NEW MEXICO OIL CONSERVATION COMMISSION

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Santa Fe, NEW MEXICO

Hearing Date November 5, 1992 Time: 8:15 AM

NAME	REPRESENTING	LOCATION
Bill Hawkins	Amoco	Denver
Maurice Brunner	Byram	SF
Steven T. Brenner	Cumbre Court Reporting	SF
W. Perry Pearce	Kellahin & Kellahin	Santa Fe
Tom Olle	MOI	MIDLAND
Tom O'Donnell	MOI	MIDLAND
Phillip L. Baca		
	Campbell, Carr, Berge & Sheridan	Santa Fe

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

CASE 10,593

EXAMINER HEARING

IN THE MATTER OF:

Application of Amoco Production Company for acreage rededication and an unorthodox coal gas well location, San Juan County, New Mexico

TRANSCRIPT OF PROCEEDINGS

ORIGINAL

BEFORE: DAVID R. CATANACH, EXAMINER

STATE LAND OFFICE BUILDING

SANTA FE, NEW MEXICO

November 5, 1992

A P P E A R A N C E S

FOR THE DIVISION:

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E X H I B I T S

APPLICANT'S EXHIBITS:

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WHEREUPON, the following proceedings were had at 8:10 a.m.:

EXAMINER CATANACH: At this time we'll call Case 10,593.

MR. STOVALL: Application of Amoco Production Company for acreage rededication and an unorthodox coal gas well location, San Juan County, New Mexico.

EXAMINER CATANACH: Are there appearances in this case?

MR. CARR: May it please the Examiner, my name is William F. Carr with the Santa Fe law firm Campbell, Carr, Berge & Sheridan. I represent Amoco Production Company in this case, and I have one witness.

EXAMINER CATANACH: Any other appearances?

Will the witness please stand to be sworn in?

JAMES WILLIAM HAWKINS,

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

DIRECT EXAMINATION

BY MR. CARR:

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

A. James William Hawkins.

Q. Where do you reside?

A. Denver, Colorado.

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

A. Amoco Production Company as a senior petroleum engineering associate.

Q. Have you previously testified before this Division?

A. Yes, I have.

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

A. Yes, they have been.

Q. Are you familiar with the Application filed in this case on behalf of Amoco Production Company?

A. Yes, I am.

Q. Mr. Hawkins, have you made an engineering study of the portion of the Basin Fruitland Coal Pool that is affected by this case?

A. Yes, I have.

MR. CARR: Are the witness's qualifications acceptable?

EXAMINER CATANACH: They are.

Q. (By Mr. Carr) Mr. Hawkins, would you briefly state what Amoco seeks with this Application?

A. Amoco seeks two things: One, rededication of

the acreage within Section 25 of Township 2 North, Range 11 West; and also seeks an unorthodox location for our replacement wells for the Fields A-21 that's located in the west half of that section.

Q. What is the status of Amoco's request to rededicate acreage in Section 25, 32 North, 11 West?

A. We have filed an acreage dedication plat for Section 25 for both the west half and east half to the Aztec District Office, and it has been approved. At least that's what I've been told verbally by Ernie Bush with that office.

Q. And would you identify what has been marked as Amoco Exhibit A?

A. Exhibit A is a copy of the acreage dedication plats that have been filed for both the east half and west half of that section.

Q. The ownership in Section 25 is common throughout, so this rededication can occur without affecting the ownership in that section?

A. That's correct this is one common lease over the entire section.

Q. The only indication you've gotten today from the Division concerning approval of the rededication is a telephone conversation, however, with Mr. Bush?

A. That's correct.

Q. All right. Let's go to what's been marked as Amoco Exhibit B. Would you identify that for Mr. Catanach and then review it for him, please?

