STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

IN THE MATTER OF THE HEARING CALLED BY THE OIL CONSERVATION DIVISION FOR THE PURPOSE OF CONSIDERING:	)	
APPLICATION OF APACHE CORPORATION TO AMEND THE SPECIAL RULES AND REGULATIONS FOR THE SOUTH EUNICE-SAN ANDRES POOL, LEA COUNTY, NEW MEXICO	)	CASE NO. 13,911

ORIGINAL

REPORTER'S TRANSCRIPT OF PROCEEDINGS

EXAMINER HEARING

BEFORE: DAVID R. CATANACH, Hearing Examiner

May 10th, 2007

Santa Fe, New Mexico

This matter came on for hearing before the New Mexico Oil Conservation Division, DAVID R. CATANACH, Hearing Examiner, on Thursday, May 10th, 2007, at the New Mexico Energy, Minerals and Natural Resources Department, 1220 South Saint Francis Drive, Room 102, Santa Fe, New Mexico, Steven T. Brenner, Certified Court Reporter No. 7 for the State of New Mexico.

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I N D E X

May 10th, 2007
Examiner Hearing
CASE NO. 13,911

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E X H I B I T S

Applicant's	Identified	Admitted
Exhibit 1	6	10
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A P P E A R A N C E S

FOR THE DIVISION:

DAVID K. BROOKS, JR.
Assistant General Counsel
Energy, Minerals and Natural Resources Department
1220 South St. Francis Drive
Santa Fe, New Mexico 87505

FOR THE APPLICANT:

JAMES G. BRUCE
Attorney at Law
P.O. Box 1056
Santa Fe, New Mexico 87504

* * *

WHEREUPON, the following proceedings were had at 9:10 a.m.:

EXAMINER CATANACH: All right, at this time we'll call Case 13,911, the Application of Apache Corporation to amend the special rules and regulations for the South Eunice-San Andres Pool, Lea County, New Mexico.

Call for appearances.

MR. BRUCE: Mr. Examiner, Jim Bruce of Santa Fe, representing the Applicant. I have four witnesses.

EXAMINER CATANACH: Any additional appearances?

Okay, swear in the witnesses, please.

(Thereupon, the witnesses were sworn.)

MARIO R. MORENO, JR.,

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

DIRECT EXAMINATION

BY MR. BRUCE:

Q. Would you please state your name and city of residence for the record?

A. My name is Mario Moreno. I live in Tulsa, Oklahoma.

Q. Who do you work for, and in what capacity?

A. I work for Apache Corporation as a senior land advisor.

Q. Have you previously testified before the

Division?

A. Yes.

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

A. Yes.

Q. And are you familiar with the land matters involved in this case?

A. Yes.

MR. BRUCE: Mr. Examiner, I tender Mr. Moreno as an expert petroleum landman.

EXAMINER CATANACH: He is so qualified.

Q. (By Mr. Bruce) Mr. Moreno, could you please identify Exhibit 1 for the Examiner?

A. Yes, Exhibit 1 is a two-page exhibit. Page 1 of the plat outlines the South Eunice-San Andres Pool, showing wells within a mile of the pool. Page 2 identifies the operators of the wells within a mile of the pool.

Q. Okay. Now the -- page 1 of Exhibit 1 highlights three wells in pink. What are those wells?

A. Those are injection wells in the San Andres.

Q. Okay, so they are not producing wells?

A. No.

Q. What are the wells highlighted in yellow?

A. The wells highlighted in yellow are San Andres wells that are operated by Chevron, which it appears

Division records show as being in the South Eunice-San Andres Pool. However, we were not able to find any evidence that the pool had ever been expanded to include this acreage.

MR. BRUCE: Okay. One other thing on this map, Mr. Examiner. The Division records show the west half of Section 1 is in the pool, although we don't find any producing wells in the west half of Section 1.

Q. (By Mr. Bruce) Mr. Moreno, what is Exhibit 2?

A. Exhibit 2 is Order Number R-3706, which initially instituted 80-acre spacing for this pool.

Q. And under Special Rule 2, how many wells are allowed per well unit?

A. One well per quarter quarter section.

Q. Would you briefly describe what Apache seeks in this case?

A. Apache seeks an order or an exception to this Rule (2) of the special rules and regulations, to amend the rules to allow two wells per quarter quarter section.

Q. Now what precipitated the filing of this case?

A. In this area, particularly in the township to the north of 22-37, which is 21 and 37, Apache has been aggressively conducting an intensive infill drilling program, drilling wells in the Grayburg-San Andres and the Blinebry and Tubb formations, which we found were not

draining 40 acres.

