NEW MEXICO OIL CONSERVATION DIVISION

STATE LAND OFFICE BUILDING

STATE OF NEW MEXICO

CASE NO. 10830

IN THE MATTER OF:

The Application of Conoco, Inc., for Establishment of a Temporary Special Testing Allowable, Lea County, New Mexico.

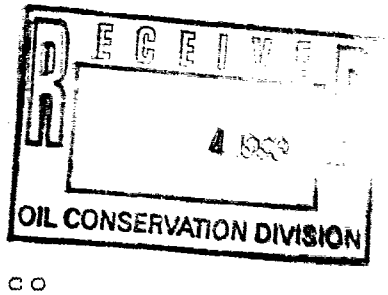
BEFORE:

MICHAEL E. STOGNER

Hearing Examiner

State Land Office Building

Thursday, September 23, 1993



REPORTED BY:

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ORIGINAL

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I N D E X

E X H I B I T S

EXAMINER STOGNER: This hearing will come to order.

I'll call next case, No. 10830, which is the application of Conoco, Incorporated, for establishment of a temporary special testing allowable, Lea County, New Mexico.

At this time, I'll call for appearances.

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

EXAMINER STOGNER: Any other appearances?

MR. BRUCE: Mr. Examiner, Jim Bruce from the Hinkle Law Firm in Santa Fe, representing Exxon Corporation. I may have one witness.

EXAMINER STOGNER: Any other appearances?

MR. CARR: May it please the Examiner, my name is William F. Carr with the Santa Fe law firm Campbell, Carr, Berge & Sheridan. We represent Marathon Oil Company. I will not call a witness.

MR. PADILLA: Mr. Examiner, Ernest L. Padilla for John Hendrix Corporation, and I will not call a witness.

EXAMINER STOGNER: Other appearances? Mr. Bruce, would you like me to go ahead and swear your potential witness in at this time?

MR. BRUCE: Yes, just in case.

EXAMINER STOGNER: Will the three witnesses please stand to be sworn in.

[And the witnesses were duly sworn.]

MR. KELLAHIN: Thank you, Mr. Examiner, I would like to call my first witness, Conoco's geologist, Susan Haycock.

SUSAN HAYCOCK

Having been first duly sworn upon his oath, was examined and testified as follows:

MR. KELLAHIN: Mr. Examiner, we have distributed copies of Conoco's exhibits to all counsel that have made appearances of record this morning. In addition, there's a representative of Shell here, and we have given that individual a copy of the exhibits.

EXAMINER STOGNER: Thank you, sir.

MR. KELLAHIN: What Conoco proposes to accomplish, Mr. Examiner, is that we have an area

of the Paddock pool on the central northern edge of that reservoir for which we're seeking permission for a project area.

The action we're requesting by the Examiner is to allow the wells within that project area, consisting of a half section, to be operated for a one-year period such that the statewide limiting gas/oil ratio of 2,000-to-1 is increased for that period, for the project, up to 6,000-to-1.

The purpose of the study will be described to you by Susan Haycock, the geologist. The other member of the team is the petroleum engineer, Mark McClelland. Mr. McClelland will provide for you the reservoir engineering and production information on the project.

Mr. Hoover is present. I've not sworn him as a witness. He is here to authenticate, if necessary, the notifications made to the interest owners that may be affected.

What he did, under my direction is, he notified all operators in the pool. In addition, he looked to all offsetting spacing units around the north half of this section, and notified

those operators and interest owners. His notification letter and a list of those parties notified is going to be introduced as Exhibit 1A. Exhibit 1 is a locator map.

What we're proposing to do is to study an area of the pool. The Paddock oil pool is a very mature oil reservoir in Lea County, New Mexico. Production, I think, was established back in the early 50s. There was a burst of initial activity, and it was generally developed on 40-acre oil spacing.

The proof will be that over the historical period of time of operation of the pool, the pool operating gas/oil ratio has been between 6 and 10,000-to-1. What Conoco believes they can do with this project area is that it makes geologic and engineering sense to try, in this project area, to test some concepts for maximizing ultimate gas recovery, as well as oil recovery, and that this project area, then, will serve as a model for subsequent opportunities, by operators in the pool, to change the gas/oil ratio up to whatever is appropriate, based upon the study.

We will share the study information

with all operators in the pool. We believe the project area can be conducted without waste and without violation of correlative rights. We have specifically addressed that issue in our proof, and we will show to you, we hope within your satisfaction, that within this project period there is no opportunity for the impairment of correlative rights of those operators offsetting us.

It's a unique opportunity in this reservoir to do some science. Ms. Haycock will describe for you the circumstances that led to her involvement as part of the project team, to set forth the criteria for the project, and to show you what they propose to accomplish.

EXAMINER STOGNER: Before you get started, Mr. Kellahin, I need to make sure I understand what you're requesting. I'm a little confused with the advertisement.

Testing allowable for this project for a maximum period of 12 months at a maximum rate equal to the capacity of each well, up to a limiting 6,000-to-1 GOR?

MR. KELLAHIN: Yes, sir.

EXAMINER STOGNER: Then I'm a little

confused. You want to open it up, and when you say equal to its capacity, that's just opening up the flow?

MR. KELLAHIN: Yes, sir.

EXAMINER STOGNER: And then you come in with that 6,000-to-1. I guess I'm a little confused. What actually are you asking for?

MR. KELLAHIN: The intent will be to allow the oil allowable rate per well, in the project area, to be produced up to an oil rate on a daily barrel-of-oil basis, that does not exceed 6,000-to-1 gas oil ratio.

We do not yet know what the maximum daily oil rate ought to be, and in order to provide flexibility to the operator, it is more practicable to control the gas/oil ratio than to guesstimate on what the maximum oil rate ought to be at this point in time.

So that would be the control mechanism for the project allowable.

EXAMINER STOGNER: As opposed to an oil allowable?

MR. KELLAHIN: Yes, sir. And Mr. McClelland can tell you the science and the reasoning behind that, but that is the basic

request.

EXAMINER STOGNER: Okay. Thank you, sir.

. EXAMINATION

BY MR. KELLAHIN:

Q. Would you please state your name and occupation.

A. Yes. My name is Susan Haycock, I'm a geoscientist for Conoco.

Q. You're going to have to speak up, Susan. That microphone is just for the tape recorder and it doesn't amplify your voice.

On prior occasions, have you testified as a petroleum geologist before the Division?

A. Yes, I have.

Q. Describe for us, in a summary fashion, what it is that you specifically do that got you involved in this project in the Paddock pool.

A. Okay. For the past four years I have been involved in reservoir studies in this portion of Lea County, New Mexico. I have worked with my reservoir engineer, Mark McClelland, who is also here, in looking mostly at our New Mexico federal units, which Conoco has a 25 percent working interest and we are the operator.

