STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

CASE 9999, CASE 10,000

EXAMINER HEARING

IN THE MATTER OF:

Application of Mobil Producing Texas and New Mexico, Inc., for Dual Completion and Downhole Commingling, Lea County, New Mexico; Application of Mobil Producing Texas and New Mexico, Inc., for a New Waterflood Project, Dual Completions, Waterflood Expansion and Two Unorthodox Water Injection Well Locations, Lea County, New Mexico

TRANSCRIPT OF PROCEEDINGS

BEFORE: MICHAEL E. STOGNER, EXAMINER

STATE LAND OFFICE BUILDING

SANTA FE, NEW MEXICO

July 11, 1990

APPEARANCES

FOR THE DIVISION:

ROBERT G. STOVALL
Attorney at Law
Legal Counsel to the Division
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FOR THE APPLICANT:

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ALSO PRESENT:

JAMES MORROW
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I N D E X

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E X H I B I T S

APPLICANT'S EXHIBITS:

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WHEREUPON, the following proceedings were had at 9:16 a.m.:

EXAMINER STOGNER: At this time we will call the next case, Number 9999.

MR. STOVALL: Application of Mobil Producing Texas and New Mexico, Inc., for dual completion and downhole commingling, Lea County, New Mexico.

EXAMINER STOGNER: I'll call for appearances.

MR. PEARCE: May it please the Examiner, I am W. Perry Pearce of the Santa Fe office of the law firm of Montgomery and Andrews, appearing in this case on behalf of Mobil.

I have three witnesses who need to be sworn.

EXAMINER STOGNER: Are there any other appearances in this matter?

MR. PEARCE: As a preliminary matter, Mr. Examiner, I would ask that this case be consolidated with Case Number 10,000. The cases involve largely the same set of exhibits, and I believe for time efficiency the cases can be properly consolidated for hearing.

EXAMINER STOGNER: In that case, I'll call Case Number 10,000 at this time.

MR. STOVALL: Application of Mobil Producing Texas and New Mexico, Inc., for a new waterflood

project, dual completions, waterflood expansion, and two unorthodox water injection well locations, Lea County, New Mexico.

EXAMINER STOGNER: Are there any appearances other than Mobil's in this particular case?

If not, Mr. Pearce?

MR. PEARCE: Mr. Examiner, at this time I would like to move that this hearing be transferred back to the Director's office for a brief period of time so that we can discuss Exhibit Number 1 to Case 10,000.

EXAMINER STOGNER: And what is Exhibit Number 1, Mr. Pearce?

MR. PEARCE: It's celebratory in nature, Mr. Examiner.

EXAMINER STOGNER: In that case, let's adjourn for about 30 minutes and go inspect Exhibit Number 1.

(Thereupon, a recess was taken at 9:20 a.m.)

(The following proceedings had at 9:49 a.m.)

EXAMINER STOGNER: This hearing will come to order.

(Thereupon, the witnesses were sworn.)

EXAMINER STOGNER: Mr. Pearce?

MR. PEARCE: Thank you.

DAN BURNHAM,

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

DIRECT EXAMINATION

BY MR. PEARCE:

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

A. Dan Burnham, Mobil Oil.

Q. Mr. Burnham, what is your employment relationship with Mobil? What do you do for them?

A. I'm a staff production geologist in the Midland office.

Q. And have you previously appeared before the Division and its examiners and had your qualifications made a matter of record?

A. I have not.

Q. All right, sir. Would you briefly summarize for us your educational and work relations that relate to petroleum geology.

A. I have a bachelor's degree in geology from Brigham Young University. I have a -- I've been working on and nearly completing a master's degree in geology from the University of Texas, Permian Basin, in Odessa.

I've been working with Mobil and previously

Superior Oil in oil and gas for approximately ten years. Of that ten years, five of it has been Permian Basin experience and four in southeast New Mexico.

Q. And are you familiar with the Applications filed by Mobil that are being considered today?

A. Yes, I am.

MR. PEARCE: Mr. Examiner, at this time I would ask that the witness be qualified as an expert in the field of petroleum geology.

EXAMINER STOGNER: This witness is so qualified.

Q. (By Mr. Pearce) Mr. Burnham, I'd ask you first to approach what we have marked as Exhibit Number 1 to this proceeding, and we've previously hung it on the wall for convenience, and describe the information displayed on that exhibit.

A. Okay, this is a base map just entailing a portion of the Vacuum field, and within this is a two-mile radius sort of a semicircle around the area of interest which we're trying to inject into six different injection wells for the purpose of injecting into a secondary recovery project in the Glorieta and the Blinebry.

We've outlined in blue around the edges of it here the portion of acreage which is on the Bridges

State lease, and that is the acreage which we'll be involved in as far as the hearing is concerned and the area which we'll be interested in flooding.

These smaller circles are half-mile radius circles, just around each injector.

Q. Those will be discussed later on?

A. Yes, I have a smaller area which is just -- zeroes in on this particular area.

Q. All right. And as I understand it, the blue outline on Exhibit Number 1 is the area we want included in the waterflood project?

A. That is correct.

Q. All right, sir. Let's move over very quickly and address what we've hung on the wall and marked as Exhibit Number 2 to this proceeding. Would you describe that for us, please?

A. Okay, this is a type log for the -- stratigraphic type log for the Vacuum field area. the formations which we're interested in and involved in this hearing are the San Andres, and I've marked it here on the top of the San Andres. This is Well Number 109, which is this well right here.