A. Yes, Exhibit B are a few pages that were taken from a large exhibit book used in Case 9420, presented to the OCD in February, 1991. This was a hearing to establish permanent spacing for the Basin Fruitland Coal Pool, and the exhibits that you have here are the excerpts -- came from a booklet put together by the Coalbed Methane Committee, and I believe they were testified to by ICF, Dr. John McIlhenney. Also this was in conjunction with a Gas Research Institute study.

Q. Why have you included this material in your exhibit package?

A. Well, I thought it gave a good background into what we're going to be talking about today.

If you turn to the next two pages within the little packet, you see a large map of the San Juan Basin, and it shows that that has been broken up into three areas, designated Area 1, Area 2 and Area 3.

What I'd like to talk about, just to go back over this briefly, is that Area 1, shown in the legend, is described as a high-pressure area with 100-percent water saturation, Area 2 is an under-pressured area

with less than 100-percent water saturation, and Area 3 is an under-pressured area. I'm now back in the 100-percent water saturation area.

And if you'll look at the text that's marked, page 1, Introduction, and go to the fourth paragraph, there's some statements here that talk about this designation of Area 1, Area 2 and Area 3. And it says that the San Juan Basin was studied by the Texas Bureau of Economic Geology under contract to the Gas Research Institute, and that provided the foundation for selecting areas of coal-bed development within this basin, areas of study, that is.

And on the basis of hydrodynamics and geology, the basin was divided into these three main regions having similar reservoir characteristics within each region. And then it describes these as the over-pressured north-central part of the basin, et cetera.

The final sentence here says that, It should be noted that the boundaries between these areas are very complex and are not as well defined as shown on Exhibit 1.

And then it talks about, The implications of subdivisions on reservoir characterization and performance will be discussed in more detail later in this study.

The point that I'd like to make is that our Application area lies on the boundary between Area 1 and Area 2. We have sufficient well development within this area to be able to have a better idea of where this transition occurs between Area 1 and Area 2, although it is very complex, and it is very difficult to pinpoint exactly where it is. You can define it as finding wells that are in the Area 1 high-pressure side and wells that are in Area 2 on the low-pressure side that don't produce water.

So I think with that, I wanted you to be aware that what we're going to be talking about has been known for a number of years. It's been a very complex part of the Basin Fruitland Coal that I guess companies are beginning to learn more and more about. It's not something new that we've totally discovered, but it is something that we are beginning to learn more about.

Q. Mr. Hawkins, are you familiar with the Application filed by Meridian in Case 10,588, in which Meridian was also seeking an unorthodox well location in the Fruitland Coal?

A. Yes.

Q. And where, generally speaking, in this field was that unorthodox location?

A. It was on this boundary between Area 1 and Area 2 as well.

Q. And are you aware that Conoco has recently been considering a similar application?

A. Yes.

Q. And where is that located?

A. It is also on the boundary of this Area 1 and Area 2.

Q. In your opinion, do these recent proposals indicate a desire on the part of the industry to abandon spacing requirements in the Fruitland Coal Pool?

A. Absolutely not. We feel like that the well-location requirements in the Basin Fruitland Coal Pool are there for a reason, to protect correlative rights and to promote orderly development.

But along these boundaries I think there are some very unique conditions that may require deviation from those location requirements.

Q. Is your engineering study on this portion of the field contained in what has been marked as Amoco Exhibit Number C?

A. Yes.

Q. Or letter C. Can you go to that exhibit now and identify the first document in that portion of your

exhibit package?

A. Okay, the first document is really a copy of the Application that was filed in this case. If we skip through about the first four pages, we'll come to what's marked as Exhibit Number 1, and that's a plat showing the Section 25 and the offset operators in this -- that will be affected by this Application.

You'll notice that Meridian Oil, Inc., and Conoco, Inc., both show as offset operators, and they have been noticed in this Application of our intent to ask for an unorthodox location for the Fields A-21-R well.

Q. And this exhibit shows the two proposed standup units in Section 25?

A. Yes, they do.

Q. It also indicates the exact footage location for the proposed Fields A-21-R well?

A. Yes, that is 820 feet from the north line and 1820 feet from the west line of Section 25, Township 32 north, Range 11 West.

