STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BLDG.
SANTA FE, NEW MEXICO

26 August 1987

EXAMINER HEARING

IN THE MATTER OF:

Application of Mobil Producing Texas and New Mexico, Inc., for pool creation and special pool rules, Lea County, New Mexico. CASE 9200

BEFORE: David R. Catanach, Examiner

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Division: Jeff Taylor
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For the Applicant: W. Perry Pearce
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# I N D E X



## E X H I B I T S

MR. CATANACH: Call next Case 9200.

MR. TAYLOR: Application of Mobil Producing Texas and New Mexico, Incorporated, for pool creation and special pool rules, Lea County, New Mexico.

MR. CATANACH: Are there appearances in this case?

MR. PEARCE: If it please the Examiner, I am W. Perry Pearce of the Santa Fe law firm of Montgomery and Andrews. I am appearing in this matter on behalf of Mobil Producing Texas and New Mexico, Inc.

I have two witnesses who need to be sworn.

MR. CATANACH: Are there any other appearances in this case?

Will the witnesses please stand to be sworn in?

(Witnesses sworn.)

TED FLANIGAN,

being called as a witness and being duly sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. PEARCE:

Q For the record, sir, would you please state your name?

A T. Edward Flanigan.

Q Mr. Flanigan, by whom are you employed?

A I am employed by Mobil Oil Corporation.

Q And what are your job responsibilities?

A I am a production geologist for Lea County, New Mexico.

Q Your office is in Midland, is that correct?

A That's correct.

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

A I have not.

Q Would you please for the record state your education and work experience, beginning with your undergraduate degree?

A I received a Bachelor's degree in geology from the University of Missouri in Columbia in 1978; received a Masters in geology and geophysics at the University of Texas at Austin in 1980.

In 1980 I went to work for Mobil Oil in

the Houston Division, working the West Texas area as an explorationist.

Since that time I've had positions in exploration and production geology, as well as in reservoir engineering.

Q Okay, and are you familiar with the application numbered Case 9200 that we're talking about today?

A Yes, I am.

MR. PEARCE: Mr. Examiner, I would request that the witness be recognized as an expert in petroleum geology.

MR. CATANACH: The witness is so qualified.

Q Mr. Flanigan, would you for the record please summarize what we're seeking today?

A We're seeking a new pool designation for a new pool and discovery well in Lea County. Furthermore, we're seeking special field rules calling for 80-acre proration units to be oriented standup of laydown at the operator's option.

Furthermore we're asking that orthodox locations be limited to those within 150 feet of the center of a governmental quarter quarter section.

Finally, we're asking that the pool be established over the northwest quarter of Section 6, Town-

ship 17 South, Range 36 East.

Q All right, sir, and am I correct that after your consultations with the Hobbs Office of the New Mexico Oil Conservation Division you are requesting that this pool be known as the South Shoe Bar Upper Pennsylvanian Pool?

A That is correct.

Q All right, sir. At this time I would ask you to approach what we have hung on the wall as Exhibit Number One and describe that for the Examiner and those in attendance and I'd ask you to speak up so the court reporter doesn't have a problem.

A All right. Exhibit Number One is a map on a scale of 1-to-1000, which shows the discovery well, the Mobil No. 1 Lovington Deep Amoco State in this location with a 2-mile radius circle drawn around it.

We show all the producing wells and dry holes within that circle and then color coded we identify the different producing intervals.

Yellow is San Andres. Blue is Upper Pennsylvanian. Red is the Lower Pennsylvanian Morrow formation. Purple is Mississippian. And finally, green represents the Silurian and Devonian reservoir.

Furthermore, on this map we show all the leaseholders of record, and outlined in orange is the 700-

acre drilling unit which Mobil operates with Yates Petroleum and Amoco Production Company as partners.

Q All right, sir. You pointed when you began that discussion to the discovery well. Give us the name of that well again, please.

A That is the Mobil No. 1 Lovington Deep Amoco State.

Q All right, sir. I would ask you now please to refer to what we have marked as Exhibit Number Two, which is the next thing hanging on the wall and discuss that for us, please, sir.

A All right. Exhibit Number Two is the electric log from the discovery well. Our new pool discovery pay zone is located here. Perforations are from 10,746 feet to 10,794 feet.

The well was potential tested January of 1987 for 326 barrels of oil, 400 MCF gas. The reservoir is a limestone, intergranular (unclear) fracture porosity.

Q Okay. I notice that there is a zone marked Base Shoe Bar Pennsylvanian pay zone above the zone in which this well was perforated.

A Yes.

Q What can you tell us about that zone?

A There are two other wells within the area completed in the Upper Pennsylvanian. Both of these comple-

tions lie within this Shoe Bar Penn pay zone that I've identified.

I'll discuss them more, in more detail later when we look at the cross sections.

Q All right, sir.

A I might add that there is in excess of 300 feet of separation between our new pool discovery zone and any of the other two previous exhibits.

Q And when you say separation, that is a nonproductive interval of 300 feet or more?

A That's correct.

Q All right, sir, thank you. I would ask you at this time to refer to Exhibit Number Three and tell the Examiner and those in attendance what that exhibit is.

A This is a structure map contoured on the top of the Pennsylvanian, Upper Pennsylvanian productive interval. The scale is one inch to 1000 feet and the contour interval is 50 feet.

This map shows that the new pool discovery lies on an anticlinal feature. I feel that structure is important in trapping the oil. I feel also stratigraphy may play an important role.

Also shown on this map is the red -- in red is the laydown 80-acre unit which we ask to assign as the proration unit for the discovery well.

Q All right, sir, I notice to the east and south of the discovery well location there are a number of well spots. Are those well spots wells in other pools?

A Yes, they're all in the San Andres Pool. There are some wells that penetrate deeper than the San Andres. None of those are sufficiently deep to penetrate the Upper Pennsylvanian zone.

Q All right, sir, you mentioned earlier the nonproductive zone between the two Pennsylvanian zones.

I'd ask you now to approach what we've hung on the wall, Exhibit Number Four, and discuss that, please.