EXAMINER STOGNER: And what well is that? Could you give me a description?

THE WITNESS: Yes, that's the Bridges State

Mobil Number 109.

EXAMINER STOGNER: And that's in the southeast of the southwest of --

THE WITNESS: -- Section 24.

EXAMINER STOGNER: Thank you.

THE WITNESS: The top of the San Andres is marked here, the Glorieta. The zone which we are producing in currently -- The field pays in 13 different pay horizons. The ones which we're interested in here is the San Andres, the Glorieta. The Glorieta includes the Paddock formation and also the Blinebry. Those three zones.

The zones which we are interested in in commingling and also injecting into for purposes of secondary recovery is this Glorieta zone which includes the Paddock and also the Blinebry zone.

Q. (By Mr. Pearce) All right, sir. I'd ask you please to return to your seat. Let's look at what we've marked as Exhibit Number 3 to this proceeding. Would you discuss that for us, please?

A. I'll let him get it out there. Okay, you see that blue outline around the acreage which is involved in it. This is just a smaller version of that map up there. In red is indicated -- are the injectors, proposed injectors. We have two wells, the 602 and the

601 wells, which will be -- They are proposed injectors, will be drilled --

Q. Okay, let's locate the 601 and 602.

A. Okay, that's in Section 25, just in the north portion of it, on the bottom part of the map.

Q. The southern area of the proposed waterflood project?

A. That's correct. Those are the two proposed drilled wells, and then the other wells are wells which would entail a workover and just a conversion into an injector.

Q. We will discuss this later, but am I correct that Wells 601 and 602 are the unorthodox-location wells that we're going to discuss today?

A. That's correct.

Q. All right, sir.

A. Highlighted, also circled in a pink, I guess it is, color is Well Number 36, and that is the well which we are asking for application to commingle in production in the Glorieta and the Blinebry zones.

EXAMINER STOGNER: And that is Case Number 9999; is that correct?

MR. PEARCE: That's correct, Mr. Examiner.

EXAMINER STOGNER: All right, thank you.

Q. (By Mr. Pearce) All right, sir. Let's look

at Exhibit Number 4, please.

A. Okay, Exhibit Number 4 is the Glorieta production map. This is just a production map on the Glorieta zone only. All the circles colored green are wells which have produced, and above it is a total cum figure in thousand barrels, and below it is the current producing rate in barrels of oil per day.

Q. Okay. Exhibit Number 5?

A. Number 5 is a production map in the Blinebry only, and again it has the same figures. Above it is the cum production in thousand barrels, and below it is the current rate of producing -- production.

Q. All right, sir. Let's walk through the present production rate of those Blinebry wells and highlight the current producing status of those wells, please.

A. Okay. As you can see, most of these producing wells -- Most of them are not producing any longer. In fact, there's only two producing wells. One is producing -- Three producing wells. One is producing two barrels a day. The Number 38 in the Section 26 northeast quarter is only producing two barrels a day. And the largest producer is Number 27, just below that one, is producing 19 barrels of oil per day.

Q. All right. Thank you.

A. To the far west side of the map there.

Q. Exhibit Number 6, if you would, please?

A. Exhibit Number 6 is a pretty busy map. We've color-coded it. Again, this is a kind of repeat of the other two maps, but it kind of shows what we are interested in doing in the Glorieta and the Blinebry as far as a waterflood.

The Glorieta producers, again, are in green. the Blinebry producers are in purple. And in the orange are wells which have produced both from the Blinebry and the Glorieta. These wells aren't necessarily commingled or dual-completed, or they were produced at separate times.

There are two wells which are commingled currently, at this time, which have been approved in the last year or so, and that is the Marathon McCallister State Number 9 and the McCallister State Number 6, which is directly south of the blue line there, just south of our acreage.

In the red again are the proposed injectors which we would like to propose, and also again the locations which are in an optimum spot to put together an inverted five-spot pattern for additional recoveries.

Q. Exhibit Number 7, if you would, please, Mr. Burnham.

A. Okay, Number 7 is a color-coded map. As I mentioned before, this produces -- This field produces from many horizons.

This is the Abo in blue. The Abo is, of course, below the Tubb, just below is that zone. We have a large waterflood out there, North Vacuum Abo unit. And we've color-coded in blue those producers -- and injectors, they're both together.

And the purpose of the red triangles to the north portion of the flooded area are a portion of the Application. We're interested in dual-completing injectors with two strings of tubing, dual injecting into the Glorieta and also into the -- currently into the Abo.

Q. All right, sir. For clarity, as I understand it, we're proposing to have a dual injection string, one injecting into the commingled Glorieta and Blinebry, and a separate string continuing to inject into the Abo; is that correct?

A. That is correct.

Q. All right, sir. Let's look, please, at Exhibit Number 8.

A. Okay, Exhibit Number 8 is, again, another

formation. This is the San Andres on top of the Glorieta. These are the San Andres producers shaded in brown, the 601, 602 wells shaded in red. And the injectors are also -- We are asking for application to inject into the San Andres formation at these two locations only.

This area is currently under -- The hatched line that runs around the lease there is the -- our portion of the Bridges State Co-op waterflood, which is currently under waterflood and has been for -- since 1930. I believe it was the first waterflood in New Mexico.

So this would be -- What we're asking for application for is to inject into the commingled Blinebry Glorieta with one string of tubing, and then with the other string of tubing inject into the San Andres. So they're totally separate.