As a result, we permitted and drilled some numerous San Andres wells in this pool, and approved APD stated that we needed to get infill drilling approval. Through an oversight, this was not done. And we received a notice from the OCD basically notifying us of the violation, the density violation of having more wells per quarter quarter section in this field.

Q. And the OCD's letter of violation is marked as Exhibit 3, is it not?

A. Yes, it is.

Q. Did Apache then come to Santa Fe to meet with Division personnel?

A. Yes, we did. The New Mexico team consisted of myself, a reservoir engineer, a production engineer and a geologist. We met with the Division on April the 3rd and discussed with the OCD what had happened, and we were trying to seek a resolution to this matter.

As a result of that meeting, we had filed an Application based on the geology and the engineering in this pool.

Q. Besides filing this Application to amend the special pool rules, did Apache take any additional action?

A. Yes, we did. The Division basically told Apache that we needed to shut in the offending wells until the

case could be heard. However, due to matters which one of our engineers will discuss later on in this testimony, Apache had applied for permission to produce the offending wells on the three 80-acre units, pending the outcome of this hearing.

Q. And is the order granting Apache's interim request marked as Exhibit 4?

A. Yes.

Q. Does Apache request that this order be continued in effect until a final decision is rendered in this case?

A. Yes.

Q. Were all of the operators of producing wells in the pool notified of this hearing?

A. Yes, they were.

Q. And that's shown by Exhibit 5, is it not?

A. That is correct.

Q. And each of the operators did receive -- did sign the green cards and receive actual notice?

A. That is correct.

Q. Do any of the operators object to the Application?

A. No, we got a letter from Chesapeake strongly supporting our position to allow for two wells per quarter quarter section. ICA, one of the other offset operators, had no objection, and we haven't heard from any of the

other operators, being Chevron, Marathon and John Hendrix.

Q. And is the letter written from Chesapeake Operating to the Division marked as Exhibit 5A?

A. That is correct.

Q. Now as part of the notice we had to look for any potentially affected operators outside the pool. Are there any such operators?

A. No, there are not. The offsets are operated wells located -- or included within other pools outside of the Eunice-San Andres Pool.

Q. And the only ones potentially affected were those two wells marked in yellow on Exhibit 1, but that's Chevron which operates in this pool?

A. That is correct.

Q. Were Exhibits 1 through 5A prepared by you or under your supervision --

A. Yes.

Q. -- or compiled -- And is the granting of this Application in the interests of conservation and the prevention of waste?

A. Yes.

MR. BRUCE: Mr. Examiner, I'd move the admission of Apache Exhibits 1 through 5A.

EXAMINER CATANACH: Exhibits 1 through 5A will be admitted.

Mr. Bruce, I don't recall the notice requirements on pool rules.

MR. BRUCE: As long as you're not seeking to increase or decrease spacing, if it's like GOR or well density, I understand that it's -- you notify the operators in the pool, and every operator within a mile of the pool, unless those wells are in another existing pool.

EXAMINER CATANACH: Okay, I'll have to double-check on that.

EXAMINATION

BY EXAMINER CATANACH:

Q. These operators that you have listed for notice, those are all operators in the pool?

A. Yes.

MR. BRUCE: Mr. Examiner, Rule 1210.A.(4) is the rule. Other than changing the amount of acreage it says, If the application involves other matters, the applicant shall notify all Division-designated operators in the pool and all Division-designated operators of wells within the same formation as the pool and within one mile of the pool's outer boundary, which have not been assigned to another pool.

Q. (By Examiner Catanach) Okay. So the Exhibit Number 4, the emergency order, that covers -- seven wells? Nine wells?

A. I believe that's correct. We had four wells out of the nine that were in violation.

Q. Four wells that were drilled in greater density than -- I mean, two per 40; is that what you're saying?

A. Yeah, we had two, we had -- per 80-acre we had -- well, in the northwest quarter we had two wells and -- that was out of compliance in that south-half unit -- or north -- yeah, in the north half of the northwest quarter unit, we had basically two wells that were drilled in the northwest, so one well there was out of compliance.

In the south-half unit of the south -- south half of the northwest quarter unit, we had four wells drilled on that 80, so we were two wells out of compliance. So we had two wells per quarter quarter in that south half.

Q. Okay, this order says that all of the wells -- that the following existing wells exceed the limitation of one well per quarter quarter section. So you're saying there's only four out of these wells that are really in violation; is that what you're saying?

A. In those three units that the Commission -- that the OCD sent us the letter on, yes, sir.

Q. Okay, can you identify by number which wells are in violation?

A. The New Mexico State S Number 42 -- Let me make sure. Okay, in the north half of the northwest quarter

unit, the New Mexico State S wells that were drilled in there were the New Mexico State Number 42, 46 and 56.