And the Lockhart A-27 lease is a New Mexico federal unit lease.

Specifically, what got myself and Mark involved in this is we were not currently studying the area, but a couple of our production engineers had realized that the Lockhart A-27 lease, which is part of the Paddock pool, had not effectively exploited the Paddock on our lease, even though this is a very mature field. It's been producing for over 40 years. So they saw some opportunity to recomplete to the Paddock zone.

They tried a recompletion in 1991, in our Lockhart A-27 No. 6 well, and what they found was a very high rate producing well. It was producing at much higher rates than all the other wells around us, and also found virgin reservoir pressure in this well, which was surprising for such a mature field.

As they tried some other recompletions in the field, they found some problems occurring in trying to keep the wells choked back to the 2,000-to-1 GOR allowable, and these problems we'll go into more detail about, especially Mark in his testimony, but they asked Mark and myself

to take a more detailed look at the Paddock pool, and to find the best way to optimize our production in that lease.

Q. Having been assigned the task and the responsibility of addressing that particular issue brought to you by the production department, as a geologist, what kinds of things would you have checked off as issues or criteria in which to develop data, from which you can then reach geologic conclusions?

A. First of all, I needed to look at where our lease stood in relation to the rest of the field, what kind of rock are we producing from, what are the reservoir characteristics of this type of dolomite, what are the limits of the pool, both vertically and laterally, and what does this structure have to do with the production that we've seen over time?

So, as part of my work, I looked at core data from the Paddock, I constructed a structure map over the entire pool, and put together some data on the cumulative oil and the gas/oil history of the pool, cumulative gas/oil ratio map, and also put together seven detailed cross-sections that go through all the Paddock

wells in our leases, as well as the immediate offsets around us.

Q. Based upon that data, were you satisfied, as a petroleum geologist, that you had enough information upon which to begin to prepare interpretations of the geology, to aid the engineers in addressing the problem that you were asked to provide answers for?

A. Yes.

Q. Have you done that?

A. Yes, I have.

Q. And, based upon that work, then, are you now able to reach certain geologic conclusions that address the problem the production people brought to you?

A. Yes. There are a couple of general conclusions that I think--

MR. KELLAHIN: Before you relate your conclusions, at this time, Mr. Examiner, I would tender Ms. Haycock as an expert petroleum geologist.

EXAMINER STOGNER: Ms. Haycock is so qualified.

Q. Before we look at the display, give us an outline of what your major conclusions are

insofar as they apply to the request for a project area?

A. Okay. One of the conclusions that I was able to make, in conjunction, too, with the engineer, is that our Lockhart A-27 lease is one of many structural highs located throughout the Paddock pool, that our Lockhart A-27 lease has a small structural high, and it is bounded on all four sides by dip, and to the west before you go to the next structural high over.

Based on reservoir data that we have, our lease encountered virgin reservoir pressure, and this sufficiently isolates our lease from the rest of the pool, as well as immediate offset wells. So, we felt that there would not be any correlative right issues, or anything like that involved, based on what we could tell in the initial stages of the study.

Another conclusion that was made was that because there are structural highs throughout the pool, we would be able to draw analogies from the other structural highs back to ours. And, since they have been producing for over 40 years, we would be able to know what to expect for our lease.

Q. Let's turn to the first display and have you identify that for us.

A. Exhibit No. 1 is a land plat. The Conoco Lockhart A-27 lease is in the center, north part of the map, in the stippled blue area.

The dark black outline, that you see there, encompasses over 18,000 acres, and is the outline of the Paddock pool. Our lease is a 320-acre half section that you see there in Section 27, which is part of Section 21 South, 37 East.

Also noted on this map are the immediate lease names surrounding our lease, as well as all of the offset operators.

This map also shows an outline in blue of the Exxon-operated Paddock waterflood unit outline. Although this is not an active waterflood, I believe it stopped being flooded in 1974.

And then down to the south and the southeast corner of the map is the south Paddock pool, outlined in green.

Q. When we talk about the Conoco project area, within the context of this case, what are

we identifying on this display?

A. We are identifying the north half of Section 27, stippled in blue there, that's labeled Lockhart A-27.

Q. Can you give us a brief historical context in relation to the project area and pool development?

A. Okay. The discovery well for the Paddock pool was drilled in 1945. It's located a couple of sections to the southeast of the Lockhart A-27. The field was rapidly developed after initial discovery in 45, and had a lot of development by the early 50s.

Conoco, in the early 60s, drilled two wells on the very western side of our lease, and they are shown there as Well 13, in the very southwest corner of our lease, and No. 4, in the very northwest corner of our lease. Those were drilled in the early 60s and were fairly marginal.

It was believed at that time that the Paddock pool limit was getting near our lease, and that that was the very eastern flank at that time. Conoco did no other Paddock work until 1991, in which case we recompleted our No. 6

well, which you can see there in Letter Unit B on our lease.

Q. Has Conoco confirmed the accuracy, to the best of its knowledge and belief, about the operatorship of the various tracts that are identified on Exhibit 1?

A. Yes.

Q. Based upon that knowledge, was notice sent to the operators in the pool?

A. Yes. Our Exhibit No. 1A shows a list of all the operators within the Paddock pool, as well as the operators that immediately offset our Lockhart A-27 lease.

The second page is a letter that we sent on August 30th of 93, to notify them of our proposal, and then the next two pages are certified mail receipts showing that they did, indeed receive our notice.

Q. Before we talk about the horizontal boundaries and look at the structure, give us a sense, vertically, of what the reservoir looks like. Do you have a type log?

A. Yes. Exhibit No. 2 is a type log. It's from the JN Carson No. A 2, just one section to the west, located in Section 28, just one

section to the left of our Lockhart A-27 lease.

Q. Taking Exhibit 2, it's a type log of which well?

A. It's the JN Carson No. 2 well. It is located one section west of our Lockhart A-27 lease. On this type log, basically the reason for showing this is to show the stratigraphy that's involved in the Paddock pool. The pool encompasses the Glorieta down to the top of the Blinebry formation. These are Permian in age.

The other purpose of showing this is for correlation purposes. We have broken the Paddock down into three different zones, in which we call them the Paddock A, B and C zones.

Q. A will be the shallowest?

A. A is the shallowest, and C is the lowermost producing zone that we recognize in our Paddock pool.

Q. Geologically, are each of those Paddock members distinct and separate between the others?

A. Yes, we believe that they are. We have reservoir pressure data and test data to show that they are separate.

Q. Geologically, they appear separate to you when you map them?

A. Geologically, and in core data, it appears that the permeability comes in streaks within those zones, and each of them are capped by tighter dolomites. There's the core data shown there to the right that shows, on the very right-hand side it says "core permeability," you can see how the permeability comes in streaks within those zones.