Q. All right, sir, let's look at Exhibit Number 9, please.

A. Okay, Number 9 is just a structure map over the top of the Glorieta. You can indicate the anticlinal nature of the Vacuum field, and it's plunging to the north and the northeast.

Q. And once again, the 36 well, the proposed commingled producer, is highlighted with a pink circle.

Is there anything else that you'd like to highlight for the Examiner on this exhibit?

A. The reason we are trying to recomplete and commingle the 36 well is the well just directly next to it to the east of it, the Number 112, was an old Glorieta producer. It is now an Abo injector, and it was not suitable for a producer at that location. We'd like to just recomplete the Number 36 well into a producer.

Along the edge of this, to the -- very direct edge to west of this location, we have a oil/water contact/transition zone in the Glorieta, and we're looking at, you know, picking up an optimum location just in that area for efficient recoveries.

Q. Okay. All right, looking at Exhibit Number 10 -- let's unfold that, please -- which appears to be a cross-section, would you describe that for us?

A. Okay, this is a structural cross-section running east-west. I've highlighted the San Andres, the Glorieta and the top of the Blinebry. This indicates just basically the structural nature. It is not -- not a lot of structure out there. And what we're showing here is just that we have indicated the perforations on the existing Glorieta wells and also the proposed 602 well which would be drilled in a

location between the 112 and 106.

Q. Okay, for clarification, looking at Exhibit Number 9, the first well on the cross-section, the westerlymost well, is entitled the Mobil Bridges State Number 4.

A. That's right.

Q. Looking at Exhibit Number 9, is that the well directly on the minus-1900 contour line?

A. That's correct.

Q. Thank you.

A. The very farthestmost west well.

Q. Anything else on A/A-prime?

A. I guess just what we're looking at here is, we're trying to inject, of course, into the Glorieta and the Blinebry together.

As you'll hear later testimony from Mr. Moshell, the Blinebry zone is marginal economicwise as far as production, and we're looking at only about a 500-foot, at the most, difference in actual stratigraphic difference in -- depthwise between these two intervals. Pressure differences should be minimal.

Q. All right. Let's look at B/B-prime, please, Exhibit Number 11.

A. Okay, B/B-prime is just another structural cross-section similar to the other one. This just runs

north/south.

The farthest south well is the McCallister State Number 10, on the left-hand side. And the well just next to it, the McCallister State Number 9, the second well to the left on the southern portion, is one of the wells which is commingled at this time in the Blinebry and the Glorieta for production purposes.

Q. That's a Marathon?

A. That's a Marathon well, yes. And we have hatched in here our proposed 601 well, injector.

Hatched on here also is a rough estimate of the oil -- original oil/water contact from the original wells in the Glorieta.

Q. Okay. Exhibit Number 12, C/C-prime, please?

A. C/C-prime is an east-west stratigraphic cross-section. Yours may not be colored up. I'll just show you -- This one's colored up. I'll give you this one.

This is just a stratigraphic cross-section, just to indicate the discontinuous nature of the carbonate reservoirs. This is very typical of carbonates where you have porosity coming and going within the zone. The oil/water transition zone is marked on there, and just trying to illustrate here that even though wells at this 40-acre spacing

encounter pay within one well, they -- That same pay is not always equivalent in another well offset.

And marked on the left-hand side is the oil/water transition zone, the heavy line at the very bottom portion that skews across the page there.

Q. Mr. Burnham, at this time do you have anything further to present --

A. No --

Q. -- of a geological nature?

A. -- nothing further to present.

MR. PEARCE: Mr. Examiner, I have no further questions of this witness. He is available for your questions now or will be available later.

EXAMINER STOGNER: I'm going to reserve any questions until later, Mr. Pearce.

Mr. Stovall, do you have any questions?

MR. STOVALL: I just have a couple questions, just to clarify some things that were said.

EXAMINATION

BY MR. STOVALL:

Q. On Exhibits 6 and 7, if I may unbury these from our stack here, look at Well 119, I believe it is.

A. Okay.

Q. It's got a triangle around it, which I assume means it's an injector; is that correct?

A. That's a proposed Blinebry-Glorieta injector, that's correct.

Q. Okay, now my -- That's why I want to clarify it, because on your Exhibit Number 6 it is not colored, and you refer to the red wells as being injectors. Is that an oversight, or is there a reason it's not colored?

A. 119 is not a producer in the Glorieta, has never produced in the Glorieta.

Q. Oh, okay. So the red --

A. It was drilled --

Q. -- the red --

A. -- it was drilled --

Q. -- is an indication of producer; is that what you're saying?

A. Well, no. On this map the green is shaded for Glorieta producers only.

MR. PEARCE: And he's referring to Exhibit Number 6.

THE WITNESS: Right, Number 6.

Q. (By Mr. Stovall) I don't think that's -- That doesn't look the same. Is that Number 6?

A. Yes, that's my Number 6.

Q. Well, I'm going to have to put on my glasses and make sure I'm seeing what I'm --

A. It's multi-colored.

Q. The 119 is colored in Number 6, then?

A. It's red, yes, as an injector.

Q. Okay, it was not red on our exhibit. That's why I was questioning that.

A. Oh, okay.

Q. And I think that answers the question.

A. It is a producer in the Abo only, and that's where it's produced. That's why it's coded blue on the other --

Q. Now, is Number 6 -- It wasn't colored at all when you referred to red as injectors in that.

A. Okay.

Q. Apparently it was a mapping error, so that clarifies that.

The only other question I had was on your production map -- Let me see which one that is. Number 5 --

A. Okay.

Q. -- you identified two wells that are currently producing from the Blinebry, and I notice Number 13 --

A. Yes, there's --

Q. -- appears to have a number under it.

A. Yeah.

Q. Is that a --

A. It's marginally producing. There's three wells. That's an oversight on mine.

MR. STOVALL: Okay, that's all I have.

