19, p. 65)

21. On January 2, 1991, in response to the SANTA FE application, HANLEY files its own compulsory pooling application requesting approval of a well at a standard location and pooling from the surface to total depth of the well. (OCD case file)

22. On January 3, 1991, HANLEY obtains an OCD subpoena for data and serves SANTA FE for production at the January 10, 1991 Examiner hearing. On January 9, 1991, SANTA FE moves to Quash the Subpoena. (OCD case file)

23. On January 4, 1991, HANLEY writes HEYCO sending an AFE and requests HANLEY be operator. (Han. Ex. 19, p. 70)

24. On January 7, 1991, HANLEY sends SANTA FE and HEYCO HANLEY'S proposed AFE for the subject well. (Han. Ex. 19, p. 71-73)

25. On January 8, 1991, SANTA FE writes HANLEY requesting HANLEY to join in the SANTA FE well. (Han. Ex

19 p.118) On January 8, 1991, HEYCO writes HANLEY advising HEYCO has joined SANTA FE. (Han. Ex. 19, p. 119).

26. On January 10, 1991, Examiner Catanach modifies the subpoena and requires SANTA FE to surrender production/test data and logs on Kachina 8-1 well. The SANTA FE case is continued to January 24, 1991. (OCD case file)

27. On January 16, 1991, 64 days after the first production test, SANTA FE files its completion report on the Kachina 8-1 well. (Han. Ex. C )

28. On January 14, 1991, SANTA FE appeals the Examiner subpoena order to the Commission which hears the subpoena appeal on January 17, 1991. (OCD case file)

29. On January 21, 1991, SANTA FE writes HANLEY for clarification of HANLEY'S proposed AFE. (Han. Ex. 19, p. 120).

30. On January 30, 1991, SANTA FE unilaterally turns over certain data to HANLEY. (Han. Ex. 19, p. 122)

31. On February 4, 1991, HANLEY again proposes to SANTA FE and HEYCO that HANLEY operate the well and it be located on the HANLEY tract. (Han. Ex. 19, p. 123-124)

32. On February 5, 1991, HANLEY notifies the OCD and SANTA FE/HEYCO of its amended location to the north 40-acre tract. (OCD case file)

33. On February 6, 1991, Examiner Stogner decides HANLEY's amendments can be addressed at the Examiner hearing and orders both pooling cases continued to the February 21, 1991 Examiner's docket. (OCD case file)

34. On February 12, 1991, HANLEY files a first amended compulsory pooling application requesting pooling only from top of Wolfcamp to total depth with the well being located in the North 40 acres of the spacing unit. (OCD case file)

35. On February 14, 1991, Examiner Stogner again confirms that moving of the HANLEY well location does not require re-advertisement of the case. (OCD case file)

36. On February 15, 1991, Commission enters its Ruling on HANLEY's subpoena of SANTA FE data and confirms Examiner Catanach's order with the exception of production of the mud log for the Kachina 8-1 well. (OCD case file)

37. By agreement of the parties the two pooling cases are continued from February 21, 1991 Examiner

docket to Examiner docket of March 7, 1991. (OCD case file)

## SUMMARY OF GEOLOGY

HANLEY showed the distribution of producing wells in the area as well as what horizons produced in each well. The subject unit is between established Bone Springs production to the east and west and Wolfcamp production to the south. SANTA FE operates only the Kachina 5-1 well and the 8-1 well. (p. 138, lines 15-18) The most prolific production is from the Bone Springs (carmine red) and the Wolfcamp limestones (yellow). (Han. Ex. 4)

Both the Bone Springs and Wolfcamp horizons produce from stratigraphic traps which are interpreted as being carbonate detritus deposited in the basin which flowed down slope from east-west trending updip reef fronts to the north. This carbonate detritus was deposited as channelized and discontinuous piles perpendicular to the reef front and therefore have a north-south direction. (Han. Ex. 1 & 3)

The first geologic issue of importance is the construction of an accurate structure map for both the Bone Springs and Wolfcamp. While both geologists prepared structure maps which are in substantial agreement (p. 235 lines 18-22). HANLEY's geologist, Brett Bracken, concluded that down-structure water was a risk in both the Bone Springs and Wolfcamp. (p. 196, line 19-22; p. 211, lines 14-18) Although the SANTA FE geologist, John Thoma, conceded that the SANTA FE location in the Bone Springs would be wet and non-productive, he contended that water in the Wolfcamp was not a concern and therefore HANLEY's up-structure position in the Wolfcamp would not matter. Mr. Bracken and (p. 211-212) Mr. Huck (p. 276, lines 13-23) disputed that contention.

The HANLEY structure map is contoured on base of the lower Wolfcamp with a contour interval of 50 feet. (Han. Ex. 1; p. 209-210) It is important to note the steep dip to the south along the reef face which is trending east-west consistent with regional geology. (p. 197). Thus, any debris that was deposited down this steep slope will be perpendicular to it and will have a north-south orientation. (p. 198 lines-14). A location in the north 40-acres as proposed by HANLEY will be approximately 20-30 feet higher than the SANTA FE proposed location in the south 40-acres. The SANTA FE location has a down structure water risk to it. The HANLEY location can have 20-30 feet more oil column in the Wolfcamp due to the potential hazard of water production at the SANTA FE location. The HANLEY location also has an improved structural advantage over the SANTA FE Kachina 8-1 well to the east (p. 130, lines 6-10) which has at least two Wolfcamp zones listed as containing oil and water on SANTA FE's completion report. (Han. Ex. C)

When it came to the Bone Springs potential, there was substantial agreement between the geologic witnesses. SANTA FE contoured the Bone Springs thicks trending north-south as did HANLEY. HANLEY's Exhibit 3 is a structure map contoured on top of the second Bone Spring carbonate Zone "B" pay which is the pay that produces in the North Young Bone Spring pool to the northwest of the subject unit. (p. 208 lines 4-8). It is important to note that the HANLEY location will be 100 feet high to the SANTA FE location. This is very critical because wells which are located at or south of the -4600' subsea contour, as seen in the North Young Bone Spring Pool produce large amounts of water. The -4600' subsea contour borders the south lease line of the HANLEY tract. Also, the south dip off the reef fronts will make the

HANLEY location higher than the SANTA FE location at all formations. The HANLEY location is also higher than the SANTA FE Kachina 8-1 well location to the east.

SANTA FE's geologist agreed with the HANLEY geology in that the proposed SANTA FE location will be approximately 100 feet down-structure from the HANLEY location (p. 111 lines 11-15) (Han. Ex 1). and wet in the Bone Springs and thus the Bone Springs is not a viable target at the SANTA FE well location. (SF Ex. 8) (p.106 lines 4-23).

It is interesting to note that like HANLEY, Mr. Thoma oriented the Bone Springs reservoir north-south in relation to his east-west orientation of the Bone Springs structure map. (SF Ex. 8; p. 113-114) He also stated that the Bone Springs and Wolfcamp structure would have the same general structure (p. 237; p. 115, lines 22-24), but he then applied a different orientation when he attempted to map the Wolfcamp reservoir. (SF Ex. 7; p. 114) The northeast-southwest orientation he imposed is discordant to his stated depositional model and different than the north-south orientation used in the Bone Springs.

That shift in orientation then became the second major geologic issue of importance to this case. The issue was how the Wolfcamp reservoir should be mapped and related to the structure. Over this issue, there was substantial dispute and significant disagreement in the proper orientation of the isopach to the structure map. (p. 202, lines 4-25; p. 237, lines 19-24).

The HANLEY map is an isopach of the net clean lime within the total lower Wolfcamp interval. (p. 198-199; Han. Ex. 1) It shows two north-south thicken sections. As expected from the structure map, the isopach shows elongated, lobed shaped Wolfcamp deposits oriented north-south and perpendicular to the steep dipoff of the reef front to the north. (p. 200-201) The lower Wolfcamp limestone reservoir thickness at the HANLEY location is going to be equal to or greater than the thickness of the SANTA FE location. (p. 199 lines, 22-25)

HANLEY agrees with Mr. Thoma when in describing SANTA FE's Wolfcamp isopachs he stated "it appears that there is a general relationship between carbonate thickness and the probability of encountering producible reservoir conditions in the Wolfcamp. (p. 101, lines 7-10) Mr. Thoma has described the Kachina 8-1 well as having some 50-60 feet of good matrix porosity ranging from 4 to 12 percent in the so called "AG" carbonate which is only one of three potential wolfcamp zones in this well. (p. 101, lines 14-25)

However, unlike the HANLEY Wolfcamp isopach, Mr. Thoma did not construct his isopach to be perpendicular to the reef front. (p. 119, lines 4-19). Instead he arbitrarily placed the orientation in a northeast-southwest direction which is oblique to the reef face. This is in spite of the fact that he acknowledged (p. 100, lines 14-17) that the Wolfcamp is carbonate debris and that he contours the Bone Springs (also carbonate debris) with a north-south orientation. By shifting the angle of orientation, Mr. Thoma has made the Wolfcamp reservoir thicker across the SANTA FE tract than it is across the HANLEY tract. (p. 103, lines 1-7). Mr. Thoma then argues that while his Wolfcamp location is structurally inferior to the HANLEY location (approximately 45 feet, p. 118, lines 13-17), the SANTA FE location is thicker and that thicker is better. (p. 116, lines 19-24; p. 125, lines 12-17). Mr. Thoma dismisses the fact that down-structure wells in the Wolfcamp also produce water. (p. 118, lines 18-15; p.

143, lines 13-20). Mr. Thoma also admitted that the Kachina 8-1 well log showed the so called "AF" carbonate to be productive of water as well as oil. (p. 118, lines 1-7).

Unfortunately, the shift in orientation of Mr. Thoma's three Wolfcamp isopachs makes the isopachs inconsistent with the production data from the Wolfcamp wells. In addition, it is simply not a useful geologic tool from which any conclusions about potential locations can be drawn. (p. 206-207). For example, using his "AG" carbonate isopach map which is the Wolfcamp zone productive in the Kachina 8-1 well with a thickness of 31 feet, Mr. Thoma argues that the SANTA FE location will have similar thickness to the Kachina 8-1 well while the HANLEY location will be only 10 feet thick. Mr. Thoma ignores the fact that this same map also shows the well in Unit H of Section 8 to have 30 feet of net thickness but was drill stem tested and abandoned in that zone. (p. 123, lines 19-22).

The HANLEY cross section (Han. Ex. 2) shows the Kachina 8-1 well log which is the immediate east offset well to the HANLEY tract. (p. 204) Geologically, because of its proximity to the Kachina 8-1, HANLEY concludes the subject well must be located in the north 40-acre tract to mitigate drainage of the HANLEY tract by the Kachina 8-1 well. (p. 303, lines 12-25). A well in the SANTA FE location will be in a less favorable location and cannot protect the HANLEY tract from drainage.

SANTA FE reports that the Kachina 8-1 well has both oil and water productive in shallower Wolfcamp pays and estimated that the HANLEY location would be approximately 19 feet structurally higher than the Kachina 8-1 well. (p. 130, lines 6-10). HANLEY also concludes that its location which is structurally higher than Kachina 8-1 location is the more prudent location to drill than the SANTA FE proposed location which is down structure to both the HANLEY location and the Kachina 8-1 location. (Han. Ex. 2, p. 201)

Finally, while Mr. Thoma continued to argue his contention for the south 40-acre location, he admitted that his justification for the 330 foot unorthodox location for the Kachina 5-1 well in Unit O of Section 5 was simply one of "closeology" to the Kachina 8-1 well. (p. 133, lines 22-25). And in closing his discussion, Mr. Thoma admitted to Mr. Stovall that both well locations should be drilled. (p. 142, lines 11-13).

## SUMMARY OF ENGINEERING

Mr. Huck, HANLEY's petroleum engineer, prepared a cumulative production map through 9/90 for all Wolfcamp producers. (Han. Ex. 5, p. 241-242) It also shows the average daily production from the last month available. A star indicates that the well is no longer producing from the Wolfcamp. There is a marked variability in production. Therefore HANLEY concurred with the SANTA FE geologic witness who concluded that it reduces the Wolfcamp risk to drill in close proximity to a good well.

Based upon decline curve analysis of all Wolfcamp wells in the field, Mr. Huck prepared an ISO production map to show the estimated ultimate recoveries in the area. (Han. Ex. 6, p. 244; Han. Ex. 7, p. 253) Mr. Huck confirmed that the ISO production map conformed to the HANLEY geologic interpretation with the north-south trend in production conforming to the isopach of HANLEY. (p. 245-246). These contour lines connecting points of equal recoveries delineate three major areas or pods that are highly productive and contain 40% of the field's reserves. They tend to orientate somewhat east-west and have high water cuts on their south side. (p. 276, lines 13-19) It was noted as you move from these pods productivity rapidly decreases. Mr. Huck also commented that the SANTA FE isopach map was inconsistent with the HANLEY ISO production map. (p. 245-146; p. 286-288). Mr. Huck further confirmed that contrary to the contentions of Mr. Thoma, there was a definite water risk in the Wolfcamp on the south side or down structure side of the major oil accumulations. (p. 244, lines 10-23)

By comparing the initial producing rate of the Kachina 8-1 well with the initial producing rates of the rest of the wells in the Wolfcamp pool, HANLEY estimated that the subject well drilled on the HANLEY tract should produce 260,000 barrels of oil while the SANTA FE location should only produce 130,000 barrels of oil. (p. 246-247; Han. Ex. 7)

SANTA FE's engineer did not present any decline curve analysis, reserve calculations or volumetric analysis but simply assumed a recovery of 100,000 barrels of oil for the 80-acre spacing unit and declared that 40-60% would go unrecovered if the HANLEY location was approved. (p. 150, lines 16-25) Mr. Offenberger further stated that 100,000 barrels of oil "typical for a Wolfcamp recovery number" (p. 148, lines 5-6), and that the Kachina 8-1 would be a "typical well." (p. 148, lines 10-15) However, Mr. Thoma testified that he expected high rates of production from other zones in the well and that very few wells in the field had the kind of porosity that was developed in the Kachina 8-1. (p. 139, lines 11-18) But under cross-examination, Mr. Offenberger admits that the Wolfcamp oil under the HANLEY tract will be drained by the Kachina 8-1 well. (p. 167-168) And further admitted that he had not done any volumetric calculation of recoverable oil under the SANTA FE 40-acre tract. (p. 169, lines 5-12) Mr. Huck disputed the SANTA FE reserves assumptions and concluded that volumetric calculations would not be accurate for this reservoir because of the variability of reservoir quality rock. (p. 250-256)

While Mr. Offenberger, SANTA FE's engineer, contended hypothetically that the SANTA FE location would conform to a theoretical 80-acre diagonal spacing pattern and hypothetically provide better recovery than the HANLEY location. (p. 148) He admitted on cross-examination that such a pattern was neither mandated nor preferred by the rules for the South Corbin-Wolfcamp Pool. He further conceded there were already examples of exceptions to his pattern between the Wolfcamp wells in this pool. (See SF Ex. 8 production montage: Unit H of Section 18; Unit E of Section 17; and Unit E, Unit F, Unit I, Unit K, Unit L of Section 18 are essentially 40-acre offsets) Finally, Mr. Offenberger admitted that he was not aware of either Rule 2 or Rule 3 of the South Corbin-Wolfcamp Pool Rules. (p. 158-159).

Mr. Huck compared the costs between the SANTA FE location and the HANLEY location. (p. 259-272; Han Ex. 12). He concluded that HANLEY's estimated costs were some $54,000 less than SANTA FE's estimated costs.

Part of his conclusion was that because the SANTA FE location had no potential for Bone Springs, then HANLEY would be forced to pay 50% of SANTA FE's AFE or the sum of $360,971. (p. 73, lines 16-21; Han. Ex. 17; p. 107-108) However, if the HANLEY location was approved because it is the only location with both Bone Springs and Wolfcamp potential the cost allocation could result in substantial savings to the party pooled. For example, using the same AFE and then allocating the costs between the Bone Springs and Wolfcamp potential at the HANLEY location, then SANTA FE/HEYCO would only have to pay $226,673. as their proportionate share of the Wolfcamp costs. (Han. Ex. 17) This cost allocation would apply after depletion of the Wolfcamp.

Mr. Huck concluded that the approval of the HANLEY location would result in the difference of an additional $1 million to HANLEY (p. 248, lines 20-25), and an additional $250,000 to the U.S. Government, HANLEY's royalty owner. (p. 249, lines 14-18)

Mr. Huck concluded that the SANTA FE proposed well location could not protect the HANLEY tract from drainage by the Kachina 8-1 well. (p. 288; p. 257-258) Both the HANLEY and SANTA FE engineers agreed that unless the well was drilled on the HANLEY tract the Kachina 8-1 well would drain the HANLEY tract. (p. 162, lines 6-8; p. 258).

Finally, SANTA FE sought a 200% penalty because of the risk involved in its location (p. 108, line 13) while HANLEY sought 150% penalty for the risk involved at its location. (p. 256, line 14). The Examiner Order applied a 100% to the SANTA FE location and denied the HANLEY location.

## SUMMARY

SANTA FE's first proposal to HANLEY about participation in the subject well was by letter dated November 12, 1990. HANLEY responded to that proposal by letter dated November 19, 1990 advising SANTA FE that HANLEY was considering drilling a Bone Springs well on its own acreage and requested data from SANTA FE so HANLEY could properly evaluate the SANTA FE proposal for a Wolfcamp test. (Han. Ex. 19, p. 7-8)

HANLEY strongly believes that SANTA FE's actions have been an attempt to use the compulsory pooling act to keep HANLEY from offsetting the SANTA FE Kachina 8-1 well in which SANTA FE has a 50% working interest and to require the HANLEY tract to be dedicated to a well (Kachina "8" Fed #2 well) in south 40 acres of the W/2NW/4 of Section in which SANTA FE only has a 25% working interest. (p. 89-91; Han Ex. 19, p.19-20)

This is evidenced by the fact that, among other things, SANTA FE drilled the Kachina 8-1 well, released the rig and potentialed the well some 64 days later. Prior to potentialing the well they attempted to compulsory pool HANLEY's interest while refusing to provide data to HANLEY so HANLEY could make an informed decision. (Han. Ex, 19; Han. Ex. C)

As a result of having the data subpoenaed, HANLEY for the first time, had logs and test information from which to evaluate the Kachina 8-1 well.