The porosity averages in the productive zones about 14-percent porosity, and about seven millidarcies of permeability. The reservoir is predominantly dolomite.

Q. Can you, as a geologist, describe for us the classification of production in each of those members, whether it's gaseous or oil, or a combination of both?

A. Well, they appear to be a combination of both oil and gas. The A zone is a little bit more gassy in the Glorieta. We don't have a separate test on it, but it looks pretty gassy.

Q. I understand Mr. McClelland has concluded that this is a solution gas drive reservoir. Is that your information?

A. Yes, it is.

Q. Do you, as a geologist, see any

geologic evidence to confirm or support his engineering conclusion about the drive mechanism in the reservoir?

A. Yes. We have some maps that we'll show in the next three exhibits that support that it is a solution gas drive reservoir.

Q. Can you describe for us, historically, what has been the strategy of the operators and how they approach the opportunity to deplete the Paddock, and how they select which, if any of the members, they penetrate and produce?

A. Well, I don't think that in the past the operators have been very consistent in which zones they are producing. We have cross-sections outside of our lease that show that anywhere from the Glorieta to even below our Paddock C zone, have been perforated.

In our particular case, we started out with just perforating the Paddock C zone, which is the lowermost zone and the most oily zone.

Q. When the production department came to you with the problem, I believe it was for the No. 6 well?

A. Yes.

Q. All right. Let's look on Exhibit 1 and

make sure everybody has found the No. 6 well. That's the well in Unit B of the section?

A. Yes.

Q. When they came to you with the problem, in terms of the production having to be curtailed by the gas/oil ratio limit of 2,000-to-1, where is the No. 6 well perforated in the Paddock?

A. In the C zone.

Q. It's in the lowest zone?

A. Yes. It was initially. After that, we perforated the upper zones, but they are no longer producing. We have some cross-sections that we can show you later, but it's only producing from the C zone currently.

Q. Let's turn now to the issue of looking at what the reservoir picture is, structurally. Do you have a display that shows that?

A. Yes. Exhibit No. 3 is a structure map over the Paddock pool. And highlighted in the purple hachured is a contour value of minus 1680 subsea. Basically what I'm trying to show there is visually, so your eyes can go right to the high parts of the structure.

Looks like right down the center of the Lockhart A-27 lease is a fairly large high. Over

in the northwest corner of the lease there is another high. And then there are a couple of smaller isolated highs to the east of the main high, running down the middle.

And our Lockhart A-27 lease, you can see we have a small high as well. This map also shows that our high is bounded to the north by north dip, to the east by easterly dip, pretty rapidly dipping beds, to the south by south and southeast dip, and to the west, there's a small saddle structure before going into the next high directly to the west.

Q. Let's go around your boundary of the project area, as you propose it, and let's talk geologically about the opportunity, if any, to affect the immediate offsetting properties. Let's start anywhere you like.

A. Okay. When the first well was recompleted, the Lockhart A-27 No. 6, which is in the center of our high on our lease, our pressure was virgin reservoir pressure. This indicated to us that our pressure had not been drained by the mature development in the offset leases.

As you can see on this map, to the east the structure dips very rapidly and there are no

good Paddock completions in that area. And, as I will show in the next two exhibits, our lease was directly surrounded by very marginal wells.

Q. Is there a geologic explanation that you can find that gives you an understanding of why the engineer, when he sees a portion of the pool where you have old, mature, producing wells that have drawn down reservoir pressure, have somehow not affected the recent well? Is there a geologic answer to that?

A. Yes, it's showing that we are isolated from the offsets.

Q. What, in your opinion as a geologist, has caused the isolation within the reservoir between you and the offsets?

A. Basically, there is no way for communication to take place. As you go lower down on structure, the porosity and mainly the permeability is pinching out on the flanks of the structure.

It's mainly due to the fact that we are isolated and high, and we are surrounded by very marginal wells with lower permeabilities.

Q. This is a dolomite reservoir?

A. Yes, it is.

Q. Describe for us the kind of porosity that you're dealing with and the changes, and what would cause the changes in terms of the pore volume or what has filled up that pore volume?

A. From what we could tell, there's not much core data in this area. I think we had five different core reports. It looks like the loss of porosity is probably due to anhydrite plugging.

I think, in older reports, they talked a lot about how, on the center of the structure, which is part of the Eunice high, that the permeability was much greater down the center of the structure and then degraded as you went off on the flanks.

Vertically, within the reservoir, the different zones do not communicate with each other as well.

Q. Is there a specific example, in the relationship between the south boundary of your project area and the Marathon wells in the southwest quarter of Section 27, that gives you an illustration of this example?

A. Yes. We have some examples of wells that directly offset our lease that were

nonproductive or very marginal.

Q. Have you shared with Marathon the information concerning their inquiries about your project and the effect, if any, it might have on their wells immediately to the south?

A. I believe our reservoir engineer, Mark McClelland, has spoken to their engineer and discussed it.

Q. Is there log information for those wells available for the engineers to share data with?

A. Yes.

Q. Continue around the project area. Let's move from the Marathon tract and continue counterclockwise. Let's go to the southeast quarter section, Section 27. That's the Exxon-operated tract?

A. Yes.

Q. All right. Geologically, what do you see in terms of the relationship between the two areas?

A. Well, basically they are a little bit lower on structure than us in their wells. We have some cross-sections that we can show, I think they are Exhibits 6, 7, and 8, that go into

detail about those, but basically all the evidence we have shows that we would not affect their wells at all.

Q. As you continue counterclockwise, what happens to the reservoir and the opportunity for wells in that reservoir?

A. As you go--

Q. Oh, Section 26, the northwest quarter.

A. There are no Paddock wells producing from Section 26.

Q. Do you see the opportunity to have Paddock wells in that portion of the reservoir?

A. No. We tried a recompletion, it's not shown on this land plat, but it's just to the east of our No. 10 well in the southeast corner of our lease. It was our No. 11 well.

We tried a recompletion in all the different zones in the Paddock in that well, and it was noncommercial. The porosity was there, but the permeability was gone, and that's much lower on structure.

As you can see on this structure map, the southeast corner of that map, it dips off very rapidly. It was, structurally, much lower.

Q. Have you been able to continue around

the outside boundary of your project area, and satisfy yourself, as a geologist, that if this application is approved, there should be sufficient separation between your project area, and either for explanations geologically, or those from Mr. McClelland, we can have this project approved without affecting the correlative rights of the offsetting operators?