Q. So basically, Mr. Hawkins, what we have here is a standard setback from the outer boundary in accordance with the Basin Fruitland Coal rules, but we're in the wrong quarter section?

A. That's correct.

Q. Let's go to what is marked Exhibit 2 in this portion of your exhibit package.

A. Exhibit 2 is simply a plat map of the nine sections in the vicinity of Section 25, and we show all of the Basin Fruitland Coal wells that have been drilled in this area, and also our proposed location for the Fields A-21 replacement well.

I would draw your attention to a couple of things on this map. On the north -- Just to the north of our proposed replacement well is -- are a couple of Amoco wells. The Barnes Gas Com A Number 1 appears to be in Section 23, in the top left corner, and it shows two well symbols. In fact, what we have here is a well that was drilled originally and cased, and then subsequently sidetracked and completed open-hole with cavitation. So it isn't just a misprint on the map.

Again, in Section 24, immediately north, there's the Barnes Gas Com D Number 1 that was drilled, cased, and then subsequently sidetracked and completed open-hole. And in fact, the A -- the well in Section 25, the Fields A-20 is also a well that was drilled, cased and then subsequently sidetracked and completed open-hole.

The other things to note, I guess, is that in Section 30, immediately to the east, is the Hamilton

Mesa Limited Partnership well. This was taken over by Conoco and actually redrilled as the Hamilton Federal 3-R, and it was redrilled so that it could be drilled as an open-hole well, as opposed to a cased-hole well.

Q. The proposed well is actually located in the Basin Fruitland Coal Gas pool; is that correct?

A. That's correct.

Q. And how close are we, actually, to the Cedar Hill Pool?

A. I think the Cedar Hill Pool boundary is on the township here between 32 -- excuse me, 11 West and 10 West, which would be immediately there between Section 25 and Section 30.

Q. Mr. Hawkins, let's go now to the next page in Exhibit C, and I'd ask you to identify this and then review it for Mr. Catanach.

A. Okay, the next page is a contour map, based on current rate in MCF per day, and I'd like to draw a couple of things to your attention.

First, on this map we see posted by the well symbol a -- the current rate that each of those wells is making.

And as you look from the southwest portion of this map, you'll see that wells generally make a hundred MCFD or less, and as you get to the first dark

blue color contour, that is contoured on 1 million cubic feet per day. And to the right of that line, wells generally are producing 1 million to 2 million cubic feet per day. And in fact, in Section 24, the well that just is immediately offset of our proposed location is producing about 7 million cubic feet per day.

This dark blue contour represents a reasonable expectation of where this boundary between Area 1 and Area 2 occurs. And you can see that there's a dramatic difference in production capability of the wells that are on the northeast of this boundary, this 1-million-a-day line, and the wells that are on the southwest of that line in Area 2.

The other things that are different in terms of production from these two areas is that the wells on the northwest in Area 1 generally produce water with the gas, and the wells in the southwest in Area 2 do not produce water with the gas.

The other point of interest, I guess, is that the wells on the north side in Area 1, or northeast side, generally have a higher pressure, with a pressure gradient on the order of .45, maybe, to .5. The wells on the southwest in Area 2 have a lower pressure with a pressure gradient on the order of .3.

Q. The well in Section 24 is operated by Meridian, is it not?

A. That's correct.

Q. And you have located the location of the replacement well with a red well spot?

A. Yes, that's right.

Q. What do you attribute these variations in well-producing characteristics to?

A. Well, there's a number of factors that contribute to the differences in production, but by far and away the most dramatic characteristic that's driving that production is permeability.

There is a -- probably a tenfold increase in permeability from the southwest to the northeast, from Area 2 to Area 1, in this -- at least along this boundary.

The other things that are changing are, again, the pressures, I talked about, and that -- You might be able to get a -- maybe double the pressure drawdown from wells that are on the northern -- you know, Area-1 portion of this field, as opposed to wells that are in the southwest Area 2 portion of the field.