Once HANLEY had reviewed the geologic data obtained by subpoena from SANTA FE on the Kachina 8-1 well, HANLEY concluded that:

(1) The optimum location for the well was on the HANLEY tract and not on the SANTA FE tract to the south.

(2) A structure map of the Wolfcamp shows the HANLEY location to be up structure to the Kachina 8-1 well and to be approximately 25 feet up structure to the SANTA FE proposed location. (Han. Ex. 1)

(3) A structure in this Wolfcamp was important because down structure Wolfcamp wells produced substantial volumes of water and could be too wet to be productive of oil. (p. 276-278)

(4) Both HANLEY and SANTA FE agreed that HANLEY had a superior Bone Springs location and that the SANTA FE location would be wet and non-productive in the Bone Springs.

(5) HANLEY rejected the SANTA FE isopach interpretation because it was contrary to the perpendicular orientation of the carbonate to the reef face and erroneously inferred Wolfcamp production were drilling had proved none existed.

(6) The HANLEY reserve calculations based upon decline curve analysis showed the HANLEY tract to potentially recover 130,000 barrels of oil more than the SANTA FE location. HANLEY rejected the SANTA FE estimates of recovery as being nothing more than arbitrary guesses.

(7) Unless the well is drilled on the HANLEY tract, Wolfcamp oil reserves would be drained by the Kachina 8-1 well.

(8) That the pool was being effectively developed on 40-acre locations.

## DEFECTS IN EXAMINER ORDER

In this case, HANLEY is asking the Commission to disregard the Examiner order for reasons which include, but not by way of limitation, the following:

1. The Examiner's Order was issued in violation of Section 70-2-13 N.M.S.A. 1978 because it was entered

prior to receipt of the transcript in the case. An Examiner does not have the authority to enter an order in a case he hears but must provide to the Division Director his recommended order based "upon the transcript of testimony and record made by or under the supervision of the examiner..." There was no transcript available and therefore the order was entered prematurely.

2. The Examiner's order failed to decide the case on the merits of each party's geologic evidence but instead ignored that dispute and resolved the case in favor of SANTA FE based upon a theoretical 80-acre diagonal offset well pattern which was certainly not mandatory or even preferred in the Special Field Rules for the South Corbin-Wolfcamp Pool (Reference Order No. R-8181-B 5-20-86). The Examiner also ignored the undisputed fact that SANTA FE's Kachina 8-1 well is closer to HANLEY's lease line and more like to drain HANLEY's share of Wolfcamp hydrocarbons than the south location granted in the Order.

3. The Examiner's order failed to make essential finds of ultimate facts concerning dispute over which party's AFE was reasonable and failed to adopt either AFE whether reasonable or not.

4. The Examiner's order incorrectly pooled all mineral interests from the surface to the base of the Wolfcamp in direct conflict with both parties stated purposes which was to pool only those interest for 80-acre spaced oil production, including the Wolfcamp pool. That mistake results in 40-acre spaced mineral production being pooled into an 80-acre spacing unit in violation of Section 70-2-17(C) N.M.S.A. 1978.

5. The Examiner's order failed to make findings of ultimate facts from which to understand the reasoning of the Division on the cost allocation issue raised by HANLEY. The Examiner, having determined that the well would be located in the south 40-acres in which HANLEY had no interest above the top of the Wolfcamp, failed to allocate costs between the shallow versus the deep oil zones thereby requiring HANLEY to pay a disproportionately higher share of the costs of the well than is allowed under COPAS Bulletin #2. This oversight by the Examiner is contrary to the requirements set forth for the Division by the New Mexico Supreme Court in <u>Fasken v. Oil Conservation Commission</u>, 87 N.M. 588 (1978).

6. The Examiner's order failed to take into proper consideration that HANLEY is the largest single working interest owner in the spacing unit.

7. The Examiner's Order ignored the undisputed evidence that the SANTA FE location was estimated to recover only 130,000 barrels of oil while the HANLEY location was estimated to recover 260,000 barrels of oil.

## CONCLUSION

The HANLEY 40-acre tract cannot be protected from drainage by the Kachina 8-1 well if the Commission approves the SANTA FE compulsory pooling application.

The Special Rules and Regulations adopted by the Division for the South Corbin-Wolfcamp Pool (Order R-8181-B) specifically provide for the drilling of pool wells on each of the quarter-quarter sections in a spacing unit and further provides for the approval of a 40-acre non-standard proration and spacing unit for the pool.

The HANLEY tract has sufficient oil potential to economically support the drilling of the well at a standard location in its tract as a non-standard proration and spacing unit and HANLEY will drill that well if approved by the Commission.

Approval of the HANLEY application will afford to HANLEY and its royalty owner the opportunity to timely recover their share of the pool hydrocarbons underlying its tract without having its interest diluted with the inclusion of SANTA FE's south 40-acre tract which is down structure, potentially wet and non-productive and will not contribute reserves to the HANLEY tract.

HANLEY requests that its compulsory pooling application be granted, or in the alternative, that both compulsory pooling applications be denied and HANLEY's application for approval of a 40-acre non-standard proration and spacing unit be approved.

Respectfully submitted

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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:

CASES NOS. 10211 AND 10219
Order No. R-9480

APPLICATION OF SANTA FE ENERGY OPERATING PARTNERS, L.P. FOR COMPULSORY POOLING, LEA COUNTY, NEW MEXICO

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APPLICATION OF HANLEY PETROLEUM INC. FOR COMPULSORY POOLING, LEA COUNTY, NEW MEXICO.

ORDER OF THE DIVISION

BY THE DIVISION:

This cause came on for hearing at 8:15 a.m. on March 7, 1991, at Santa Fe, New Mexico, before Examiner Jim Morrow.

NOW, on this 29th day of March, 1991, the Division Director, having considered the testimony, the record and the recommendations of the Examiner, and being fully advised in the premises,

FINDS THAT:

(1) Due public notice having been given as required by law, the Division has jurisdiction of this cause and the subject matter thereof.

(2) The applicant in Case 10211, Santa Fe Energy Operating Partners, L.P., (Santa Fe), seeks an order pooling all mineral interests from the surface to the base of the Wolfcamp formation underlying the following described acreage in Section 8, Township 18 South, Range 33 East, NMPM, Lea County, New Mexico, in the following manner:

(a) The W/2 NW/4 to form a standard 80-acre oil spacing and proration unit for any and all formations and/or pools developed on 80-acre spacing within said vertical extent, which presently includes but is not necessarily limited to the Undesignated South Corbin-Wolfcamp Pool;

(b) The SW/4 NW/4 to form a standard 40-acre oil spacing and proration unit for any and all formations and/or pools developed on 40-acre spacing within said vertical extent, which presently includes but is not necessarily limited to the Undesignated West Corbin-Delaware, Undesignated Central Corbin-Queen, Undesignated West Corbin-San Andres and Undesignated Corbin-Bone Spring Pools.

Both units are to be dedicated to a single well to be drilled at a standard oil well location 1980 feet from the North line and 660 feet from the West line (Unit E) of said Section 8.

(3) The applicant in Case 10219, Hanley Petroleum Inc. (Hanley), originally sought an order pooling all mineral interests from the surface to the base of the Wolfcamp formation underlying the following described acreage in Section 8, Township 18 South, Range 33 East, NMPM, Lea County, New Mexico, in the following manner:

(a) The W/2 NW/4 to form a standard 80-acre oil spacing and proration unit for any and all formations and/or pools developed on 80-acre spacing within said vertical extent, which presently includes but is not necessarily limited to the Undesignated South Corbin-Wolfcamp Pool;

(b) The SW/4 NW/4 to form a standard 40-acre oil spacing and proration unit for any and all formations and/or pools developed on 40-acre spacing within said vertical extent, which presently includes but is not necessarily limited to the Undesignated West Corbin-Delaware, Undesignated Central Corbin-Queen, Undesignated West Corbin-San Andres, and Undesignated Corbin-Bone Spring Pools.

Both units would have been dedicated to a single well to be drilled at a standard oil well location 1980 feet from the North line and 660 feet from the West line (Unit E) of said Section 8.

(4) Hanley amended its application in Case 10219 and at the hearing requested approval for an 80-acre oil spacing and proration unit as described in Finding No. (3)(a) above with said unit to be dedicated to a well to be drilled at a standard oil well location 660 feet from the North and West lines (Unit D) of said Section 8. A 40-acre oil spacing and proration unit in Unit D would not require compulsory pooling since Hanley's working interest in the NW/4 NW/4 of said Section 8 is 100%.

(5) Each applicant (Santa Fe and Hanley) has the right to drill and each proposes to drill a well on their respective units, as described above in Findings (2) and (4), to a depth sufficient to test the Wolfcamp formation.

(6) Cases Nos. 10211 and 10219 were consolidated for the purpose of hearing and should be consolidated for purpose of issuing an order since the cases involve common acreage and the granting of one application would require the denial of the other.

(7) This matter has been the subject of previous Oil Conservation Division and Oil Conservation Commission actions involving Hanley's subpoena request for certain Santa Fe records.

(8) A representative of the Harvey E. Yates Company appeared at the hearing in support of Santa Fe's application.

(9) There are interest owners in the proposed units who have not agreed to pool their interests.

(10) The primary objective of either proposed well would be a Wolfcamp completion in the Undesignated South Corbin-Wolfcamp Pool to offset Santa Fe's recently completed Kachina "8" Federal Well No. 1 in the NE/4 NW/4 of said Section 8. It flowed 411 barrels of oil, 59 barrels of water and 577 MCF of gas per day on initial potential on January 13, 1991. Santa Fe's Form C-115 production report shows that the well produced 8143 barrels of oil, 213 barrels of water and 9374 MCF of gas during January, 1991.

(11) Pool rules for the South Corbin-Wolfcamp pool provide for 80-acre standard spacing and proration units with wells to be located within 150 feet of the center of a governmental quarter-quarter section or lot.

(12) In support of its application in Case No. 10211, Santa Fe submitted the following information through its exhibits and the testimony of its witnesses:

(a) Santa Fe's proposed location for its Kachina 8 Federal Well No. 2 in the SW/4 NW/4 of said Section 8 would conform to an 80-acre diagonal spacing pattern. Santa Fe believes this would provide better recovery than Hanley's location which would be a direct West offset to Santa Fe's Kachina 8 Federal Well No. 1.

(b) Cross-sections, structure maps and isopach maps were submitted to show the favorable conditions at the Santa Fe location. Their geology shows that the proposed location would be approximately 20 feet lower on the Wolfcamp structure than their Kachina 8 Well No. 1 and would have about the same thickness of clean Wolfcamp carbonate. The Santa Fe location is 50 feet lower structurally than the Hanley location but would encounter a great thickness of clean carbonate in the Wolfcamp according to Santa Fe's testimony.

(c) Santa Fe's witnesses testified that lower structural position would not necessarily result in increased water production from the Wolfcamp.

(d) Santa Fe's engineering witness estimated that a well at the Santa Fe location would recover 50,000 to 60,000 barrels more oil than one at the Hanley location.

(e) Cross-sections, structure maps and porosity maps submitted by Santa Fe indicate that the Bone Spring formation would be productive at the Hanley location but would be water productive at the Santa Fe location. Santa Fe recommended allocation of well costs between the Wolfcamp and the Bone Spring if the Hanley location is approved.

(f) Santa Fe's estimated well cost is $721,942. They expect to recover 100,000 barrels of oil from the Wolfcamp. Monthly overhead rates of $6,260 while drilling and $626 while producing were requested along with a 200% risk penalty.

(g) Santa Fe and the Harvey E. Yates Company each have 50% working interest in the SW/4 NW/4 of said Section 8.

(13) To support its application in Case No. 10219, Hanley presented the following information through its exhibits and the testimony of its witnesses:

(a) Structure and isopach maps and cross-sections were submitted to show that their proposed location is the better choice. Their geology shows that the Hanley location would be approximately 25 feet higher on the Wolfcamp structure than Santa Fe's location and would encounter approximately the same thickness of net clean Lower Wolfcamp limestone.

(b) Decline curves to estimate the reserves for Wolfcamp completions in the area were submitted. This data along with an estimate of the reserves for Santa Fe's Kachina "8" Federal Well No. 1 was used to construct an "Iso-Production" map for use in estimating ultimate recovery. Hanley's Wolfcamp recovery estimates are 260,000 barrels for their location and 130,000 barrels for the Santa Fe location.

(c) Water production data from Wolfcamp completions in the Corbin area was used by Hanley to support their testimony that wells lower on the Wolfcamp structure produce more water.

(d) Hanley submitted a Bone Spring structure map indicating their proposed location would be approximately 100 feet higher on the Bone Spring structure than the Santa Fe location.

(e) Hanley's estimated cost for a Wolfcamp well is $667,782. They proposed a method for allocating and amortizing well costs in the event the well is eventually plugged back for a completion attempt in the Bone Spring or other zone in which the ownership differs from that in the Wolfcamp. Monthly overhead rates of $5,184 while drilling and $485 while producing were suggested based on the mean rates in the Ernst and Young 1990 survey. A risk penalty of 150% was recommended at the Hanley location. Hanley's witnesses testified that the risk would be higher at the Santa Fe location.

(f) Payout calculations prepared by Hanley show that a Wolfcamp well will payout in four months at their location and in eight months at the Santa Fe location.

(14) Santa Fe's compulsory pooling application was received by OCD on December 12, 1990, Hanley's initial application was received by OCD on January 2, 1991, and their amended application was received on February 12, 1991. Hanley began efforts to develop their acreage after Santa Fe filed its application.

(15) Based on the evidence and testimony received in these cases, either the Santa Fe or the Hanley location should result in a successful Wolfcamp completion. Evidence shows that Santa Fe's is the more appropriate location since it conforms to an 80-acre diagonal spacing pattern and should therefore result in better recovery of reserves. Santa Fe's application should be approved and they should be designated as operator. Overhead charges for supervision should be set at $5,184 while drilling and $485 while producing. Since risk of an unsuccessful completion is low, the risk penalty should be set at 100%. The 40-acre spacing unit applied for in Santa Fe's application is not required since all of the working interests in

the SW/4 NW/4 of said Section 8 have reached voluntary agreement concerning the pooling of their interests.

(16) Approval as set out in Finding (15) above and in the following order will avoid the drilling of unnecessary wells, protect correlative rights, prevent waste and afford the owner of each interest in said unit the opportunity to recover or receive without unnecessary expense his just and fair share of the production in any pool resulting from this order.

IT IS THEREFORE ORDERED THAT:

(1) The application of Hanley Petroleum Inc. in Case No. 10219 as described in Findings (3) and (4) of this order is hereby denied.

(2) All mineral interests, whatever they may be, from the surface to the base of the Wolfcamp, underlying the W/2 NW/4 of Section 8, Township 18 South, Range 33 East, NMPM, Lea County, New Mexico, are hereby pooled to form an 80-acre oil spacing and proration unit to be dedicated to a well to be drilled at a standard oil well location 1980 feet from the North line and 660 feet from the West line (Unit E) of said Section 8.

PROVIDED HOWEVER THAT, the operator of said unit shall commence the drilling of said well on or before the 15th day of June, 1991, and shall thereafter continue the drilling of said well with due diligence to a depth sufficient to test the Wolfcamp formation.

PROVIDED FURTHER THAT, in the event said operator does not commence the drilling of said well on or before the 15th day of June, 1991, Decretory Paragraph No. (2) of this order shall be null and void and of no effect whatsoever, unless said operator obtains a time extension from the Division for good cause shown.

PROVIDED FURTHER THAT, should said well not be drilled to completion, or abandonment, within 120 days after commencement thereof, said operator shall appear before the Division Director and show cause why Decretory Paragraph No. (2) of this order should not be rescinded.

(3) Santa Fe Energy Operating Partners, L.P. is hereby designated the operator of the subject well and unit.

(4) After the effective date of this order and prior to commencing said well, the operator shall furnish the Division and each known working interest owner in the subject unit an itemized schedule of estimated well costs.

(5) Within 30 days from the date the schedule of estimated well costs is furnished to him, any non-consenting working interest owner shall have the right to pay his share of estimated well costs to the operator in lieu of paying his share of reasonable well costs out of production, and any such owner who pays his share of estimated well costs as provided above shall remain liable for operating costs but shall not be liable for risk charges.

(6) The operator shall furnish the Division and each known working interest owner an itemized schedule of actual well costs within 90 days following completion of the well; if no objection to the actual well costs is received by the Division and the Division has not objected within 45 days following receipt of said schedule, the actual well costs shall be the reasonable well costs; provided however, if there is an objection to actual well costs within said 45-day period the Division will determine reasonable well costs after public notice and hearing.

(7) Within 60 days following determination of reasonable well costs, any non-consenting working interest owner who has paid his share of estimated costs in advance as provided above shall pay to the operator his pro rata share of the amount that reasonable well costs exceed estimated well costs and shall receive from the operator his pro rata share of the amount that estimated well costs exceed reasonable well costs.

(8) The operator is hereby authorized to withhold the following costs and charges from production:

A. The pro rata share of reasonable well costs attributable to each non-consenting working interest owner who has not paid his share of estimated well costs within 30 days from the date the schedule of estimated well costs is furnished to him; and

B. As a charge for the risk involved in the drilling of the well, 100 percent of the pro rata share of reasonable well costs attributable to each non-consenting working interest owner who has not paid his share of estimated well costs within 30 days from the date the schedule of estimated well costs is furnished to him.

(9) The operator shall distribute said costs and charges withheld from production to the parties who advanced the well costs.

(10) $5,184 per month while drilling and $485 per month while producing are hereby fixed as reasonable charges for supervision (combined

fixed rates); the operator is hereby authorized to withhold from production the proportionate share of such supervision charges attributable to each non-consenting working interest, and in addition thereto, the operator is hereby authorized to withhold from production the proportionate share of actual expenditures required for operating such well, not in excess of what are reasonable, attributable to each non-consenting working interest.