EXAMINER STOGNER: Mr. Pearce, you may continue.

MR. PEARCE: Subject to recall, I would call Mr. Mark Moshell at this time.

MARK MOSHELL,

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

DIRECT EXAMINATION

BY MR. PEARCE:

Q. Sir, for the record, would you please state your name and your employer?

A. Mark Moshell, Mobil Oil.

Q. And Mr. Moshell, what is your job title with Mobil Oil?

A. Senior staff reservoir engineer.

Q. Mr. Moshell, have you previously appeared before the Oil Conservation Division Examiners or Oil Conservation Commission and had your qualifications as an expert in the field of petroleum engineering made a matter of record?

A. Yes, I have.

Q. And are you familiar with the Applications filed by Mobil that are being considered today?

A. Yes.

MR. PEARCE: Mr. Examiner, at this time I would ask that the witness be qualified as an expert in the field of petroleum engineering.

EXAMINER STOGNER: Mr. Moshell is so qualified.

Q. (By Mr. Pearce) Mr. Moshell, before we look at your exhibits, I'd like for you to summarize for us why Mobil has filed these Applications and what it's seeking to do.

A. We seek to increase recovery from the San Andres, the Glorieta and Blinebry reservoirs under the Bridges State lease by making maximum use of the available wellbores and making maximum use of the proposed 601 and 602.

Dan previously mentioned there are numerous pay zones. I believe 13 different ones have been identified on this structure. And as you can see from the base map, many well locations or pads, as we call them, have three or four wells, most of which are still producing from different zones.

This field has been producing since the early 1930's, and even though the San Andres waterflood has

been underway since 1958, there are still oil reserves to be recovered by additional injection locations and, in the case of marginal reservoirs, by commingling, extending the economic lives of those marginal reservoirs.

The largest reservoir in terms of cumulative oil production on this structure we call Vacuum that is not under any type of secondary recovery is the Glorieta. That is the dog that wags the tail, so to speak, here.

The Blinebry is a marginal zone which will never be waterflooded by Mobil alone. As shown on the production cumulative maps, the cums are a lot smaller than the Glorieta or San Andres, and we are seeking to combine downhole this -- these injectors -- so that recovery -- additional recovery in the Blinebry will be economic.

In the San Andres, I will show on some upcoming exhibits that even though this is a old flood, increased density has proven to be effective in economically recovering additional reserves.

Q. Okay, ready to turn to exhibits?

A. Yes, sir.

Q. All right. Let's look, please, at what we've marked as Exhibit Number 13.

A. Yes, sir.

Q. Would you describe that exhibit for us, please?

A. These are three different graphs, all having a common X coordinate of time in years.

The topmost graph is water cut percent, in blue, versus time.

The --

Q. Water cut -- Okay, go ahead, I'm sorry.

A. The second graph on that -- excuse me, second curve on that same graph is number of wells on production. We currently have eight Glorieta producers still active.

Moving to the middle graph on this page is gas/oil ratio in thousands of cubic feet per barrel versus time, showing that this is a typical solution gas-drive reservoir. There is some evidence of minimal water influx, but by no means could it be called a water-drive primary mechanism.

The lower and final graph on this page is oil rate in green, gas rate in red, water rate in blue, versus time. Production began in 1963 on this lease and was fairly constant at 600 to 700 barrels a day from 1966 through about 1972. This was primarily due to proration.

A combination of declining productivity and removal of proration from that point results in a fairly typical solution-gas decline. We are producing approximately 80 to 90 barrels a day from those eight active producers on this lease, and I classify this as a lease in an advanced state of depletion.

Q. All right, sir. Let's look, please, at Exhibit Number 14.

A. Fourteen is a similar graph. The order of the data presented is altered slightly. This is the Blinebry production, total from the Bridges State lease operated by Mobil.

Starting at the top I have shown oil rate in green, water rate in blue, and I have omitted the gas rate but it's reflected in red on the lowest, in terms of gas/oil ratio; it's fairly insignificant.

These wells were not as affected by proration because they have been lower rate during their entire lives. The permeability is lower than the Glorieta, the net-pay thickness is lower, and I have -- as I've previously said, it's just a secondary objective here compared to the Glorieta.

The water cut, as shown on the second portion of the graph in blue, has remained in the neighborhood of 20 percent throughout its life.

And the gas/oil ratio, although it has fluctuated, has been around 2000 cubic feet per barrel throughout its life. This is also indicative to me of a solution gas-drive reservoir. Both this and the Glorieta will most likely benefit substantially from waterflood.

Q. For clarification, Exhibits 13 and 14, as I understand it, represent lease production totals; is that correct?

A. Correct.

Q. And looking at Exhibit Number 1, which is on display, the waterflood area itself is significantly smaller than the lease total area; is that correct?

A. Yes.

Q. All right. Let's look now at Exhibit Number 15, and would you describe that for us, please?

A. This, again, is three different graphs on one page, rate versus time. This is for only a portion of the San Andres reservoir. It has to do with those producers in Section 25, wells Number 14, 16, 176 and 178.