In the north -- in the south half of the northwest quarter unit, there were four wells that were drilled in there. They were the New Mexico State S Number 47, the 50, the 48 and the 49.

Then in the third unit, the north half of the southwest quarter, there were two wells that were drilled in there in the northwest of the southwest, and they were the Number 53 and the 43.

Q. Okay. So all of those wells are in violation, is what you're saying?

A. Well, if you go back to --

MR. BRUCE: Mr. Examiner, I thin if you look at Exhibit 3, the first page, you know, in the north half, northwest, either -- you could say either the 42 or 46 well.

EXAMINER CATANACH: Okay.

MR. BRUCE: And then in the south half of the northwest you can pick out two of those --

EXAMINER CATANACH: I've got you. Okay, I understand.

THE WITNESS: Yeah, so four out of those nine is out of compliance.

Q. (By Examiner Catanach) Okay. And you've checked

the records on those two Chevron wells, and they actually do say that they're producing from that pool?

A. Yes, they are.

Q. Okay.

MR. BRUCE: That's what the Division well files show, that they were old Texaco wells, and the change-of-operator forms show that they were South Eunice-San Andres.

EXAMINER CATANACH: And you looked in the nomenclature books here in Santa Fe?

MR. BRUCE: (Nods)

EXAMINER CATANACH: Okay. All right, I'll have to check into that. We might to extend the pool for those wells. I'll check with Hobbs and see what they want to do.

Do you have any questions?

MR. BROOKS: No.

EXAMINER CATANACH: Okay, that's all for this witness.

ROBERT E. CURTIS,

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

DIRECT EXAMINATION

BY MR. BRUCE:

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

A. Robert E. Curtis.

Q. And where do you reside?

A. I reside in Tulsa, Oklahoma.

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

A. Apache Corporation as a senior staff geologist.

Q. Have you previously testified before the Division?

A. Yes.

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

A. Yes.

Q. And are you familiar with the geology involved in this Application?

A. Yes.

MR. BRUCE: Mr. Examiner, I'd tender Mr. Curtis as an expert petroleum geologist.

EXAMINER CATANACH: Mr. Curtis is so qualified.

Q. (By Mr. Bruce) Mr. Curtis, could you identify Exhibit 6 and then go through the rather complex geology in this San Andres Pool?

A. Yes, Figure 6 is a montage including a net pay map of the San Andres centered on the South Eunice-San Andres Pool. There are also two cross-sections through various wells within the pool. The one on the top left is labeled northwest to northeast, which includes four Apache-operated wells. The one in the bottom left is labeled southwest-southeast, which includes five Chesapeake-

operated wells.

The South Eunice-San Andres Pool is outlined in the very wide blue line, 320 acres. Two hundred and -- Well, I guess it's more than 320 acres. There is acreage included in the west half of Section 2 and the southwest quarter of Section 35 shown in a separate lighter or -- lighter-weight blue line that is acreage the Division brought into the South Eunice-San Andres Pool in late 2005 after Apache had already drilled a well or two to the San Andres formation, and that produced from the San Andres formation. The 320 acres in the west half of Section 1, which is cross-hached is the acreage that we show as being included within the pool, but we could find no San Andres production therein.

On the left side of the net pay map are two polygonal areas shaded in gray. Those are -- to the south is the Southwest Eunice-San Andres Pool, which is spaced 40 acres for both oil and gas. The northern polygon is the Eunice-San Andres Pool, which is also spaced on 40 acres for both oil and gas in the San Andres. Additionally in Township 21 South, just to our north, there's the East Hare-San Andres Pool and the Northwest Hare-San Andres Pool, both of which are 40-acre oil and gas pools.

Additionally, there are two 160-acre San Andres gas pools, being the Hare-San Andres and the North Eunice-

San Andres Gas Pools.

As Mr. Moreno mentioned, the South Eunice San Andres Pool was created in March of 1969 by the Division in Order R-3706, brought by Humble Oil -- the petition was brought by the Humble Oil and Refining Company, because their New Mexico State Water Supply Well Number 4 in the southwest of the southwest of Section 1 was producing some oil instead of just water. Its top perforations were at a drill depth of 4238 feet, which we'll discover later is generally below where we're producing hydrocarbons.

That order created the 80-acre laydown units. Part of the rationale there was to prevent economic loss caused by drilling unnecessary wells and to prevent risk arising from drilling an excessive number of wells.

The Division, however, asked that Humble return one year thereafter to justify why the spacing should remain on 80 acres and not reduced to 40, as would fit statewide rules. Unfortunately, we've been unable to locate a hard copy or electronic copies of the testimony, but in March of 1970 those 80-acre rules were allowed -- were --

Q. Made permanent?

A. -- formalized.

Q. Made permanent?

A. Made permanent.

Okay. Now then, the wells with the light green donuts around them are San Andres producers. To the right of each wellbore is the operator of record, and directly below that in a bolder font is the well name and number. The red -- pardon me, the green, red and blue numbers above the well symbol are the current daily oil, gas and water rates. Below the well symbol is the cumulative gas and water production.