(11) Any unleased mineral interest shall be considered a seven-eighths (7/8) working interest and a one-eighth (1/8) royalty interest for the purpose of allocating costs and charges under the terms of this order.

(12) Any well costs or charges which are to be paid out of production shall be withheld only from the working interest's share of production, and no costs or charges shall be withheld from production attributable to royalty interests.

(13) All proceeds from production from the subject well which are not disbursed for any reason shall be placed in escrow in Lea County, New Mexico, to be paid to the true owner thereof upon demand and proof of ownership; the operator shall notify the Division of the name and address of said escrow agent within 30 days from the date of first deposit with said escrow agent.

(14) Should all the parties to this force-pooling reach voluntary agreement subsequent to entry of this order, this order shall thereafter be of no further effect.

(15) The operator of the subject well and unit shall notify the Director of the Division in writing of the subsequent voluntary agreement of all parties subject to the force-pooling provisions of this order.

(16) Jurisdiction of this cause is retained for the entry of such further orders as the Division may deem necessary.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

WILLIAM J. LEMAY,
Director

dr/

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

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

CASE NO. 8802
Order No. R-8181

APPLICATION OF SOUTHLAND ROYALTY COMPANY FOR SPECIAL POOL RULES, LEA COUNTY, NEW MEXICO.

ORDER OF THE DIVISION

BY THE DIVISION:

This cause came on for hearing at 8:15 a.m. on January 9 and 22, 1986, at Santa Fe, New Mexico, before Examiner David R. Catanach.

NOW, on this 7th day of March, 1986, the Division Director, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS THAT:

(1) Due public notice having been given as required by law, the Division has jurisdiction of this cause and the subject matter thereof.

(2) The applicant, Southland Royalty Company, seeks the promulgation of special pool rules for the South Corbin-Wolfcamp Pool, Lea County, New Mexico, including a provision for 80-acre spacing and proration units.

(3) The applicant is the operator of approximately sixty-two percent of the active wells in said pool.

(4) The South Corbin-Wolfcamp Pool was discovered in August, 1967 by the Aztec Oil & Gas Company Federal "MA" Well No. 2 located in Unit I of Section 21, Township 18 South, Range 33 East, NMPM, Lea County, New Mexico.

(5) Although said pool has been voluntarily spaced on 80 acres or more, it has remained since its creation governed by general statewide 40-acre spacing and proration units.

(6) The applicant recently drilled and completed the West Corbin Unit Well No. 5 located 2080 feet from the North line and 560 feet from the West line of Section 17, Township 18 South, Range 33 East, NMPM, and the Huber 17 Federal Well No. 1 located 660 feet from the South line and 660 feet from the West line of said Section 17.

(7) The West Corbin Unit Well No. 5 is located 2540 feet North of the Huber 17 Federal Well No. 1.

(8) Testimony by the applicant at the time of the hearing indicated that there was a difference of approximately 400 psi between the original bottomhole pressures in the West Corbin Unit Well No. 5 and the Huber 17 Federal Well No. 1, which could possibly indicate drainage by the West Corbin Unit Well No. 5 in excess of 40 acres.

(9) The applicant is also the operator of the West Corbin Unit Well No. 1 drilled in 1982 and located 1980 feet from the North line and 660 feet from the East line of Section 18, Township 18 South, Range 33 East, NMPM.

(10) The West Corbin Unit Well No. 1 is located 1220 feet West of the West Corbin Unit Well No. 5 and is also 1320 feet closer to the West Corbin Unit Well No. 5 as is the Huber 17 Federal Well No. 1.

(11) The West Corbin Unit Well No. 5 was drilled as a 40-acre offset to the West Corbin Unit Well No. 1.

(12) The possible drainage of 80 acres by the West Corbin Unit Well No. 1 should have had an affect on the bottomhole pressure or the producing capability, or both, on the West Corbin Unit Well No. 5.

(13) Evidence presented at the hearing indicates that the West Corbin Unit Well No. 5 had a considerably higher initial potential than did the No. 1 well, which may indicate that drainage by the No. 1 well may not have occurred.

(14) Geologic and engineering evidence presented at the hearing was insufficient to indicate that one well in the South Corbin-Wolfcamp Pool is capable of draining 80 acres.

(15) The application of Southland Royalty Company for special pool rules for the South Corbin-Wolfcamp Pool, including a provision for 80-acre spacing, should be <u>denied</u>.

IT IS THEREFORE ORDERED THAT:

(1) The application of Southland Royalty Company for special pool rules for the South Corbin-Wolfcamp Pool, Lea County, New Mexico, including a provision for 80-acre well spacing and proration units, is hereby denied.

(2) The South Corbin-Wolfcamp Pool shall remain on General Statewide Rules and Regulations including 40-acre spacing.

(3) Jurisdiction of this cause is retained for the entry of such further orders as the Division may deem necessary.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

R. L. STAMETS
Director

S E A L

fd/

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

CASE NO. 8802
Order No. R-8181-A

APPLICATION OF SOUTHLAND ROYALTY COMPANY FOR SPECIAL POOL RULES, LEA COUNTY, NEW MEXICO.

NUNC PRO TUNC ORDER

BY THE DIVISION:

It appearing to the Division that Order No. R-8181, dated March 7, 1986, does not correctly state the intended order of the Division,

IT IS THEREFORE ORDERED THAT:

(1) The first paragraph of the introductory section on page 1 of Order No. R-8181, dated March 7, 1986, be and the same is hereby amended to read in its entirety as follows:

> "This cause came on for hearing at 8:15 a.m. on January 9, 1986, at Santa Fe, New Mexico, before Examiner David R. Catanach."

(2) The corrections set forth in this order be entered nunc pro tunc as of March 7, 1986.

DONE at Santa Fe, New Mexico, on this 26th day of March, 1986.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

R. L. STAMETS
Director

S E A L

fd/

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

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

CASE NO. 8802 DE NOVO
Order No. R-8181-B

APPLICATION OF SOUTHLAND ROYALTY COMPANY FOR SPECIAL POOL RULES, LEA COUNTY, NEW MEXICO.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 a.m. at Santa Fe, New Mexico, on April 9, 1986, before the Oil Conservation Commission of New Mexico, hereinafter referred to as the "Commission."

NOW, on this 20th day of May, 1986, the Commission, a quorum being present, having considered the testimony presented and the exhibits received at said hearing, and being fully advised in the premises,

FINDS THAT:

(1) Due public notice having been given as required by law, the Commission has jurisdiction of this cause and the subject matter thereof.

(2) The applicant, Southland Royalty Company, seeks the promulgation of special pool rules for the South Corbin-Wolfcamp Pool, Lea County, New Mexico, including a provision for 80-acre spacing units.

(3) By Order No. R-3342, effective December 1, 1967, the Commission created the South Corbin-Wolfcamp Pool as a result of the completion of the Aztec Oil and Gas Company Federal "MA" Well No. 2 located in Unit I of Section 21, Township 18 South, Range 33 East, NMPM, Lea County, New Mexico.

(4) Although the development of said pool has resulted in wells being drilled on what constitutes an 80-acre spacing pattern, it has remained since its creation governed by general statewide 40-acre spacing units.

(5) Geologic and engineering evidence presented at the hearing showed that wells in the South Corbin-Wolfcamp Pool may be capable of draining 80-acre spacing units.

(6) Evidence and testimony at the hearing demonstrated that drilling wells in the South Corbin-Wolfcamp Pool on 40-acre spacing is uneconomical at the present time and may result in the drilling of unnecessary wells.

(7) Adoption of temporary special pool rules including provisions for 80-acre spacing would encourage continued drilling of South Corbin-Wolfcamp Pool wells, thereby producing oil which might not otherwise be produced, thereby preventing waste.

(8) In order to prevent the economic loss caused by the drilling of unnecessary wells, to avoid the augmentation of risk arising from the drilling of an excessive number of wells, to prevent reduced recovery which might result from the drilling of too few wells, and to otherwise prevent waste and protect correlative rights, temporary special rules and regulations providing for 80-acre spacing units should be promulgated for the South Corbin-Wolfcamp Pool as previously defined and described.

(9) The temporary special rules and regulations should provide for limited well locations in order to assure orderly development of the pool and protect correlative rights.

(10) The temporary special rules and regulations should be established for an 18-month period in order to allow the operators in the subject pool to gather reservoir information to establish the area that can be efficiently and economically drained and developed by one well.

(11) Unless called earlier, this case should be reopened at an Oil Conservation Division examiner hearing in October, 1987, at which time the operators in the subject pool should be prepared to appear and show cause why the South Corbin-Wolfcamp Pool should not be developed on 40-acre spacing units.

IT IS THEREFORE ORDERED THAT:

(1) Temporary Special Rules and Regulations for the South Corbin-Wolfcamp Pool, Lea County, New Mexico, as previously defined and described, are hereby promulgated as follows:

TEMPORARY SPECIAL RULES AND REGULATIONS
FOR THE
SOUTH CORBIN-WOLFCAMP POOL

RULE 1. Each well completed or recompleted in the South Corbin-Wolfcamp Pool or in the Wolfcamp formation within one mile thereof, and not nearer to or within the limits of another designated Wolfcamp oil pool, shall be spaced, drilled, operated, and produced in accordance with the Special Rules and Regulations hereinafter set forth.

RULE 2. Each well shall be located on a standard unit containing 80 acres, more or less, consisting of the N/2, S/2, E/2 or W/2 of a governmental quarter section; provided, however, that nothing contained herein shall be construed as prohibiting the drilling of a well on each of the quarter-quarter sections in the unit.

RULE 3. The Director of the Oil Conservation Division, hereinafter referred to as the "Division", may grant an exception to the requirements of Rule 2 without notice and hearing when an application has been filed for a non-standard unit comprising a governmental quarter-quarter section or lot, or the unorthodox size or shape of the tract is due to a variation in the legal subdivision of the United States Public Land Surveys. All operators offsetting the proposed non-standard unit shall be notified of the application by registered or certified mail, and the application shall state that such notice has been furnished. The Director may approve the application upon receipt of written waivers from all offset operators or if no offset operator has entered an objection to the formation of the non-standard unit within 30 days after the Director has received the application.

RULE 4. Each well shall be located within 150 feet of the center of a governmental quarter-quarter section or lot.

RULE 5. The Division Director may grant an exception to the requirements of Rule 4 without hearing when an application has been filed for an unorthodox location necessitated by topographical conditions or the recompletion of a well previously drilled to another horizon. All operators offsetting the proposed location shall be notified of the application by registered or certified mail, and the application shall state that such notice has been furnished.

The Director may approve the application upon receipt of written waivers from all operators offsetting the proposed location or if no objection to the unorthodox location has been entered within 20 days after the Director has received the application.

RULE 6. A standard proration unit (79 through 81 acres) shall be subject to an 80-acre depth bracket allowable of 445 barrels of oil per day. The allowable assigned to a non-standard proration unit shall bear the same ratio to a standard allowable as the acreage in such non-standard unit bears to 80 acres.

IT IS FURTHER ORDERED THAT:

(1) The locations of all wells presently drilling to or completed in the South Corbin-Wolfcamp Pool or in the Wolfcamp formation within one mile thereof are hereby approved; the operator of any well having an unorthodox location shall notify the Hobbs District Office of the Division in writing of the name and location of the well on or before July 1, 1986.

(2) Pursuant to Paragraph A. of Section 70-2-18, NMSA (1978), contained in Chapter 271, Laws of 1969, existing wells in the South Corbin-Wolfcamp Pool shall have dedicated thereto 80 acres in accordance with the foregoing pool rules; or, pursuant to Paragraph C. of said Section 70-2-18, existing wells may have non-standard spacing or proration units established by the Division and dedicated thereto.

Failure to file new Forms C-102 with the Division dedicating 80 acres to a well or to obtain a non-standard unit approved by the Division within 60 days from the date of this order shall subject the well to cancellation of allowable. Until said Form C-102 has been filed or until a non-standard unit has been approved, and subject to said 60-day limitation, each well presently drilling to or completed in the South Corbin-Wolfcamp Pool or in the Wolfcamp formation within one mile thereof shall receive no more than one-half of a standard allowable for the pool.

(3) Unless called earlier upon the motion of the Division, this case shall be reopened at an examiner hearing in October, 1987, at which time the operators in the subject pool should be prepared to appear and show cause why the South Corbin-Wolfcamp Pool should not be developed on 40-acre spacing units.

(4) Jurisdiction of this cause is retained for the entry of such further orders as the Commission may deem necessary.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

JIM BACA, Member

Ed Kelley

ED KELLEY, Member

R. L. Stamets

R. L. STAMETS, Chairman and Secretary

S E A L

fd/

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

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

CASE NO. 8802 (Reopened)
ORDER NO. R-8181-C

IN THE MATTER OF CASE NO. 8802 BEING REOPENED PURSUANT TO THE PROVISIONS OF DIVISION ORDER NO. R-8181-B, WHICH ORDER PROMULGATED TEMPORARY SPECIAL RULES AND REGULATIONS FOR THE SOUTH CORBIN-WOLFCAMP POOL IN LEA COUNTY, NEW MEXICO, INCLUDING A PROVISION FOR 80-ACRE SPACING UNITS.

ORDER OF THE DIVISION

BY THE DIVISION:

This cause came on for hearing at 8:15 a.m. on October 7, 1987 at Santa Fe, New Mexico, before Examiner Michael E. Stogner.

NOW, on this 28th day of October, 1987, the Division Director, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS THAT:

(1) Due public notice having been given as required by law, the Division has jurisdiction of this cause and the subject matter thereof.

(2) By Order No. R-8181-B, dated May 20, 1986, issued in Case No. 8802 heard De Novo before the New Mexico Oil Conservation Commission on April 9, 1986, temporary special rules and regulations were promulgated for the South Corbin-Wolfcamp Pool, Lea County, New Mexico, establishing temporary 80-acre spacing and proration units.

(3) Pursuant to the provisions of Order No. R-8181-B, this case was reopened to allow the operators in the subject pool to appear and show cause why the South Corbin-Wolfcamp Pool should not be developed on 40-acre spacing units.

(4) The evidence establishes that one well in the South Corbin-Wolfcamp Pool can efficiently and economically drain and develop 80 acres.

(5) The Special Rules and Regulations promulgated by said Order No. R-8181-B have afforded and will afford to the owner of each property in the pool the opportunity to produce his just and equitable share of the oil and gas in the pool.

(6) In order to prevent the economic loss caused by the drilling of unnecessary wells, to avoid the augmentation of risk arising from the drilling of an excessive number of wells, to prevent reduced recovery which might result from the drilling of too few wells, and to otherwise prevent waste and protect correlative rights, the Special Rules and Regulations promulgated by Order No. R-8181-B should be continued in full force and effect until further order of the Division.

IT IS THEREFORE ORDERED THAT:

(1) The Special Rules and Regulations governing the South Corbin-Wolfcamp Pool, Lea County, New Mexico, promulgated by Order No. R-8181-B, are hereby continued in full force and effect until further order of the Division.

(2) Jurisdiction of this cause is retained for the entry of such further orders as the Division may deem necessary.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

WILLIAM J. LEMAY
Director

S E A L

Form 3160—4
(November 1983)
(formerly 9—330)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

SUBMIT IN DUPLICATE* (See other instructions on reverse side)

Form approved.
Budget Bureau No. 1004—0137
Expires August 31, 1985

RECEIVED

JAN 16 11 07 AM '91

CARLSBAD, NEW MEXICO

# WELL COMPLETION OR RECOMPLETION REPORT AND LOG*

5. LEASE DESIGNATION AND SERIAL NO.: NM-84731

6. IF INDIAN, ALLOTTEE OR TRIBE NAME:

1a. TYPE OF WELL: OIL WELL [X] GAS WELL [ ] DRY [ ] Other

b. TYPE OF COMPLETION: NEW WELL [X] WORK OVER [ ] DEEP-EN [ ] PLUG BACK [ ] DIFF. RESVR. [ ] Other

7. UNIT AGREEMENT NAME:

8. FARM OR LEASE NAME: Kachina 8 Federal

2. NAME OF OPERATOR: Santa Fe Energy Operating Partners, L.P.

9. WELL NO.: 1

3. ADDRESS OF OPERATOR: 550 W. Texas, Suite 1330, Midland, Texas 79701

10. FIELD AND POOL, OR WILDCAT: South Corbin Wolfcamp

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements)*
At surface (C) 660' FNL and 1830' FWL
At top prod. interval reported below
At total depth

11. SEC., T., R., M., OR BLOCK AND SURVEY OR AREA: Sec. 8, T-18S, R-33E

14. PERMIT NO. API #30-025-30986 | DATE ISSUED

12. COUNTY OR PARISH: Lea | 13. STATE: NM

| 15. DATE SPUDDED | 16. DATE T.D. REACHED | 17. DATE COMPL. (Ready to prod.) | 18. ELEVATIONS (DF, RKB, RT, GR, ETC.)* | 19. ELEV. CASINGHEAD |
|---|---|---|---|---|
| 9-29-90 | 10-26-90 | 11-14-90 | 3931.2' GR | |

| 20. TOTAL DEPTH, MD & TVD | 21. PLUG, BACK T.D., MD & TVD | 22. IF MULTIPLE COMPL., HOW MANY* | 23. INTERVALS DRILLED BY | ROTARY TOOLS | CABLE TOOLS |
|---|---|---|---|---|---|
| 11,500' | 11,412' | N/A | → | All | N/A |

24. PRODUCING INTERVAL(S), OF THIS COMPLETION—TOP, BOTTOM, NAME (MD AND TVD)*
11,308'- 11,348' (Wolfcamp)

ACCEPTED FOR RECORD

JAN 22 1991

25. WAS DIRECTIONAL SURVEY MADE: No

26. TYPE ELECTRIC AND OTHER LOGS RUN: LDT/CNT; DLL/MSFL, BHC

27. WAS WELL CORED: No

28. CASING RECORD (Report all strings set in well)

| CASING SIZE | WEIGHT, LB./FT. | DEPTH SET (MD) | HOLE SIZE | CEMENTING RECORD | AMOUNT PULLED |
|---|---|---|---|---|---|
| -3/8" | 48 | 353' | 17- | 400 sx Cl C (circ) | None |
| -5/8 | 24 | 2892' | 12-1/4 | 1175 sx Cl C (circ) | None |
| 5-1/2 | 15.5 & 17 | 11,500' | 7-7/8 | 2200 sx Cl H | None |