There are other wells completed in the San Andres in this section, but they are either now water injectors or are temporarily abandoned or have been plugged.

This is not a complete history. It only goes from 1961 through early 1990. This reservoir was discovered in 1929 and has produced since the 1930's.

I'll bring your attention to the topmost graph. The green curve starts near the rate of nine barrels per day in 1961 and declines down near three barrels per day until 1972 -- 1973, excuse me.

Shortly thereafter, Wells Number 176 and 178 were drilled on 20-acre density near the south lease line, and production improved substantially: Approximately 60 barrels a day initially, and then over the period until 1981 it declined to about 20 barrels a day. I'll remind you that this is always illustrating the sum of these four wells' production.

In the early 1980's, in cooperation with Texaco, Central Vacuum unit, Mobil entered into a lease line injection system, drilling new injectors. And that effort was successful again, even though this reservoir was nearing 50 years old at that point, in rejuvenating production up over 200 barrels a day from these four wells. Since the peak in about 1983 of over 200, it has declined somewhat and is now producing approximately 70 barrels of oil per day.

At over $300,000 for a wellbore, it is unlikely that Mobil would inject -- drill and inject

into the San Andres in these locations as a single, but by utilizing the 601 and 602 wellbores, which are primarily for the Glorieta, it is feasible to recover additional San Andres reserves, if we were able to dually complete in the San Andres.

Just to complete the exhibit presentation, the second graph in the middle is the water cut shown in blue, and it reflects 40 to 80 percent with some fluctuations up until 1982 when the water cut dropped significantly as the oil response I previously mentioned was experienced. The water cut now is up above 85 percent, in the 90-percent range, and we seek to lower that water percentage and increase the oil cut by the injection into the San Andres in 601 and 602.

The final graph on this page is red, gas/oil ratio at the bottom, and it shows fluctuation over the early life presented here. But in 1982 you see a significant lowering in the gas/oil ratio, which represents repressuring of the reservoir, driving the gas back into solution in the oil, and is in part responsible for that good oil recovery.

We seek to duplicate this effort, which is shown here, driving oil from the south to these injectors, 176, 178, 14, and to a lesser extent 16, by injecting from the north in 602 and 601. And by

injecting on a 20-acre density, our well-to-well zone continuity is expected to be improved, as we experienced here.

Q. Are there other items you'd like to highlight for the Examiner?

(Off the record)

Q. (By Mr. Pearce) I would ask you, Mr. Moshell to please refer to what we've marked as Exhibit Number 3 for convenience, and I want you to address for me, please, the unorthodox locations that are being selected for wells 601 and 602. How were those well locations picked?

A. The locations are a combination of attempts to maximize pattern efficiency in the Glorieta, secondarily in the San Andres, and thirdly in the Blinebry.

If you can visualize 601, to start, it is the center of an inverted five-spot in the Glorieta with, to the southwest, 111 producer, going to the southeast 102, northeast 110, northwest 106. It is approximately in the center of that four-producing-well area.

Because there are a limited number of wells still producing here, if we were to convert an existing well to injection in the Glorieta, it would take that well out of the picture, so far as a point of

production, and it would not achieve as symmetrical a pattern as these unorthodox locations.

Now, 602 is a very similar case. There are three active producers in a five-spot location around it, and we seek authority to produce Number 36, which will complete an inverted five-spot location there.

Q. Highlight for us the three wells currently.

A. In the 602 pattern, in addition to 36, Wells Number 103 down southwest, southeast is 111, northeast is Well Number 106.

In the Blinebry initially, we expect to see production increases in wells number 13 and 36. If we -- When we do, we will probably be back here at the Commission to expand this flood and to seek other pattern-injection locations.

I've already spoken a little bit about the San Andres, so I won't go into that in any more detail unless there are questions.

Q. Okay, other items?

A. (Shakes head)

Q. Mr. Moshell, you've spent a good deal of effort collecting and reviewing data on this Application. I would ask you now if in your opinion the granting of these Applications is in the best interest of the prevention of waste and the protection

of correlative rights?

A. Yes.

Q. All right, sir. Do you have anything further at this time?

A. No, sir.

MR. PEARCE: All right, sir.

Mr. Examiner, that's all the questions I have of this witness at this time. I have, again, one more witness, if you would prefer to hold questions for Mr. Moshell or if you have questions for him at this time.

EXAMINER STOGNER: I'm going to reserve my questions for Mr. Moshell afterwards.

Are there any questions, however, of this witness?

If not, he may be excused at this time. However, I may recall him later.

Mr. Pearce?

(Off the record)

MR. PEARCE: Thank you.

DONNA ELWOOD,

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

DIRECT EXAMINATION

BY MR. PEARCE:

Q. For the record, would you please state your

name and your employer?

A. My name is Donna Elwood, my employer is Mobil Oil.

Q. Ms. Elwood, what are your responsibilities with Mobil Oil?

A. My responsibility is an operation engineer in the Vacuum field, Lea County, New Mexico.

Q. And as an operations engineer for Mobil Oil, have you previously appeared before the New Mexico Oil Conservation Division or Commission and had your qualifications accepted and made a matter of record?

A. No.

Q. Would you briefly describe for us, please, your educational and work experience as it relates to the field of petroleum engineering?

A. I have a bachelor in petroleum engineering from Texas A&M University, I worked a year and a half as an operation engineer in Texas, I've worked the past two years as an operation engineer over this same field here in New Mexico.