A All right. This is a cross section oriented northeast to southwest. I might point out that the dark blue and dark green colors on this cross section do not bear any relation to the light blue and light green on Exhibit One.

This cross section runs, as I said, from the northeast to the southwest. On this section it will run from the Hamon No. 1 Fate B. Well in this location down to the south, southwest, to a Superior State 12-17 Well.

Shown in green on the cross section is our new pool discovery producing zone. The zone is -- the overall gross zone is stratigraphically continuous across the area; however, porosity within the zone appears to be

confined to the two Mobil wells on this cross section and on the other cross section I show the other immediately adjacent Mobil well.

These are the only wells in the area that we see porosity in that zone currently.

In blue I've outlined the Shoe Bar Pennsylvanian producing zone.

The J. L. Hamon No. 1 State B Well produced oil and gas from this zone through perforations shown here.

This well was potentialed in 1969 for a production rate of 203 barrels a day.

Our records show that the wells produced only a total of 483 barrels before this zone was abandoned and the well was converted to salt water disposal.

I might point out that this productive interval is separated by more than 600 feet of tight limestones and shales from our producing zone.

Q Any other features that you'd like to point out to us on this exhibit?

A Not on that one, no.

Q All right, let's take a moment and hang the next exhibit. All right, sir, now would you please approach what we've marked as Exhibit Number Five and discuss that?

A All right, this is a cross section oriented from the northwest to the southeast. On the -- on Exhibit One it will run from this location down through the other Pennsylvanian, Upper Pennsylvanian productive wells and down to ending at the subject discovery well.

Again this cross section shows the (unclear) discovery zone, the overall gross interval being stratigraphically continuous across the area.

But again we see that porosity is developed only in the two Mobil wells. Well, only in the Mobil well immediately adjacent to the discovery well, and the discovery well itself.

Also shown on this cross section is the ARCO, later operated by Western Natural Gas, No. 2 Ramco State Well.

This well was perforated in the Upper Pennsylvanian at this level, some 300 feet above our new pool discovery producing zone. It was initially potentialed for 103 barrels of oil per day in 1954 and has produced a total of slightly over 65,000 barrels of oil to date.

Again I would point out that this well is separate -- or this zone is separated from our zone by approximately 300 feet of tight limestones and shales.

Q Is there anything else you'd like to point out on this exhibit?

A No, that concludes my prepared testimony.

Q Okay, if you'll have a seat for just a minute and let me ask you at least one other question.

Ted, come back for just a second. All right, thank you.

Mr. Flanigan, as part of your responsibilities as a practicing professional petroleum geologist, you have conducted a geological study of this area, is that correct?

A That's correct.

Q And have you formed an opinion on whether the Mobil No. 1 Lovington Deep Amoco State Well is a well within a new oil pool?

A I believe that it is.

Q Do you have -- have you formed an opinion on whether that well is geologically separated from other Pennsylvanian producing zones in the area?

A It's my opinion that the well is indeed separate from any other Pennsylvanian wells in the area.

Q Thank you, sir. I have nothing further, Mr. Examiner.

CROSS EXAMINATION

BY MR. CATANACH:

Q Mr. Flanigan, your two other Pennsylvan-

ian producing wells in the area, those are just producing from the blue section?

A That's correct.

Q Do you know if these wells were tested in the Lower Penn or in the lower part of the Upper Penn?

A There are no records that they have been tested in that zone.

Q But you say that there is no porosity in those --

A The logs that were run in those wells don't show any evidence of porosity or reservoir development in that zone.

Q I think that's all I have for now. You may be excused.

A Thank you.

GLENN M. BANKSON,

being called as a witness and being duly sworn upon his oath, testified as follwos, to-wit:

DIRECT EXAMINATION

BY MR. PEARCE:

Q For the record, sir, would you please state your name and employer?

A My name is Glenn Bankson. I work as a

petroleum reservoir engineer for Mobil Oil Corporation in Midland.

Q Mr. Bankson, have you testified before the New Mexico Oil Conservation Division or the Commission preeviously?

A Yes, I have.

Q And have your credentials as an expert in petroleum reservoir engineering been accepted and made a matter of record?

A Yes, they have.

Q Are you familiar with the subject matter of Mobil's application in this case numbered 9200?

A Yes, I have.

MR. PEARCE: Mr. Examiner, I would tender this witness as an expert in petroleum reservoir engineering.

MR. CATANACH: He is so qualified.

Q Mr. Bankson, I would ask you to look at what we have marked as Exhibit Number Six to this proceeding and describe for us the information shown on that exhibit.

A Exhibit Number Six is a map of the area that we've been talking about. It shows the South Shoe Bar drilling unit and it is the same area as Ted Flanigan was talking about on his maps on the wall.

I've put these in this packet here as just kind of a point of reference for the opinions that are coming later. I'd like to point out that the Lovington No. 1 and the Amoco No. 2, which are shown as just circled dots there, are Silurian or Devonian production and the we;; we'll be talking about primarily in this discussin is the Amoco State No. 1, which is the well that was completed as a discovery well in the Penn.

Q All right, sir, I would ask you now please to turn to Exhibit Number Seven and I would ask you if this is a compilation of data derived on the basis of the drilling and production of the Lovington Deep Amoco State Wells No. 1 and 2?

A It is.

Q All right, sir, and has the information contained on Exhibit Number Seven been utilized and is it reflected on Exhibit Number Eight to this proceeding?

A Yes, it is.

Q All right, sir. At this time I would ask you to refer to Exhibit Number Eight and I would ask you if that shows calculations based upon a pressure build-up test run on this well?

A It does.

Q And how long, over what period of time was that well -- was that test taken?

A The well was shut in just shortly after the Pennsylvanian perforations were first -- before the well was first perforated.

The pressure build-up was over a five day period.

Q All right, sir, and during this five day test period was any boundary effect encountered in the test of this well?

A There was no boundary effect at all.

Q Okay, Mr. Bankson, was the radius of investigation derived from the data and calculation indicative of a drainage area greater than 40 acres?