29. LINER RECORD

| SIZE | TOP (MD) | BOTTOM (MD) | SACKS CEMENT* | SCREEN (MD) |
|---|---|---|---|---|
| N/A | | | | |

30. TUBING RECORD

| SIZE | DEPTH SET (MD) | PACKER SET (MD) |
|---|---|---|
| 2-7/8" | 11,178' | 11,178' |

31. PERFORATION RECORD (Interval, size and number)
11,308'-11,348 (40 holes) .41" dia

32. ACID, SHOT, FRACTURE, CEMENT SQUEEZE, ETC.

| DEPTH INTERVAL (MD) | AMOUNT AND KIND OF MATERIAL USED |
|---|---|
| 11,308-348' | Spot 500 gals 15% HCl |

33.* PRODUCTION

| DATE FIRST PRODUCTION | PRODUCTION METHOD (Flowing, gas lift, pumping—size and type of pump) | WELL STATUS (Producing or shut-in) |
|---|---|---|
| 11-14-90 | Flowing | Producing |

| DATE OF TEST | HOURS TESTED | CHOKE SIZE | PROD'N. FOR TEST PERIOD | OIL—BBL. | GAS—MCF | WATER—BBL. | GAS-OIL RATIO |
|---|---|---|---|---|---|---|---|
| 1-13-91 | 24 | 19.5/64 | → | 411 | 577 | 59 | 1404 |

| FLOW. TUBING PRESS. | CASING PRESSURE | CALCULATED 24-HOUR RATE | OIL—BBL. | GAS—MCF. | WATER—BBL. | OIL GRAVITY-API (CORR.) |
|---|---|---|---|---|---|---|
| 740 | pkr | → | 411 | 577 | 59 | 42.5° |

34. DISPOSITION OF GAS (Sold, used for fuel, vented, etc.): Sold - Conoco, Inc.

TEST WITNESSED BY:

35. LIST OF ATTACHMENTS: Deviation Survey, Logs

36. I hereby certify that the foregoing and attached information is complete and correct as determined from all available records

SIGNED Terry McCullough TITLE Sr. Production Clerk DATE Jan. 15, 1991

*(See Instructions and Spaces for Additional Data on Reverse Side)

Title 18 U.S.C. Section 1001, makes it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

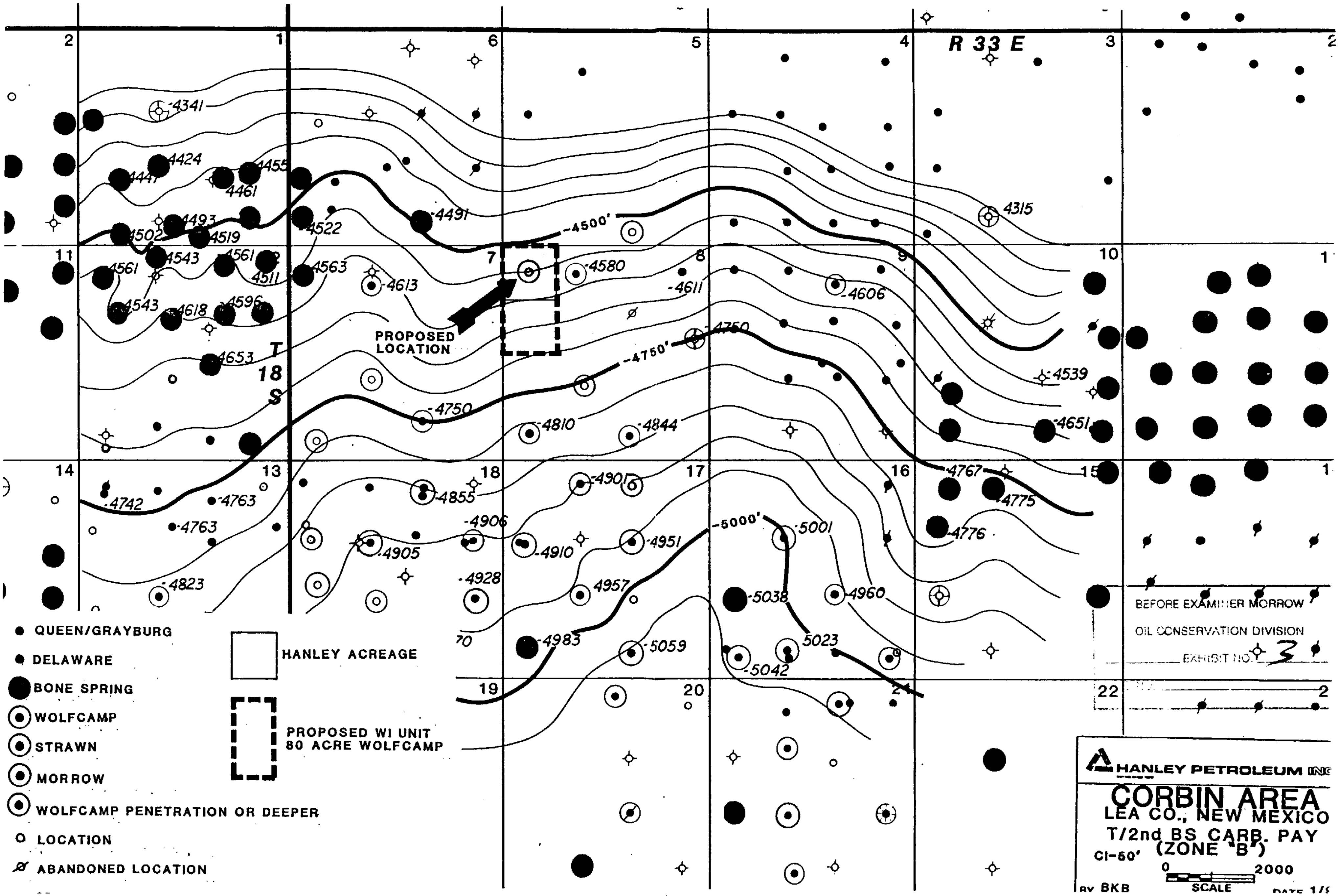
37. SUMMARY OF POROUS ZONES: (Show all important zones of porosity and contents thereof; cored intervals; and all drill-stem, tests, including depth interval tested, cushion used, time tool open, flowing and shut-in pressures, and recoveries):

| FORMATION | TOP | BOTTOM | DESCRIPTION, CONTENTS, ETC. |
|---|---|---|---|
| Queen | 4218 | 4232 | Oil and Water |
| Bone Spring | 8524 | 8538 | Oil |
| | 8706 | 8744 | Water |
| | 9324 | 9354 | Water |
| Wolfcamp | 10972 | 11026 | AE Oil and Water |
| | 11150 | 11246 | AF Oil and Water |
| | 11306 | 11350 | AG Oil and Water |

38. GEOLOGIC MARKERS

| NAME | TOP MEAS. DEPTH | TOP TRUE VERT. DEPTH |
|---|---|---|
| Rustler | 1447 | |
| Seven Rivers | 3379 | |
| Queen | 4188 | |
| Delaware | 5574 | |
| Bone Spring | 6917 | |
| Wolfcamp | 9860 | |

Harley EXHIBIT NO. C
CASE NO. 10211


R 33 E
T 18 S
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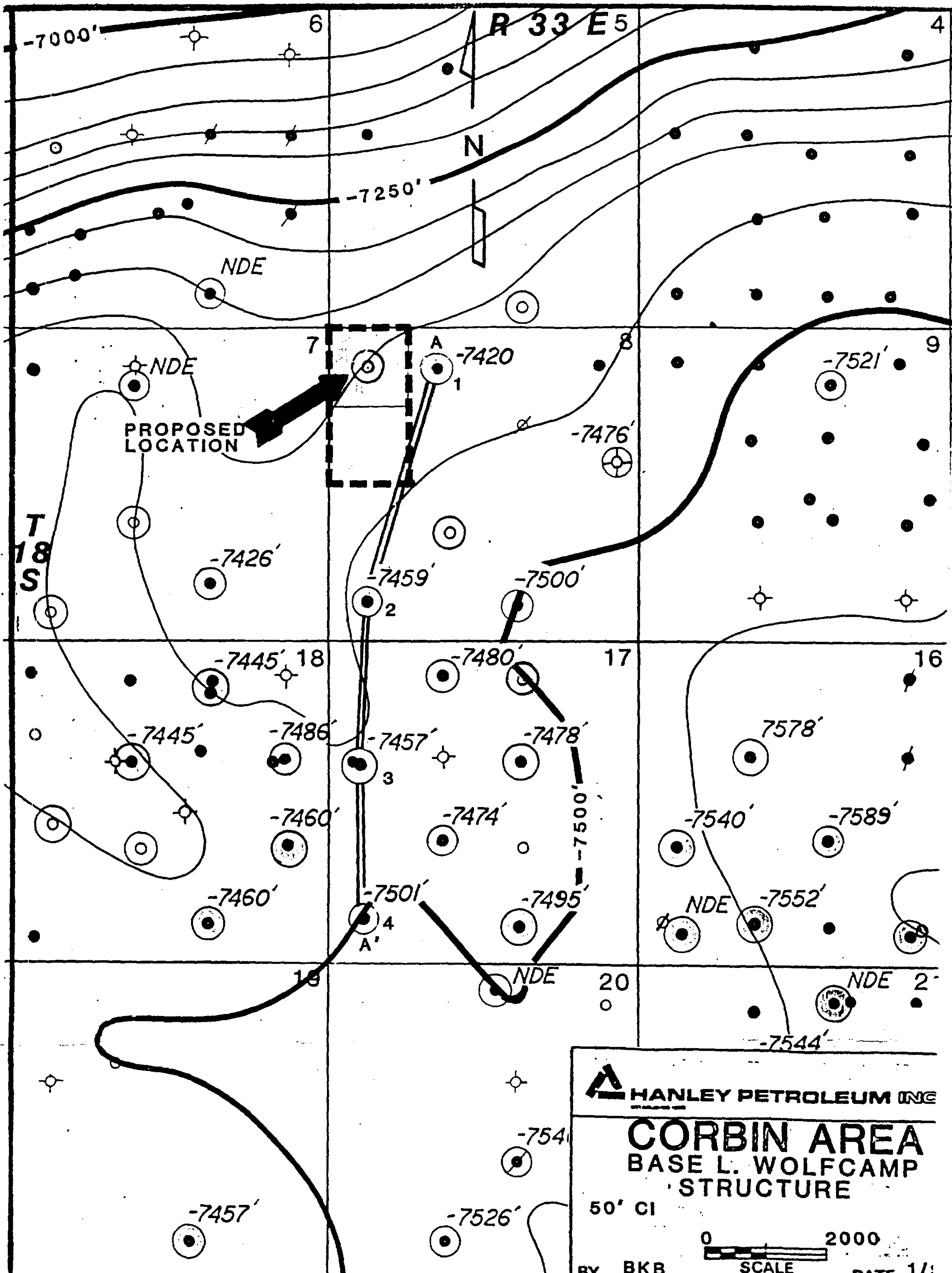
-4341
4424
4447
4455
4461
4493
4502
4519
4522
4491
-4500'
4561
4543
4511
4563
-4613
-4580
-4611
-4606
4315
4543
4618
4596
4653
PROPOSED LOCATION
-4750'
4750
-4539
-4651
-4750
-4810
-4844
-4742
-4763
-4763
-4855
-4901
-4767
4775
-4776
-4906
-4905
-4910
-4951
-5000'
5001
-4928
-4823
4957
-5038
-4960
5023
-4983
-5059
-5042
QUEEN/GRAYBURG
DELAWARE
BONE SPRING
WOLFCAMP
STRAWN
MORROW
WOLFCAMP PENETRATION OR DEEPER
LOCATION
ABANDONED LOCATION
HANLEY ACREAGE
PROPOSED WI UNIT 80 ACRE WOLFCAMP
BEFORE EXAMINER MORROW
OIL CONSERVATION DIVISION
EXHIBIT NO. 3
HANLEY PETROLEUM INC
CORBIN AREA
LEA CO., NEW MEXICO
T/2nd BS CARB. PAY
(ZONE 'B')
CI-50'
0
2000
SCALE
BY BKB