There are three wells with smaller blue circles on their symbols, which are the water injector -- or actually water disposal wells Mr. Moreno mentioned, and they're located in Unit C of Section 2 and Unit O of Section 2, and additionally a well in Unit H of Section 3.

We selected sonic porosity to use to determine our net pay. We use a threshold value of 5-percent sonic porosity, 40-API unit gamma ray, and 50-percent apparent water saturation. Large dark green numbers located just to the west or just to the left of wellbores are those sonic net pay numbers. The contours are on the sonic net pay 50-foot contour interval.

Every once in a while you will see a San Andres producer that shows no net pay. Well, again, remember these are just based on sonic porosity. Sonic porosity looks at what is called primary porosity. It tends to be better connected. Neutron density logs record total

porosity, which includes vuggy porosity, which very often is not connected well to well.

The cross-section in the upper left of the montage on four Apache wells are -- the curves show the gamma-ray response in the far left on the zero to 100 scale. The right-hand side of the logs have in black cross-plotted neutron density porosity, and then in red the sonic porosity. And it's evident that the sonic porosity is less than the neutron density porosity, which we would again expect, because the sonic is only looking at the primary porosity.

When I looked at the statistics of the pay values using neutron density versus sonic, the sonic net pay gave us values of approximately 60 to 65 percent of what we got in the -- from the neutron density porosities, which, when we calculate water saturation, that would give us higher apparent water saturations. And when Mr. Barnes calculates volumetrics, it would also give us a smaller -- excuse me, that would be a lower water saturation. And then also it would calculate a smaller drainage area.

The light green donuts around the San Andres producers are 14 acres in area, which is the average that Mr. Barnes calculated, average drainage areas that Mr. Barnes calculated.

Also on the cross-sections in a bright purple or

hot pink color we show perforations. Below the wells are production curves. Also I've noted right above the well logs water-oil ratios. Looking at our cross-section, or the cross-section of Apache wells, the first well, the well on the left, has, oh, about two-thirds of the way down, a symbol denoting a bridge plug. So that well is only producing from open perforations in the upper two-thirds or so of the San Andres interval.

Also the San Andres is about a 1000-foot-thick formation extending down to the top of the Glorieta at approximately 5200 feet. We have targeted generally the upper 400 to 500 feet, so ranging from about a drill depth of 3800 feet to approximately 4200 feet, which is again above the depth that Exxon had perforated in the, quote, discovery well, unquote.

The New Mexico State S 47 shows a produced oil-water ratio of 4.84.

Moving to the right, the New Mexico State S 50, we only have perforations open in the lower part of the interval. Its water-oil ratio is 9.09, which one would think, then, is showing normal gravity segregation of fluids.

However, moving to the New Mexico State S Number 48, next eastward on the cross-section, again in that case the lower perforations are below a bridge plug and

therefore not producing, so one would expect it to have a water-oil ratio more like the Number 47 well. It's water-oil ratio was equivalent to the Number 50, which is only producing from lower perforations.

So I guess the summary of this is, the San Andres was deposited on the Central Basin Platform as a very cyclic unit. Variations in porosity, especially permeability, occur over distances that are well less than well spacings. So the reservoir is heterogeneous and compartmentalized. That is an additional reason, we feel as though we can produce without adverse effect other wells -- more than one well per governmental quarter quarter section.

Q. Mr. Curtis, in looking at the logs you said that generally -- and I think our next witness will talk a little bit about where the wells are perforated in the San Andres, and he talks about upper San Andres or lower San Andres. It's all the same pool, correct?

A. Yes, it's all the same pool and common source of supply.

Q. And you said that Apache generally looks at the upper 500 feet or so --

A. Yes.

Q. -- of the San Andres, but perforations may occur in any --

A. Yes.

Q. -- range of areas within that upper --

A. Yes.

Q. -- 500 feet?

A. Yes.

Q. And when you go in, you can't tell -- Some of these perforated zones seem to be more water-bearing than others, but you can't tell until you go in there?

A. I would suspect that each zone of porosity has its own individual fluid contents. Log analysis of the San Andres is quite problematic. You know, the zones we tend to perforate -- or the zones we do perforate, tend to be very similar looking in log analysis values. However, we obviously have gotten substantially different fluid recoveries, you know, based upon wells having lower sets of perforations squeezed off and upper ones still open.

Q. And so just when you go in and drill the well, you can't really tell what the -- from log analysis, it might look good, but two wells right next to each other might have markedly different results?