A Yes. The bottom calculation on this map shows our drainage area that was affected and recognized by this pressure build-up. It shows that the radius of investigation was approximately 744 feet. This, if the wells were drilled on -- on square proration units, it would be approximately 51 acres or greater than a 40-acre drainage area.

Q All right, sir, and based upon the failure to encounter a boundary effect during the running of this pressure build-up test, do you have an opinion as to what the appropriate spacing for the South Shoe Bar Upper Pennsylvanian Pool should be?

A Based on this and some other information

that we're working on here shortly, I believe that we should go -- we should be developing this field on 80 acres rather than on 40 acres.

Q All right, Mr. Bankson, I would ask you to please refer to what we have marked as Exhibit Number Nine to this proceeding and tell us what's reflected on that exhibit.

A The Exhibit Number Nine is a production history graph of the Amoco State No. 1 and its production since -- out of the Pennsylvanian reservoir.

What it shows is that the well came in for approximately 327 barrels on its initial potential and has been flowing, it is still flowing at this time. It flowed or the cumulative production to date is approximately 62,000 barrels.

The -- by projecting this , we anticipate that within the first year of production this particular well will -- will have produced approximately 100,000 barrels.

Q And based upon your experience and with other reservoirs, do you have an expectation or an estimate of the expected ultimate recovery from this well?

A In my calculations I anticipate that this well is going to make about 166,000 barrels, or better.

Q Okay. At this time, Mr. Bankson, I'd

like for you to look at what we have marked as Exhibit Number Ten to this proceeding and describe what that exhibit reflects.

A Exhibit Number Ten is a gamma ray neutron that was run over the productive Penn in this Amoco State No. 1. The reason that I included this in the exhibits is I wanted to bring out the fact that we're talking about approximately a 30-foot reservoir. This -- this, of course, will enter into my volumetric calculations.

Q All right, sir, and, Mr. Bankson, utilizing this 30-foot productive interval in the discovery well, have you calculated original oil in place for an 80-acre spacing unit?

A Referring back to Exhibit Number Seven, about the -- about a little more over halfway down, I've got the original oil in place and my calculations, based on the porosity and the water saturation that we've shown here, in a volumetric calculation I come up with 288 stock tank barrels per acre foot and when this is put on an 80-acre drainage area, an 80-acre proration unit with 30 feet of net pay, I come up with 690,000 barrels, stock tank barrels of oil originally in place.

Q Okay. Am I correct, Mr. Bankson, that if a 40-acre spacing pattern were utilized, the original oil in place would have been calculated to be half of that amount

or 345,000 stock tank barrels?

A That is correct.

Q All right. Mr. Bankson, on the basis of your education and experience as a practicing petroleum engineer, could you relate your estimated ultimate recovery of 166,000 barrels to these two different original oil in place calculations and tell us what that indicates to you?

A The producing mechanism in this -- in the Penn Field here is a solution gas drive and in my experience with solution gas drive type reservoirs the ultimate primary recovery is going to be somewhere between 20 and 30 percent if you've got a good reservoir, which we feel we have here.

Just using that ultimate recovery, in effect the 690,000 barrels per 80 acres, the recovery after one year would be 15 percent and the 166,000 barrels of ultimate primary recovery would be approximately 25 percent. To me that falls within a sensible and believable limits for what you would expect from this type a producing mechanism.

On the other hand, if we take a 40-acre drainage area, and cut the ultimate oil in place in half, we come up with approximately 30 percent of the oil recovered after one year's time and an ultimate recovery of 48 percent.

Now the 48 percent is the calculation indicates to me that this is an unusually high percent of

recovery and it indicates to me that we are draining more than the 40 acres and that the 80 acres drainage area is a more reasonable -- you know, it's an indication that we're draining more than 40 acres looks to me like we're draining at least 80.

Q All right, Mr. Bankson, do you have an opinion on whether 80-acre spacing will effectively and efficiently drain this reservoir?

A I do and in addition to that I believe that developing this reservoir on 80 acres instead of 40 will eliminate the need to drill a bunch of unnecessary wells.

Q Mr. Bankson, is it your opinion as an experienced, professional, petroleum, reservoir engineer that granting this application for pool creation, 80-acre spacing, well location requirements and spacing unit orientation, will be in the best interests of the prevention of waste, the protection of correlative rights, and the conservation of natural resources?

A I do.

MR. PEARCE: I don't believe I have anything further at this time, Mr. Examiner.

CROSS EXAMINATION

BY MR. CATANACH:

Q Mr. Bankson, were the Amoco Well No. 2 or Lovington Well No. 1 tested in this zone?

A No.

Q They were not.

A No, we drilled through. We did take a core in the Amoco No. 2 but we weren't -- there was no test on it.

And, of course, we have logs through this interval which indicate the reservoir is there.

Q Your reserve calculation, that's based on volumetrics, right?

A It's based on volumetrics primarily, and also, we've been keeping a very close record. We've been keeping close records on this particular well, watching the tubing pressure and the gas/oil ratio, and so I'm able to predict within reason when I think it's going ot go on pump, when we're going to go below the bubble point, and certain things like that, so a decline, you know, I've worked on my own decline curve, so that what I've got, I came with the numbers, a close fit to my perception of how it's going to work is, and also it falls within reason of the volumetrics.

Q And the estimated ultimate recovery, that was obtained from the decline curves?

A Yes, that and from the volumetrics, also.

When you first start out like this, of course, you don't have a whole lot to go on and you -- and the first track you have to take is the volumetrics to figure out, you know, approximate reserves.

There is obviously no decline -- let me correct one thing.

There is no decline on this particular well so far that you could just go ahead and decline out. There was, you know, just my working. When I figures it was going to go ahead and go on pump and start to decline after the unit got gas coming in and from that point I just made harmonica decline curves and calculated what I'd estimate the reserves to be.

Q What did you use as a decline percentage?

A Well, I've got a rather steep decline. I've got it here on my -- well, I've got a copy of it here. It's about 15 percent.

Q 15 percent.

A Or, let's see, it's even -- it's possible -- well, I'm sorry. I've got a decline of about 30 percent here on this.

