STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

CASE 10340

EXAMINER HEARING

IN THE MATTER OF:

Application of Meridian Oil, Inc., for a High Angle/Horizontal Directional Drilling Pilot Project, Special Operating Rules, a Non-Standard Oil Proration Unit, an Unorthodox Gas Well Location, and an Exception to Division Order No. R-5459, as Amended, San Juan County, New Mexico

TRANSCRIPT OF PROCEEDINGS

BEFORE: MICHAEL E. STOGNER, EXAMINER

STATE LAND OFFICE BUILDING

SANTA FE, NEW MEXICO

June 27, 1991

ORIGINAL

A P P E A R A N C E S

FOR THE DIVISION:	ROBERT G. STOVALL, ESQ. Counsel for the Division Post Office Box 2088 State Land Office Building Santa Fe, N.M. 87504-2088
FOR THE APPLICANT:	**W. THOMAS KELLAHIN, ESQ.** Kellahin, Kellahin & Aubrey Post Office Box 2265 Santa Fe, N.M. 87504-2265
FOR AMOCO PRODUCTION COMPANY:	**WILLIAM F. CARR, ESQ.** Campbell & Black, P.A. Post Office Box 2208 Santa Fe, N.M. 87504-2208

I N D E X

E X H I B I T S

APPLICANT'S EXHIBITS:

EXAMINER STOGNER: Call the next case No. 10340.

MR. STOVALL: Application of Meridian Oil, Inc., for a high angle/horizontal directional drilling pilot project, special operating rules therefore, and a nonstandard oil proration unit, an unorthodox gas well location, and an exception to Division Order No. R-5459, as amended, San Juan County, New Mexico.

EXAMINER STOGNER: I'll call for appearances.

MR. KELLAHIN: Mr. Examiner, I'm Tom Kellahin of the Santa Fe law firm of Kellahin, Kellahin and Aubrey, appearing on behalf of the Applicant. I have four witnesses to be sworn.

EXAMINER STOGNER: Are there any other appearances?

MR. CARR: If it please the Examiner, my name is William F. Carr with the law firm Campbell & Black, P.A., of Santa Fe. I represent Amoco Production Company.

I do not intend to call a witness. Mr. Bill Hawkins will have a statement at the conclusion of Meridian's presentation.

EXAMINER STOGNER: Are there any other appearances? Will the witnesses please stand to be

sworn.

[Thereupon, the witnesses were sworn.]

EXAMINER STOGNER: Mr. Kellahin?

MR. KELLAHIN: Thank you, Mr. Examiner. I would like to call Mr. Greg Jennings as our first witness. Mr. Jennings is a petroleum geologist.

GREGORY L. JENNINGS

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

EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Jennings, would you please state your name and occupation?

A. My name is Gregory Louis Jennings. I'm a senior geologist for Meridian Oil, located in Farmington, New Mexico.

Q. Mr. Jennings, on prior occasions have you testified before the Division?

A. Yes, I have.

Q. You participated in the hearings before the Commission as a petroleum geologist when we discussed two other horizontal wells in the basin, did you not?

A. Yes, I did.

Q. And that was the Howell and the Riddle wells?

A. Correct.

Q. Pursuant to your employment as a geologist, have you made a geologic study with regards to this application?

A. Yes.

Q. Based upon that study, have you reached certain geologic conclusions?

A. Yes.

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

EXAMINER STOGNER: Mr. Jennings is so qualified.

Q. Mr. Jennings, before we go to each of your displays, perhaps we could take one of the orientation maps and talk in general terms about your project.

To do that, let's go to Exhibit Tab No. 2, and there's an area locator map. Describe for the Examiner the general concept of this particular pilot project and what, in your mind, Meridian is attempting to accomplish with this type of activity.

A. Well, if you look at the locator map, you'll see that the project well, the Howell L #5 is located roughly in the center of the basin, in Section 34 of 30 North, 8 West. Essentially, what we're trying to do is establish or extend the production

from the Chacra interval of the Navajo City Pool.

The current production is from one well, the Lively #7 Y, as completed in the mid-70s in the Navajo City-Chacra interval. That well, that zone, is essentially producing from fractured porosity and permeability. We're trying to extend that pool into our 320-acre tract.

The problem is, as with most fractured reservoirs, that the probability of success in a vertical well is very low, and we feel that the only way we have an economic shot at production is to drill horizontally in the zone.

Q. Let's get more site-specific with the information to be furnished the Examiner, and let me ask you, sir, to turn to Exhibit Tab 4. If you'll go past the vertical profile display and look at the next display, it's the plan view. You also have a large copy of that on the wall to the right of the Hearing Examiner.

Let's give him some of the basic information about this particular prospect and its relationship to the Lively well. Let's start, first of all, in looking at the adjoining section to the east of the subject section, and spot for us the Lively Chacra producer.

A. You could probably see it quite well from your seat, but the Lively #7 Y is located in the northwest of 35, 30 North, 8 West. It's highlighted in green, and it's essentially twinned by a Mesaverde producer, the Howell L #3A.

Q. While you're at it, Mr. Jennings, identify for us in Section 35 the other Mesaverde wells in that section.

A. There are three other Mesaverde wells in addition to the Howell L #3A. Essentially, the section is fully developed. There's the 3 and the 3A in the west half, and the 39 and the 39A in the east half. Our subject east half of Section 34 is our target. It's located about half a mile west of the Lively #7 Y.