Q. And are you familiar with the Applications filed by Mobil being considered today?

A. Yes.

MR. PEARCE: Mr. Examiner, at this time I would ask that Ms. Elwood be qualified as an expert in

the field of petroleum engineering.

EXAMINER STOGNER: Ms. Elwood is so qualified.

(Off the record)

Q. (By Mr. Pearce) Miss Elwood, I would ask you, please, to refer to what we have marked as Exhibit Number 16 at this time, please, and describe that for the Examiner and those in attendance.

A. Okay. Exhibit 16 is a wellbore sketch of the Bridges State 36. The purpose of my discussion is just really discuss how the well will be completed.

Bridges State 36 is located in Unit D of Section 25. It is currently a shut-in San Andres producer. By the sketch, we propose to squeeze off the San Andres with cement, and downhole commingle the Glorieta and Blinebry through one tubing string.

On this same location as marked, and Dan had mentioned earlier, there has been separate Blinebry and Glorieta production, and by commingling this in one wellbore we will be able to prevent waste.

Q. Any unusual equipment arrangement in this well?

A. No, this well is a standard rod-pump well, tube and anchor, 2-7/8 tubing, one string of tubing. I might mention, in the C-108 Application -- I'm sorry,

not the C-108, the downhole commingle application -- by a fluid-level estimate the two zones are within 200 pounds of each other, so I feel there will not be a cross-flow problem.

And as Dan mentioned earlier, just south of this, in McCallister State, Marathon has recently and successfully downhole commingled two wells in these same two zones.

Q. Anything else on Exhibit Number 16?

A. Not from me.

Q. Let's look at Exhibit Number 17, please.

A. Exhibit 17 references the two unorthodox well locations. This is the sketch of Bridges State 602. 601 will be quite similar.

This well will be completed in three zones. One tubing string we will inject to the proposed Grayburg-San Andres perfs; the other tubing string will be used to downhole commingle injection to the Glorieta and Blinebry.

As you can see, there will be packers isolating the downhole commingled zones from the San Andres thus to prevent cross-flow, and there will be an annulus to monitor pressure.

Q. Okay. Ready for the next exhibit?

A. I might mention one more thing.

Q. Okay.

A. In the original Application for the unorthodox well locations, we have requested a TD on the Bridges State 601 of 6400 feet. We would like to extend that to 6800 feet, which is the depth we also propose for 602.

These two locations are unorthodox, not only to complete a symmetrical pattern, but also due to constrictions of pipelines and flow lines the pads had to be moved.

Q. Okay. Let's look at Exhibit Number 18, please, ma'am.

A. Exhibit 18 is a wellbore sketch of the North Vacuum Abo Unit Number 109. This well is currently in the North Vacuum Abo Unit as a freshwater injection well. This well is typical of the four wells located in Section 24 that we are asking for dual completions as well.

The sketch shows we are currently injecting into one zone, the Abo, through one tubing string. We are proposing to go into the well at Glorieta and Blinebry, downhole commingle those, and inject through a second tubing string water into those two zones.

The 109 completion, as I say, will be the same on the proposed Bridges State or North Vacuum

Abo -- The two names are synonymous -- 116, 119 and 204.

Q. Anything else on those exhibits?

A. No.

MR. PEARCE: All right. Ms. Elwood, we have collected and submitted with the Application a substantial amount of information in the form of attachments to the Form 108.

Mr. Examiner, I have additional copies of the 108 which I will mark as exhibits to this proceeding if you'd like us to, or if you would prefer to minimize the amount of paper in the Commission's file, I'll be happy to have you work off of the -- refer to the information in that.

We will not be referring to much of that information specifically, but obviously that is available to you.

EXAMINER STOGNER: Are there any significant changes, Mr. Pearce?

MR. PEARCE: There are not, sir.

EXAMINER STOGNER: And if I remember right -- or, I'm sorry, I have them here in front of me. There were two C-108's prepared, one for the four wells, 109, 116, 119 and 204; is that correct?

THE WITNESS: Yes.

EXAMINER STOGNER: And the other one was for the -- Another one, there again, combined for the 601 and 602 wells. We do have those, and let's just refer to the Application, Mr. Pearce.

MR. PEARCE: All right, sir.

Q. (By Mr. Pearce) Ms. Elwood, at this time part of the C-108 Application process requires certain water analysis. Have you tested the compatibility of waters in the formation with injected sources to determine whether or not problems should be expected?

A. Yes, we have tested it, and we find no compatibility problems with the mixing of these waters.

We are proposing to be permitted for produced or freshwater injection. Our freshwater source is Ogallala, yet our preference is freshwater for two reasons: First, the freshwater is a cleaner fluid, less total dissolved solids that might otherwise reduce the permeability and thus prevent -- cause waste by reducing recoverable reserves. And second of all, the freshwater is available in the quantities we need. We currently only produce 115 barrels of produced water from the Glorieta and Blinebry, which is much lower than the amount needed to flood these zones.

Q. But you have performed compatibility tests on both sources of water; is that correct?

A. Yes.

Q. All right. Let's look, now, please, at what we have marked as Exhibit Number 19 to this proceeding, ma'am. Could you describe that?

A. Exhibit 19 refers to, on the Application C-108, number 6.

We have in your Application a tabular form of all the wells within a half-mile radius of the proposed injection wells, and your requested data such as casing depths, cement, so forth. Exhibit 19 covers what data was not already in the original permit.