Q For your --

A Well so far it's not declined. The way we've been leaving a choke on the well and keeping it flowing as long as it could, so although it's dropping off a little bit in productive capacity there, it's not a good decline to work with at this point.

Q How did you arrive at that 30 percent decline?

A Well, like I said, I have -- it was a combination, really, of what I felt that the volumetric reserves would be and working on -- working on a decline curve that brought me the right number of barrels and also fit within my perception of when it was going to stop flowing and start on its decline.

Essentially what happens is at the end of the year I've got 100,000 barrels, you know, produced. I predicted at the rate we're going we're going to produce 100,000 barrels on the first year.

And then volumetrics that said that they were -- I was going -- volumetrics gave me the 166,000 barrels and decline, of course, was based primarily on the remaining reserves at that time.

Q Does this formation show any similarities to the other Pennsylvanian formation or did you even look at that?

A I looked around at -- what I -- one of

the other things I tried to do is figure out how many barrels we would get out of this well is to look around at other Pennsylvanian wells around there, and when you look in the reserves of the other wells around you get everything from 4 or 500 barrels ultimate to 300,000 barrels, depending on, you know, just how good a Pennsylvanian reservoir you get. It's just too wide, it's hard to pick a typical Pennsylvanian well from (unclear).

MR. CATANACH: Mr. Pearce, how long are these -- are you requesting these pool rules remain in effect?

MR. PEARCE: Eighteen months, Mr. Examiner.

MR. CATANACH: That's sufficient time to gather some more data on these wells?

A What we paln on -- yes, we'll be probably drilling another well here pretty soon and we can get more pressure data on it to check for interference and satisfy ourselves that the 80-acres is the proper area to drill this in.

Q What was the original bottom hole pressure in this well?

A The original bottom hole pressure was 4043 psig.

Q Did you compare that number to the other

Pennsylvanian wells in the area?

A No, we try to look on scout tickets and everything and we couldn't find enough information to go on.

Q I think that's all the questions I have of Mr. Bankson at this time.

He may be excused.

MR. PEARCE: At this time, Mr. Examiner, I would like to move the admission of Mobil Exhibits One through Ten.

MR. CATANACH: Exhibits One through Ten will be admitted into evidence.

MR. PEARCE: And I have nothing further, Mr. Examiner.

MR. CATANACH: Is there anything -- nothing -- there being nothing further in Case 9200, it will be taken under advisement.

(Hearing concluded.)

C E R T I F I C A T E

I, SALLY W. BOYD, C.S.R., DO HEREBY CERTIFY that the foregoing Transcript of Hearing before the Oil Conservation Division (Commission) was reported by me; that the said transcript is a full, true, and correct record of the hearing, prepared by me to the best of my ability.

Sally W. Boyd CSR

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 9200, heard by me on August 26 1987.

David R. Catanach, Examiner
Oil Conservation Division

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO

12 April 1989

EXAMINER HEARING

IN THE MATTER OF:

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| In the matter of Case 9200 being re-opened pursuant to the provisions of Division Order No. R-8518, which promulgated temporary special rules and regulations for the South Shoe Bar Upper Pennsylvanian Pool, Lea County, New Mexico. | CASE 9200 |

BEFORE: Michael E. Stogner, Examiner

TRANSCRIPT OF HEARING

A P P E A R A N C E S

| | |
|---|---|
| For the Division: | Robert G. Stovall<br>Attorney at Law<br>Legal Counsel to the Division<br>State Land Office Building<br>Santa Fe, New Mexico |
| For Mobil Producing Texas and New Mexico, Inc.: | W. Perry Pearce<br>Attorney at Law<br>MONTGOMERY & ANDREWS<br>P. O. Box 2307<br>Santa Fe, New Mexico 87504 |

# I N D E X



## E X H I B I T S

MR. STOGNER: All right, we have gotten the three OCD cases out of the way, we'll now call Case Number 9200.

MR. STOVALL: In the matter of Case 9200 being reopened pursuant to the Division's -- provisions of Division Order No. R-8518, which promulgated temporary special pool rules and regulations for the South Show Bar Upper Pennsylvanian Pool, Lea County, New Mexico, including provision for 80-acre spacing units.

MR. STOGNER: Call for appearances.

MR. PEARCE: May it please the Examiner, I am W. Perry Pearce of the Santa Fe law firm of Montgomery & Andrews, appearing in this matter on behalf of Mobil Producing Texas & New Mexico, Inc.

I have two witnesses who need to be sworn.

MR. STOGNER: Are there any other appearances in this matter?

Will the witnesses please stand and be sworn at this time?

(Witnesses sworn.)

MR. PEARCE: Mr. Beavers.

Mr. Examiner, at this time before we begin, if I may, let me take a couple of minutes and hang some exhibits on the wall. I think it will allow this case to go more quickly.

MR. STOGNER: Okay, we'll take a little recess about three to five minutes so Mr. Pearce can hang and I can go get a drink of water.

(Thereupon a recess was taken.)

MR. STOGNER: We're on Case Number 9200. Mr. Pearce, you may continue.

MR. PEARCE: Thank you, Mr. Examiner.

JAMES L. (JIM) Beaver, JR.,

being called as a witness and being duly sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. PEARCE:

Q For the record, sir, would you please state your name and employer?

A My name is Jim Beaver and I'm employed by Mobil Exploration and Producing, U. S., Incorporated, in

Midland, Texas.

Q And what are your responsibilities with Mobil, Mr. Beaver?

A Current I am a production geologist and I am handling fields in the southeast New Mexico area.

Q And are you familiar with the case being heard by the Examiner this morning?

A Yes, I am.

Q And have you appeared before the New Mexico Oil Conservation Commission or Division and had your qualifications as an expert in the field of petroleum geology accepted?

A Yes, I have.

Q All right, sir. At this time , Mr. Beaver, if you would, I would ask you to step up to what we've marked as Mobil Exhibit Number One to this proceeding and begin addressing that; however, initially I'd like for you to just make the record clear about why Mobil is here this morning. What are we seeking?