Q. The primary factor is permeability?

A. Yes, that's right.

Q. And you would be in agreement, then, with the

testimony presented by Meridian on September 17th in that regard?

A. That's correct.

Q. Let's go to the next page in Exhibit C. Could you identify that, please?

A. Yes, Exhibit C is a contour map on cumulative production.

Q. What is the scale, now, that you've used here?

A. The scale is not shown on the map, but in the legend it does say contour interval equal to 200. That 200 is 200 million cubic feet of gas produced.

And as you get from the very light colors on the southwest you again see a transition or a marked -- the first contour where it turns dark yellow, 200 million cubic feet of gas produced, and as you get to the orange color, that is the 1 BCF cumulative production line.

So what you see in Section 25 is again a pretty dramatic indication of where this transition is occurring from Area 1 to Area 2, and wells to the northeast being much more prolific and having higher cumulative production.

Also shows pretty dramatically that the well in the southwest of Section 24, immediately offset of

our replacement well, has cum'd close to 4 BCF of production and is, in our opinion, fully capable of draining reserves out of our spacing unit in the west half of Section 25.

Q. If the Application today is not approved and a replacement well drilled, would there be any way for Amoco to offset drainage to 24 with the existing wells in Section 25?

A. No, there would not. Our only way to offset that drainage is to drill this replacement well.

You note that our well, the A-21 down in the southwest of 25, shows a cumulative production of about 59 million cubic feet of gas. We've calculated the expected ultimate recovery for this well to be 340 million cubic feet of gas to an economic limit of 10 MCFD. So its ultimate recovery will be way lower than any of the wells on the northern -- in Area 1, and in particular, the well that's in Section 24.

Q. Let's move on to the next page in this exhibit, marked 5. Would you identify that for Mr. Catanach?

A. Yes, Exhibit 5 shows the -- again, the nine sections broken into spacing units. And typed into each of these spacing units is the calculated gas in place in BCF over the entire 320 acres.

You'll -- Let's look at Section 25. Our Fields A-21 well, the west half of Section 25, has calculated 12.3 BCF of gas in place within that spacing unit. You'll recall we expect the ultimate recovery of the A-21 well to be only 340 million cubic feet of gas, or about three percent of the gas in place.

The other point I would draw is that the gas in place in our section, you can see in all of Area 1, is typically greater than that in Area 2, or at least in this case it is. There's a couple of things that are driving that.

One is that there is some changes in thickness as you look at the net feet of coal moving from the southwest to the northeast.

There's also a change in pressure, as we talked about, which would affect the amount of gas that's in place within the coal.

Q. Basically, what this shows is that if you're unable to drill an additional well, that you're only going to recover three percent of the gas in place in the west half of Section 25?

A. That's correct.

Q. As part of your study did you determine whether or not there was a geologic reason for the variations in producing capabilities?

A. We've conducted a study. I worked with one of the geologists in Amoco, and I asked him to prepare some exhibits for us to evaluate, is there any way for us to predict where this transition occurs or why it's occurring, based on typical geologic exhibits?

And we have prepared three exhibits for you to look at on that, if you'd like to turn to the next exhibit.

Q. And what is this?

A. Okay, this is a map of net coal thickness, and let me just generally describe to you what we see here.

Over the nine sections, as we move from the far southwest we see coal thicknesses of around 43 -- you know, low 40 feet of coal. And move towards the northeast, we see this net coal thickness increasing up to about 90 feet. So there is a gradual change across this area, increasing coal thickness as you move to the northeast.

But if you look in the vicinity of Section 25, and in particular kind of -- You see some dashed lines on this map. That is going to be describing a cross-section we'll look at in just a little bit.

The net feet of coal around Section 24 and Section 25 generally ranges from the mid-seventies to

the mid-eighties. It's fairly consistent in that area.