A. Correct.

Now the lower cross-section, I'll touch on real quickly, is five wells from a Chesapeake lease. You know, again they show that -- in this case it's just logs that were commercially available. So the middle well, the

Wortham Number 5, is a sonic log. Compare that to the Wortham Number 8 just to its left and, you know, that -- which is a neutron density log. Obviously the neutron density log appears much greater than the sonic porosity.

Those wells -- or some of those wells have much longer production history. Looking at the production curves on the bottom, one can see no adverse effect from the older wells when the newer wells have been brought on, again indicating or suggesting that the reservoir can support more than one well quarter quarter.

Q. And there are -- Chesapeake does have a couple of situations where they have two wells per 40 acres?

A. Yes, they have found themselves in the same situation that we're in.

Q. And looking at the cross-sections, the data you have on the Chesapeake wells, there is also a substantial variation in the water-to-oil ratio?

A. Yes.

Q. From well to well, even when they look to be perforated in more or the less the same zone?

A. Yes.

Q. Was Exhibit 6 prepared by you?

A. Yes, it was.

Q. And in your opinion is the granting of this Application in the interests of conservation and the

prevention of waste?

A. Yes, it is.

MR. BRUCE: Mr. Examiner, I'd move the admission of Exhibit 6.

EXAMINER CATANACH: Exhibit 6 will be admitted.

EXAMINATION

BY EXAMINER CATANACH:

Q. Mr. Curtis, did you by any chance review any of the data that was presented in the original -- the initial pool case?

A. I remember looking to see if I could find testimony, and I do not remember reviewing that data, so I suspect I was not able to find it.

Q. I'm just wondering, I've run across a couple of these older pools where there's not really even a whole lot of drainage data associated with these type of situations. But the original pool rules were based on that one Chevron well; is that right?

A. Humble.

Q. Humble, okay. And that was perforated at a depth lower than what you guys are producing?

A. Yes, sir.

Q. So really, I mean, the pool rules are not based on anything that's being produced out there now?

A. Not particularly.

Q. And the reason that you guys aren't producing the lower zones is because why?

A. We've generally found it to be water-bearing, and additionally the three water disposal wells that we've mentioned previously tend to dispose of the water in those depths. And, you know, if you look at the Rice Operating C 2 in Unit C of Section 2, since 1994 it has disposed of almost 22 million barrels of water. So we would like to stay away from that.

You know, the San Andres is a quite complicated reservoir, so from well to well some zones of porosity and permeability will correlate, and a lot will not. You know, we just don't want to -- you know, we're producing enough water as it is.

Q. Okay, so basically what you're finding out there is the different porosity zones are not generally continuous within, say, a 40-acre tract?

A. Yes, sir. Reading industry literature about the San Andres, looking at outcrops, they found, you know, variations in porosity and permeability between their sampling stations at 1000 feet to be the same as variations at a spacing of 100 feet, as at 10 feet, even down to one foot. And then looking at microscopic samples, those same sort of variations occur on down to the microscopic level. So it was a very complicated depositional event. And then

as a carbonate, later diagenesis has complicated things additionally.

Q. These porosity zones are separated by just less -- is it zones that are less --

A. Yes, sir.

Q. -- porous --

A. Yes, yes, by tighter intervals.

Q. Okay.

A. The facies and/or diagenesis will change and destroy porosity and permeability.

EXAMINER CATANACH: Okay. Questions?

MR. BROOKS: I don't.

EXAMINER CATANACH: I think that's all we have.

CLINT MILLS,

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

DIRECT EXAMINATION

BY MR. BRUCE:

Q. Would you please state your name and city of residence for the record?

A. Clint Mills, Tulsa, Oklahoma.

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

A. I work for Apache Corporation as a production engineer.

Q. Have you previously testified before the

Division?

A. No, sir.

Q. Would you please summarize your educational and employment background for the Examiner?

A. I've got a degree in petroleum engineering from the University of Tulsa. I've been working for Apache for the last five years as an engineer.

Q. Does your area of responsibility at Apache include this part of southeast New Mexico?

A. Yes, sir, it does.

Q. And are you familiar with the production engineering matters related to this Application?

A. Yes, sir.

MR. BRUCE: Mr. Examiner, I'd tender Mr. Mills as an expert production engineer.

EXAMINER CATANACH: Mr. Mills is so qualified.

Q. (By Mr. Bruce) Mr. Mills, could you identify Exhibit 7 for the Examiner and just briefly describe its content?

A. Exhibit 7 is -- it shows all of the wells in question. It's broken out into the north 80, the middle 80 and the lower 80. The top three wells there would be located in the north 80.

The main reason I brought this in is to show what zones they're all completed in, whether it be upper or

lower San Andres, Grayburg, and so on.