A Mobil is seeking continuance of 80-acre spacing development and we are seeking to establish permanent pool rules for South Shoe Bar Upper Penn Field in Lea County, New Mexico.

Q All right, sir, and do you recall when the temporary 80-acre rules were put in place for this

pool?

A I believe that was in August of 1987.

Q That's when the hearing was, all right, sir. Now let's address Exhibit Number One, please, and highlight the important features of that exhibit.

A Exhibit Number One is a location map for the area surrounding the South Shoe Bar Pool. The scale of this map is such that one inch is equal to 1000 feet. We have identified according to color coding producing formation in all of the completed wells within two miles of our discovery well, which is the Lovington Deep Amoco State No. 1.

Looking at our stratigraphic column the most significant producing horizons in the vicinity of South Shoe Bar include the Devonian in green, Morrow in red, the Upper Pennsylvanian, of which the Canyon is productive at South Shoe Bar, and the Permian San Andres formation.

Q And it is the Canyon member of the Upper Penn in which the wells in this pool are completed, is that correct?

A That's correct.

Q All right, and I notice that there is a red outline sort of in the middle of the large circle on that exhibit. What does that red outline represent?

A The red outline represents the acreage included within South Shoe Bar Upper Pennsylvanian Pool.

Q All right, there are, it appears, four blue well spots within that pool area.

A That is correct.

Q Those are the Upper Pennsylvanian completions?

A That's correct.

Q All right, sir, in addition to that I notice two blue well spots outside the pool area but still within the circle that you've drawn. What are those two wells?

A These two wells are completed in the Shoe Bar Pennsylvanian Pool.

Q One again that's in the Canyon member of that Upper Penn, is that correct?

A Well, it's Pennsylvanian up there, sir.

Q All right, sir. The Shoe Bar Pennsylvanian Pool, what's the spacing on that pool, if you know?

A 40 acres.

Q Okay. We are seeking continuation of 80-acre spacing within the South Shoe Bar Upper Pennsylvanian. Could you relate the two pools and what you think this exhibit demonstrates with regard to spacing?

A This exhibit demonstrates that although

the spacing is 40 acres for the Shoe Bar Pool, that it has not been developed on the 40-acre spacing, and we feel that we are structurally and stratigraphically separate from the Pennsylvanian wells in the Shoe Bar Pool.

Q All right, sir, are there other items you'd like to highlight on this exhibit?

A I might also mention that this exhibit does show the up-to-date lease standings in the area and all the wells whether currently or past productive or dry holes.

Q Okay. Move now, if you would, please, to what we've hung on the wall and marked as Mobil Exhibit Number Two to this case.

A Exhibit Number Two is a structural contour map contoured on top of the Upper Pennsylvanian main pay interval. The horizontal scale for -- the scale for this map is such that one inch is equal to 750 feet. Again you see in the red outline the limits of the South Shoe Bar Upper Pennsylvanian Pool.

This map has a contour interval of 50 feet, by the way, and it was compiled using a combination of seismic interpretation and well control data.

Q Would you describe the primary geological features shown on this structure map, please?

A Yes. The South Shoe Bar Upper Penn Pool

consists of an anticline possessing on the order of 180 feet of vertical closure.

To the northeast of the field production data and log analysis indicates that an oil/water transition occurs at a subsea depth of 6900 feet. Similarly, on the southwest side of the field in our Lovington Deep No. 2 Well log analysis and production results indicate that an oil/water transition zone is topped at an elevation of 6933 feet subsea and you notice we have a 33-foot difference between the oil/water transition on the southwest side and the northeast side and it appears that this is due to hydrodynamic tilting.

Other significant features within this area include the horst block, horst fault block, that this anticline is superimposed on. To the southwest we have mapped from seismic a fault possessing 450 feet of vertical displacement at the Upper Pennsylvanian level and this displacement is such that it is down to the southwest.

Similarly to the northeast our seismic control indicates the presence of a fault bounding the horst and this fault possesses vertical displacement of 100 feet.

I might also mention that we have superimposed our seismic data grid on the map and this is indicated by the long dashed lines interrupted by the small

circles.

Q All right, sir, I notice in the bottom lefthand corner of that exhibit there appears to be trace of cross sections, is that correct?

A That's correct.

Q All right, sir. Looking at that trace, let's turn now to what we've marked as Exhibit Number Three, which is the cross section and could you discuss that exhibit for us, please?

A Yes. Exhibit Number Three is stratigraphic cross section A to A'. This cross section begins approximately one mile to the northwest of the pool and extends southeast to the southeastern or beyond the southeasternmost limits of the pool.

In this cross section and the next one I'll be discussing -- we have hung them stratigraphically on the top of the Upper Pennsylvanian Shale and this permits us to show the correlations much better than structural cross sections.

I might mention that on both these sections the vertical scale on the log is such that one inch is equal to 40 feet. On this section the horizontal scale is such that one inch is equal to 200 feet.

One other thing is that the bright red marker strip that you see along the top of the section de-

notes the limits of Mobil's acreage on this section.

Q All right, sir, looking specifically at that portion of this exhibit which deals with the Upper Pennsylvanian reservoir, and I notice that there is a dark shaded area marked "main pay interval" and then below that "base of Upper Penn reservoir". Could you discuss for us what this exhibit demonstrates about the Upper Pennsylvanian reservoir?

A Yes. You might notice that also we have a color code on these two cross sections. I have colored the nonporous limestone intervals, which are continuous across the field, in a light purple shade. I have colored the continuous shales which traverse the field area in an orangeish color. I have colored noncontinuous shales which interfinger with our porous Pennsylvanian zones in a light gray, and I had shaded the main pay interval as -- in the darker blue, while the upper pay interval is in the lighter blue.

Q Okay. What conclusions have you draw form this exhibit about the Upper Pennsylvanian reservoir?

A What is significantly -- what is significant in this cross section is that following deposition of our Upper Pennsylvanian shale we have a very uniform, nonporous carbonate section deposited across the field area and on top of that we also had a fairly uniform shale

deposited on top of that, and on top of this shale was deposited the main pay interval which the South Shoe Bar Pool currently produces from.