And we could just look at a few of the wells here. First would be -- We show the Primo Mudge well in the southwest of 24 -- that's the Meridian well -- at 86 feet of coal. And you'll recall that is in Area 1, one of the higher-pressure, better-rate, higher-permeability wells.

And then moving down to the Fields A-20, which is in the northeast of 25, we have about 76 feet of coal.

We then move over to what we have identified as the Fields 14 well. That is a Picture Cliffs well that we have a log, and we can look at the coal in that log, and it again has about 74 feet of coal.

And then move down to the A-21 well, which is our low -- we know in Area 2 it's a lower-pressure, low-permeability well, has about 74 feet of coal, pretty similar to the Fields A-20, although production there is dramatically different.

And then if we move back again to the northeast -- or excuse me, northwest, we see the Barnes Gas Com E well at about 86 feet of coal, identical to the Meridian well, but it is in the Area-2 side of the reservoir and has much poorer permeability and lower producing rate.

So the conclusion we draw from this net coal thickness is that in the general area that we're interested in, the coal is relatively constant at about 75 to 85 feet thick. It is not -- Thickness is not one of the important factors in determining productivity in this area. And in fact, you could not predict where the transition between Area 1 and Area 2 lie on the basis of thickness.

Q. All right. Let's go now to your structure map, Exhibit Number 7. Review that for the Examiner.

A. Exhibit Number 7 is a structure map on the Picture Cliffs structure. In this area, Picture Cliffs sandstone lies immediately below the Fruitland Coal seams, and so it does provide a consistent picture to see where are the coals sitting on, and is there any structural relief that would cause some change in reservoir characterization.

What you see is a gently dipping structure change from the east to the west of about 80 feet over three miles. So it is basically flat in this area. There is no dramatic structural relief that would -- that you could tie to a change in reservoir characteristics.

Q. Now, let's go to the cross-section, Exhibit Number 8. Would you review that for Mr. Catanach?

A. Exhibit Number 8 -- let's open it up -- is a big cross-section. It shows about six wells, and you might want to look at that net coal thickness map in conjunction with this, because it does show the wells that are tied in on the cross-section.

If you look at the coal thickness map, this cross-section is shown from -- The first well is the Barnes 6A, which is a PC well located in the southeast of Section 23, and it shows about 83 feet of coal.

On the structure map I draw your attention to the well on the far left. That on the far right-hand track is the density log associated with that well, and we've highlighted in dark black the net coal less than two grams per cc, and that shows up very clearly where the coal seams lie in this well.

Now, if we move along the cross-section to the Meridian well, the Primo Mudge 100, that's the next well immediately adjacent. It shows again the coal seams on the density log. They are easily correlatable. There's no dramatic change in the coal seams as you go from one well to the next. And as you follow this around, we'll follow it through the same wells that I discussed in terms of thickness when we looked at the coal thickness map.

The third well over is the Fields A-20 well.

It shows similar deposition of the coals. There is a channel sand occurring between the bottom two packages of coal that we've marked as Fruitland A and Fruitland B. You can see about 50 feet of sand deposited there, which is a channel sand.

But the point being is that both the Mudge well, 100 Mudge well, and the Fields A-20 well are both in Area 1. There is not a dramatic change in terms of thickness or structure here.

And then as you begin to move, now, to the next wells over, we're going to go into the south, Area 2, where the wells' productivity is much lower and the permeability is much higher, and yet there is still no dramatic change at all on the cross-section in how the coals were deposited or the correlatability of those coals.

The next well over is the -- which is the fourth well -- is the Fields 14. It's a PC well, located in the northwest of Section 25.

The fifth well is the Fields A-21 well, which is the well we're going to be replacing, and you can see that coal stratigraphy is still very similar. There is some deposition of channel sand occurring in the Fruitland B interval, but it is not a dramatic change that would cause you to go from Area 1 to Area

2. It's simply the channel sands that are deposited in the Fruitland.

And the last well over is the Barnes Gas Com E, which is located in the northeast of Section 26. And again it shows about 86 feet of net coal, without a dramatic difference in terms of how the stratigraphy lies or how the wells -- how you correlate the coals.