A. Yes.

Q. Describe for us what unique opportunity this project area provides for Conoco, to provide an example for the rest of the pool about what to do in terms of a most efficient rate of production.

A. Okay. What's unique about our situation here is we have a small, isolated high, similar to other highs within the Paddock pool. We feel that because we are isolated and that we will not affect the offset operators, at the same time we will be able to draw analogies from these other highs and know what to expect for our lease.

And, in the next couple of exhibits, we will show that, historically, the pool has produced a much higher GOR than the allowable.

Q. Let's turn now to Exhibit No. 4. Identify and describe this display for us.

A. Exhibit No. 4 is a color-contoured cumulative oil map. The color bar is located at the bottom of the map and shows that the darker green is greater than 450 MBO, and the white area, within the pool, are wells that made less than 50 MBO. And you can see the shading goes from 50, then, to greater than 450 MBO.

On our Lockhart A-27 lease, there is not any color because our wells are very new wells, being produced since 1991, and, therefore, their cumulative oil is fairly low. I think at the time of this map, or the date on this map, up to the end of 1992, our best well had made 49 MBO, so it didn't get a color on this map.

But the rest of the field is very mature, probably, you know, developed mostly in the 50s. One thing I would like to point out about this map is, to the north, the northeast, and the east of us, there isn't any Paddock production. As you go south, you can see that light yellow shows a very marginal production. And, as you go to the west, on our structure map we showed a saddle structure before that next

high over in Section 28. So, basically, we are surrounded by very marginal, low-cumulative oil wells.

And also this map illustrates the abrupt change, as you go from a good well to a very bad well.

Q. When you look at the cum oil map, is that taking into consideration production from each well regardless of whether it's in the A, B, or C member of the Paddock?

A. Yes, that's correct.

Q. When you look at how the A, B, and C members of the Paddock are distributed in the reservoir, are you able to prepare a map that shows reasonable continuity of each member as you look among the wells?

A. Yeah. I don't have an exhibit that shows that, but it appears that the production continuity is rather consistent, as you go with each zone, but the Paddock pool itself is a very complex reservoir and it's hard to predict.

You can go from a very good well to a very bad well in a short period of time. It's not just a homogeneous blanket, where the porosity and permeability is just continuous

across the entire pool; but, for the most part, the A, B, and C zones are generally productive throughout the area.

Q. So, if the Examiner chooses to look at the cross-sections, you can see where a geologist can pick the marker that helps that geologist find the A, B, and C zone, and then you can correlate that from well to well?

A. Right. You can correlate the A, B, and C zone across the entire field. And our cross-sections, we have seven detailed cross-sections included. They show, in detail, exactly what each operator has perforated, what their testing data was, what their cumulative production was, and, if they're currently producing, what their daily rates are.

Q. When you look at an individual cross-section and pick two wells, one well may be highly productive and the other well not. Are there examples like that?

A. There are examples of that.

Q. As a geologist, when you look at the cross-section, can you see an explanation that would account for the difference?

A. Sometimes the explanation is as simple

as, they have not opened up as much pay in one well versus another; but sometimes it's much more complex than that, and I don't think on the logs you can always tell that totally. Even though it may have a lot of porosity, it may not have the permeability. Without core data, I can't pinpoint exactly why one is a poorer producer than the other.

Q. So, then, the level of investigation has to be transferred to the reservoir engineer to apply the disciplines of his science to see if these wells really are affecting one to the other?

A. That's true. And sometimes with that core data to give exact rock properties, why these things happen, a lot of times you have to rely on the production history of the well and what it's telling you.

Q. What opportunity will Conoco have if the Division Examiner approves the project area? What will it let you do, then?

A. Well, we would be able to go in and test these wells to find out what the optimum producing rate is. I have another exhibit that has a cumulative gas/oil ratio for the entire

field, and what we will show is that, by actually limiting our GOR to 2,000-to-1, we are actually causing waste in the reservoir and we are damaging our wells.

And, historically, the field has produced at much higher GORs than 2,000-to-1.

We have a work plan scheduled out for a 12-month period of time that will show exactly what work we want to do, and Mark McClelland will go over that.

Q. I guess my question is, the answer to the optimum way to produce the pool is not so simple that we can simply map it geologically, the light bulb goes off, and we've got the answer?

A. Right. It would take the testing of the wells in order to determine that.

Q. There is something happening in the mechanics of the reservoir to cause wells in close proximity to each other to perform entirely different?

A. That's true.

Q. Let's look at that map you just identified. Is that Exhibit No. 5?

A. Yes.

Q. Tell us how to read it, and then we'll ask you what it means to you.

A. Okay. This Exhibit No. 5 is cumulative gas/oil ratio over the Paddock pool. The color bar is located at the bottom of the map, and shows that areas that are in white, that are not colored within the Paddock pool, have a zero to 2,000 GOR.

The area in light yellow, from two to 6,000 GOR; the orangish color, from six to 10,000, and the very dark red, those wells that are there have produced with over a 10,000-to-1 GOR.

One point about this map, as well as the cum oil map, if you look at both of the maps in conjunction with the structure map, the higher cum oil and the higher GORs are associated with the well structurally.

Another point about this GOR map is that this is a solution gas drive reservoir, and this is a characteristic of the fact that it is a solution gas drive reservoir, where you have your higher gas associated with your higher oil. And our Lockhart A-27 lease, of course, is colored in here, because we do have the higher GORs.

Q. Based upon your geologic investigation, do you see any evidence that this is anything other than a solution gas drive reservoir?

A. No. It is a solution gas drive reservoir. Mark McClelland, our engineer, has some supporting data for that that he will show in his exhibits.

Q. Within the geologic context, though, you don't see this as a gas cap reservoir?

A. No.

Q. Any indication of water drive or encroachment in this portion of the reservoir?

A. No. There is a little bit of water associated, but we don't see it as water drive in our area. I think in the very northwest corner of the map there's some water influx there, and it's probably more of a water drive in that area.

Q. Why have not you and Conoco taken on the task of studying the entire pool and requesting the Division to approve a gas/oil ratio increase for the total pool?

A. Well, initially, we wanted to do that. It was something that we thought we could undertake. But, as you can see, our lease is 320 acres, and the pool encompasses over 18,000

acres. When you get down to the details of this, this is a very complex reservoir. There's a lot of data here. It's been producing for over 40 years.

And we just really could not justify the manpower, time and money, to do so such a study. Even though initially that's what we wanted to do, when we got into the study and we realized how we were isolated and that we could look at it separately, then we thought that was the best route to take. When we realized we would not be hurting any offset operators and that we would be able to test these on our lease, maybe what we find here can be applied to the rest of the pool. We just thought that that was the way to go.