Q. When we look at the Navajo City-Chacra Pool, what is your recollection about the acreage dedication pursuant to those pool rules for the Lively #7 Y well?

A. Well, the Lively #7 Y is producing from the Navajo City-Chacra interval, which has been deemed a separate reservoir and not in communication with the Mesaverde, and has been removed from the Mesaverde pool.

Q. What acreage, then, is dedicated to that

well for spacing unit purposes?

A. I believe it's 160 acres in the northwest quarter.

Q. When we look over into the east half of Section 34, into your proposed spacing unit, you're requesting the opportunity to put two 160-acre spacing units together as a single, nonstandard proration unit?

A. Correct.

Q. What's the basis for that request?

A. Well essentially there are two main objectives in drilling a horizontal well, and one is to intercept the fractures at the proper orientation, and the other is to have some degree of lateral extent to your horizontal wellbore.

You really need the full use of the 320-acre tract to have any lateral extent, significant lateral extent in your horizontal wellbore.

Q. In terms of a drilling window within the Chacra formation, what do you propose to the Examiner in terms of a site boundary setback to the east half of Section 34?

A. We're just proposing to stick with the standard 790 setbacks, essentially create a window 790 feet from the boundaries of the east half of Section

34.

Q. Those standard setbacks would be applicable to the Mesaverde rules, would they not, for a typical 320-spaced unit for that reservoir?

A. Correct.

Q. And that setback would be more restrictive or conservative than the setbacks under the Chacra 160 rules which would be a 660 setback?

A. Correct.

Q. All right. Describe for us the other wells that you're going to have in Section 34 that are the typical Mesaverde pool completions. Where are they and how are they identified?

A. Meridian originally had the standard two wells in the east half of 34, the old #4 in the northeast quarter which was an old open-hole completion drilled in the 50s.

The infill well, the #4A in the southeast quarter, and then, about a year and a half ago, Meridian drilled the #4R, a redrill for the #4 which was in bad mechanical shape and not deemed to have a very good chance of ultimately recovering the reserves from the Mesaverde in that 160-acre tract.

Q. What do you attempt to achieve as a geologist with the horizontal well that you have not

been able to achieve with the vertical wells that have been drilled in this section?

A. Essentially, we're trying to get a wellbore to intercept the fractures that we believe exist in the Chacra interval in our 320. I guess we just weren't as lucky as Lively, and our three wells did not penetrate a fractured location in the Chacra.

All three wells that penetrated the Mesaverde in our 320-acre tract are nonproductive, not capable of production in the Chacra interval. We feel, however, that there's a good chance that the fractures that the Lively produces from extend into our 320. Very possibly we've even been drained by that Lively well to this point, but we're simply seeking, if those fractures do extend into our 320, we're seeking to produce from them.

Q. Let's go to your cross-section now, Mr. Jennings, which is on the opposite wall.

MR. KELLAHIN: That should be in the exhibit book as Exhibit No. 3, Mr. Examiner.

Q. Before you describe in detail your conclusions about cross-section Exhibit No. 3, let's go first to the type log which, I think, is going to be behind the locator map, which is the first page after Exhibit No. 2. Let's start with the type log

first. Identify that for us.

A. What I have on the wall is a blow-up of the type log that's in your exhibit book. In fact, I've even added the Pictured Cliffs and Fruitland formations so you can get a perspective of where this Chacra zone sits relative to the underlying and overlying formations.

The Navajo City-Chacra is located--let me back up. This log is actually a composite log from Sections 34 and 35 in the Navajo City area. Most of the log from about 3,150 down is from the Lively well, and then I've added a section from the adjacent well in Section 34, that log that had an induction log over the Pictured Cliffs and the Fruitland.

The Navajo City-Chacra interval is at about 3,700 feet, immediately below the Huerfanito Bentonite. It's approximately 600 feet below the base of the Pictured Cliffs formation, and about a thousand feet above the Massive Cliff House formation, which is the first main producing interval in the Mesaverde.

Q. When we look at the pool rules for the Blanco-Mesaverde, in this particular area where would be the top of the Mesaverde pool on this type log?

A. The Huerfanito Bentonite is in this area, is essentially the top of the Mesaverde. This well is

located north of the Chacra line and north of the Chacra line the definition of the Mesaverde is from the top of the Huerfanito Bentonite to a point 500 feet below the top of the Point Lookout formation.

Q. In this immediate vicinity, with the exception of the Lively #7 Y well, are there any other wells in the immediate vicinity that produce from the Navajo City-Chacra zone?

A. No. In fact, we have direct measurements in our section that shows it's not capable of production. When we get into the cross-section I'll give you some details. There's even a well in Section 35 where someone--Tenneco attempted to offset the Navajo City-Chacra production, and they failed. They perforated and frac'd the zone and had to squeeze it. This is the only producer in this zone, in this area.

Q. Within this area, when we look at the Mesaverde production, is it confined to the Massive Cliff House member of the pool?

A. No, the production essentially starts in the Cliff House formation and continues on down through the Menefee and the Point Lookout. I've just chosen to show the top of the Mesaverde, to give you some reference.

Q. What's the vertical distance between the

base of the Navajo City pool and the top producing interval in the Cliff House member of the Mesaverde?