R 33 E
T 18 S
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-7000'
-7250'
NDE
PROPOSED LOCATION
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A'
-7420
-7521'
-7476'
-7426'
-7459'
-7500'
-7445'
-7480'
-7486'
-7457'
-7478'
7578'
-7460'
-7474'
-7500'
-7540'
-7589'
-7501'
-7495'
-7552'
-7544'
-7457'
-7526'
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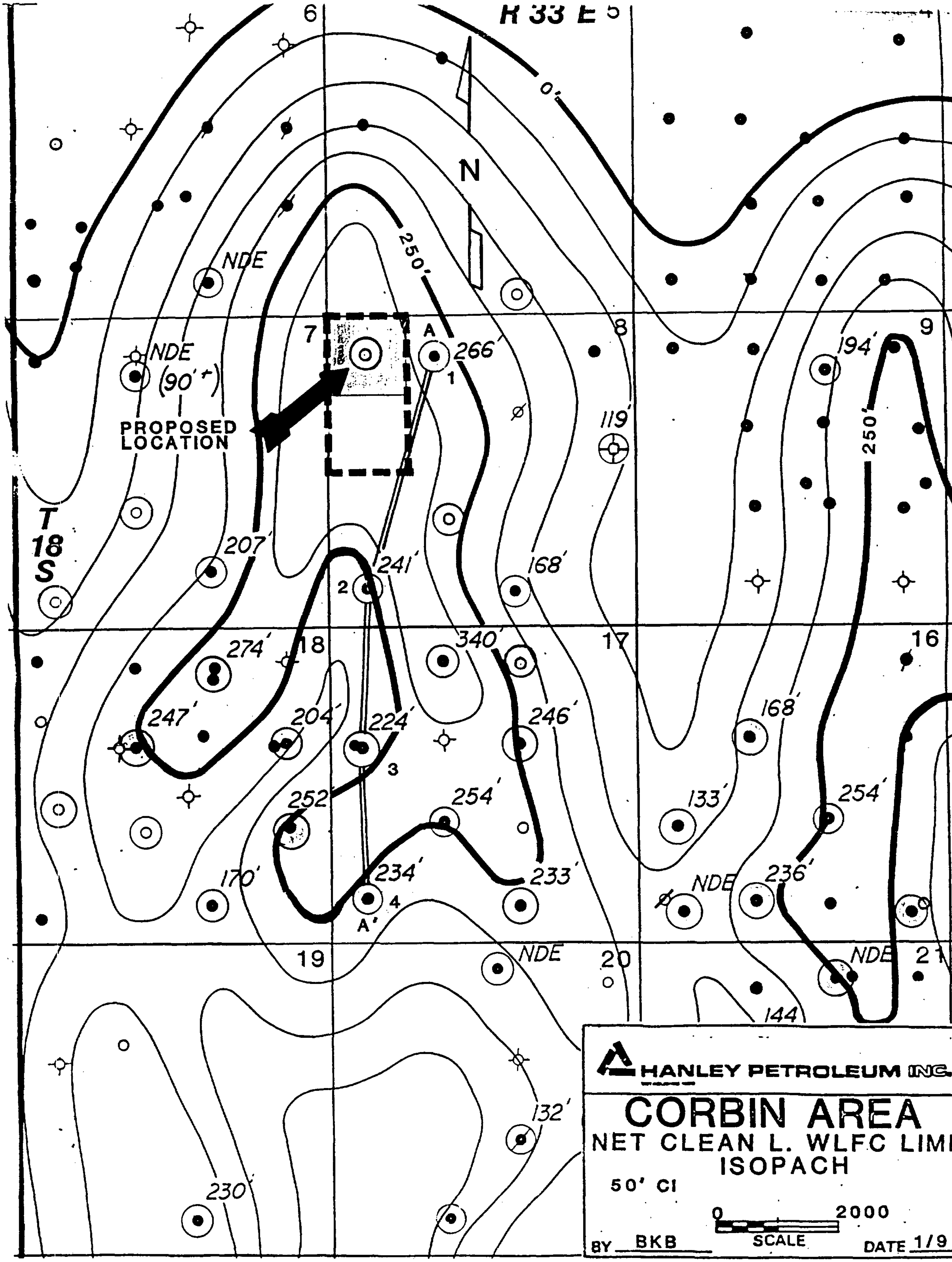
HANLEY PETROLEUM INC
CORBIN AREA
BASE L. WOLFCAMP STRUCTURE
50' CI
0
2000
SCALE
BY BKB
DATE 1/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(90'+)
PROPOSED
LOCATION
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250'
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S
207'
241'
2
168'
18
274'
340'
17
16
247'
204'
224'
3
246'
168'
252'
254'
133'
254'
170'
234'
4
A'
233'
NDE
236'
19
NDE
20
NDE
21
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132'
230'
HANLEY PETROLEUM INC.
CORBIN AREA
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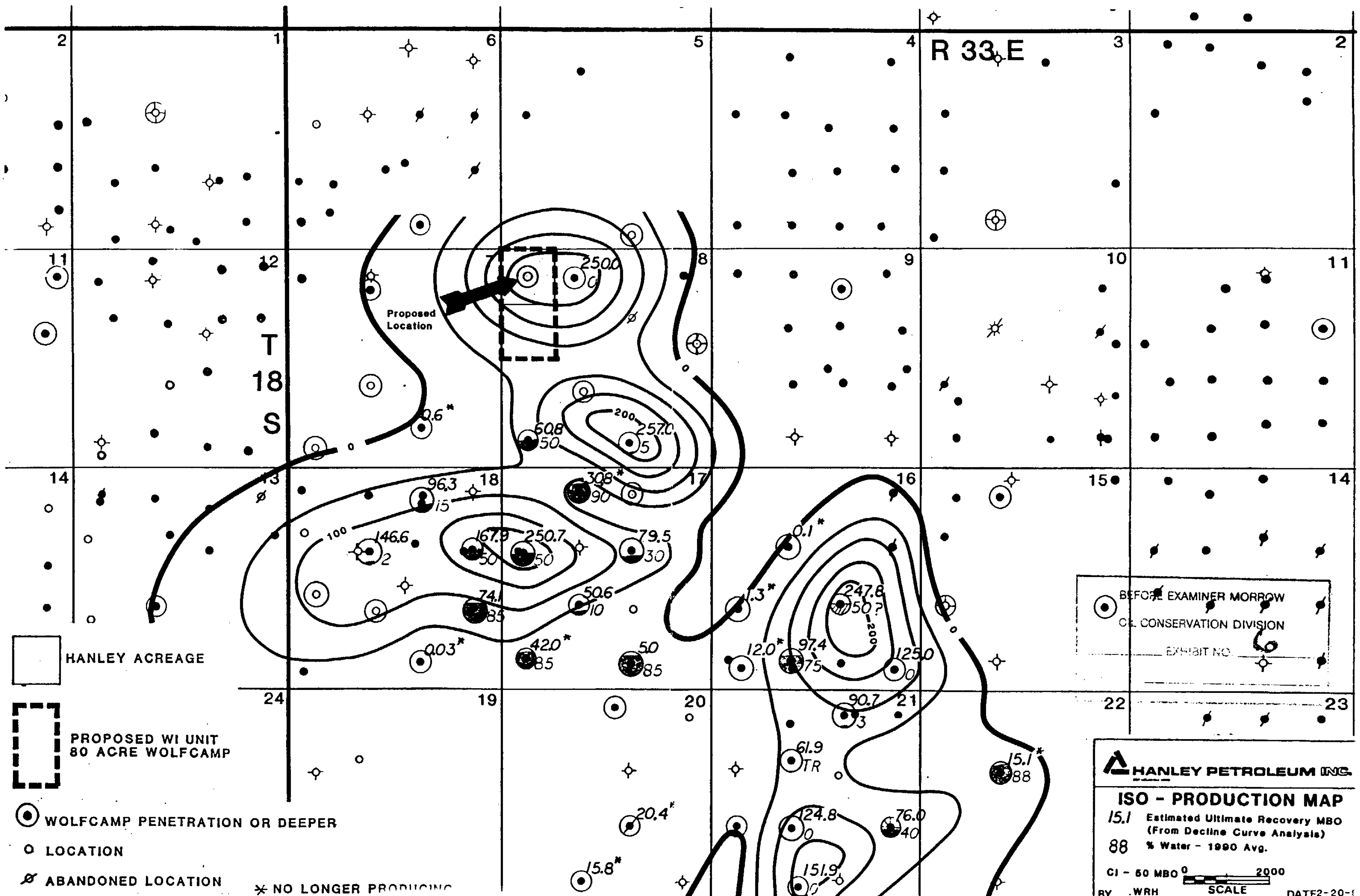
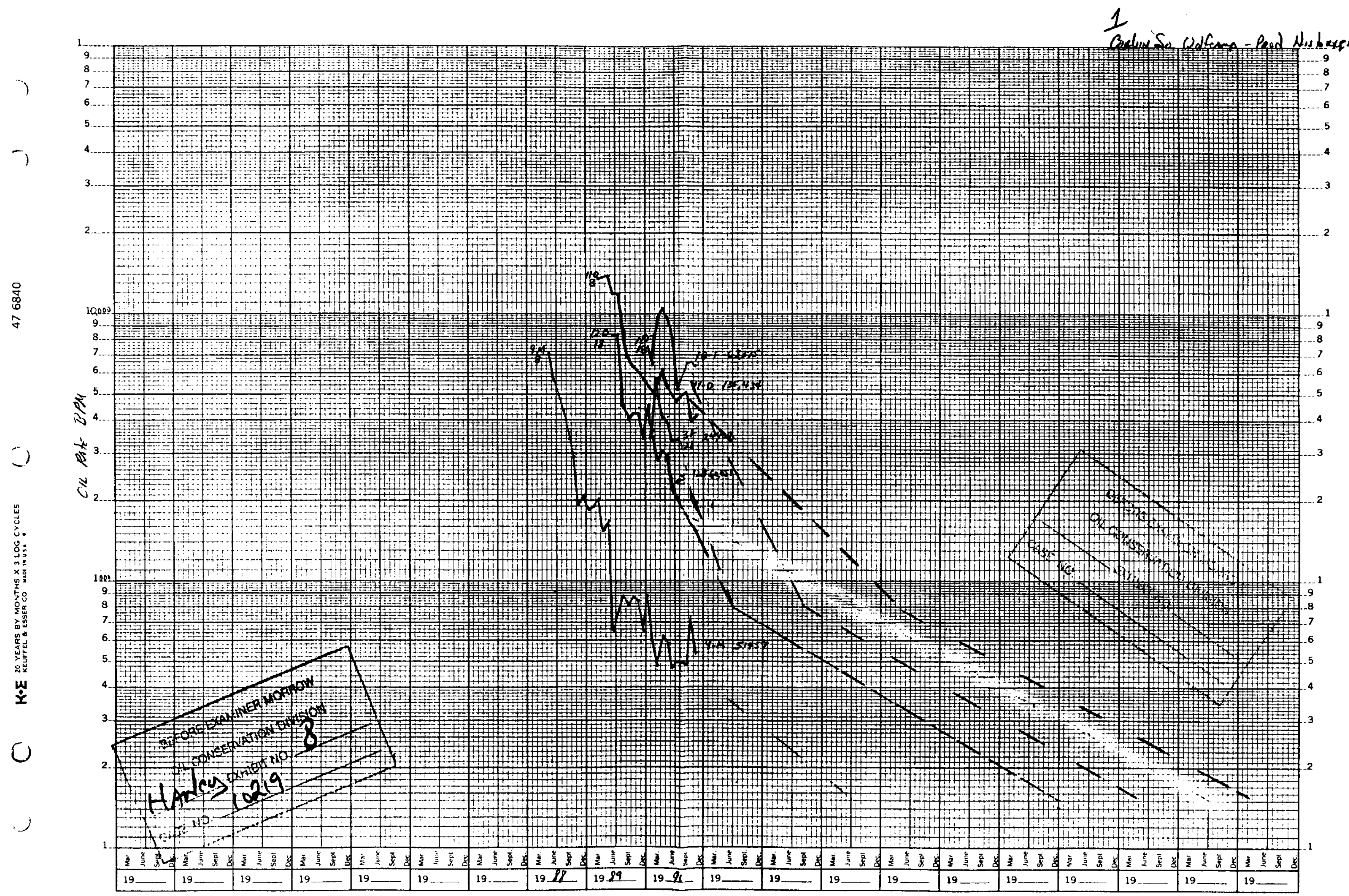
SCALE
BY BKB
DATE 1/9

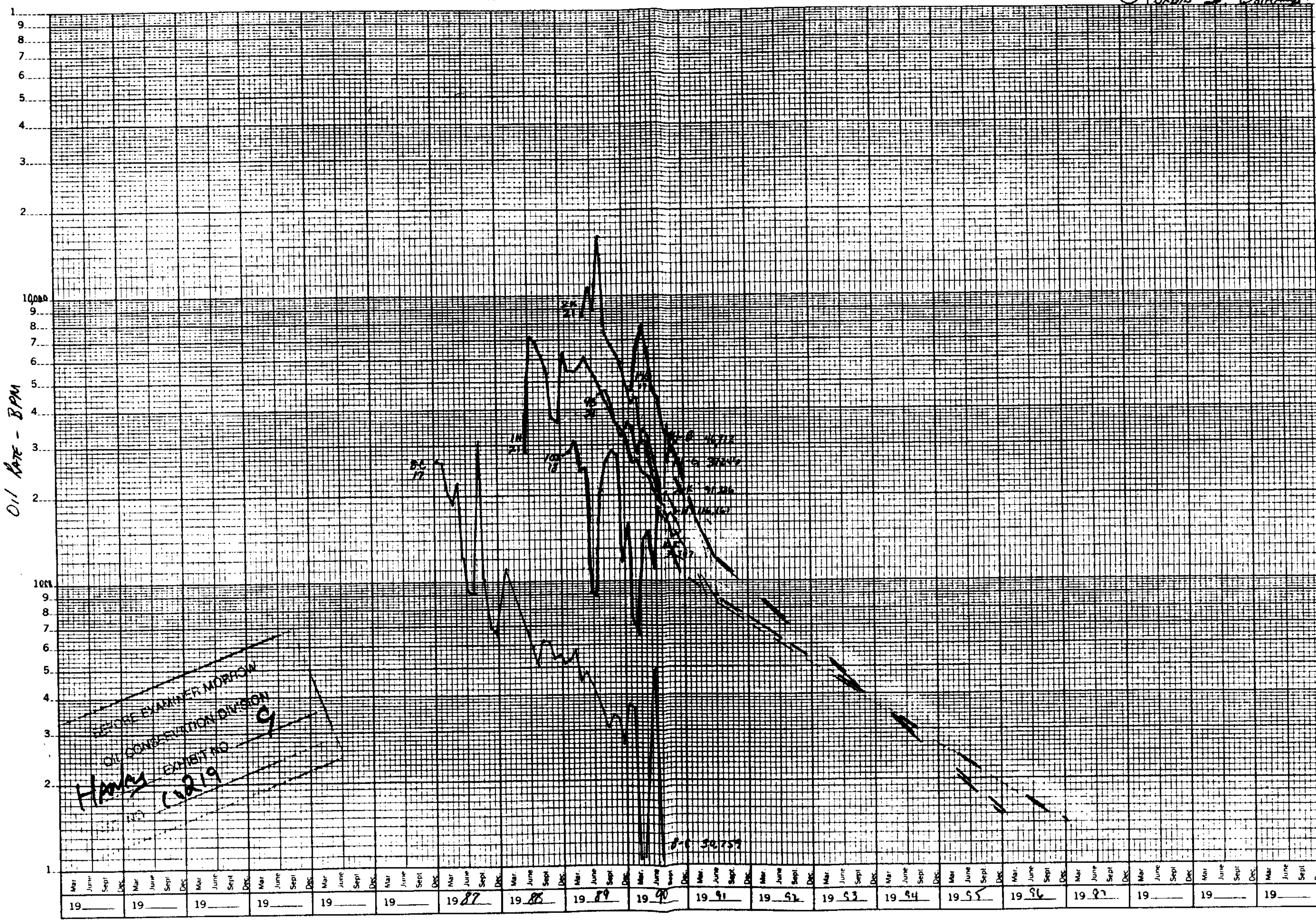


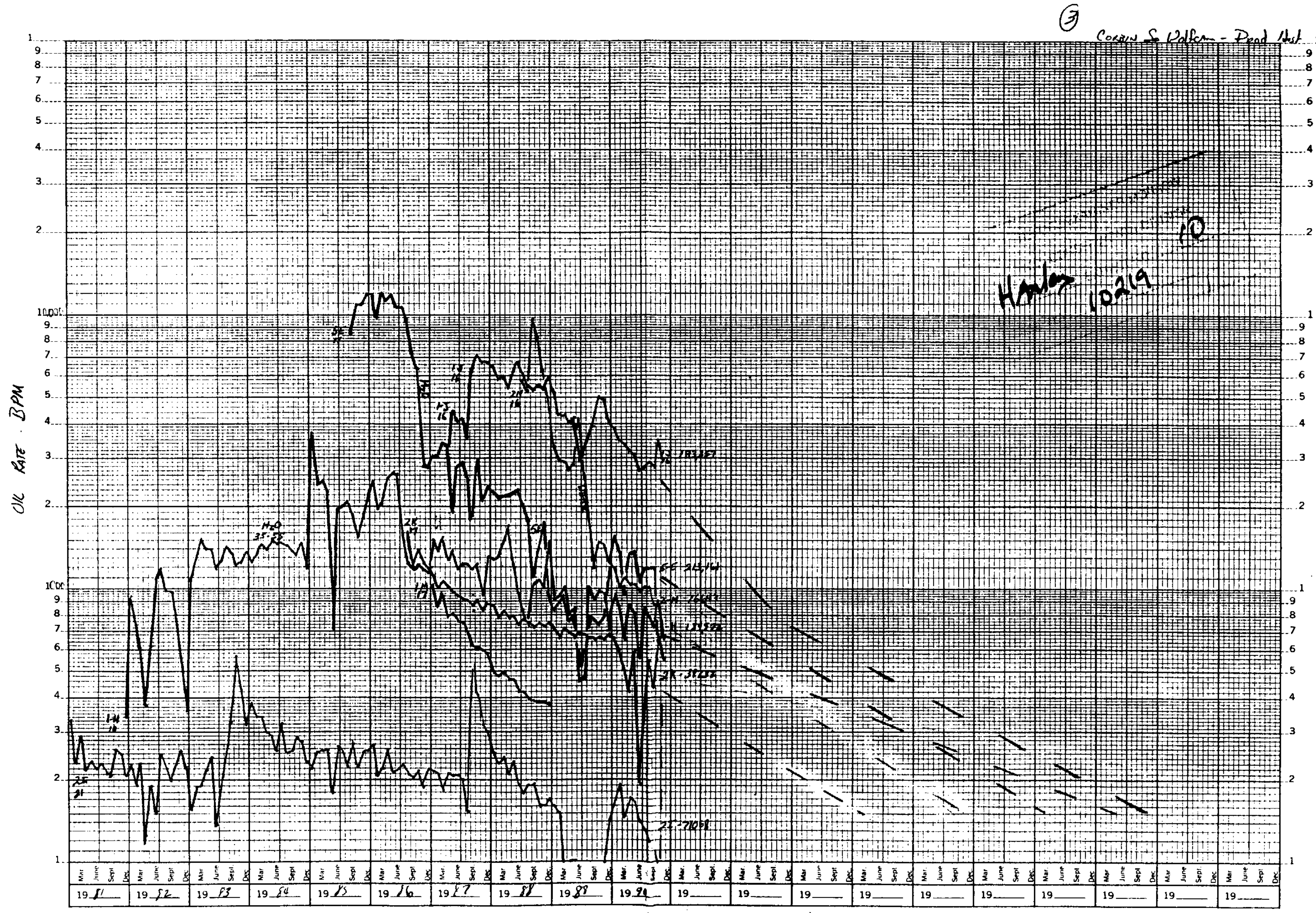
R 33 E
T 18 S
Proposed Location
HANLEY ACREAGE
PROPOSED WI UNIT 80 ACRE WOLFCAMP
WOLFCAMP PENETRATION OR DEEPER
LOCATION
ABANDONED LOCATION
* NO LONGER PRODUCING
BEFORE EXAMINER MORROW
OIL CONSERVATION DIVISION
EXHIBIT NO. 6
HANLEY PETROLEUM INC.
ISO - PRODUCTION MAP
15.1 Estimated Ultimate Recovery MBO (From Decline Curve Analysis)
88 % Water - 1990 Avg.
CI - 50 MBO
SCALE
BY WRH



1
Oil Rate BPM
BEFORE EXAMINER MORROW
OIL CONSERVATION DIVISION
EXHIBIT NO. 8
Hanley 10219
CASE NO.
19 88
19 89
19 90
K+E 20 YEARS BY MONTHS X 3 LOG CYCLES
KEUFFEL & ESSER CO. MADE IN U.S.A.
47 6840

(2) Corbin So. Wolfcamp - Prod History





K+E 20 YEARS BY MONTHS X 3 LOG CYCLES KEUFFEL & ESSER CO. MADE IN U.S.A.