Q. Is Conoco willing to share the project data, the technical information that you generate from the project area, with any of the other operators in the pool?

A. Yes, we would be more than happy to share any of our data with all of them.

Q. Identify for the record the cross-sections and how they're numbered.

A. Okay. Included in your packet are

cross-sections, A-A', E-E' and G-G'. They're Exhibits 6, 7, and 8. Those cross-sections, I will not discuss them, but they'll be there for you to refer to.

Basically, these cross-sections have an index map on the very left-hand side, showing exactly where the cross-section is located. The cross-sections include from a little bit above the Glorieta to the top of the Blinebry formation, so it covers the entire pool limits, stratigraphically.

Each of these have a gamma ray and a porosity log. In red are the perforations, exactly what was perforated in each well. Highlighted in yellow are higher porosities, and down at the bottom of each well I have cumulative production data for oil, gas and water.

If it's currently producing, I have, in red, the daily average production for 1993, and also very detailed information as to exactly what was perforated, what it tested, what the choke sizes were, whether they were acidized or frac'd or any of that information, so it's pretty much all there at your fingertips, if you have a question.

For instance, G-G' has two Conoco wells and then the two Exxon wells immediately to our south.

Q. Do all the geologic interpretations, that we've presented to the Examiner today, represent your own personal work?

A. Yes, they do.

MR. KELLAHIN: We move the introduction of Conoco Exhibits 1, 1A, and 2 through 8.

EXAMINER STOGNER: Exhibits 1, 1A, and 2 through 8 will be admitted into evidence at this time.

MR. KELLAHIN: That concludes my examination of Ms. Haycock.

EXAMINER STOGNER: Mr. Bruce, your witness.

EXAMINATION

BY MR. BRUCE:

Q. Ms. Haycock, I don't want to paraphrase your words, but it sounds like one of the reasons you're going for this application, seeking approval of this application, is to gather some data, is that correct?

A. For the best optimum producing rates for our lease.

Q. And you didn't want to do it for the whole pool, because Conoco has two or three other leases in here, but Conoco has a small portion of the acreage?

A. Yes, that's one of the reasons.

Q. Is there any intrinsic objection that Conoco has to granting this type of relief for other operators?

A. I'm sorry, your question?

Q. Is there any objection that Conoco has to granting this same type of relief for any other operators?

A. No. No objection.

Q. I think what you said, your position is, the higher GOR won't cause any waste on Conoco's lease?

A. No. In fact, we have evidence to show it's probably--being restricted to the 2,000-to-1 is probably actually hurting us, and Mark can show this. Pinching it way back is hurting the oil production and it's also, whenever we have to shut a well in for overproduction, sometimes when we put it back on, we can't get it back up to what it was producing beforehand.

Q. In your opinion, would having the

higher GOR, on any other offsetting leases, cause waste on those leases?

A. No.

Q. Were you involved in contacting other operators for their support?

A. No, I was not personally involved. Mark McClelland, the reservoir engineer, and John Condio, our production engineer, have talked to some of the offset operators and, at one point in time, asked for any kind of support so that we could get the GOR changed for the entire pool.

MR. KELLAHIN: Excuse me, Susan. Stay with what you know, all right?

A. Okay. Yeah, I personally was not involved.

Q. That's fine. Looking at your first Exhibit No. 1, which Conoco wells have been reworked to date? I wasn't clear on that.

A. The No. 6 well in Unit B, the No. 7 well in C, the 13 in the southwest corner, the No. 2 well, which is just to the east of that, and the No. 10 well, which is just to the south of the No. 6 well.

Q. Okay, so five wells.

A. Five.

Q. Do any of these wells currently produce at less than the 6,000-to-1 GOR?

A. Pardon me?

Q. Do any of those five wells currently produce at less than 6,000-to-1 GOR?

A. No.

Q. Now, the five wells you just mentioned that have been reworked, except for the No. 6 well, they're all offset by other Paddock wells, aren't they?

A. Yes.

Q. The one question I have on that is, how can you be sure that your wells are not in communication with those offsetting wells?

A. Well, I think if they were, then, it would have drawn down our reservoir pressure. And, looking at some of these wells in detail, we can compare initial rates and pressures, and things like that, and show that these are not affected.

Q. Have any of the offsetting wells been reworked?

A. Some of them have, yes.

Q. Do you know which ones?

A. I believe it was the Exxon well, and

I'm not sure, I would have to look at my cross-section, I think one of them was frac'd. It was a Marathon well that was frac'd.

And one of those wells, I'm not sure which, I would have to look at my cross-section, is a fairly new completion as well. And I think Mark McClelland is planning to address the specifics of what was completed in these other wells.

Q. I think my only problem with your testimony is, you say that, basically, the phenomenon in your lease stops at your lease line?

A. Basically it's the fact that our lease has a high and then dips off in every direction. So, the farther you get away from our lease, the less that's going to have an effect on it.

Q. Okay. But looking at your Exhibit 3, for instance, Conoco's No. 7, No. 2 and No. 13 wells aren't much different, structurally, than the offsetting Marathon wells, or Texaco wells or Chevron wells?

A. And those wells are not as strong a producers as our No. 6 well, either.

Q. Are they all perforated at the same

interval?

A. The No. 13 well, I believe that's in the A, B, and C zone, and the others, 7 and 6, I believe those are just in the C zone.

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

EXAMINER STOGNER: Mr. Carr?

MR. CARR: Mr. Examiner, I have no questions of this witness.

EXAMINER STOGNER: Mr. Padilla?

MR. PADILLA: I have none.

EXAMINER STOGNER: Mr. Kellahin, any redirect?

MR. KELLAHIN: A couple of points of clarification.

FURTHER EXAMINATION

BY MR. KELLAHIN:

Q. Within the project area, let's start with your wells and have you identify for me what portion of the Paddock they're currently completed in, so that we have a complete list. If you'll start with the No. 6 well in Unit B?

A. The No. 6 well is currently completed and producing from the C zone.

Q. C zone only?

A. C zone only.
Q. If you go to the No. 7 well, what's that producing in?
A. I believe that's producing from the C zone only.
Q. No. 4 well is what, plugged?
A. That's plugged. 4 and 8 are not producing.
Q. Okay. Down into, where are we now?
A. 13.
Q. We're in E?
A. 13 is in A, B, and C.
Q. Okay. That's a pumping well, 13?
A. Yes, it is.
Q. And it's completed in A, B, and C?
A. Yes, it is.
Q. All right. The No. 2 well in Unit F?
A. I believe the No. 2 well is in the C zone alone.
Q. Then we get to Unit G, the No. 10 well.
A. The No. 10 well is A, B, and C.
Q. Okay. And the last well in Unit H is a dry hole, isn't it?
A. Yes, the No. 11.