A. Well, the base of the Navajo City formation to the top of the Massive Cliff House is approximately 900 feet.

Q. That 900 feet consists of what?

A. Let me just back up one step. The Chacra zone itself is in this area, and in fact in the main Chacra trend to the southwest, is interpreted to have been deposited in an offshore shelf environment, essentially by storm action. The lithology consists of very fine-grained silt stones and shales interbedded, a very low porosity in the neighborhood of two to four percent in this area, and very low permeability. Essentially it has no reservoir characteristics. The production is from, in this well, is from natural fracturing.

The lithology separating the Chacra from the Mesaverde, the 900 to 1,000 feet, is essentially tight shale deposited in an offshore marine environment, with an occasional sand or silt stringer. Basically no reservoir characteristics whatsoever.

Q. Geologically, do you see any faulting or other means by which the Navajo City-Chacra is going

to be in communication or connection with the producing zones in the Mesaverde in this vicinity?

A. No, I don't. In fact, we have really, to a large extent as a result of our horizontal drilling, pursued and studied natural fracturing in this basin, as well as others, and from cores and fracture identification logs, the average height of a vertical fracture in these lithologies tends to be in the neighborhood from a few inches to perhaps a maximum of 10 feet. It's inconceivable in my mind that you could have natural fracturing, a natural fracture to cover a thousand-foot interval and connect these two horizons.

Q. Let's turn now to the cross-section, which is behind Exhibit Tab No. 3, and have you identify and describe that display for us, Mr. Jennings.

A. This cross-section really will show most of the geologic issues that I would like to talk about. It's essentially a six-well cross-section which runs through our east half of Section 34, through all three Mesaverde wells that penetrated these formations, over to the Lively #7 Y well, the producing well in the Chacra formation, and to the immediate twin which is producing from the Mesaverde formation below, and then over to the Tenneco Florence #39A, where they attempted to extend the Navajo City-Chacra pool and

failed.

Basically, this cross-section shows a few major points. One is the continuity of the reservoir. This zone is essentially identical in our 320-acre tract with the Lively #7 Y well over to the Florence #39A, and in fact in this area it essentially is a very continuous formation, low porosity, low permeability.

I have included a porosity log in our Howell L #4R just to show you the porosity. Essentially, this is on a 0 to 10 percent scale, with a density porosity in the Chacra interval ranges from 2 to 4 percent maximum, and is quite shaley, if you look at the gamma ray, just confirming the lack of just natural reservoir characteristics.

In addition, this cross-section is intended to show where the typical perforations are in the Mesaverde, and as you can see, with the exception of an occasional little sand zone above the Massive Cliff House, the main producing interval is in the neighborhood of 900 to 1,000 feet below the Navajo City-Chacra.

If you look at the Lively #7 Y, you can probably see the perforated interval. Just real briefly, the history on the Lively #7 Y, it was a

planned Dakota well. They drilled through the Navajo City-Chacra interval and had a natural gauge of 5.5 million a day from natural fracturing.

They continued on down, drilled to the Dakota, ran a liner, cemented it all the way back above the Chacra, completed in the Dakota, came back in probably a year later, a short time later, and perforated and frac'd the Navajo City-Chacra interval and were able to bring it back to an initial rate of a little over three million a day, and have been producing from that zone since then.

Proof that just how lucky they were and how hard it is to get this zone, immediately adjacent to their well, about 300 feet away, is the Howell L #3A which was drilled a couple years after the Lively #7 Y, and they encountered nothing in the Navajo City-Chacra.

Our Howell L #4R in the northeast quarter, we took a gauge after we drilled through the interval with gas, and we had essentially no gas or too small to measure.

And then the Tenneco Florence #39A, in the southeast of Section 35, actually they had a planned attempt to complete in this zone to try to extend the excellent production from the Lively #7 Y, so they

drilled to the Mesaverde, ran a line or cemented it up over the Chacra interval, and perforated and frac'd with 30,000 gallons of emulsion at 50,000 pounds of sand, and got nothing from the Chacra. Squeezed it and went on down and produced the Mesaverde interval below; just proof that if you're not fortunate enough to encounter the fractures, your chances of frac'ing into it are slim to none.

Q. When you examine the geology available to you in this area, do you see any orientation to give you an opportunity to maximize the chance of encountering these fractures? Is there any orientation that you can find?

A. Yes. We're pretty fortunate that in this local area, the fracture direction is northeasterly. This is based on a variety of data. A couple of the sources are surface fracture patterns. These fracture orientation logs that I mentioned that we've run and other companies have run, showing northeasterly orientations, and that, essentially, is the basis for our planned azimuth on our wellbore. We plan to drill in a southeasterly direction to get maximum interception of that interpreted fracture direction.

Q. The plan, then, is to stay confined to the Navajo City-Chacra Pool limits with the entire lateral

section of the wellbore?

A. Correct.

Q. Within this drilling window?

A. Yes. Shall we--

Q. Sure. Let's take a quick look at the vertical section or the vertical profile, and summarize for us what we're trying to achieve with the lateral portion of the well?

A. The drilling engineer, John Clayton, will give you some more details on the particular aspects of the drilling, but in a nutshell, from my perspective, what we're planning on doing is drilling a horizontal well in this Navajo City-Chacra interval, which is in the neighborhood of 60-feet thick.