As you can see, this interval does vary in thickness significantly across the field, such that to the northwest we grade from a very thick, relatively coarse section, over to a section possessing about half as much clean lime and porosity and one location to the north of that we go to 100 percent shale.

So we see a stratigraphic transition from porous lime to nonporous lime and shale to the northwest.

Similarly along the field's southeast flanks we see that we go from porous limestone to nonporous limestone in the distance of one well location.

Overlying the Upper -- I'm sorry, the main pay interval of the Upper Pennsylvanian was deposited a shale interval which is continuous over the field and constitutes the vertical shale for the main pay reservoir.

I might also mention about this main pay interval that it ranged in thickness from 5 to 69 feet and that's limestone only within the field and net pay thicknesses range from zero to 60 feet.

The other reservoir interval within the Upper Pennsylvanian is known as the upper pay. This inter-

val is very erratic in thickness and as we can see, it interfingers laterally with shales and the thickness of the limestone interval itself ranges from zero to 39 feet while net pay thicknesses range from zero to 22 feet. This zone has not been drill stem tested or completed in, however, of 8 wells drilled in the field to date we've only seen 3 possessing hydrocarbon saturated porosity in the interval and we feel that this zone does represent a more limited occurrence than the main pay.

I might also mention that I have plotted opposed perforations in two wells in the upper pay interval in South Shoe Bar Field and we are planning some workovers soon of those intervals.

Overlying our Upper Pennsylvanian reservoir complex, again colored in purple, is a relatively nonporous limestone interval within the Wolfcamp and overlying that is a Wolfcamp shale interval also colored in the orange color, denoting continuity across the field area.

Q All right, sir. Other items you'd like to point out to the examiner on this exhibit?

A One other thing I might mention is that since the last hearing Mobil has drilled five wells within the field area and I believe four of those are on this cross section and the results of our drilling program indicate that as previously presented, this is a correlatable

reservoir that does possess significant lateral extent and we feel that the large bulk of the reservoir is found within the pool boundaries.

Q Okay. All right, sir, let's -- I'd ask you at this time to step across the room and approach what we have marked as Exhibit Four to this proceeding and discuss that.

Q This is cross section B to B'. It traverses the field -- this traverses the field from southwest to northeast.

This cross section uses the same color coding as in our previous section with the same vertical scale; however, the horizontal scale is somewhat more compressed where one inch is equal to 300 feet.

This section does show many of the same relationships that we see on our previous section and that we have a very uniformly deposited blanket of limestone across the area. On top of that we had a very uniform -- a relatively uniform shale bed and then on top of this shale was deposited the carbonate reservoir complex which forms our main pay interval.

Q Labeled on that exhibit as main pay interval, is that correct?

A That's right.

Q All right.

A We can see, we have significant thicknesses and variations within the main pay interval grading -- which grades laterally with shale. We have the overlying shale interval, which provides vertical shale, and we also see the main pay interval varies significantly --- I'm sorry, the upper pay interval varies significantly in thickness across this area.

One thing that this cross section does show, however, is that this field has been subjected to a significant degree of structural activity which postdates the deposition of the -- of a Pennsylvanian reservoir complex.

You can see in our well along the southwest edge of our cross section that the correlations are pretty good from there up the field; however, as mentioned previously, seismic indicates that there is a fault with displacement on the order of 450 feet in the Upper Pennsylvanian section.

Similarly, on the northeast edge of the field seismic has indicated that we have a fault possessing 100 feet of displacement in the Upper Pennsylvanian section such that we are down relative to the northeast and it has placed this relatively porous section in both the main and upper pay intervals in the Stanoline No. 1 AC State Well well within the oil -- I'm sorry, the water transition zone

and both of these intervals tested wet on the fishing attempt.

Q All right, conclusions you've drawn from that cross section.

A Well, as I mentioned, we can see a similarity in the correlations, both in horizons above and below, and we have good correlatable shale markers within the interval, good correlatable lime markers, and this does show that we have continuity within the reservoir.

Q All right. Will you refer to what we've marked now as Exhibit Number Five, please, and discuss that for the Examiner.

A Exhibit Number Five is a net pay thickness map of the main pay interval of the Upper Pennsylvanian reservoir and this does not include the upper pay because we have not produced from it.

This map possesses a horizontal scale such that one inch is equal to 750 feet. The contour interval is such that one -- is that of 10 feet, and again you can see the pool boundaries outlined in red for the South Shoe Bar Upper Penn Pool.

This, as we have mentioned previously, this pool is limited by both structural and stratigraphic mechanisms and these are all demonstrated on this map. Stratigraphic mechanisms include a facies change from a

clean, porous limestone up to a shale and nonporous limestone to the northwest.

Similarly, to the southeast we have transition from porous limestone down to nonporous limestone as we've seen in our Lovington Deep Amoco No. 3 Well. The structural mechanisms which -- which limit the extent of this pool include an oil/water transition to the northeast at a subsea depth of 6900 feet, and similarly to the southwest we have encountered the top of an oil/water transition zone at an elevation of 6,933 feet subsea.

I have plotted, also, the location of our seismically defined faults on this map and as you can see to the southwest these faults are located a significant distance away from our pool. To the northeast they generally do not appear to interfere with the lateral extent of the reservoir and one other thing I also want to mention is that the seismic interpretation indicates that within the main body of the reservoir itself there has been no significant degree of faulting.

Q All right, sir. Anything further with regard to that exhibit?

A Yes, there is one final thing I'd like to review quickly.

I have identified by the use of symbols the present and proposed future status of all the wellbores

in the South Shoe Bar Field, such that an open circle represents an active Upper Pennsylvanian oil well, of which there are four.

Similarly, an open triangle represents an active Devonian oil well with no plans for recompletion in any other zones in the future or near future and we have one such well.

An open square represents a Devonian oil well to be recompleted to Upper Pennsylvanian, of which we have one.

And finally, a solid star represents an Upper Pennsylvanian oil well to be recompleted to the Wolfcamp, of which we have one.