47 6840

COMPARISON OF

RESERVES AND ECONOMICS

Hanley 8 Federal No. 1
(Wolfcamp)

| LOCATION | NW/4 NW/4, Sec. 8 | SW/4 NW/4, Sec. 8 |
|---|---|---|
| ULTIMATE RECOVERY (Gross Barrels) | 260,000 | 130,000 |
| HPI - NET INVESTMENT | $333,500 | $333,500 |
| PAYOUT - Months | 4 | 8 |
| Barrels | ±46,000 | ±44,000 |
| HPI-CUM PRETAX CASH FLOW (Net of Investment) | $1,576,360 | $598,804 |
| HPI-NET PRESENT VALUE (Discounted 10%) | $1,235,230 | $457,750 |
| ROYALTY INTEREST: | | |
| CUM PRETAX CASH FLOW | $514,913 | $222,092 |
| NET PRESENT VALUE | $432,162 | $185,508 |

RISK ANALYSIS

| RESERVES | # WELLS | % TOTAL |
|---|---|---|
| 0 - 45 MBO | 13 | 40.5 |
| 45 - 90 MBO | 7 | 22.0 |
| 90 - 250 MBO | 12 | 37.5 |
| | 32 | 100.0 |

WRH
2-21-91

BEFORE EXAMINER MORROW
OIL CONSERVATION DIVISION
Hanley EXHIBIT NO. 7
CASE NO. 10219

EXAMPLE COST ALLOCATION

9000' Bone Spring
vs.
11,500' Wolfcamp

1. Costs shown are from Hanley Petroleum Inc. AFE furnished 1-7-91.

2. Drilling day ratio is based on the drilling curve of the Santa Fe - Kachina 8 Federal No. 1.

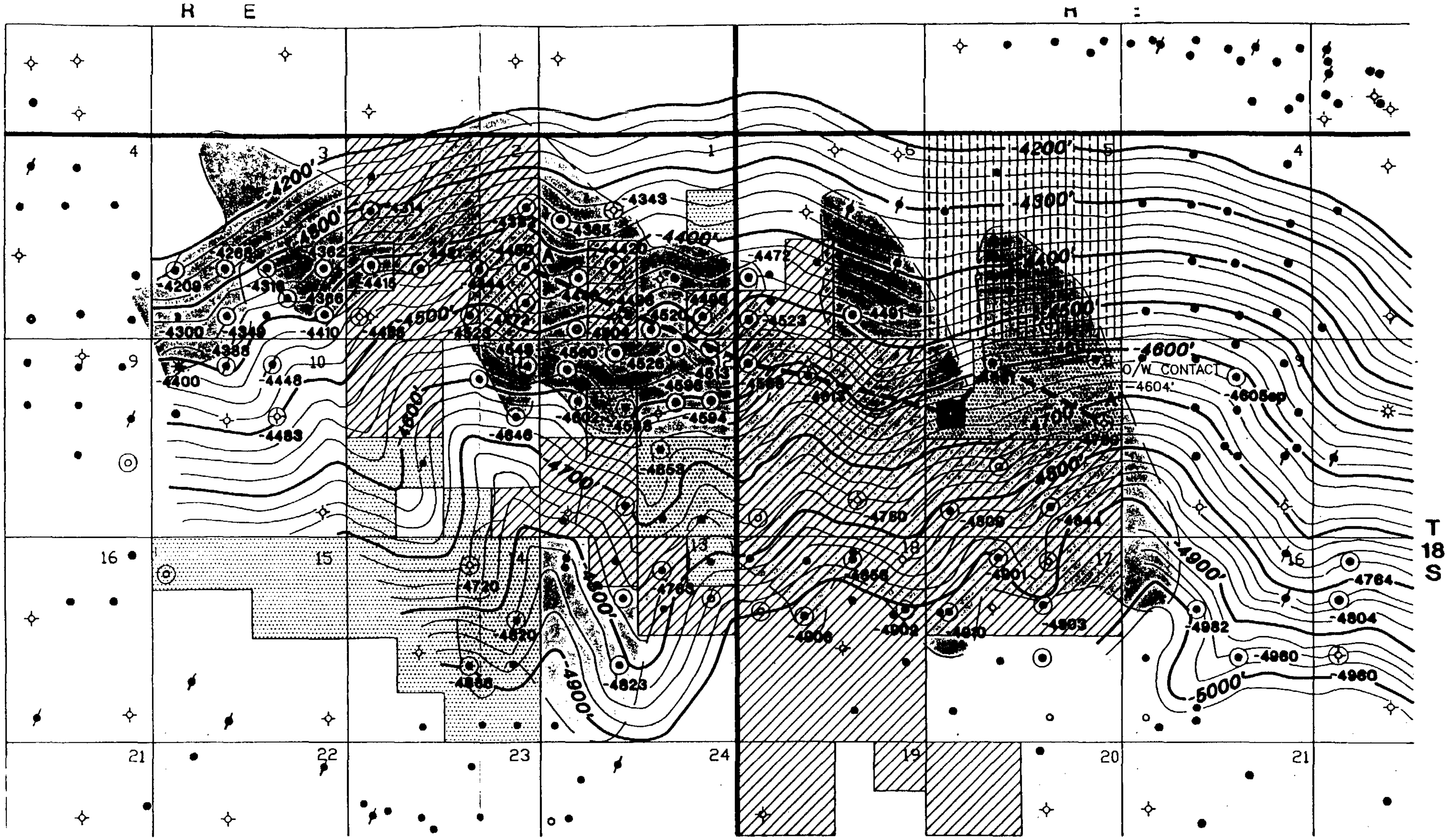
Ratio = $\frac{\text{Drilling days to 9000' (incl. logs, run csg.)}}{\text{Drilling days to 11,500' " " " "}}$

$= \frac{17}{30} = .5666$

| | WOLFCAMP | BONE SPRING Wolfcamp dry | BONE SPRING Wolfcamp Productive |
|---|---|---|---|
| DRY HOLE | | | |
| TANGIBLE | | | |
| Casing & Tubingheads | $14,500 | $14,500 | ½ of the greater of depreciated or salvaged value. |
| Surface casing | 9,800 | 9,800 | |
| Intermediate casing | 30,820 | 30,820 | " " " |
| INTANGIBLE | | | |
| Drilling Contractor | 221,400 | 125,445 | Amortized cost x .5666 |
| Road/Location/Damages | 16,000 | 9,066 | " " " |
| Mud/Cemicals/Water | 18,000 | 10,198 | " " " |
| Mud Logging | 8,750 | 4,957 | " " " |
| Electric Logs | 33,500 | 18,981 | " " " |
| Cementing surface & Intermed. | 23,500 | 23,500 | " " " |
| Supervision | 11,200 | 6,346 | " " " |
| DST's | 22,000 | -0- | -0- |
| Transportation/Supplies | 5,000 | 2,833 | Amortized cost x .5666 |
| Contingencies | 38,877 | 22,027 | " " " |
| TOTAL | $453,347 | $278,473 | |
| COMPLETION | | | |
| TANGIBLE | | | |
| 5½" casing | $90,885 | $71,126 | Proportion to 9000', then same as dry hole. |
| 2-7/8" tubing | 46,750 | 36,587 | " " " |
| Battery | 22,500 | 22,500 | " " " |
| INTANGIBLE | | | |
| Cement long string | 24,000 | 13,598 | Amortized cost x .5666 |
| Transportation/Supplies | 7,500 | allocated by completion interval. | |
| Completion Rig/Rentals Stimulation/Perforating | 22,800 | " " " | |
| Overhead | J.O.A. | x .5666 | Amortized cost x .5666 |

WRH
2-20-91

BEFORE EXAMINER MORROW
OIL CONSERVATION DIVISION
Hanley EXHIBIT NO. 17
CASE NO. 10219




ILLEGIBLE

SFEOP,LP ACREAGE

SFEOP,LP INTEREST ACREAGE

SFEOP,LP FARM-IN ACREAGE

PROPOSED LOCATION (SFEOP,LP)

SNIPER PRODUCER

SNIPER SHOW

INDUSTRY LOCATION

PROPOSED LOCATION (HANLEY PET.)

Santa Fe Energy Operating Partners, LP.
*PERMIAN BASIN DISTRICT*
MIDLAND, TEXAS

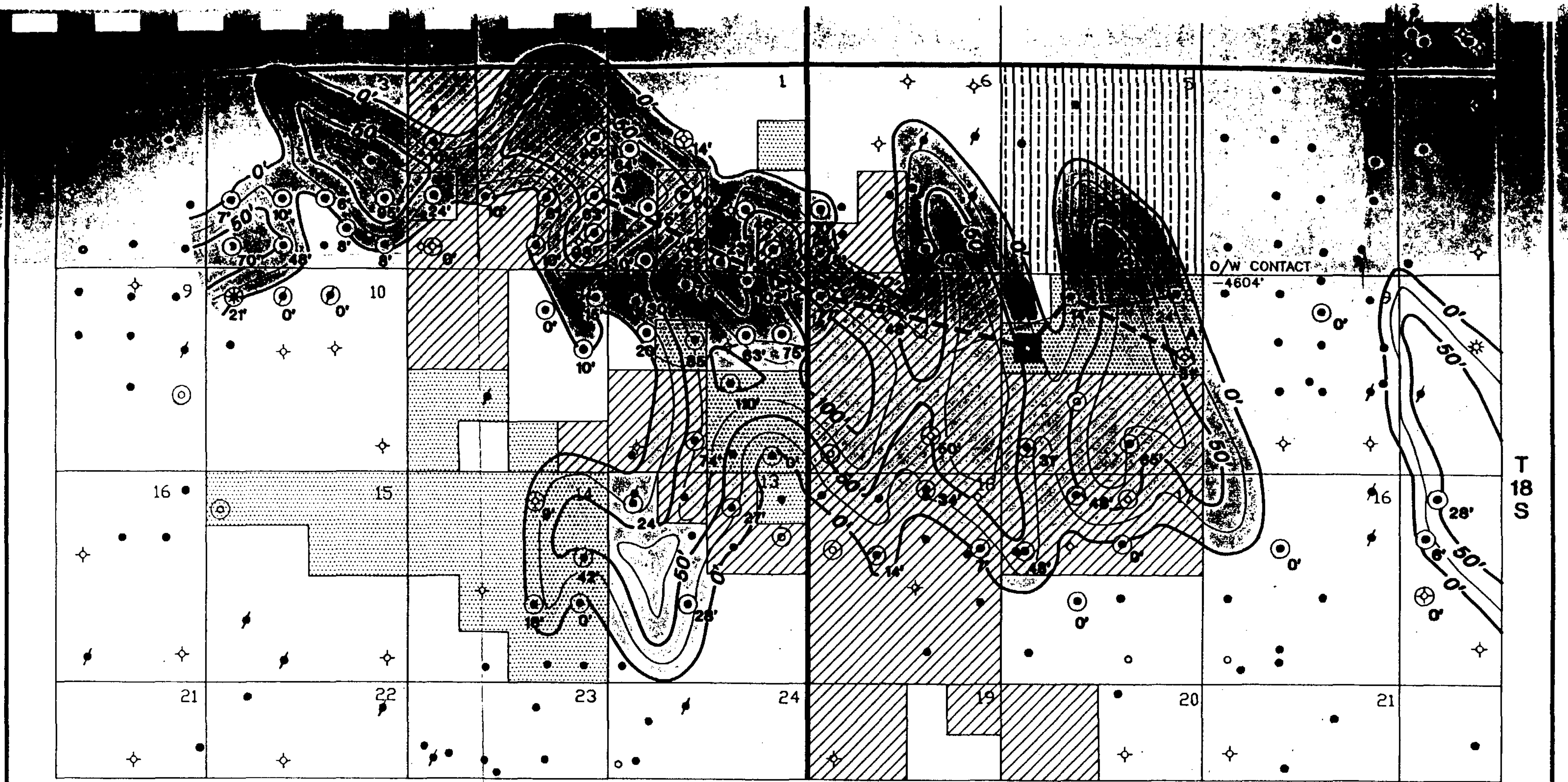
LEA SOUTH AREA
**KACHINA PROSPECT**
LEA COUNTY, NEW MEXICO

**STRUCTURE MAP**
**TOP "SNIPER" DOLOMITE**

GEOL BY: J. THOMA
SCALE: 1"=3000'

C.I.: 25'
DATE: 1-22-91

FILE: 2-1-7
KACHINA.DWG




ILLEGIBLE

SFEOP,LP ACREAGE

SFEOP,LP INTEREST ACREAGE

SFEOP,LP FARM-IN ACREAGE

PROPOSED LOCATION
(SFEOP,LP)

SNIPER PRODUCER

SNIPER SHOW

INDUSTRY LOCATION

PROPOSED LOCATION
(HANLEY PET)

Santa Fe Energy Operating Partners, LP.
*PERMIAN BASIN DISTRICT*
MIDLAND, TEXAS

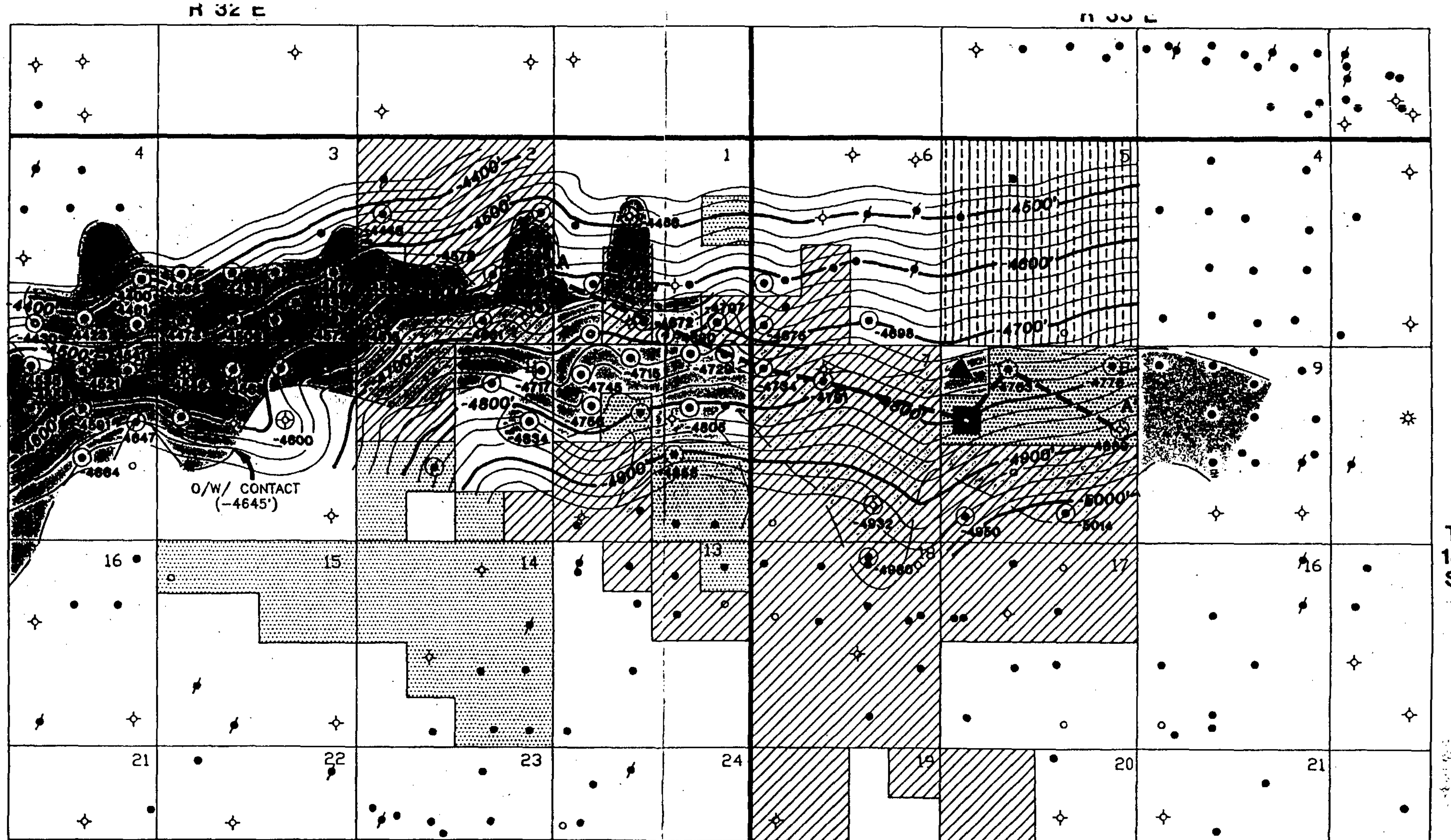
LEA SOUTH AREA
**KACHINA PROSPECT**
LEA COUNTY, NEW MEXICO

**ISOPOROSITY MAP**
**"SNIPER" DOLOMITE**
**$\emptyset_N \geq 8\%$**

GEOL BY: J. THOMA
SCALE: 1"=3000'

C.I.: 25'
DATE: 1-22-91

FILE: 2-1-7
KACHINA.DWG




ILLEGIBLE

SFEOP,LP ACREAGE

SFEOP,LP INTEREST ACREAGE

SFEOP,LP FARM-IN ACREAGE

PROPOSED LOCATION
(SFEOP,LP)

YOUNG DEEP PRODUCER

YOUNG DEEP SHOW

INDUSTRY LOCATION

PROPOSED LOCATION
(HANLEY PET)

Santa Fe Energy Operating Partners, LP.
*PERMIAN BASIN DISTRICT*
MIDLAND, TEXAS

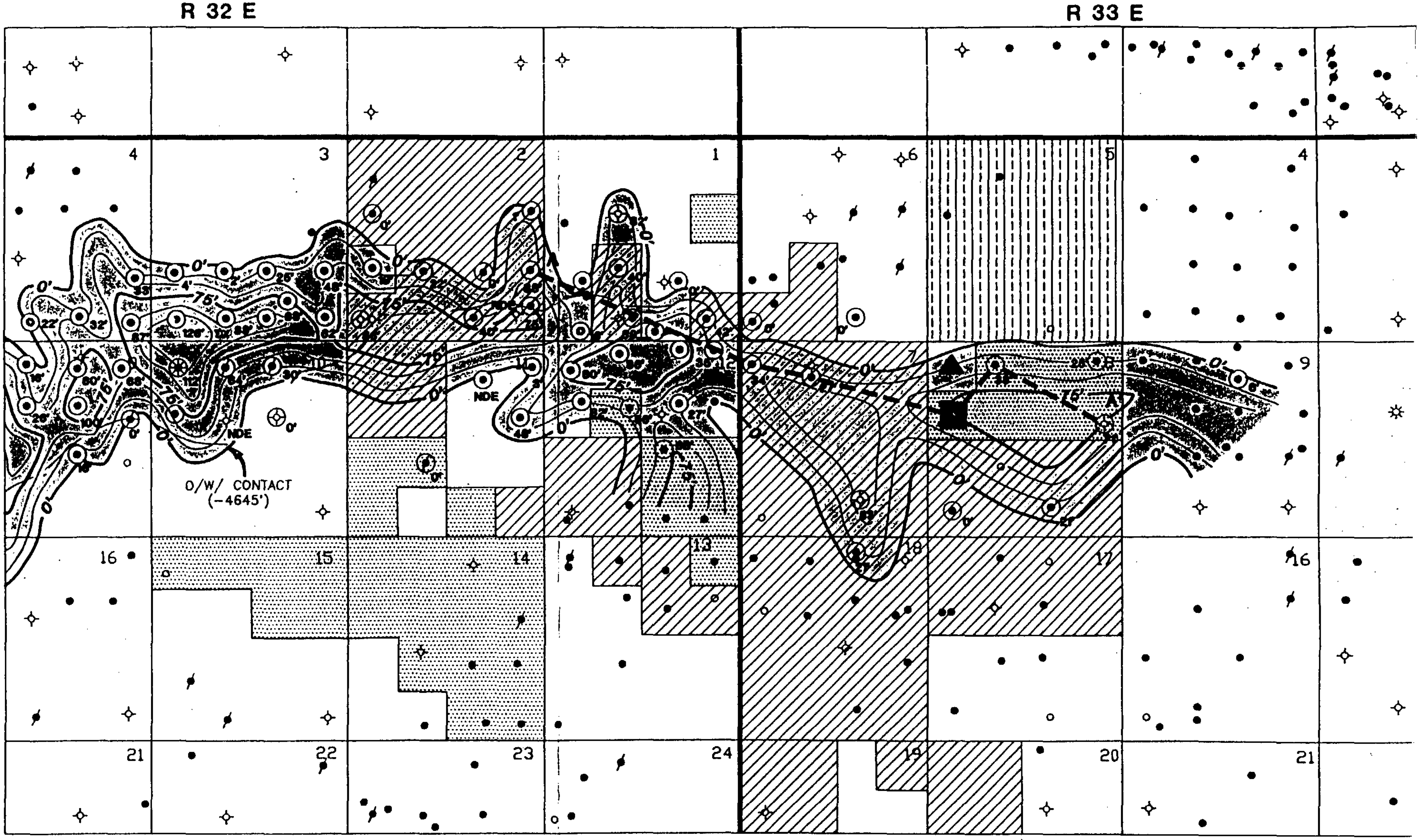
LEA SOUTH AREA
**KACHINA PROSPECT**
LEA COUNTY, NEW MEXICO

**STRUCTURE MAP**
**TOP OF YOUNG DEEP**
**CARBONATE**

GEOL BY: J. THOMA
SCALE: 1"=3000'

C.I.: 25'
DATE: 1-22-91

FILE: 2-I-7
KACHINA.DWG




SFEOP,LP ACREAGE

SFEOP,LP INTEREST ACREAGE

SFEOP,LP FARM-IN ACREAGE

PROPOSED LOCATION
(SFEOP,LP)

YOUNG DEEP PRODUCER

INDUSTRY LOCATION

PROPOSED LOCATION
(HANLEY PET.)