Also it shows their current test data. This indicates how the tighter spacing would affect test data, which I'd like to explain that it doesn't. One of the main reasons is, the Number 42 well was one of our first wells drilled, and it still tests the best, quite frankly.

Also, it's got on the last column there, is their cumulative production data.

Q. One thing on what you called the north 80, the status of the Well Number 46, what is that at this point?

A. Information that was not made available to Mr. Moreno when he testified, for example. That well we have now plugged back to where it's only a Grayburg producer. We did this right after we received our letter of violation. And if you refer to the production graph of that -- you can if you want to or not -- we plugged it back because the San Andres was primarily all wet, and it was flooding out our Grayburg production --

Q. Okay.

A. -- so we plugged it back.

Q. Now in looking at the others, you do talk about upper and lower San Andres. Again, this is all the same pool, but you're just referencing the general areas where the wells are perforated?

A. Yes, sir.

Q. And one other thing, and we'll get into that in a minute. One other item is, in the lower 80 acres, the 43 and 53 well, is that well both a San Andres and a Grayburg producer?

A. That's correct, they are commingled.

Q. Okay. Now let's move on to your Exhibit 8. Just briefly, what does this show?

A. Exhibit 8 includes all the graphs, production graphs of all the wells in question. The first graph you'll see there is the Number 42 well.

Q. And that's the really good well?

A. Correct, yes, that was one of the early wells, it's one of our best wells. What happened with this well, if you'll notice in September of '06 we had some problems due to weather out there in Eunice. This well was shut in for a week. After that shut-in, the production never came back the way we had hoped it would. We lost about 75 barrels of oil and about 75 MCF of gas, and it never quite came back.

Q. And that is in essence the reason that Apache applied for the emergency order, so that it didn't have to shut in any other wells?

A. That's correct.

Q. You were afraid that if Apache had to temporarily shut in the other wells, it might adversely affect their

long-term production?

A. That is correct.

Q. Now I don't really want to go through these charts, but it appears that even though these wells produce at low rates, it appears that their decline rates are extremely low, so they would produce for a number of years at these rates?

A. Yes, sir.

Q. Do you have a -- just an off-the-cuff idea of the producing lives of these wells?

A. I believe it's roughly 30 years.

Q. Okay. And even at the lower rates, you wouldn't want to shut them in and have their production affected, it could affect their lives?

A. No. No, when we shut them in, as Bob mentioned, there's all these different stringers, some containing hydrocarbons, some containing water. When we shut them in, the zones containing water will tend to flood the hydrocarbon zones, and pushing those hydrocarbons away from the wellbore, causing damage.

Q. And then finally Exhibit 9, is this simply the letter that was drafted by Apache to support the Application to continue producing the wells in the interim while this case was decided?

A. Yes.

Q. And you had input into this letter, did you not?
A. Yes, sir.
Q. Were Exhibits 7 through 9 prepared by you or under your supervision, or compiled from company business records?
A. Yes, they were.
Q. And in your opinion, is the granting of Apache's Application in the interests of conservation and the prevention of waste?
A. Yes.
MR. BRUCE: Mr. Examiner, I'd move the admission of Apache Exhibits 7 through 9.
EXAMINER CATANACH: Exhibits 7 through 9 will be admitted.

EXAMINATION

BY EXAMINER CATANACH:

Q. These wells on Exhibit 7 were the wells that you guys have drilled recently, right?
A. Yes, sir.
Q. Okay. I notice there's, you know, two or three pretty good wells, but the rest of them are -- you know, there's some that range between two barrels a day, 15 barrels a day, nine barrels a day.
A. Uh-huh.
Q. I mean, what's economic for you guys? I mean,

have you guys determined that?

A. Believe it or not, those are economic numbers.

Q. Two barrels a day?

A. Two barrels a day isn't economic. That one -- What that two barrels a day is, that's a San Andres test only. That well was completed in the Grayburg and the San Andres. Since then we have plugged that back to where it's only a Grayburg producer. That well was completed in all three zones. So that zone is no longer productive in that well.

What happened -- The way we complete these wells is, we go in and we start with the lower zone, and we perforate and we acidize. We swab it to get a feel for how productive the interval is. On this one it was fairly productive, but we didn't want to leave it there, so we set a plug and we moved up and we shot the Grayburg zone, which is above it, and it is much more productive. We produced the Grayburg zone for a period, and then we pulled the plug over the San Andres.

And what happened at that time is, we didn't pick up hardly any hydrocarbons, and we picked up a lot of water. So much water that it actually choked back our hydrocarbon production. And then upon further evaluation we went back and plugged that San Andres back below the plug, to where it's not going to affect our production.