Q All right, sir, at this time I'd ask you to return to your seat for just a moment, please.

Mr. Beaver, you've conducted an extensive geological study of this area. I want to ask you, sir, if after that study you believe that the South Shoe Bar Upper Pennsylvanian Pool represents an identifiable oil reservoir of limited horizontal extent?

A Yes, I do.

Q And do you believe that the extent of the South Shoe Bar Upper Pennsylvanian oil reservoir roughly approximates the present pool boundary?

A Yes, I do.

Q Do you believe that it is appropriate for the South Shoe Bar Upper Pennsylvanian Pool to continue to be classified as a separate oil reservoir?

A Yes. Yes, sir.

Q Do you have anything further at this time?

A No, I do not.

MR. PEARCE: Mr. Examiner, I would move the admission of Mobil Exhibits One through Five to this case and I have nothing further of this witness.

MR. STOGNER: Exhibits One through Five will be admitted into evidence at this time.

At this time I have no witnesses -- I have no questions of Mr. Beaver.

MR. PEARCE: He will be available later in the hearing if you develop any questions, Mr. Examiner.

MR. STOGNER: Thank you, Mr. Pearce.

DONALD C. STACKS,

being called as a witness and being duly sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. PEARCE:

Q For the record, sir, would you please state your name and employer?

A My name is Donald Stacks and I'm employed by Mobil Oil Corporation.

Q And in what capacity are you employed, Mr. Stacks?

A Currently a staff reservoir engineer.

Q Mr. Stacks, have you previously appeared before the New Mexico Oil Conservation Commission or Division and had your qualifications as a petroleum engineer made a matter of record?

A No, sir, I haven't.

Q All right, sir, very briefly would you you describe your educational background and work experience as they relate to petroleum engineering?

A I graduated from Texas A & M University in 1979 with a degree in civil engineering, Bachelor's degree.

I went to work for Mobil Oil Corporation in 1979; did some work in civil engineering, and approximately five years ago turned to some field engineering work and two years ago began my service as a reservoir engineer.

Q And during your course of employment as

a reservoir engineer with Mobil have you had responsibility for oil reservoirs in the Permian Basin and southeast New Mexico?

A Yes, sir, I have.

Q And are you familiar with the object of Mobil's appearance at this hearing today?

A Yes, I am.

Q All right, sir.

MR. PEARCE: At this time, Mr. Examiner, I would tender Mr. Stacks as an expert in the field of petroleum engineering.

MR. STOGNER: Mr. Stacks is so qualified.

Q All right. Mr. Stacks, at this time I'd ask you to look at what we have marked as Exhibit Number Six to this proceeding and discuss that exhibit for the Examiner and those in attendance.

A Exhibit Number Six is basically a production performance curve, a composite production performance curve, for wells in the Upper Pennsylvanian reservoir.

The green plot shows the oil production in barrels per day over the course of the life of the field.

The red plot is the GOR. The blue plot is barrels of water per day produced. And in black I show

the timing of the wells as they were brought on line out here in this reservoir.

Q Looking at the bottom of that exhibit, the black line shows that there are currently four wells completed in this pool, is that correct?

A That's right.

Q All right, Mr. Stacks, attached to the exhibit as the second page is a sheet of tabular data. Could you tell us what that sheet represents, please?

A Simply the data, monthly production data, for a composite for all the wells in the Upper Pennsylvanian zone out there. That's cumulative production.

Q So tabular statement of the data reflected graphically on the first page?

A Exactly; exactly.

Q All right, sir. I would ask you to look at what we have marked as Exhibit Number Seven to this proceeding, please, and discuss that for us.

A Okay. Exhibit Number Seven is a pressure build-up history versus cumulative production for the pressure build-ups that we have for the wells that are in this reservoir and if I could step up and show where these wells are located on the map --

Q Thank you.

A Basically we have pressure build-ups in

three wells out there. The first well, we took in the discovery well, the Amoco State No. 1, located here.

MR. STOGNER: And where is -- where are you pointing at, Mr. Stacks?

A This blue dot which is located kind of in the north central part of Section 6, east -- west half of it.

MR. STOGNER: Thank you.

A We have three pressure build-ups for that well that were taken and they are shown on the plot in red here.

Also took a pressure build-up in the Lovington State No. 2 Well, which is located in the south-east corner of -- I guess of Section 1 here. That was taken soon after it was brought on line in January of '88.

In addition, we have another pressure build-up point shown in blue on the plot here and also blue on the map here. It's taken on the Kriti State 31 No. 1, located in the southwestern corner of Section 31.

Q All right, sir.

A This plot basically shows we have pressure depletion being experienced out there. The initial reservoir pressure taken in the discovery well was around 4000 psi. Currently, or the last production or pressure build-up we had shows it to be around 2400 psi.

The green pressure build-up for the Lovington Deep State 2 Well, which is fairly close to the Amoco State 1 Well, it's shown on the map, came out to be around 26-to-2700 psi, and last October we took another pressure build-up in the Kriti State 31 Well soon after it was completed and came up with a reservoir pressure of 3500 pounds.

From this information, the plot shows that we are experiencing pressure communication between wells on the current 80-acre spacing; certainly between the Amoco State No. 1 Well and the Lovington Deep State No. 2 Well, and to a lesser extent on the Kriti State No. 31 No. 1 Well, as evidenced by the fact that pressure is depleted from the original reservoir pressure of 4000 psi to what was taken in the Kriti Well of 3480.

Q All right, sir, any other items you'd like to discuss about Exhibit Number Seven?

A Not at this time, no.

Q All right. Mr. Stacks, at this time I'd ask you to turn to what we've marked as Exhibit Number Eight to this proceeding and I would ask you if you have received from the geologist and compiled from studies which you've performed, certain average reservoir parameters for the South Shoe Bar Upper Pennsylvanian Pool?

A Okay. They're listed here below and

they're obtained, as you say, from log data and PVT analysis.

Q All right, sir.

A Do I need to --

Q No, I'll be real open, what have you done with those average reservoir --

A Okay.