Santa Fe Energy Operating Partners, L

*PERMIAN BASIN DISTRICT*

MIDLAND, TEXAS

LEA SOUTH AREA

**KACHINA PROSPECT**

LEA COUNTY, NEW MEXICO

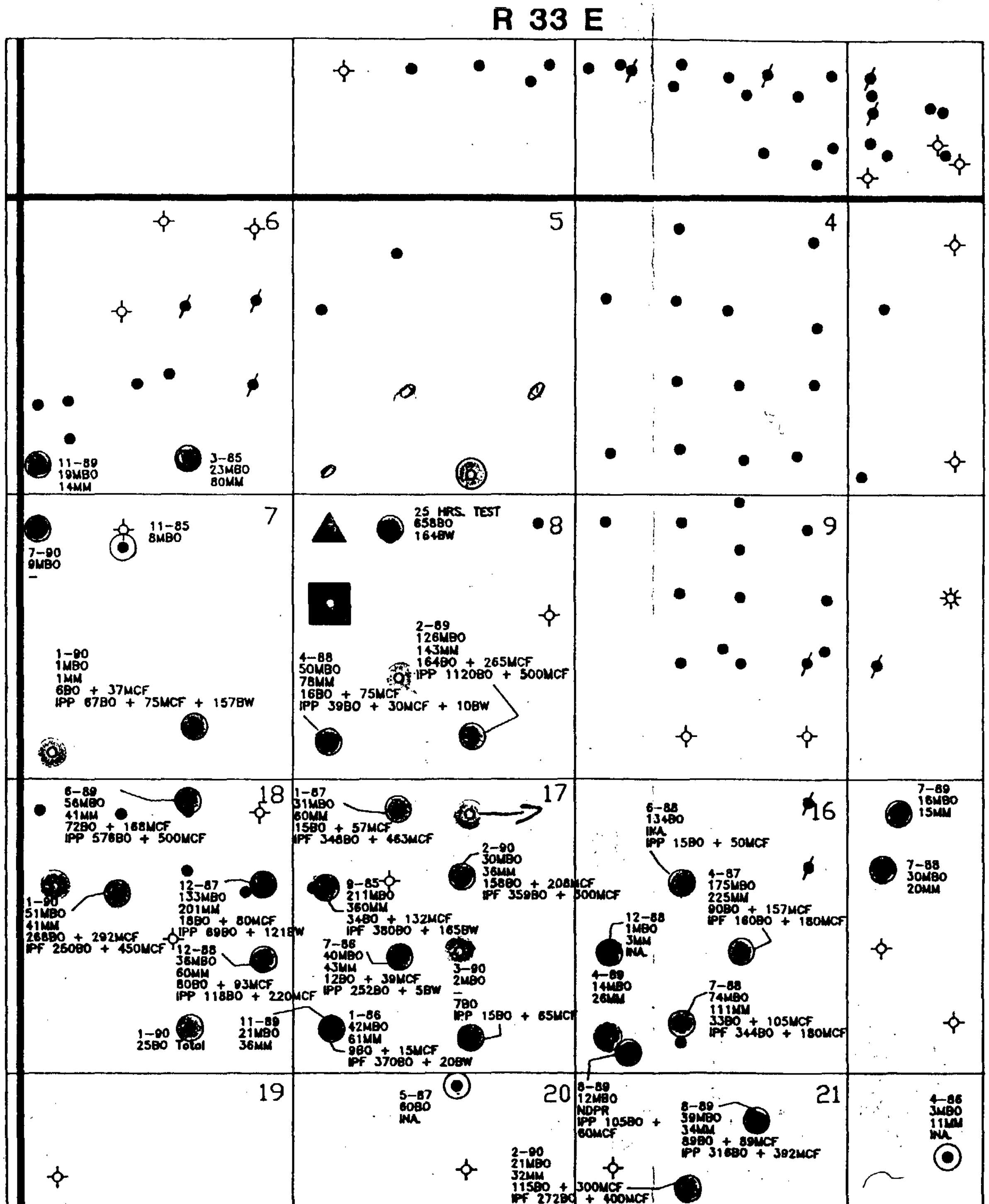
**ISOPOROSITY MAP**

**YOUNG DEEP DOLOMITE**

GEOL BY: J. THOMA
SCALE: 1"=3000'

C.I.: 25'
DATE: 1-22-91

ILLEGIBLE




PROPOSED LOCATION (HANLEY PET.)

PROPOSED LOCATION (SFEOP,LP)

INDUSTRY LOCATION

BONE SPRING

WOLFCAMP

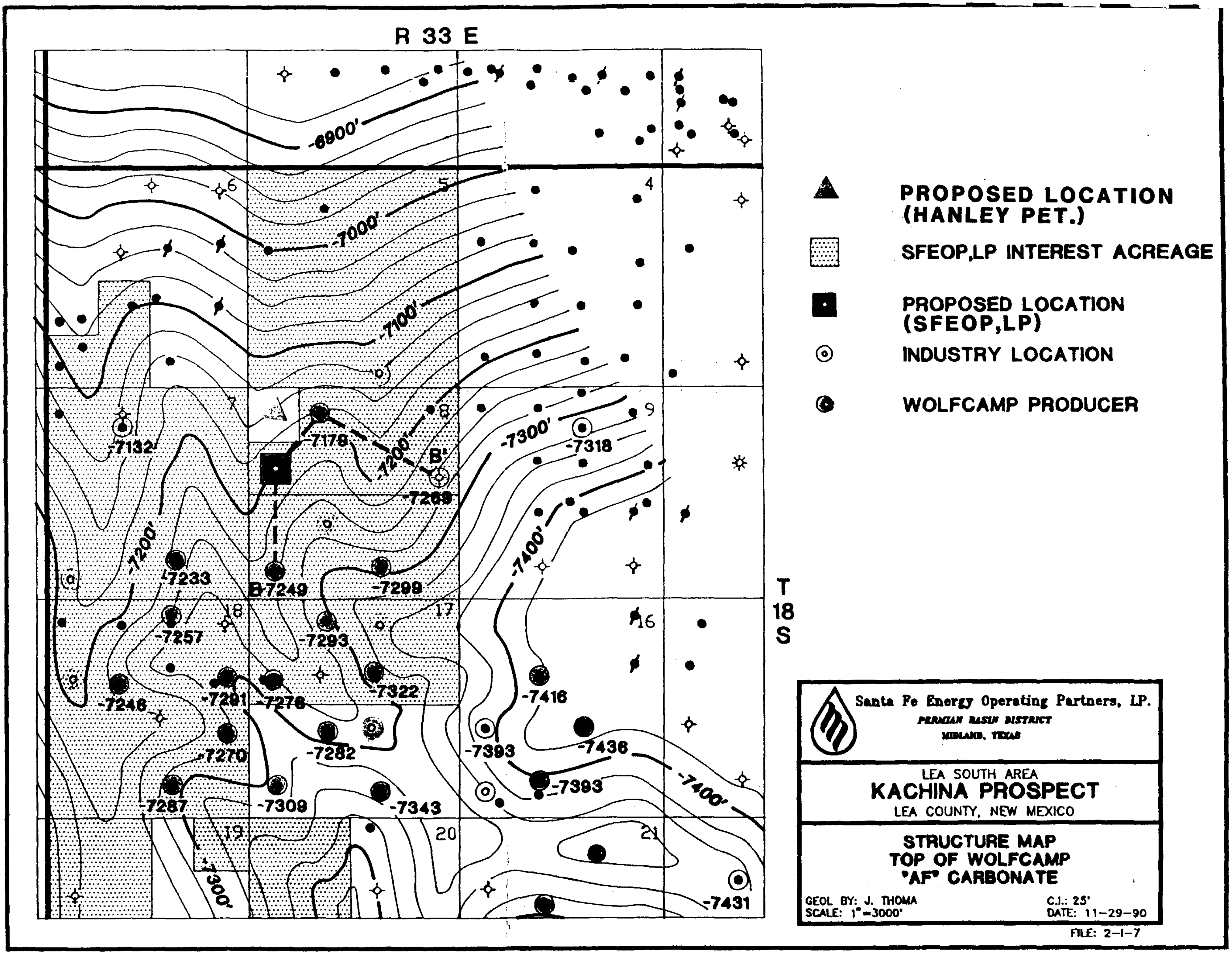
| | |
|---|---|
| 8-89 | DATE OF COMPLETION |
| 39MBO | CUM. OIL |
| 34MM | CUM. GAS |
| 89BO + 89MCF | CURRENT DAILY OIL + GAS |
| IPP 316BO + 392MCF | INITIAL PRODUCING RATES |

**Santa Fe Energy Operating Partners, LP.**
*PERMIAN BASIN DISTRICT*
MIDLAND, TEXAS

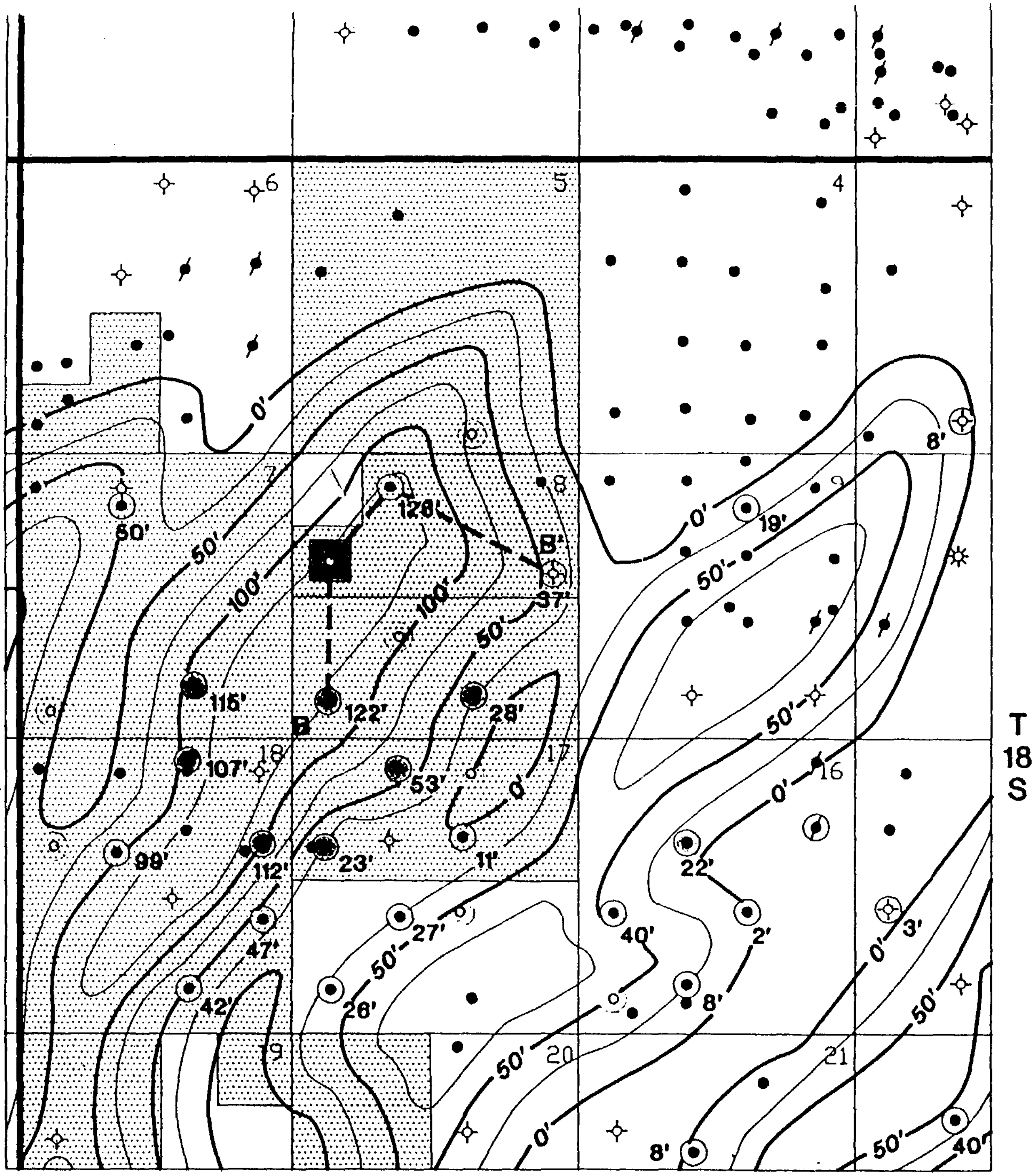
LEA SOUTH AREA
## KACHINA PROSPECT
LEA COUNTY, NEW MEXICO

## PRODUCTION MAP THROUGH 7-1-90

GEOL BY: J. THOMA
SCALE: 1"=3000'
C.I.:
DATE: 11-29-90



R 33 E
T 18 S
-6900'
-7000'
-7100'
-7200'
-7300'
-7400'
-7132
-7178
-7269
-7318
-7233
B 7249
-7299
-7257
-7293
-7246
-7281
-7276
-7322
-7416
-7270
-7282
-7393
-7436
-7287
-7308
-7343
-7393
-7431
B'
PROPOSED LOCATION (HANLEY PET.)
SFEOP,LP INTEREST ACREAGE
PROPOSED LOCATION (SFEOP,LP)
INDUSTRY LOCATION
WOLFCAMP PRODUCER
Santa Fe Energy Operating Partners, LP.
PERMIAN BASIN DISTRICT
MIDLAND, TEXAS
LEA SOUTH AREA
KACHINA PROSPECT
LEA COUNTY, NEW MEXICO
STRUCTURE MAP
TOP OF WOLFCAMP
"AF" CARBONATE
GEOL BY: J. THOMA
SCALE: 1"=3000'
C.I.: 25'
DATE: 11-29-90
FILE: 2-1-7




PROPOSED LOCATION (HANLEY PET.)

SFEOP,LP INTEREST ACREAGE

PROPOSED LOCATION (SFEOP,LP)

INDUSTRY LOCATION

"AF" PRODUCERS

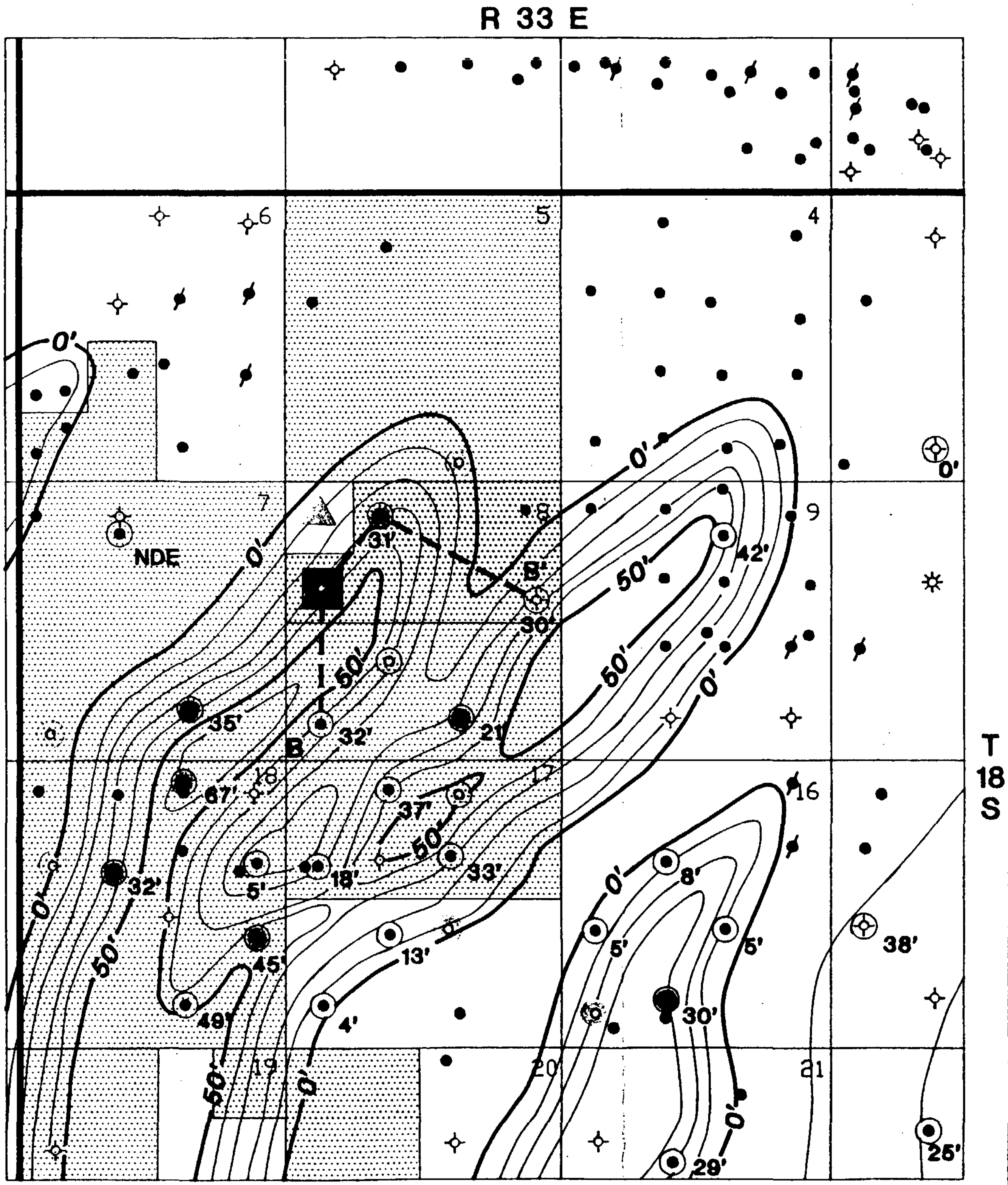
Santa Fe Energy Operating Partners, LP.
PERMIAN BASIN DISTRICT
MIDLAND, TEXAS

LEA SOUTH AREA
**KACHINA PROSPECT**
LEA COUNTY, NEW MEXICO

**ISOPACH MAP**
**NET CLEAN CARBONATE**
**LOWER WOLFCAMP "AF" CARBONATE**
GR ≤ 40 APIU

GEOL BY: J. THOMA
SCALE: 1" = 3000'
C.I.: 25'
DATE: 11-29-90

FILE: 2-1-7




PROPOSED LOCATION (HANLEY PET.)