Q. If you look at this cross-section, you've indicated the coal by shading it in black?

A. That's correct, on the far right-hand track of the density log.

Q. Looking at this exhibit, do you see anything in terms of these coal zones that would appear to you to be anything other than normal variations or regular variations that you would anticipate in this?

A. Absolutely not. This looks -- is very typical, as you move across an area of a couple of miles within the Fruitland Coal.

Q. If we look back at the net pay map, Exhibit Number 6, we have the second and last well on this cross-section both showing a thickness of 86 feet; is that correct?

A. That's correct.

Q. And how do they compare in terms of their producing capabilities?

A. The producing capability of the Primo Mudge well 100 -- it's in the southwest of 24, it has 86 feet of coal -- is about 100 times the producing capability of the Barnes Gas Com E well with 86 feet of coal located in the northeast of Section 26.

Q. Based on your review of this information, do you see any geologic basis that would explain the transition which is occurring between the Area-1 and Area-2 portions of the Basin Fruitland Coal at this point?

A. Nothing that could be picked out on these typical geological exhibits.

Q. So basically, you're still back at looking at changes in permeability?

A. That's correct.

Q. What plans does Amoco have for the well that is currently producing in the southwest quarter of Section 25?

A. At this point we would continue to produce the well while we drill our replacement well. But once we complete that replacement well as a commercial producer, we would stop production from the Fields A-21 well, utilize that as a monitor well to observe changes in pressure within the reservoir and maybe help us determine a little bit more about this transition zone

and, you know, what it really represents.

Q. Mr. Hawkins, is Exhibit D an affidavit confirming that notice of today's hearing has been provided to both Conoco and Meridian, the offsetting operators?

A. Yes, it has.

Q. And have you received any response from either Conoco or Meridian to this notification?

A. Well, Conoco has an interest in this well, and so they would be participating or at least have the option to participate in this redrill.

We have heard from Meridian, and they have indicated they have no objection to our Application.

Q. How soon does Amoco propose to drill this well?

A. We want to drill it before the end of the year.

Q. Do you request that the Order in this case be expedited to the extent possible?

A. Yes, I would. This is a federal tract, and we have processed a notice of staking for the replacement well, but I think in order for the BLM to process a permit to drill, we're going to need an approved unorthodox location from the State, before they'll proceed with that.

MR. CARR: Mr. Catanach, if you desire, we'll be happy to submit a proposed order in this case. It would be modeled after the order that you entered in the Meridian case a few weeks ago for the presentation, in fact is modeled after that.

EXAMINER CATANACH: Okay.

Q. (By Mr. Carr) Mr. Hawkins, will approval of this Application prevent waste and protect correlative rights?

A. Yes, it will.

Q. How will it prevent waste?

A. It will allow recovery of the majority of the gas in place under the west half of Section 25, as opposed to right now we're only going to recover about three percent of the gas in place in that spacing unit.

And it will also protect our spacing unit from drainage that is occurring from the Meridian well to the north.

Q. Do you believe you'll be gaining an advantage on the Meridian well to the north?

A. Absolutely not. The Meridian well to the north is producing at about 7 million cubic feet a day, one of the best wells in the pool. I think we would be lucky to get a well that would produce 1 to 2 million cubic feet of gas per day. And it will help protect

our acreage, but it will not gain an advantage on the Meridian well.

Q. Were Amoco Exhibits A through D either prepared by you or compiled under your direction?

A. Yes, they were.

MR. CARR: At this time, Mr. Catanach, we would move the admission of Amoco Exhibits A through D.

EXAMINER CATANACH: Exhibits A through D will be admitted as evidence.

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

EXAMINATION

BY EXAMINER CATANACH:

Q. Mr. Hawkins, is there a method to measure the permeability in the coal?

A. The method that -- There are two methods, I guess, to measure permeability. One is to attempt to do such under pressure buildup analysis within your well. The other would be to attempt to model from a reservoir model the production history in the area and then get a better refinement on permeability in the area around that well.