Like I said, we believe the fracture direction is approximately northeast. We plan to drill from northwest to southeast, which should intersect this fracture in a roughly perpendicular orientation. However, to ensure that we have the proper azimuth, what we plan to do is drill down, with mud, to a certain point, and run a fracture orientation log and get--more or less fine-tune the actual fracture orientation that exists in this area.

From that point, continue on with drilling and perhaps fine-tune our azimuth of our wellbore to

better intercept the azimuth that we see on this fracture orientation log. That's why what we've shown you on our plan view is a planned window for the wellbore, not an actual path. We believe that the fractures are approximately northeast, and our planned well path right now is south 45 degrees east. That will give us the 1,600-foot lateral section in the Navajo City-Chacra. We may adjust that, of course, if the fracture orientations come in any different than my current interpretation.

MR. KELLAHIN: Thank you. Why don't you have a seat.

That concludes, Mr. Examiner, my examination of Mr. Jennings. We would move the introduction at this time of Exhibits 2, 3 and 4.

EXAMINER STOGNER: Exhibits 2, 3 and 4 will be admitted into evidence at this time. I'm going to reserve my questions of this witness at this time, and see what else you've got to offer.

Any questions of this witness?

MR. KELLAHIN: I would like to call Mr. Eric Bauer. Mr. Bauer is a reservoir engineer.

ERIC R. BAUER

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

EXAMINATION

BY MR. KELLAHIN:

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

A. Eric Bauer. I'm a reservoir engineer for Meridian Oil.

Q. Mr. Bauer, on prior occasions, have you testified as a reservoir engineer before the Division?

A. Yes, I have.

Q. Pursuant to your employment as a reservoir engineer, have you made a study of some of the engineering aspects of this particular request of your company for a horizontal well in the Chacra Pool?

A. Yes, I have.

MR. KELLAHIN: We would tender Mr. Bauer as an expert reservoir engineer.

EXAMINER STOGNER: Mr. Bauer is so qualified.

Q. Mr. Bauer, let me ask you to turn in the exhibit book to the information contained behind Exhibit Tab No. 5.

A. Yes.

Q. Have you researched, analyzed and reviewed the available production and pressure information from the Lively #7 Y Chacra producer in the adjoining

section to your Section 34?

A. Yes, I have.

Q. Have you compared the performance of that well in terms of its pressure and production to the Mesaverde wells in close proximity to the Lively #7 Y well?

A. Yes, I have.

Q. Based upon your studies, do you have an engineering opinion or conclusion about whether or not the Chacra zone in the #7 Y well is in a separate reservoir from the Mesaverde-producing zones?

A. Yes, I do.

Q. What is that opinion?

A. That opinion is that the Chacra interval, the Navajo City-Chacra interval, is not in communication with the Cliff House interval of the Mesaverde and down.

Q. Do you see any information from the Chacra producer, in the Chacra zone, to give you any belief that they're in pressure communication with the Mesaverde being produced in any of the wells offsetting?

A. No, I do not.

Q. When you plot the information available from the #7 Y well, and compare that to the other

Mesaverde wells within its spacing unit, have you reduced that information to a display?

A. Yes, I have, and it appears immediately after Exhibit 5.

Q. Let me have you identify for us the three wells you've plotted data for. Which ones are they?

A. Okay. They would be the Howell L #3, which is in the southwest quarter of Section 35, the Howell L #3A, which is in the northwest quarter, and the Lively #7 Y, which is approximately 300 feet to the west of the Howell L #3A.

Q. When we look on your data sheet, identify for us how you have coded the information for each of those three wells.

A. Okay. First of all, I've plotted shut-in wellhead pressure versus date, and at the bottom you'll notice a legend and it has specific symbols for specific wells. And then immediately following the well name is the completion date.

Q. Give us a summary, starting with the Howell L #3 well, which is the first well on which you've plotted the pressure data, tract the pressure performance of that well and then tell us what happens when the next well, the Lively well, begins to record surface shut-in pressures.

A. Okay. First, the Howell L #3 was completed in January of 1951, with an initial shut-in pressure of approximately 1,100 pounds. This plot only shows from 1970 forward, and it is declining and holding steady from 1978 on, at approximately 400 pounds.

The next well is the Lively #7 Y which was completed in June of 1974, and it came on at an initial shut-in pressure of 775 PSI, and its last data point is 1984.

Q. When we look at the Lively shut-in initial pressure, the 775--

A. Yes.

Q. --and look down the display in 1974, and find the surface shut-in pressure for the Howell well--

A. Yes.

Q. --just short of 500 pounds?

A. Correct.

Q. Can you draw any engineering conclusions about the surface pressure differential between those two wells at that point in time?

A. Yes. That the Mesaverde interval had less pressure at that time due to production.

Q. If the Lively well in the Chacra had been in pressure communication with the Mesaverde, being

produced by the Howell L #3 well, would you have anticipated the surface shut-in pressure of the Lively well to be that high?

A. Not that high. I would anticipate maybe a little bit higher than the Howell L #3.

Q. Over time, then, you continue along and you pick up, then, the Howell L #3A well?

A. Correct, in 1976.

Q. By 1977, what has happened to the pressure performance data for the Howell L #3A well when you compare it to the Howell L #3 well?