I might add, we are still -- That was a hindsight on our part, and we are still collecting a few wells that will be presented to you this afternoon.

Q. Okay, and so Exhibit 19 is a supplement to the information in the Applications that deals with completion of these wells; is that correct?

A. Yes.

Q. Do you have anything further at this time?

A. One thing to mention from an operational standpoint, since this area overlays our North Vacuum-Abo unit, Mobil's investment and thus the economics of the entire project are that much greater because we can use an existing injection system, existing wellbores, existing freshwater wells and existing injection lines.

That makes the recovery and the whole project of the Glorieta, San Andres and Blinebry extensions that much better.

Q. Anything further?

A. That is all.

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

I would move the admission of Mobil Exhibits 1 through 19 at this time. And this witness is available for examination.

EXAMINER STOGNER: Exhibits 1 through 19 are admitted into evidence, and we'll also take notice of the C-108's for both these Applications.

MR. PEARCE: Thank you, sir.

EXAMINATION

BY EXAMINER STOGNER:

Q. Miss Elwood, let me make sure I understand Exhibit Number 19. This will be supplemented further later on this afternoon?

A. Yes, sir. That includes approximately a third of the wells in the area of interest. The total list of the wells was in the original C-108 Application. Some of the data was left off, the data on Exhibit 19. We will need to collect that data for the remaining 50 or so wells and present it to you this

afternoon.

EXAMINER STOGNER: Okay. Mr. Pearce, I'll hold the record open on Exhibit 19 pending that information.

Q. (By Examiner Stogner) Miss Elwood, in your preparation of Exhibit 19, are there any wells within the half-mile radius of review of these six injection wells where there is open cement in the proposed injection zones?

A. No, sir.

Q. And that includes all the zones? As a matter of clarification -- I'm sort of stumbling here -- is the Paddock a part of the -- Is that a separate pool or separate formation? Anybody?

MR. PEARCE: Mr. Examiner, at this time let's allow our geologist to address that question.

MR. BURNHAM: That's a confusing problem. The Paddock is -- Yes, it is part of the producing zone. It is part of the Glorieta pool, Glorieta field --

MR. PEARCE: As defined by OCD?

MR. BURNHAM: It was defined, and from the top of the Glorieta to the top of this Blinebry marker separated in 196- -- early Sixties when this field was discovered, and a separate pool was assigned in this

zone.

Most of the production, 99 percent of the production, is out of the Paddock. It's always been called the Glorieta, so it is the Glorieta pool. The Blinebry was defined as being 275 feet above this marker in the Bridges State 95 well, which is just right here.

EXAMINER STOGNER: And what section is that, what quarter section?

MR. BURNHAM: That's in Section 26, so it would be the southwest quarter -- southeast quarter, excuse me.

EXAMINER STOGNER: Southeast quarter, southeast quarter, it appears.

MR. BURNHAM: That was by OCD, and that's the definition of the top of the Blinebry in this area.

EXAMINER STOGNER: Okay, thanks for clarifying that for me.

Q. (By Examiner Stogner) I'm referring now, Miss Elwood, to Exhibit Number 17, which is your schematic of the 602.

A. Okay.

Q. Will that be plastic-lined tubing in both strings?

A. No, sir, we are proposing, as mentioned

earlier, freshwater injection. That's what we use, bare tubing, which we also currently use on our Abo waterflood.

Q. How about in the present Bridges-Vacuum-Grayburg-San Andres waterflood?

A. That waterflood does have cement-lined, plastic-coated or Duolining, which is a fiberglass lining.

Q. But in these two wells, as far as the Grayburg and the San Andres injections, that will be fresh water?

A. Yes.

Q. And therefore you're requesting a waiver for the lined tubing; is that right?

A. Yes, sir.

Q. In both the 601 and 602?

A. Yes. We've had the freshwater injection on the North Vac in a number of units since 1973. All the tubing has been bare since that time, and no significant corrosion problems.

Q. I'm now looking at Exhibit Number 18. This is the proposed schematic for the 109. There again, bare tubing in both zones?

A. Yes, sir.

Q. Are there any other freshwater supply

sources, other than the Ogallala, in this area?

A. Not that Mobil is aware of or currently uses.

Q. As a matter of record, after breakthrough or water production -- after breakthrough, 50 years -- water production on these two waterfloods, how is the water disposed of?

A. Currently -- Well, prior to June of this year, all produced water was injected into the Bridges State-San Andres waterflood.

Mobil applied for and recently completed a disposal well ten miles south of the vacuum field. We currently produce -- dispose of all non-San Andres-produced water into this disposal well. So only San Andres water is injected into San Andres.

Q. And you're proposing at this time these six wells of this Application will be freshwater only?

A. Freshwater injection, yes.

Q. Yes. And your other wells that have lined tubing will continue to take the San Andres water?

A. Produced water. The produced water from this proposed Glorieta-Blinebry waterflood will be sent to our disposal well.

Q. Right, in the Glorieta-Blinebry zone, okay.

What's that little symbol on Exhibit 19?

A. It's a Mobil symbol for our recent

reorganization: Don't waste time crossing your T's and dotting your I's.

(Off the record)

EXAMINER STOGNER: I have no questions of Miss Elwood at this time.

MR. PEARCE: Mr. Examiner, the other two witnesses are available if you have questions of them.

EXAMINER STOGNER: Mr. Stovall, do you have any questions while I try to get my notes together here?