Q -- reservoir parameters?

A From -- from these parameters I've wanted to attempt to determine a volumetric area of drainage per well, average per well, for wells that have been completed in the Pennsylvanian zone out there and what I did was, first off, I determined an original oil in place in terms of barrels per acre from the reservoir parameters that are listed above. I came up with a value of 7,176 barrels per acre.

The next thing I did was to analyze each individual well's performance and through decline curve analysis came up with an ultimate recovery for each well and averaged recovery together, came up with an ultimate recovery total well of 115,000 barrels (sic).

The next thing I did was took the original oil in place value, assumed an 18 percent recovery factor, which is considered an average primary recovery for a solution gas drive reservoir of this type, applied it to

the original oil in place value and came up with a volumetric drainage per well average of 89 acres.

Q Mr. Stacks, the statewide normal spacing for oil pools is 40 acres per well. Based upon your calculation of estimated original oil in place, the calculated average ultimate recovery, and assuming what you found, apparently, from experience and study to be average recovery, do you believe that spacing the South Shoe Bar Upper Pennsylvanian Oil Pool on 40 acres would be an appropriate step for the agency to take?

A No, I sure don't.

Q Okay, could you tell us very briefly why you do not believe that would be appropriate?

A Well, of course, the conclusions of this -- the recovery estimates show that we will probably drain more than 80 acres currently with the wells that we have out there and the pressure evidence also indicates that we are in pressure communication (not clearly heard.)

Q Based upon your study, do you believe it is necessary to develop the South Shoe Bar Upper Pennsylvanian Pool on 40-acre spacing in order to effectively recover all of the oil reserves in that pool?

A No, not on 40-acre spacing, no.

Q Do you have anything further at this time?

A I sure don't.

MR. PEARCE: Mr. Examiner, I have nothing further of this witness at this time.

I would move the admission of Mobil Exhibits Six, Seven and Eight to this proceeding.

MR. STOGNER: Exhibits Six, Seven and Eight will be admitted into evidence at this time.

CROSS EXAMINATION

BY MR. STOGNER:

Q Mr. Stacks, when I look at your Exhibit Number Eight, the original oil formation factor of 1.82, how again did you come up with that?

A That was from PVT analysis taken on the discovery well, the Amoco State No. 1.

Q Did you check that figure with any of the other wells?

A We haven't had any other PVT analysis taken out there, no.

MR. STOGNER: I have no further questions of this witness.

Is there anything further in this case, Mr. Pearce?

MR. PEARCE: Nothing further,

Mr. Examiner.

MR. STOGNER: Does anybody else have anything further in Case Number 9200?

This case will be taken under advisement.

(Hearing concluded.)

C E R T I F I C A T E

I, SALLY W. BOYD, C. S. R. DO HEREBY CERTIFY that the foregoing Transcript of Hearing before the Oil Conservation Division (Commission) was reported by me; that the said transcript is a full, true and correct record of the hearing, prepared by me to the best of my ability.

Sally W. Boyd CSR

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 9200, heard by me on 12 April 1989.

Michael E. Stogner, Examiner
Oil Conservation Division

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO

~~15~~ March 1989
29

EXAMINER HEARING

IN THE MATTER OF:

In the matter of cases called on this date and continued or dismissed without testimony presented.

CASES
9200
9633
9634
9636
9637
9597
9638
9639
9640
9641

BEFORE: David R. Catanach, Examiner

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Division:

# I N D E X

MR. CATANACH: The hearing will come to order for Docket Number 10-89. I'm David Catanach, Hearing Examiner for today's hearing.

We'll call first Case 9200. In the matter of Case 9200 being reopened pursuant to the provisions of Division Order No. R-8518, which promulgated temporary special rules and regulations for the South Shoe Bar Upper Pennsylvanian Pool, Lea County, New Mexico.

This case will be continued to April 12th, 1989.

(Hearing concluded)

MR. CATANACH: Case 9633, the application of Sun Exploration and Production Company for compulsory pooling, Lea County, New Mexico.

This case will be dismissed.

(Hearing concluded.)

MR. CATANACH: Case 9634. The application of Sun Exploration and Production Company for compulsory pooling, Lea County, New Mexico.

This case will also be dismissed.

(Hearing concluded.)

MR. CATANACH: Case 9636, the application of Grand Resources, Incorporated, for statutory unitization, San Juan County, New Mexico.

This case will be continued to April 12th, 1989.

(Hearing concluded.)

MR. CATANACH: Case 9637. Application of Grand Resources, Inc., for a waterflood project, San Juan County, New Mexico.

This case will also be continued to April 12th, 1989.

(Hearing concluded.)

MR. CATANACH: Case 9597. Application of Meridian Oil, Inc., for compulsory pooling, San Juan County, New Mexico.

This case will be dismissed.

(Hearing concluded.)

MR. CATANACH; Call next Case 9638.

Application of Meridian Oil, Inc., to amend Division Order No. R-8882, San Juan County, New Mexico.

This case will be continued to April 26th, 1989.

(Hearing concluded.)

MR. CATANACH: Case 9639. Application of Meridian Oil, Inc., for compulsory pooling, San Juan County, New Mexico.

This case will be continued to April 26th, 1989.

(Hearing concluded.)

MR. CATANACH: Case 9640. Application of Meridian Oil, Incorporated, for compulsory pooling, San Juan County, New Mexico.

This case will also be continued to April 26th, 1989.

(Hearing concluded.)

MR. CATANACH: And the application of Meridian Oil, Inc., for compulsory pooling, San Juan County, New Mexico.

This is Case 9641. This case will also be continued to April 26th, 1989.

(Hearing concluded.)

C E R T I F I C A T E

I, SALLY W. BOYD, C. S. R. DO HEREBY CERTIFY that the foregoing Transcript of Hearing before the Oil Conservation Division (Commission) was reported by me; that the said transcript is a full, true and correct record of the hearing, prepared by me to the best of my ability.

Sally W. Boyd CSR

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. ____, heard by me on March 29 1979.

David R. Catanach, Examiner
Oil Conservation Division