SFEOP,LP INTEREST ACREAGE

PROPOSED LOCATION (SFEOP,LP)

INDUSTRY LOCATION

"AG" PRODUCERS

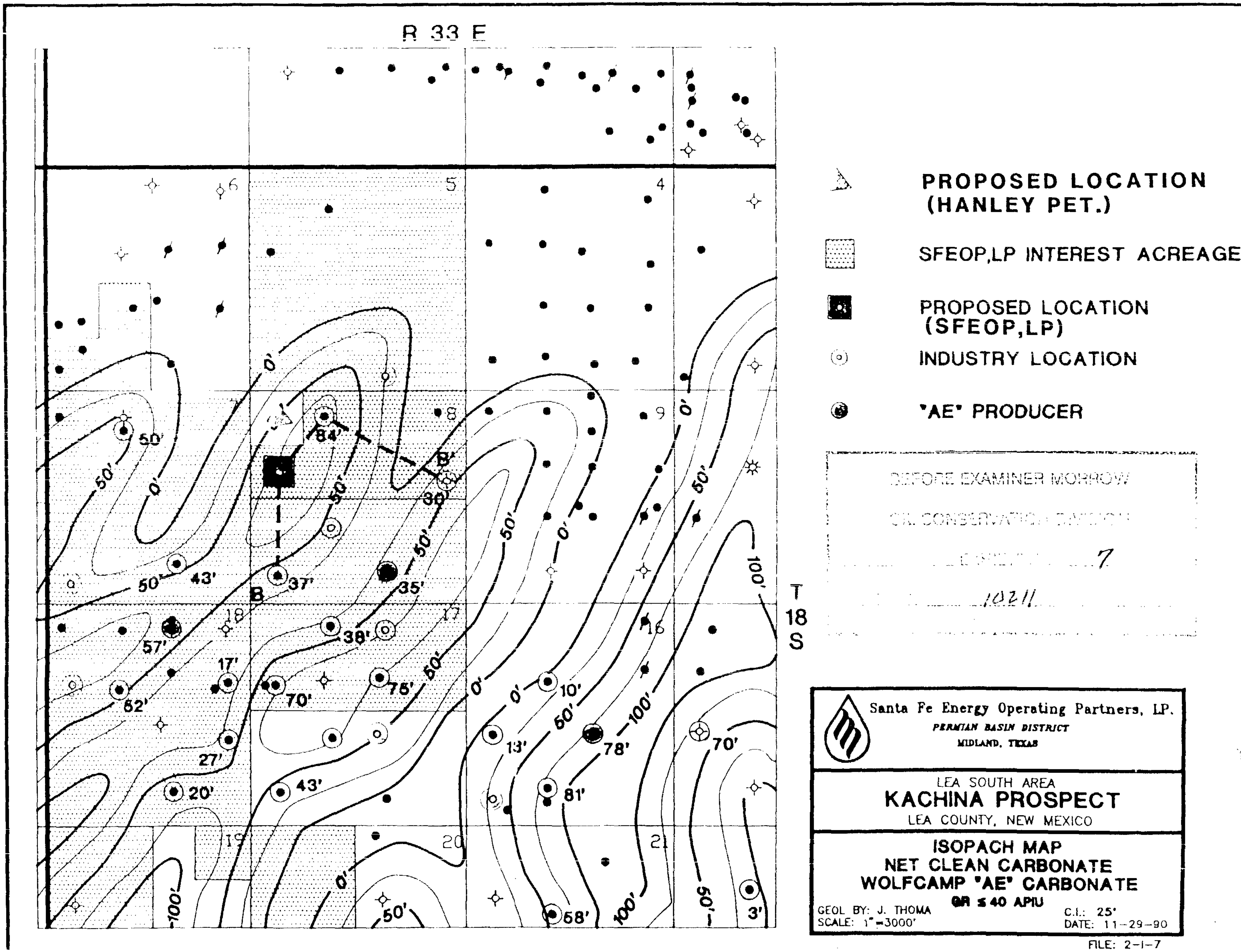
Santa Fe Energy Operating Partners, LP.
*PERMIAN BASIN DISTRICT*
MIDLAND, TEXAS

LEA SOUTH AREA
**KACHINA PROSPECT**
LEA COUNTY, NEW MEXICO

**ISOPACH MAP**
**NET CLEAN CARBONATE**
**WOLFCAMP "AG" CARBONATE**
**GR≤40 APIU**

GEOL BY: J. THOMA
SCALE: 1"=3000'
C.I.: 10'
DATE: 11-29-90

FILE: 2-I-7


R 33 E
T 18 S
PROPOSED LOCATION (HANLEY PET.)
SFEOP,LP INTEREST ACREAGE
PROPOSED LOCATION (SFEOP,LP)
INDUSTRY LOCATION
"AE" PRODUCER
BEFORE EXAMINER MORROW
OIL CONSERVATION DIVISION
7
10211
Santa Fe Energy Operating Partners, LP.
PERMIAN BASIN DISTRICT
MIDLAND, TEXAS
LEA SOUTH AREA
KACHINA PROSPECT
LEA COUNTY, NEW MEXICO
ISOPACH MAP
NET CLEAN CARBONATE
WOLFCAMP "AE" CARBONATE
GR ≤ 40 APIU
GEOL BY: J. THOMA
SCALE: 1"=3000'
C.I.: 25'
DATE: 11-29-90
FILE: 2-1-7

# HANLEY PETROLEUM INC.

ESTABLISHED 1893

415 WEST WALL, SUITE 1500/MIDLAND, TEXAS 79701-4473/915-684-8051 FAX: 915-685-1104

HANLEY PETROLEUM INC.

CORBIN AREA

LEA COUNTY, NEW MEXICO

Copies Of Correspondence Concerning The Drilling Of A Proposed 11,500' Wolfcamp Test Well To Be Located On An 80 Acre Working Interest Unit Comprising The W½NW¼ Section 8, T-18-S, R-33-E, Lea County, New Mexico

BEFORE EXAMINER MORROW

OIL CONSERVATION DIVISION

Hanley EXHIBIT NO. 19

CASE NO. 10219

Date: 2-5-91

10000

**Santa Fe Energy Operating Partners, L.P.**

Santa Fe Pacific Exploration Company
Managing General Partner

CERTIFIED MAIL - RETURN RECEIPT

November 12, 1990

Hanley Petroleum, Inc.
415 West Wall
Suite 1500
Midland, Texas 79701

RECEIVED
NOV 14 1990
Hanley Petroleum Inc.

ATTN: James Rogers

Re: Well Proposal
Kachina "8" Fed. Com. #2
1980' FNL & 660' FWL
(W/2NW/4) Sec. 8, T-18-S, R-33-E,
Lea County, New Mexico

Gentlemen:

Santa Fe Energy Operating Partners, L.P. herein proposes to drill an 11,500' Wolfcamp test at the above captioned location.

Please find enclosed two (2) Well Cost Estimates (AFES) covering the cost of drilling said well. If you elect to participate, please execute the enclosed AFES and return one copy to the undersigned. The Operating Agreement covering the W/2NW/4 is presently being prepared and will be furnished to you for your signature.

If you elect not to join in the drilling of this well, Santa Fe Energy Operating Partners, L.P. respectfully requests a farmout of your interest in the NW/4NW/4 of Section 8, T-18-S, R-33-E, based on the following terms:

1. Hanley will deliver an 80% NRI Lease to Santa Fe, while retaining an ORRI equal to the difference between existing burdens and 20%.

2. Upon payout of said well, Hanley will have the option to convert your ORRI to a 25% Working Interest, proportionately reduced.

3. Upon execution of a formal Agreement, Santa Fe will have 180 days to drill or cause to be drilled a well at the above captioned location.

4. Santa Fe will earn rights from the surface down to 100' below total depth drilled.

If these terms are acceptable, please prepare your agreement for Santa Fe Energy Operating Partners, L.P.'s approval and signature.

Please advise the undersigned of your election, so the necessary paper work can be prepared for signatures.

Permian Basin District
550 W. Texas, Suite 1330
Midland, Texas 79701
915/687-3551



An Affiliate of Santa Fe Pacific Corporation

If you have any questions, please do not hesitate to contact the undersigned. Thank you in advance for your cooperation and prompt reply to this proposal.

Sincerely yours,

SANTA FE ENERGY OPERATING PARTNERS, L.P.
By: Santa Fe Pacific Exploration Company
Managing General Partner

By: Larry Murphy
Larry Murphy, Senior Landman

LM/efw
Encls a/s

EFW1473

HANLEY PETROLEUM INC.
ESTABLISHED 1883

415 WEST WALL, SUITE 1500/MIDLAND, TEXAS 79701-4473/915-684-8051 FAX: 915-685-1104

November 26, 1990

Santa Fe Energy Operating Partners, L.P.
550 West Texas, Suite 1330
Midland, Texas 79701

Attn: Mr. Larry Murphy
Senior Landman

RE: Well Proposal
$W\frac{1}{2}$ $NW\frac{1}{4}$ Sec. 8, T-18-S, R-33-E
Eddy County, New Mexico (HPI NM-43)

Gentlemen:

We have received your letter dated November 12, 1990 concerning the drilling of a Wolfcamp test 1980 feet FNL and 660 feet of FWL of Section 8, T-18-S, R-33-E to be dedicated to the W2 NW/4 of said section. Unfortunately, you have failed to supply us with sufficient information from which to evaluate your request.

First; we are currently evaluating the drilling of a Bone Spring test in the NW/4NW/4 for 40-acre spaced oil production. Your acreage in the SW/4NW/4 may have some potential for Bone Spring production but your proposal fails to address how you propose to allocate costs between the Bone Spring and the Wolfcamp so that we do not have to help you pay for exploration for production in zones in which we would have no interest. Please submit to us your revised AFE addressing this issue.

Second; we are unable to completely evaluate your proposed well location and its opportunity to success in the Wolfcamp unless you also submit to us relevant data available to your from the Kachina "8" Federal #1 well which you have recently drilled and on which you have run production casing. If your proposal is intended to be a good faith effort to obtain our voluntary participation, then we will need the following information:

(1) Daily Drilling and Completion Reports,
(2) Mechanical Logs and Mud Logs if any,
(3) Geologic interpretations by which you justify the well and evaluate its risk.

7

Third; we are unable to evaluate your farmout terms without further information from you including why you have offered us only a 20% ORRI subject to payment of outstanding burdens against production. The sliding scale royalty provision in our lease should be taken into consideration.

Fourth; we recommend to you that we operate the subject well. You have failed to supply us with any information from which to determine why we would allow you to be the operator when we believe our company structure and experience will result in more efficient operations of the well than you can obtain.

In summary, we consider your well proposal premature pending obtaining and disclosing to us the results of the Kachina "8" Federal #1 well. In the alternative, please consider this letter our offer to you that you join with us under the same terms you have offered to us and we will operate the well.

Yours very truly,

HANLEY PETROLEUM INC.

James W. Rogers

James W. Rogers
Vice President Land

/pjm

Certified Mail - Return Receipt

**Santa Fe Energy Operating Partners, L.P.**

**Santa Fe Pacific Exploration Company**
**Managing General Partner**

DEC 19 1990

Hanley Petroleum Inc.

CERTIFIED MAIL - RETURN RECEIPT

December 17, 1990

Hanley Petroleum, Inc.
415 West Wall, Suite 1500
Midland, Texas 79701-4473

ATTN: James W. Rogers

Re: Well Proposal
W/2NW/4 Sec. 8
T-18-S, R-33-E
Eddy County, New Mexico
Kachina "8" Fed. Com. #2

Dear Mr. Rogers:

Reference is made to our phone conversation of December 13, 1990 wherein we discussed the drilling of the above captioned well.

Santa Fe Energy Operating Partners, L.P. herein is willing to allow Representatives of Hanley Petroleum, Inc. to review the logs and drilling reports from spud date until 11/12/90 of the Kachina "8" Fed. #1 during normal business hours at Santa Fe's offices located at 550 West Texas, Suite 1330, Midland, Texas.

The viewing of this information is based on a commitment from Hanley Petroleum, Inc. to join in the drilling of this well or enter into a Farmout Agreement with Santa Fe Energy Operating Partners, L.P., and the information shown to Hanley will be kept Confidential.

If Hanley agrees to participate in the well, the contract area will cover the W/2NW/4 of Section 8, T-18-S, R-33-E from the surface to the base of the Wolfcamp Formation. The ownership of this area will be as follows:

| | |
|---|---|
| Hanley Petroleum | 50% |
| Santa Fe Energy Operating Partners, L.P. | 50% |

If Hanley elects to Farmout, the Agreement will cover the NW/4NW/4 Section 8 from the surface to the base of the Wolfcamp Formation.

1) Hanley will deliver an 80% NRI lease to Santa Fe, retaining an ORRI equal to the difference between existing burdens and 20%, but in no event will Hanley's ORRI be less than 2.50%.

2) Upon payout of said well, Hanley will have the option to convert its ORRI to a 25% Working Interest, proportionately reduced.

3) Upon execution of a formal Agreement, Santa Fe will have 150 days to drill or cause to be drilled a well at a legal location in the W/2NW/4 of Section 8, T-18-S, R-33-E.

4) Santa Fe will earn rights from the surface down to 100' below total depth drilled, but in no event below the Wolfcamp Formation.

Hanley will have 5 days upon receipt of this letter to commit its interest to the options stated above and will have 10 days after reviewing the information above to make its election on these options.

In addition, Santa Fe is requesting to be placed on the January 10, 1991 docket for compulsory pooling, so a prompt reply is appreciated.

If you agree with the above captioned terms, please acknowledge your approval, by signing in the space provided below.

If you have any questions, please contact the undersigned.

Sincerely yours,

SANTA FE ENERGY OPERATING PARTNERS, L.P.
By: Santa Fe Pacific Exploration Company
Managing General Partner

By: Larry Murphy
Larry Murphy, Senior Landman

LM/efw

HANLEY PETROLEUM, INC. herein agrees this ________ day of December, 1990 to commit its interest in the NW/4NW/4 of Sec. 8 to an Operating Agreement or Farmout Agreement before the logs and drilling report (from spud date until 11/12/90) have been reviewed. In addition, Hanley agrees to make an election 10 days after the information stated above has been reviewed. The viewing of this information will be done no later than December 28, 1990 at Santa Fe's offices during normal business hours.

HANLEY PETROLEUM, INC.

By: ______________________________

Type Name: ______________________________

Title: ______________________________

Date: ______________________________

EFW1549

RETURN THIS COPY TO
SANTA FE ENERGY OPERATING PARTNERS, L.P.

HANLEY PETROLEUM INC.
ESTABLISHED 1983

415 WEST WALL, SUITE 1500/MIDLAND, TEXAS 79701-4473/915-684-8051 FAX: 915-685-1104

December 19, 1990

Santa Fe Energy Operating Partners, LP
Permian Basin District
550 West Texas, Suite 1330
Midland, Texas 79701

Attn: Larry Murphy
Senior Landman

RE: Well Proposal W½NW¼ Section 8,
T-18-S, R-33-E, Lea County,
New Mexico Kachina "8" Fed. #2

Gentlemen:

Reference is here made to your correspondence of November 12, 1990 and following. In the November 12 letter you stated that an Operating Agreement was being prepared and was to be furnished to us. As of this date we have not received a proposed form of Operating Agreement for our inspection and approval. Further, the data included in your application for compulsory pooling under Paragraph 3 & 4 are false in that your acts have been to withhold information vital to a reasonable decision to drill the proposed well from a 50% owner in the proposed venture. You have failed to make these data available under reasonable conditions including not providing the proposed form of Operating Agreement as above discussed. Due to the timing of your proposal, with week-ends and holidays it is unreasonable to expect our response to your proposed timetable. Please call us at your earliest and propose a reasonable arrangement and we will respond. In addition, your December 3rd reply to my November 26th letter was neither responsive nor constructive in our efforts to properly develop the minerals in the subject spacing unit. I request that you review our November 26th letter and provide us with a detailed meaningful response to each of the items we raised in that letter.

The fact remains that Hanley does own a valid and subsisting Federal Oil and Gas lease covering the NW¼NW¼ Section 8, and if necessary we will employ all legal means to receive our just and fair share of the reservoir applicable thereto. In the alternative we stand ready to work with you toward an amenable resolution, but the basis of any such resolution is not enhanced by such demands as your are attempting to place on Hanley with your paper trail of correspondence.

Yours very truly,

HANLEY PETROLEUM INC.

James W. Rogers
Vice President Land

/pjm