MR. KELLAHIN: Thank you. That's all, Mr. Examiner.

EXAMINATION

BY EXAMINER STOGNER:

Q. Referring to Exhibit No. 5, where you have your pool outline of the Paddock pool, what really pops out, it looks like there's three distinct areas, perhaps, or is this exhibit showing any P & A'd wells, perhaps, in between these pods?

A. I'm showing--are you looking at the GOR or the oil--Exhibit No. 5, the gas/oil ratio well?

MR. STOVALL: I think what he's looking at, and let me help with it because I don't think she quite understood your question, if you'll look at the development pattern, he's looking at the well development pattern, three distinct areas of well development, regardless of whether it's GOR or structure or whatever.

A. Okay. Well, I'm really not sure if that's showing any P & A'd well. This is more showing current and past producers in the Paddock pool, and I'm not sure if there are any of these shown on this map as P & A'd wells or not. It

looks like there is, because one in our well is P & A'd and it shows up on the map.

MR. STOVALL: I think his question is, if you go up in the northwestern portion of this area, you'll see there are wells up in the northwestern corner--

THE WITNESS: Structurally high?

MR. STOVALL: --and then there are some wells over where your lease is, a grouping of wells. Is there a reason that there are no wells shown on this map, say, in Sections 29 and 32?

THE WITNESS: I believe a lot of that has to do with structure. If you look at the structure map in conjunction with this, it looks like there's more of a high over here in the northwest quarter, and then a high that encompasses the middle of the Paddock pool, and then a couple of other isolated highs off to the east of that.

MR. STOVALL: So there is no development in those areas?

THE WITNESS: There is not in the Paddock, no.

Q. (BY EXAMINER STOGNER) Would it be safe to say, in these areas that are separated from

each other, could they be separate pools, in fact, and should they have been developed separately, perhaps?

A. Well, they are separated because the permeability is pinching out in these lower structural areas. However, I think the Paddock A, B, and C, since you correlate them across this entire area and they do seem to have a pattern of producing similarly, anyway, over time, I think they all should be within this same pool.

EXAMINER STOGNER: Perhaps I'm asking too many questions too early. Perhaps I should see what the other witness has to say and then, maybe, recall your first witness at that time.

MR. STOVALL: Let me help with one thing.

EXAMINATION

BY MR. STOVALL:

Q. Looking at it from a geologist's perspective, it has a common geologic characteristic in that you have the Paddock formation and the different zones of the Paddock throughout the pool area, is that correct?

A. Yes.

Q. And, as a geologist, you would call

that a common source of supply? Forget about the engineering and production criteria. Just looking at cross-sections, rock to rock.

A. I believe so.

Q. And it's also your testimony there is some, as you said earlier, it's not homogeneous, it varies throughout and there are areas that, although it contains the formation, it pinches out as far as productivity in the oil-bearing rock?

A. Or the wells were just very marginal and uneconomical to produce.

Q. And there is a geologic explanation for that, that you get into these lows and--

A. Yeah, and the permeability is not as good.

Q. So that's the geologic basis and the engineer can explain what's happened, as far as the communication?

A. Yes.

MR. STOVALL: Okay. I don't have anything further.

EXAMINER STOGNER: Mr. Kellahin?

MR. KELLAHIN: I would like to call Mr. Mark McClelland.

MARK McCLELLAND

Having been first duly sworn upon his oath, was examined and testified as follows:

EXAMINATION

BY MR. KELLAHIN:

Q. Would you please state your name and occupation?

A. My name is Mark McClelland. I'm a senior reservoir engineer with Conoco. I work out of Midland.

Q. You're going to have to speak up, too, Mark. On prior occasions, before the Division, have you testified as a reservoir engineer?

A. Yes, I have.

Q. What are your current responsibilities with regards to this specific case?

A. I'm a reservoir engineer. My charge in this case was to evaluate the Paddock production we had in our Lockhart A-27 lease, and determine the best way to produce this lease and the most efficient way to recover the oil.

Q. Have you had an opportunity to work with Susan Haycock in looking at the geologic investigation that she's made?

A. Yes. Susan and I spent approximately

three months studying this pool.

Q. As a result of your months of effort, have you now reached certain engineering conclusions with regards to what to do in terms of best defining the most optimum way to continue to produce the Paddock reservoir?

A. Yes, I have.

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

EXAMINER STOGNER: Any objections? Mr. McClelland is so qualified.

Q. Start first, if you will, Mr. McClelland, and give us the problem that was presented to you and Susan, for which they were asking you to investigate.

A. The development of our Lockhart A-27 lease, we had the No. 6 recompletion initially in 1991, we quickly offset that with three other recompletions. We soon realized we had a lot stronger wells than what the allowable had let us produce; and since we hadn't choked the wells back to keep the wells under the gas allowable, we saw a dramatic decrease in our oil production from the lease.

Q. Specifically, what was the operational

concern of the operating engineers when he took the No. 6 well, choked it back or restricted it to make the 2,000-to-1 gas/oil ratio limit?

A. Well, the operational engineer saw a dramatic increase in the gas/oil ratio on this well, and the offset wells, and his concern became, are we actually causing reservoir waste by having to pinch these strong wells back in order to keep the wells under 214 Mcf per day, which is the 2,000-to-1 limiting GOR.

Q. What is the current depth bracket allowable for the oil wells on 40-acre spacing from the pool?

A. These wells are allowed to produce 107 barrels of oil per day. That's the statewide rules that are the five to 6,000 foot depth bracket. The 2,000-to-1 GOR allows the wells to make 214 Mcf per day.

Q. Having been presented with the problem, take us right to the environment that you find yourself in, in this portion of the reservoir, in terms of characterizing the offsetting wells.

How old are they, and at what kind of rate are they being produced, in a general way?

A. In a general way, the Paddock pool

itself is mature, discovered initially in 1945, so it's some 47 years old at this time.

Primarily, what you see outside of our lease it's fairly mature wells that are marginal. I think 70 to 80 percent of the wells in the Paddock currently produce below 10 barrels of oil per day.

Q. What did you want to have, in terms of data and information, as a reservoir engineer, to commence studying the problem?

A. The first thing that I did was to look at the pool's performance in total, look at the total Paddock production, and try to quantify, what sort of reservoir is this? Is it a water drive? is it a gas cap expansion? is it a solution gas drive?

And, in gathering that data, I quickly identified that this was a solution gas drive reservoir.