A. They have met, and they track almost on top of each other from 1977 through 1989, which is our last data point.

Q. What's your engineering conclusion about those two wells?

A. They are in contact with the same reservoir.

Q. How does that compare to or contrast with the Lively #7 Y well?

A. The Lively #7 Y began an initial pressure of 775 PSI, which is considerably higher, and it has not dropped off, where the Howell L #3A dropped off quite rapidly to meet the Mesaverde pressure line.

Q. Does the pressure profile for the

Lively #7 Y well establish a certain rate of pressure decline for you as a reservoir engineer?

A. Yes, it does.

Q. How does that pressure decline plot compare to the decline profile of pressure for the two Mesaverde wells?

A. It is much steeper, as illustrated by the graph.

Q. What is your ultimate conclusion, then, about whether or not the Lively is producing from a separate source of supply than the Mesaverde wells in the immediate vicinity?

A. That they are not in pressure communication.

Q. Have you looked at the production and fluid rates being produced by the Mesaverde and the Chacra well?

A. Yes, I have.

Q. What does that tell you?

A. If we turn to the next page in Exhibit 5, this shows a production plot of the Lively #7 Y. The access on the Y is in per-month figures. For instance, the gas is in Mcf per month.

It shows that the Lively #7 Y started off in 6 of 1974, and then in June of 1976, the

Howell L #3A came on and was first delivered, and there's no evidence in the Lively #7 Y as far as change in any sort of production figures. I want to again emphasize that the Howell L #3A is 300 feet away.

Q. If they were in communication, would you, as a reservoir engineer, expect that the rates of production would have fluctuated in the #7 Y well?

A. Yes, I would. I would have expected that the #7 Y's production would have dropped off due to drainage.

Q. What about the characteristics of the hydrocarbons and fluids being produced by either well?

A. If you turn your attention to the next graph, which shows the Howell L #3A, you'll notice that the Howell L #3A has liquids associated with it, which are apparent in most Mesaverde wells that we've drilled in this basin. The Lively #7 Y, in contrast, does not have any liquids associated with it.

Q. What is your conclusion about that comparison?

A. Based on the fact that the Howell L #3A had no evidence of production impact on the Lively #7 Y's production plot, and that the Lively #7 Y does not produce any liquids, again my judgment is that they

are not in communication, they are separate reservoirs.

Q. When we look at the reservoir engineering, what are you attempting to accomplish, as a reservoir engineer, with the high angle/horizontal well in the Chacra zone when we move into the east half of Section 34?

A. In the east half of Section 34, we're drilling a horizontal well to encounter natural fractures in the Navajo City-Chacra.

Q. From what information you have available to you, that appears to be about the only way to have a realistic opportunity for production out of the Chacra is to maximize the chance to intercept these fractures?

A. Correct. Based on what the geologist showed in the logs, there does not seem to be a good porosity in that interval. In fact, a number of our wells are Mesaverde wells; the Howell L #3A, and the #4A, have not intercepted any fractures vertically. Therefore, we are attempting a horizontal well.

MR. KELLAHIN: That conclusion my examination of Mr. Bauer, Mr. Stogner. We would move the introduction of Exhibit No. 3.

MR. KELLAHIN: Exhibit No. 3 will be

admitted into evidence. Again, I'm going to hold my examination possibly until later.

Any questions of this witness? Anybody else?

There being none; Mr. Kellahin?

MR. KELLAHIN: Call Mr. John Clayton.

JOHN CLAYTON

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

EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Clayton, would you please state your name and occupation.

A. My name is John Clayton. I'm a drilling engineer for Meridian Oil, and I reside in Farmington, New Mexico.

Q. Mr. Clayton, on prior occasions, have you testified as a drilling engineer?

A. No, sir, I haven't.

Q. Summarize for us your education.

A. I obtained a Bachelor of Science degree in petroleum engineering from Louisiana State University in the spring of 1986, and I worked for Meridian Oil in Billings, Montana, Denver, Colorado, and now Farmington, New Mexico, for five years.

Q. Summarize your experience as a drilling engineer.

A. Most of my experience as a drilling engineer for the past three years has been engineering and designing horizontal wells in the Williston Basin in North Dakota.

Q. Have you participated in the drilling and completion program for this horizontal well in the Chacra pool?

A. Yes, sir.

MR. KELLAHIN: We tender Mr. Clayton as an expert drilling engineer.

EXAMINER STOGNER: Mr. Clayton is so qualified.

Q. Mr. Clayton, let me have you turn to a copy of the vertical profile. You'll find that as the first display following Exhibit No. 4. It's also reproduced in a larger size on the hearing room wall.

Let's have you take us from the surface, and give us a summary of your drilling program, starting with your surface procedures and how you propose to drill and complete this well.

A. The vertical portion of the hole, as you can tell from the nine-section plat there's several offsets, and we don't anticipate any problems. We'll

set 13-3/8 casing at about 300 feet, basically use it for the diversion system where we can nipple up our blow-out preventors. Underneath our 13-3/8 we'll drill 12-1/4" hole to an estimated kick-off point of 3,150 feet.

At that point we'll continue drilling 12-1/4" hole along the desired azimuth. Right now we're looking at South, 45 degrees East. We'll build at 12-1/2 degrees per hundred with a fixed-build motor. We'll build to the top of the Huerfanito Bentonite. At that depth we should be in the range of 65 degrees inclination.