I think if you do a pressure buildup analysis, you're probably going to be influenced by whatever stimulation you've done on the well, whether

it be fracture or cavitation. And it may not give you an idea of what the permeability is, you know, some distance away from your wellbore, but certainly what's controlling your ultimate recovery.

Q. Are all of these wells that have been completed in the coal in this area -- Have they all been similarly completed?

A. Generally in the Area 1, high-pressured area, these wells are all completed open-hole. I pointed out a number of the wells that were originally drilled and cased and frac'd and then subsequently sidetracked or replaced and completed as open-hole completion.

Generally, the wells on the Area-2 side have been fracture-stimulated to try to improve productivity.

I think we're beginning to see that in the Area-1 portion of the field, the open-hole completion is the best completion we can make, and that in Area 2 the casing frac is probably as good as you can do.

Q. The Fields A Number 21 was completed open-hole?

A. No, it was cased and frac'd.

Q. Cased and frac'd.

A. We have looked at what would be the potential if we were to re-drill this well and complete it open-

hole, and our conclusions are that given the low permeability on this side of the reservoir, you would not achieve a significantly different well, whether you contemplated it cased-and-frac or open-hole, that the productivity and the ultimate recovery in this part of the field is not driven by completion technique but by the reservoir characteristics that exist in that part of the field and, in this case, permeability, which is so dramatically lower than in Area 1.

Q. Now, you say that permeability is so much lower. Have you actually done some tests to confirm that, or is it just due to the productivity, you're just assuming that it's lower?

A. Well, it's primarily due to the productivity. We have done some pressure-buildup testing. I know we've estimated the permeability to be on the order of .1 millidarcies in this general area.

But I think the productivity of the wells clearly is telling you that permeability is dramatically lower than the wells to the north.

Just to look at it simply, we know that productivity is a function in this area of two main things: permeability and pressure drop. Well, there is some difference in pressure between Area 1 and Area 2, and that pressure drop can probably be increased by

a factor of two as you move from Area 1 to Area 2.

For instance, in Area 1, shut-in pressures, reservoir pressures, are on the order of 1200 pounds and line pressure on the order of 200 pounds. So you can get a pressure drop of about 1000 pounds to contribute to your productivity, okay?

In Area 2, reservoir pressures are about 800 pounds and line pressures are about 200 pounds, so you get a pressure drop of about 600 pounds to contribute to your productivity.

So you can almost double that pressure drop, and that may contribute a doubling in producing rate.

But we see producing rates increasing on the order of 10 to 100 in this area.

So the other increase there is driven only by permeability.

That's a factor of five to ten, you know, bigger permeability, larger permeability. Maybe a factor of 50 in the case of the Mudge well and the well directly to the southeast in Section 26. I think that's the Barnes Gas Com E. Those are the two wells with the same feet of thickness, 86 feet. The pressure drops there probably account for a twofold change in production, but there's a hundredfold increase in productivity, so there must be a fiftyfold increase in

permeability between those two wells.

MR. STOVALL: Just to follow up on that, you're saying -- You're basing your permeability assumptions on production, but is it not also based upon the study that you presented as Exhibit B and the -- the in-depth part of that, pulling those conclusions together?

THE WITNESS: Well, I think --

MR. STOVALL: Does that help -- Does that help you get there? I guess that's my --

THE WITNESS: No, I don't really think it does.

In the study that was done by the Coalbed Methane Committee, the reservoir work that was conducted in terms of modeling work and history matching was conducted on Cedar Hill field, which is in the Area-1 portion of the field, and also the Tiffany area, which is up in Colorado, and it doesn't focus on anything in Area 2. So there was no history matching performed in Area 2 by the Coalbed Methane Committee.