MR. STOVALL: No, I don't have any questions. I've got mine all cleaned up.

MR. MORROW: On 14, how many Glorieta wells were represented there?

(Off the record)

MR. MOSHELL: Thirteen wells have produced from the Glorieta on the Bridges State lease, and they're all represented there. There are only eight still currently producing.

EXAMINER STOGNER: I'm referring now to Exhibits 4 and 5. This shows the Glorieta production and the Blinebry production. Mr. Pearce, you may help me out here too. The definition of a waterflood is essentially the injection or the introduction of water into a pool or formation where the wells are

essentially stripper wells.

Now, this is a combined effort, and there are a few wells that go over the ten-barrel-a-day limit. I'm throwing that question out and maybe you can clarify that -- Someone. Mr. Pearce?

MR. PEARCE: Mr. Examiner, we believe that over a very short period of time the remaining wells which are not yet below the ten-barrel-a-day limit might very well reach it.

We believe that in the aggregate, this is clearly a marginal producer, a stripper-well area.

On that basis, then, in order to increase the efficiency of recovery, receipt and approval of this waterflood project -- and I suppose for definitional reasons we have to base that on the average production from the wells in the area.

EXAMINER STOGNER: A lot of information has been covered today. However, I do not recall of hearing any injection pressures into the Blinebry-Glorieta zone, and I'm sorry if I missed that, Mr. Pearce.

MR. PEARCE: No, but that's in the Application. Let's ask for her to address that question, please.

MS. ELWOOD: Okay. In your Application on

the C-108, our original permeance pressure request was the state limit of .2 p.s.i. per foot.

EXAMINATION (Resumed)

BY EXAMINER STOGNER:

Q. And that is on all six wells?

A. Yes, sir. It is possible, depending upon the actual injectivity of the wells when they step-rate this test to prove or disprove whether we will fracture the wells by going to higher pressure.

MR. PEARCE: But in the event Mobil seeks to go to higher pressures, we'll return to the Division; is that correct? Or the district office?

EXAMINER STOGNER: Or an administrative procedure, which many of our applications have.

MR. PEARCE: Yes, sir.

Q. (By Examiner Stogner) Ms. Elwood, I'm going to ask you this question: A mechanical integrity test on such a dual-completed injection well, do you foresee any additional problems or circumstances surrounding such an injection well?

A. No, sir. We do have one well that is currently a dual completion in the Abo and Middle Penn injection, within the Bridges State lease. We have had no problems, yet we do have an annulus and we can monitor changes on the injection pressure in both

tubing strings if there's any downhole communication. So while the wells are being converted to Blinebry and Glorieta injection, the casing will be pressure-tested, standard procedure.

Q. And there will be pressure gauges on both strings of tubing?

A. Yes, sir.

Q. Which would indicate any loss of pressure due to leaks?

A. Yes, sir.

MR. MORROW: Would there be quite a bit of difference in the injection pressures between the Abo zone and the other zones?

MS. ELWOOD: Initially, yes. Our Abo ranges from 3800 to 4300 pounds injection, and I believe our Blinebry-Glorieta .2 p.s.i. per foot is about 1700 or 1800 pounds initially.

Q. (By Examiner Stogner) Ms. Elwood, if I remember right, the Abo pool and, as far as that goes, the Grayburg-San Andres waterflood project -- or anybody correct me on this -- the approvals for waterflood were done at a time when there was no limitations on injection pressure; is that correct?

A. The original permit, yes.

Expansion -- we've made them both floods

since then -- have fallen under -- They're not grandfathered; they do have pressure limits.

So approximately half of our Abo wells, not including the ones we're discussing today -- The newer wells converted in 1985 and 1986 were under the original .2-p.s.i.-per-foot limit and have been pressure tested accordingly to raise that, to provide sufficient injection.

Q. But there are still quite a few wells that are under the original --

A. Yes.

EXAMINER STOGNER: -- filing?

I have no other questions. Are there any other questions of these three witnesses?

If not, Mr. Pearce?

MR. PEARCE: I have nothing further, Mr. Examiner. We will supplement this record with the additional well completion information this afternoon. I will deliver that with a cover letter.

And I have nothing further in this case at this time.

EXAMINER STOGNER: Does anybody have anything further in either Case 9999 or Case Number 10,000?

Let the record show that your first Exhibit Number 1 will not be utilized or made a part of the

record in this particular proceeding, Mr. Pearce.

MR. PEARCE: Thank you, Mr. Examiner. It might age.

MR. MOSHELL: On behalf of Mobil, we'd like to thank you for working through this multiple-issue set of dockets in combining them for the sake of efficiency.

EXAMINER STOGNER: Thank you, Mr. Moshell. And we appreciate Mobil's hospitality today.

This case will be taken under advisement, and we will be receiving the rest of your Exhibit Number 19 later on, Mr. Pearce.

MR. PEARCE: Thank you, Mr. Examiner.

(Thereupon, these proceedings were concluded at 10:47 a.m.)

* * *

CERTIFICATE OF REPORTER

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

I, Steven T. Brenner, Certified Shorthand Reporter and Notary Public, HEREBY CERTIFY that the foregoing transcript of proceedings before the Oil Conservation Division was reported by me; that I 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 August 5, 1990.

STEVEN T. BRENNER
CSR No. 106

My commission expires: October 14, 1990

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case Nos. 9999, and 10,000 heard by me on 11 July 1990.

, Examiner
Oil Conservation Division