Q. So is that what you're saying, if you leave the San Andres shut in, it tends to -- water comes on in those zones?

A. When you've got a zone that's got a lot of water and a zone that's just got a little bit of water, when you mix those two together a couple things happen. One, the zones with all the water tend to have a little higher pressure and a lot more ability to flow. And so they'll come in and they will flood the zones with the hydrocarbons.

And another thing that happens is, when you've got two of those -- two different types of water mixing together, they tend to form scale. One of our biggest problems out in Eunice is scale, not just in these zones but in others. And what I believe is happening is, once that water goes into that hydrocarbon zone, it mixes with the fluids in that zone and then forms scale way out in the formation, so far out that we can't clean it up with acid.

The way we avoid that when we're producing these wells is, say for instance you've got a high zone that's got a decent amount of water, and then you've got a lower zone where your production is coming from. We set our pumps at or below the bottom perforation, and we keep our wells pumped off, meaning that there is never a column of fluid inside that wellbore. So when those two fluids are

mixing, it's at our pump and not inside the formation.

And when you keep it that way, the biggest problems you have with scale is a scaled-up pump, and which we will pull the pump and replace it.

EXAMINER CATANACH: Okay. I don't think I have anything else.

MR. BRUCE: I just have one question for him, and maybe the landman could confirm this.

FURTHER EXAMINATION

BY MR. BRUCE:

Q. But generally when you drill in the San Andres, Apache also owns the Grayburg; is that correct?

A. That's correct.

Q. So that's a possible future zone for recompletion in these wells?

A. That is correct.

MR. BRUCE: That's all I have, Mr. Examiner.

EXAMINER CATANACH: Okay.

KEEVIN BARNES,

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

DIRECT EXAMINATION

BY MR. BRUCE:

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

A. My name is Keevin Barnes.

Q. And where do you reside?
A. Tulsa, Oklahoma.
Q. Who do you work for?
A. I work for Apache Corporation as a reservoir engineer.
Q. Have you previously testified before the Division?
A. Yes.
Q. And were your credentials as an expert reservoir engineer accepted as a matter of record?
A. Yes.
Q. And are you familiar with the reservoir engineering matters related to this Application?
A. I am.
MR. BRUCE: Mr. Examiner, I tender Mr. Barnes as an expert reservoir engineer.
EXAMINER CATANACH: He is so qualified.
Q. (By Mr. Bruce) Mr. Barnes, could you identify Exhibit 10 for the Examiner?
A. Exhibit 10 is a table of drainage calculations within the pool. It includes all of Apache's wells within the San Andres and a sample of wells operated by other companies within the pool.
Q. Where did you get the data that was used in calculating the --

A. The bulk of the data --

Q. -- drainage areas?

A. -- was provided from the geologist.

Q. Okay. And in going through this, I notice you pulled out the net feet of pay, the average porosity. Now on the other -- on the non-Apache wells, you used the same number. What --

A. I just used --

Q. -- was the reason --

A. -- an average of what our area wells did. I thought that would be a very good representation.

Q. Okay. And if you could just go briefly through this and describe what your average drainage area is.

A. Basically, this just shows a back-calculation of drainage area. The EUR was calculated from rate-cum decline analysis and simply back-calculated into an acres, and you can see within our New Mexico state lease and the other pool samples, we're averaging about 14 acres of drainage.

Q. Okay. There's a few wells that drain close to 40 acres?

A. There are.

Q. But most of them drain substantially less than 20?

A. Yeah, you'll see a little bit of a range, on

occasion you'll see one that drains up to 35 or 40 acres, but on average you're pretty low at 14.

Q. Even Apache's best well, the Number 42, drains only 15 acres; is that correct?

A. Correct.

Q. So in your -- just based on the geology and the engineering that you see, is it reasonable to have two wells per 40 acres in this pool?

A. Yes.

Q. And that would be necessary to -- in some places you might need more than two wells in a 40-acre --

A. Possibly.

Q. So -- Was Exhibit 10 prepared by you?

A. Yes, it was.

Q. And in your opinion is the granting of this Application in the interests of conservation and the prevention of waste?

A. Yes, it is.

MR. BRUCE: Mr. Examiner, I'd move the admission of Apache Exhibit 10.

EXAMINER CATANACH: Exhibit 10 will be admitted.

EXAMINATION

BY EXAMINER CATANACH:

Q. Can you tell me, what do you attribute the different drainage areas to? I mean, some of these wells

are pretty similar in terms of porosity and net pay, but they have substantially different drainage areas. I mean, what do you attribute that to?

A. Probably the current production, just doesn't allot for a high EUR, or they have substantially different EURs.

Q. It looks like the Number 46 is -- that's the best well in terms of drainage?

A. Yes.

Q. 41.6 acres?

A. It's got quite a bit lower net pay, and I would suspect the production and the decline would dictate a higher EUR, giving it the higher drainage area.