Q. Describe for us what causes you to reach that engineering conclusion.

A. Primarily the rapid drop in bottomhole pressure, experienced by the wells in the Paddock pool, and also the significant increase in gas/oil ratios. Soon after pore discovery,

initially the wells produced 800 Scf per barrel of oil, or 800-to-1. Within eight to ten years, the wells were producing at a six to 8,000 GOR level.

Q. In terms of trying to get a handle on the pool, did you make an inquiry as to the size and the shape of the reservoir within the pool boundaries, as they currently exist?

A. Yes. I worked with Susan, and primarily we accessed available production data, we looked for all the wells that produced the Paddock reservoir that are in the Paddock pool.

The maps that Susan has presented as previous exhibits, show all the wells that have produced the Paddock or that have any Paddock production at all. So the first step we did was identify which wells in the Paddock pool would actually produce Paddock oil, and we made a map of that.

Q. Let's look at Exhibit No. 9, Mr. McClelland. Would you identify that for us?

A. Exhibit No. 9 is the same general area that we've been showing in the previous exhibits. You can see the Paddock pool outline. This exhibit shows only the wells that have been

active this year, wells that have been active from January through May, 1993.

Q. Let's pick out a specific well, for example. Let's look in Section 27, and let's look at the Exxon tract, the southeast quarter of Section 27. Above the well symbol, in blue, is the number "6"?

A. That's correct.

Q. What is that number?

A. That is the well number.

Q. All right. Below that, what is that?

A. 13 is the current oil production. That's average, January through May 1993, oil production.

Q. 27 represents what?

A. The gas production.

Q. And 2.1 represents what?

A. The gas/oil ratio, in Mcf per barrel of oil. So, 2,100 GOR or 2.1 Mcf per barrel of oil.

Q. So, as we look at the rest of the wells shown on this display, we can see similar information?

A. That's correct.

Q. What is the point of time for the data used in making the display?

A. That's the first five months of 1993.

Q. At what point in this project did you contact other operators?

A. Primarily, we had had conversations with Exxon, Marathon, Chevron, as far back as April 1991.

Q. What was the framework or the context of the discussions with those other operators?

A. I'm sorry, let me correct myself, April 1992. The context was that we realized that we had stronger wells than what the allowable would let us produce, and also our oil rate was dropping rapidly. We contacted the other reservoir engineers with the companies to see whether they had similar problems, and also to see if they would like to undertake a pool-wide change in the gas/oil ratio.

Q. The first question, had other operators experienced similar problems with the gas/oil ratio?

A. Yes. In talking with Trisha Plemming, she's a reservoir engineer with Exxon, our production engineer, John Condio, talked with Trisha in April 1992. She said that they, too, had been looking at this problem and had been

contacted by some of the other working interest owners as to how to proceed to get the GOR increase in this pool.

Q. Have you plotted, over time, the producing gas/oil ratio for the pool?

A. Yes, I have.

Q. And, generally, what is the range of the actual producing gas/oil ratio for the life of the pool?

A. In a range from six up to currently almost eight or 9,000 GOR.

Q. Your recommendation to the Examiner for this project area is to provide you a new gas/oil ratio ceiling of 6,000-to-1?

A. That's correct.

Q. What's the basis for that level?

A. The basis is the historical GOR that the pool was produced at.

Q. When the production engineer came to you with his concern about the No. 6 well not being able to return to its original level of oil production once it was curtailed, what zone was he talking about being perforated in?

A. The C.

Q. He's in the C zone with that well?

A. If I can expound on that briefly?

Q. Yes, please.

A. Initially, we recompleted the No. 6 well to the Paddock, anticipating a fairly marginal completion due to the life and the age of this reservoir. We were plesantly surprised, when we got a top allowable well, and also we were making a very substantial amount of gas.

The initial potential on the No. 6 was 167 barrels of oil per day, and 1,000,042 Mcf per day. Now, what we did, we perforated zones A, B, and C, in anticipation of just getting a marginal well. In order to reduce the gas rate, we isolated off zones A and B and just produced zone C, and that is where the well is currently producing from, zone C alone.

Q. If you went to zone A alone and you've cut that one off and you've taken B off, and you're now in C, what did you discover in terms of the gas/oil ratio for that zone alone?

A. The gas/oil ratio in zone C is still fairly high. In the well No. 6, initially, it was around a 3,000-to-1 GOR. Also, we cut off some oil production, too. We went from 167 barrels a day from zones A, B, and C, in total,

down to 98 barrels per day, producing in zone C alone.

We used that data to help us in our additional offsetting recompletions. We concentrated on zone C alone, trying to keep our gas low, but also maximize our oil production.

Q. Did it work?

A. No.

Q. You're still stuck up against an inefficient gas/oil ratio limit?

A. That is correct.

Q. When you talked to these other engineers for the other operators, did you have any conversations about what to do for the pool?

A. We talked about trying to form a joint case, attempted to change the pool wide rules, and then, upon additional testing on our lease, we discovered, yes, we need to do this.

So, we approached Marathon this summer and told them our plans, and I said, "Do you want to participate?" and Marathon declined to participate in this application.

Now, we did not go back to Exxon. The reason why, during our previous discussions Exxon had indicated this was a lower priority area to

them, and they would not commit the manpower to it.

Q. Did you have the resources, between you and Susan, to take on an entire pool study in order to provide the technical data to support the increase for the entire pool at this time?

A. Not the entire pool. We tried to gather as much production data as we could that was commercially available, without extensive time. I believe the exhibits you have before you show you this.

But, as far as going in and doing detailed cross-sections or detailed well histories on the entire pool, it would take much more time than the three months we've already put into the information we've gathered today.

Q. Do you have an opinion, as an engineer, as to whether or not your project area is suitable for purposes of the project?

A. I think it's a very good opportunity to really look at the Paddock pool, once again. We have an area that is virgin reservoir pressure, and we get a chance to look at production. We have a chance to maximize the flow rates and optimize the flow rates, and to observe the well

performance and not be limited to a 214 Mcf per day rate, and possibly have some reservoir waste occurring because of it.

Q. In terms of correlative rights, Mr. McClelland, within a one-year period, do you see an opportunity for Conoco to gain an unfair advantage over the offsets that would not yet have the 2,000-to-1 limit increased to six?

A. No, I do not.

Q. Why not?

A. The increase, initially, as Susan presented, we feel like our lease is isolated. We have the data on the reservoir pressure to prove that.

Also, it is a small structural high, and with that reservoir pressure, we feel like we have good data to suggest it's isolated.

Also, the wells that are fairly low structural wells won't make 400 MBO. We know that based on the cumulative oil production and how it trends along the structure map. So, if we're looking at 50 to 80 MBO wells, we still won't drain more than the 40 acres allotted to each oil well.

Q. Let's talk about the purpose of the

project. What do you propose to accomplish within that one-year period?