From that point we're looking at running some fracture identification logs to confirm our northeast fracture trend in this portion of the basin. If that's the case, we'll continue building to 90 degrees. At that point we should be located at 3,650 foot true vertical depth and nine degrees.

From there we'll continue to drill to 790 feet from the section boundary, if so given to us. At that point, if the well is deemed uncommercial, the well will be plugged and abandoned. There will be no stimulation or completion techniques on this well. We're looking for natural fractures. If the well is deemed commercial, we'll run a 5-1/2" liner to bottom.

We will overlap the 9-5/8 five casing about 150 feet up to about 45 degrees inclination.

Q. Describe for us the cementing program for the well.

A. 13-3/8 casing will be cemented to surface. We'll only be bringing cement 300 feet. We don't anticipate any problems.

Q. Has that, in your experience, been found to be sufficient depth in which to isolate out any potential fresh water sands?

A. Yes, sir. The Ojo-Alamo in the area is a fresh water sand, and it is well below us.

Q. So it will be isolated?

A. The surface casing will not isolate the sand at this point.

Q. How will you isolate the wellbore from any fresh water sand?

A. We'll drill our 12-1/4" hole to 66 degrees. At 66 degrees we'll run 9-5/8" casing. I might have missed that on the previous discussion. We'll run 9-5/8 casing at the top of the Huerfanito Bentonite. At that point, we will cement our 9-5/8 casing from there to surface, and that will isolate the fresh water, Ojo-Alamo.

Q. What is the drilling fluids or mediums that

you'll use at the various stages for drilling the well?

A. We'll just use fresh water spud mud for our surface casing and dispose of that after we've run pipe and cemented. We'll drill out with fresh water underneath that, and prior to entering the Fruitland Coal in this area, which we anticipate to be normal to over-pressured, we will most likely mud up with a calcium carbonate mud. That will give us two design criteria. The calcium carbonate will act as a wading material that could hold back any potential gas from the Fruitland Coal, and it will also, when we're drilling through the Lewis and building angle, inhibit the shelves from swelling.

Q. How is this different from any of the other recent horizontal attempts that your company is trying in the basin?

A. Relatively, as far as the drilling operations, they're pretty much the same. We'll be setting casing at 66 degrees, our previous well, the Riddle #1R, they set casing up in vertical. We did experience some hole trouble from kick-off point to about 45 degrees. This will eliminate that, and get it so-called behind pipe prior to going into our 90-degree portion of the well.

The main difference in this well is the completion technique. Basically, if we do not have a well when we reach total depth, we feel that horizontal drilling is a completion technique, and you horizontal drill so you don't have to fracture stimulate. This well will probably be deemed a failure, if we don't test commercial quantities of gas at total depth, and it will be plugged.

Q. Do you have an estimate of the time to start and finish the well?

A. We budgeted 30 days from spud to rig release on the drilling portion. The completion portion should probably take about three days.

MR. KELLAHIN: That concludes my examination of Mr. Clayton. We would move the introduction--no, we've already had Exhibit 4 in, and he only talked about Exhibit 4, so he has no exhibits to introduce.

EXAMINATION

BY EXAMINER STOGNER:

Q. Mr. Clayton, just to verify or clarify something for me, you'll be setting the 9-5/8 intermediate at 66 degrees inclination?

A. Yes, sir.

Q. But you will continue your angle build

until 90 degrees is obtained, plus or minus?

A. Yes. Of course our hole size will change and our mud motors will change too, only in size but not in design. We'll continue building at about 12-1/2 degrees. It's just a smaller motor. The housing on the 12-1/4" hole motor will be eight-inch, and this will be 6-3/4.

Q. And you're going to do that to TD?

A. Yes, sir.

Q. And if it's deemed commercial, then a 5-1/2" liner will be set?

A. Yes, sir, preperforated.

Q. Preperforated?

A. Similar to the plugs that we use in the Fruitland Coal.

Q. Meaning that it will be cemented back into the 9-5/8?

A. Are you looking at Exhibit 6? I guess that's where you're taking that from?

Q. Yes, I am.

A. I included this in here because, if you'll notice, our surface location is outside the 790 setback. We anticipate setting 9-5/8 casing in the legal window. If the build rates don't give us what we anticipate at 9-5/8 as set outside the legal

window, I included this to show you how we could cement a portion of the 5-1/2" liner, if they were outside the legal window.

Q. If necessary?

A. Yeah.

Q. And if not, it will just be on liner?

A. Yes, sir.

Q. Let me go ahead and get this out of the way. I guess you're the person to ask. On the plugging and abandonment of this well, if it is deemed commercial and then later on down the road, would the 5-1/2" liner be pulled if you didn't have to put the external cement?

A. The 5-1/2 liner wouldn't be run.

Q. Would not be run?

A. No, sir.

MR. STOVALL: I think you misunderstood the question. If it's productive.

A. Oh, if it is productive?

Q. If it is productive and then, down the line, when it is time to abandon this well, way down the line, way far down the line--

A. I won't be here. If the well is productive in the future, we have to plug this well, an attempt to retrieve that liner would probably not be

commercial. The condition of the liner after 20 years and the inspection cost and the rebuilding of any damage to it, we would probably go ahead and plug it with the liner in the hole.