Q. Where did you get in these calculations the recovery factor?

A. That's just a standard recovery factor that we use for San Andres, 12 percent.

Q. And that's for what, solution gas drive reservoir types?

A. Yes.

Q. I'm sorry, the bottom part is for wells that are not in the pool?

A. They are in the pool, just operated by other companies.

Q. Operated by other companies, okay.

And is this -- do these wells -- are they pretty representative of the whole area in the pool?

A. They are. It was a random selection, but I picked it throughout the pool. I didn't just pick one pump area.

EXAMINER CATANACH: Okay. I have nothing further.

Anything, Mr. Brooks?

EXAMINATION

BY MR. BROOKS:

Q. Just out of curiosity here, comparing Exhibit 7 and Exhibits 10, Exhibit 7 and Exhibit 10, it seems to me, come to rather different conclusions about the wells from those shown on Exhibit 7.

For instance, the Number 46 is shown with an expected ultimate recovery of 106,000 barrels. It actually looks like its production, its cumulative so far is 9599, and I believe they actually said that it was producing so little they plugged that well back.

When you have a large drainage radius, is that a valid calculation when you're getting that little production from that well?

A. The EURs I calculated were based on rate-cum decline, and I actually don't have those with me, but I can just tell you that's how I calculated the EURs on those.

Q. Yeah. Well, how did you come to the conclusion that the Number -- What generates the conclusion that the Number 46 drains that large an area when it's in that little --

A. Well, it has the lowest net pay.

MR. BROOKS: Okay. Well, I won't pursue the matter further at this time. I'm not fully understanding how your calculations are done, but that's probably not necessary for this purpose.

Thank you.

FURTHER EXAMINATION

BY EXAMINER CATANACH:

Q. Well, the Number 46 was -- did you say it was plugged in the San Andres? Didn't you say it was -- they recompleted to the Grayburg?

A. I would have to defer it -- Yes.

MR. BRUCE: Yes, it was.

Q. (By Examiner Catanach) Okay, so you don't -- you still have a -- you're still calculating an EUR for the San Andres, even though the well is not producing; is that correct?

A. I would -- Yeah, I would assume that the --

Q. Well, I mean, I don't know if it makes any difference, other than I don't know if it should be included --

A. -- included --

Q. -- except that -- I mean, you show a higher drainage area, which is probably going to be not correct for that well.

A. It's possible that when I did the drainage calculations I was using some very early San Andres production that declined a lot faster than what we predicted.

Q. Well, that would -- you know, it would be a smaller drainage area, which would tend to --

A. It would be much smaller.

Q. -- it would tend to support your Application, rather than harm what you're trying to --

A. It would make our average lower.

Q. Yeah, but I --

MR. BRUCE: Mr. Examiner, maybe Mr. Mills could answer, if you have questions.

EXAMINER CATANACH: Okay. Well, maybe he can explain it.

MR. MILLS: If you'll look at the Exhibit 8, refer to graph 46, the well that you were questioning about. If you'll notice, the production goes on pretty good, oil and gas, and then you notice the water jump up through the roof there, about October of '06?

EXAMINER CATANACH: Uh-huh.

MR. MILLS: That's when we opened up the San Andres zone. We believe the San Andres zone is productive, from the swab tests we have.

However, because we've got both zones open, we decided to produce the Grayburg solely by itself. Once the Grayburg has depleted, we will squeeze it off and go back to the San Andres when we have more freedom to tinker with it, basically.

There's too much water production for us to handle with the Grayburg zone. The Grayburg does not do well when you pump water past it. We've seen this in several areas in our field. So we have not completely abandoned the San Andres in the 46. It's just for now.

EXAMINER CATANACH: Okay. But the EUR was calculated from this curve?

MR. MILLS: It's based on production data, yes. And also what you can't see on the curve is, we had swab tests from that zone by itself, not actual production data but swab tests, which gives us kind of an oil-water cut.

MR. BRUCE: But it was producing at one point about 30, 40 barrels a day?

MR. MILLS: Yes, sir.

EXAMINER CATANACH: Okay, nothing further.

Anything further, Mr. Bruce?

MR. BRUCE: No, sir.

EXAMINER CATANACH: There being nothing further, Case 13,911 will be taken under advisement.

Let's take a 15-minute break here.

(Thereupon, these proceedings were concluded at 10:05 a.m.)

* * *

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 13911, heard by me on May 10, 2007.

David R. Catanach, Examiner
Oil Conservation Division

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 May 14th, 2007.

STEVEN T. BRENNER
CCR No. 7

My commission expires: October 16th, 2010