But what it does tell us is that -- It gives us an idea of what the permeabilities are in Area 1 or what range of values you might look to. And generally, in Area 1, you look to a permeability of 5 to 10 millidarcies.

In this case, I think we've got 5 to 10 millidarcies in this area. And then as you cross into Area 2, you drop down to the order of .1 millidarcies, something like that, at least in this portion of Area 2.

Elsewhere in Area 2, it may increase a little bit, but I still think you're going to see a dramatic change in permeability between these two areas.

Q. (By Examiner Catanach) Mr. Hawkins, in terms of recoveries, what did you estimate the Fields A-21 will recover?

A. About 340 million cubic feet of gas.

Q. And if you were to be authorized to drill your new well, have you estimated recoveries from that well?

A. Well, without having drilled it, it would be very difficult. Our best guess would be to apply a recovery factor of about 60 percent or so on the gas in place, and that would give us -- of the 12 BCF in place, you know, it may be an opportunity to recover 7 BCF.

You'll note that the Meridian well that offsets us has already recovered about 4 BCF of gas and is still producing at a significantly higher rate than any well in the area.

Q. And it's your contention that that Meridian well is in fact draining the west half of your section?

A. Yes, it is.

EXAMINATION

BY MR. STOVALL:

Q. One quick one, just a little technical -- On your structure, I think you've testified that it's dipping from east to west. Are these elevations subsea or above sea?

A. They're subsea.

Q. They are subsea? Okay.

A. Well, I guess they're not. They are above. So you're right, they are not subsea.

Q. So the higher number would be a higher elevation, right?

A. That's correct.

Q. So it dips from west to east? Is that --

A. Yes.

Q. Okay, I just wanted to --

A. Sorry about that.

Q. Somebody may come along and question that, because we're so used to subsea --

A. Right.

Q. -- they might assume that that's correct.

The other question, as far as BLM processing,

will they go all the way through their processing up to the point of issuing the APD even without an order, or do they just stop processing until you get an order?

A. To be real honest, I don't know. I know we're working with them to try to expedite the approval for this well, and it's just my opinion that they will get to a point where they can move no further if we don't have an approval by the State to --

Q. But they can do surface work up to that point; is that correct?

A. I think that's correct, and we're proceeding with notice of staking and that type of work.

FURTHER EXAMINATION

BY EXAMINER CATANACH:

Q. Mr. Hawkins, is it your opinion that the new proposed well will adequately drain the west half of that section?

A. If we get it into the Area-1 portion of the reservoir, I have no doubt that it will adequately drain that west half of the reservoir. I think there is still some risk of where exactly that boundary lies. We can tell, when you have a good well or a bad well, so to speak, whether it's in Area 1 or Area 2. But exactly where the transition lies between those two wells is still uncertain.

Q. This is a federal lease; is that right?

A. That's correct.

Q. And it's commonly owned?

A. Yes, it's a common lease over the entire section, and so the acreage rededication will have absolutely no impact on anyone's ownership or correlative rights within the section.

Q. Is Meridian the only working-interest owner? I mean Amoco?

A. Amoco and Conoco.

Q. Amoco and Conoco.

EXAMINER CATANACH: I believe that's all I have. That's all the questions we have.

MR. CARR: We have nothing further, Mr. Catanach.

EXAMINER CATANACH: Okay, there being nothing further in this case, Case 10,593 will be taken under advisement.

(Thereupon, these proceedings were concluded at 8:55 a.m.)

* * *

CERTIFICATE OF REPORTER

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

I, Steven T. Brenner, Certified Court Reporter and Notary Public, HEREBY CERTIFY that the foregoing transcript of proceedings before the Oil Conservation Division was reported by me; that I transcribed my notes; and that the foregoing is a true and accurate record of the proceedings.

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

WITNESS MY HAND AND SEAL November 14, 1992.

STEVEN T. BRENNER
CCR No. 7

My commission expires: October 14, 1994

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 10593, heard by me on November 5 1992.

David R. Catanach, Examiner
Oil Conservation Division