Q. Placing a cement plug at the top of the 5-1/2" liner?

A. Yes, sir.

EXAMINER STOGNER: Essentially isolating it. Okay. That's all the questions I have of Mr. Clayton at this time. I may have some later, Mr. Kellahin.

MR. KELLAHIN: I would like to move the introduction of Exhibit No. 6, which I've overlooked.

EXAMINER STOGNER: Exhibit No. 6 will be admit into evidence.

MR. KELLAHIN: I would like to call Mr. Fraker at this time. Mr. Fraker is a landman with Meridian Oil Company.

WALTER B. "SKIP" FRAKER

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

EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Fraker, would you please state your name and occupation.

A. My name is Skip Fraker. I'm employed by Meridian Oil as a petroleum landman.

Q. Spell your last name.

A. F-R-A-K-E-R.

Q. Mr. Fraker, on prior occasions have you testified before the Division?

A. No, I haven't.

Q. Summarize for us your educational and employment experience with regard to petroleum land management questions.

A. I was trained as an apprentice specifically in oil and gas title law and examination by Richard Tully, an oil and gas attorney in Farmington for about three years. The rest of the time as independent and staff landman for the last 10 years.

Q. As part of your duties for Meridian, are you familiar with how to locate and find the ownership within a spacing unit and determine the offset operators to that spacing unit?

A. Yes, I am.

Q. That's something you routinely do in the course of discharging your duties?

A. Yes, I do.

Q. Have you done that in this case?

A. Yes, I have.

MR. KELLAHIN: We tender Mr. Fraker as an expert petroleum landman.

EXAMINER STOGNER: Mr. Fraker is so qualified.

Q. Mr. Fraker, let's go back to Exhibit No. 1, and look behind the application. Well, I misspoke. I thought we had an exhibit on the application that identified the lands.

EXAMINER STOGNER: Are you referring to Exhibit 7?

MR. KELLAHIN: Yes, sir, we're going to 7.

EXAMINER STOGNER: It was behind Exhibit 1.

MR. KELLAHIN: Way behind it.

EXAMINER STOGNER: Way down the line.

Q. The second display after 7 is an offset operator plat. You have that?

A. Yes, I do.

Q. Based upon your search of available records, can you identify for us the offsetting operators to the east half of Section 34?

A. Yes. We are surrounded on three sides by Amoco Production, from the north and east, the northeast and the west side, and the southwest side by Amoco Production, and the south half is owned by Meridian Oil. The east half of that, Mesaverde is

owned by Amoco Production, and the Chacra by Lively Exploration Company.

Q. Meridian Oil, Inc., handles the administrative duties for Southland Royalty Company in terms of notifications?

A. Yes.

Q. So the parties to be notified would be Amoco and Lively?

A. That's correct.

Q. Within the east half of Section 34, when we look at that total interval from the top of the Huerfanito Bentonite marker, which would include the Chacra in this area, all the way down to the base of the Mesaverde pool, are we dealing in the east half of Section 34 with the same ownership?

A. Yes, we are. This is owned 100 percent by Meridian Oil.

Q. When we look at the royalties or overriding royalty owners, they would be common within that vertical portion of this section?

A. That's correct.

MR. KELLAHIN: That concludes my examination of Mr. Fraker, Mr. Examiner. We would move the introduction of Exhibit 7.

EXAMINER STOGNER: Exhibit No. 7 will be

admitted into evidence.

MR. KELLAHIN: In addition, Mr. Examiner, Exhibit No. 8 is the certificate I have made to which we've appended the return receipt green cards, showing delivery of notification to this hearing to the two companies, Amoco and Lively.

We would move that that be introduced at this time.

EXAMINER STOGNER: Exhibit No. 8 will be admitted into evidence, also.

MR. KELLAHIN: That concludes our presentation.

EXAMINER STOGNER: I have no questions of Mr. Fraker at this time. I do have some questions, though.

Before I go any further, the advertisement, the call to the case, mentioned a nonstandard oil proration unit, but the body of the application corrected it to gas. My typo. That shouldn't be any problem.

I have some general questions about the Navajo City-Chacra Pool, and it sounded like Mr. Jennings was the person to ask on that.

Let's have Mr. Jennings step up to the stand again.

GREGORY L. JENNINGS

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

EXAMINATION

BY EXAMINER STOGNER:

Q. Are you familiar with the boundaries of the Navajo City-Chacra pool?

A. Yes.

Q. What are they?

A. To my knowledge, the northwest quarter of Section 35.

Q. Do you know what the vertical limits are?

A. I believe it's described as a 100-foot interval. I want to say approximately 3,600 to 3,700 feet in the Lively #7 Y. I've actually got that in my briefcase. And Tom, if I could have it, we could doublecheck that.

Q. What you have in your briefcase, would that refer to the Division's nomenclatures?

A. Yes. Let me see the depth on that. I'm pretty sure it's 3,600 to 3,700 feet.

Q. And you're referring to the type log, are you not?

A. Yes. The definition of the Navajo

City-Chacra formation is described in footages in the Lively #7 Y. I believe it might be a 200-foot interval.

Q. Regardless, we can find that in our Division nomenclature rules or orders?

A. Yes. It's a footage description of the Lively #7 Y Navajo City-Chacra interval, which encompasses the zone that I am also describing as the Navajo City-Chacra. It might be a 200-foot gross interval that covers that zone.

EXAMINER STOGNER: I'll take administrative notice of any nomenclature orders that we've had previous in this area pertaining to the Navajo Chacra. I haven't done that in a long time.

Q. And we referred to order R-5459, which I believe is essentially another nomenclature order, is it not? Are you familiar with that order, Mr. Jennings? That was the one setting the vertical limitations of the Mesaverde pool, talking about a line and on one side it was--in fact, you mentioned it earlier, the Huerfanito Bentonite?

A. Yes, I am. I'm familiar with the definition of it and the history behind it.

Q. Do you know why that line was formed?

A. Yes. The Chacra formation to the

southwest, the Otero Pool, Bloomfield, et cetera, produced solely from the Chacra zones. Now, they're actually lower in the section, closer to the Mesaverde than this particular zone, and they have some matrix porosity and permeability. It's a fairly noncommercial trend, but nonetheless it was developed originally in the 50s and then again in the 70s, as a Chacra--a few separate Chacra pools, and developed on 160-acre spacing.

The definition of the Mesaverde was, I believe, a footage definition that started it. It had a typed well location and it was something like--it was a footage description that was very close to the Cliff House formation and down through the Point Lookout in that type location. It was a fairly ambiguous description, and probably in some need of refinement.

But I think what triggered the redefinition was this case, and perhaps one or two other wells that encountered some fractured production from intervals that were previously included in the Chacra formation. And the state, in trying to accommodate the fact that these occurrences are very rare, and the fact that the production to the southwest is already established, drew a line separating the area to the

north from the area to the south, and redefined the Mesaverde interval to the north to include those--that interval that we're calling the Chacra.

What the Commission said was that there are a few wells which produce from fractures in this interval, that may or may not be in communication within the Mesaverde, and those operators have a right to come back at a later date and show evidence that this zone is not in communication with the Mesaverde and essentially could be removed from it.

The Lively subsequently came back and showed evidence that the Navajo City-Chacra had high reservoir pressures, and was a separate reservoir, and was so deemed a separate Navajo City-Chacra Pool.

In fact, there's one other well in the basin which also has--produces from there. There are two wells in the basin which produce from this interval, and that well has also been deemed a separate reservoir.

Q. Do you know the name of it?

A. That's the Mesa Primo #1A.

Q. How about the name of the pool?

A. Animas-Chacra.

Q. And the other well being?

A. The Navajo City Chacra.

Q. How far away is that Animas-Chacra Pool?

A. It's in 31 North, 10 West, Section 6, the northwest quarter. The thing that they have in common is that they're both 1,000 feet above the Mesaverde formation.

EXAMINER STOGNER: Okay. Thank you, Mr. Jennings.

Mr. Clayton, I have a couple of questions on well costs.

JOHN CLAYTON

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

EXAMINATION

BY EXAMINER STOGNER:

Q. What would a vertical well to the Navajo City-Chacra cost, and what's your estimated cost on the proposed horizontal well?

A. The estimated cost on the Navajo City, assuming we would deem it commercial to drill, which I feel we wouldn't, it's in the neighborhood of $450,000.

Q. And how about a vertical well?

A. That would be a vertical well.

Q. How about this particular well?

A. This well was estimated at a little bit under a million dollars. Nine hundred and--a million dollars.

Q. And that's with the 5-1/2 liner?

A. Yes, sir. That's completed cost. Is there any water associated production with the Chacra?

A. No, sir. We're not looking for any water or any condensated solution. No liquids in the well.

EXAMINER STOGNER: That's all the questions I have.

Are there any questions of any of the witnesses? If not, they may be excused.

Mr. Carr?

MR. CARR: Mr. Stogner, with your permission, Mr. Hawkins would like to make a brief statement on behalf of Conoco.

EXAMINER STOGNER: Thank you, Mr. Carr. Mr. Hawkins, why don't you step forward.

MR. HAWKINS: My name is Bill Hawkins with Amoco Production Company. Amoco, as pointed out, has offset working interests on three sides of the spacing unit that Meridian has requested the horizontal well in.

We have no objection to Meridian's application for this horizontal well. The well is

proposed as an isolated Chacra test and will not penetrate the Mesaverde sands, and the Chacra interval in this area, although normally considered part of the Mesaverde, has been shown to be capable of producing in sufficient quantities to be independently developed, and this is in the Lively #7A well.

In circumstances such as this, the Division has separated the Chacra as an independent pool. If Meridian's horizontal well is successful, then Amoco has notice objection to separating the Chacra interval from the Mesaverde.

At a minimum, we believe Meridian should be allowed to drill their well and produce it unrestricted for a period of at least one year, in order to determine if they have a successful project or not.

EXAMINER STOGNER: Thank you, Mr. Hawkins.

Does anybody else have anything further in Case 10340?

If not, then this case will be taken under advisement.

CERTIFICATE OF REPORTER

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

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

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

WITNESS MY HAND AND SEAL July 2, 1991.

Carla Diane Rodriguez

CARLA DIANE RODRIGUEZ
CSR No. 91

My commission expires: May 25, 1995

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 10340 heard by me on 27 June 1991.

Michael E. Stogner, Examiner
Oil Conservation Division