A. We propose to basically step-rate test the wells that are capable of producing more production right now. That involves opening chokes, watching production stabilize, watching the GOR, and then probably choke again.

We're asking for a 6,000-to-1 GOR so that we can produce up to 642 Mcf per day on each of the wells. Mainly, we're trying to get a range that allows us to work within. But also this range would allow us to produce the oil and gas and not be shut in later, to have to make up some overproduction.

Q. What are you trying to determine at the end of this test period? What's the objective?

A. We're trying to determine the optimum flow rate, the optimum gas/oil ratio rate that we can produce these wells at.

Q. Do you have evidence, as a reservoir engineer, of what the current rate is doing, in terms of ultimate recovery from the wells?

A. I have two exhibits that show our wells and what some of the restriction is doing to them.

Q. Let's do that one first. Let's turn to Exhibit 10 and have you identify that for us.

A. Exhibit 10 I've worked up to show the Paddock pool production history. This exhibit includes all wells that are produced out of the Paddock pool since discovery in 1945.

There are three graphs, and a few notes at the bottom. The top graph shows daily gas rate in red, daily oil rate in green, and also there's a water injection period that Exxon undertook in the Paddock waterflood unit. That's in the purple.

The second graph shows the reservoir pressure in the little green squares. The gas/oil ratio is shown in the red, and the third graph down shows the well count and the total water cut across the pool.

Primarily, what this production formula shows is a solution gas drive reservoir. The two points that show that, is the rapid decrease in reservoir pressure, and also the rapid increase in gas/oil ratio.

Also, I would like to point out that, you'll notice in the center graph in 1991, our Lockhart A-27 lease, we estimated the reservoir

pressure as 2,100 pounds, very near virgin pressure, while we extrapolated the reservoir pressure out at a five to 600 psi level.

Q. What does that tell you?

A. Our lease has not been drained by offset production. It's isolated.

Q. When you look at the center graph, the red line is the producing gas/oil ratio for the pool?

A. That's correct.

Q. On an average, it's somewhere between--I guess it's about 6,000-to-1, isn't it?

A. That's correct.

Q. All right, sir. Let's now turn to have you characterize for us the fluid properties in the reservoir.

A. Exhibit No. 11 characterizes the Paddock fluid properties. These fluid properties were taken from a PVT study done on a well that was back in 1946, the New Mexico State "S" No. 2.

Primarily it shows the Paddock oil is very similar to other Permian age oils. It's a fairly volatile crude, 38-degree gravity, initial gas/oil ratio of 881 cubic feet of gas, and

solution with the oil.

And then the final point is, the reservoir pressure was estimated at nearly 2,200 pounds, 2188.

Q. Let's go to the Lockhart A-27 No. 2, Exhibit 12. First of all, before we discuss it, tell us how to read the display.

A. The Lockhart A-27 No. 2 exhibit shows three graphs, again. The top graph is current, our daily oil rate in green, gas rate in red, and also there's one bottomhole pressure point shown.

The middle graph shows gas/oil ratio; the bottom graph shows oil cut. This is from the time period 1991, when we first recompleted this well, through 1993.

Q. This is the No. 2 well we've identified in Unit F of the section?

A. That's correct.

Q. What's of importance to you when you examine this graph?

A. What stands out, if you look at the green line, you get the oil rate. Initially, the well was producing 50 to 60 barrels of oil per day. Notice the tremendous decrease in

production down to 20, to currently 10 barrels a day that this well experienced, but yet notice that the gas maintained itself right at allowable.

What was happening is that we had to choke this well back to keep it below the 214 Mcf per day allowable. As we did so, we imparted, actually, a downhole choke on the well, and caused the oil production to fall off.

What's happening, as you choke the well back, your tubing starts to load up with oil and some water production going on. That allows the gas to flow preferentially in the well. If you see the gas/oil ratio, you'll notice a pretty rapid rise in gas/oil ratio from initial levels of 3,000-to-1 up to the current rate of about 20,000-to-1.

In summary, what the limiting 200 Mcf a day does to you, it makes you choke back your well, which doesn't allow enough flow rate to continuously unload your wellbore.

Q. Did you subject this well to a step rate test to confirm what was happening?

A. Yes, we did. We did a step rate test on this well, and that data is shown in Exhibit

13. Before I go to that, I want to make one final point, though, on Exhibit 12.

We had to shut the well in, in March 1993, after we overproduced it for the step rate test, and we attempted to return the well to production in May 93, and it was loaded up, though we could not return the well to flowing. So, we swabbed on it for a week to try to unload the well, and we were not successful.

We again tried to swab on this well on August 19th through 30th, 11 days straight, and we failed to get the well to flow again. So, what we've done, we've taken a well that was initially flowing 60 barrels of oil per day with a 200 Mcf per day, forcing us to put a pumping unit on that well, which we're currently doing.

Q. No question in your mind, as a reservoir engineer, that the limiting gas/oil ratio of 2,000-to-1 is damaging the ability of this well to produce?

A. I think there's no question. If you look at the production data you'll see there's just such a tremendous decrease in production. For a well with 1,670 pounds that won't flow, we are causing reservoir damage.

Q. Let's look at 13, now. This is the step rate test on that same well?

A. That's correct. This data was gathered from mid-February through early March 1993. We froze choke on this well. In fact, we did a production step rate test.

There are two graphs shown. The top graph is oil rate versus gas rate. The bottom graph is gas/oil ratio versus gas rate. As you can see, as we increase the gas production from 350 Mcf per day up to over 600 Mcf per day, we saw an increase in oil production from five barrels a day to approximately 25 barrels of oil per day.

On the bottom graph, you'll notice the well becomes more efficient. As we produce more gas, we actually are producing a lower GOR; so, in effect, we're using the reservoir energy in a better sense.

Q. Based upon the step rate test, what appears to be the optimum producing rate for the No. 2 well?

A. On this well, prior to loading up, the 600 Mcf per day rate that we got showed 25 barrels a day oil, and yet it showed the lowest

GOR; so 600 Mcf per day was the optimum rate here.

Q. That would be the equivalent of what gas/oil ratio?

A. It would be a 6,000-to-1 GOR. We're allowed to produce 642 Mcf.

Q. Let's go to the No. 7 well, Exhibit 14.

A. No. 7 is a similar case. Exhibit 14 shows again, on top, oil and gas rates in green and red, and in the middle, gas/oil ratio, and at the bottom, water cut.

This well was similar to the No. 2 in that we had to cut back the gas flow rate to comply with the allowable gas production. As you can see, again we went from approximately 40 barrels of oil per day down to currently 1 barrel of oil per day. The gas/oil ratio is over 100,000-to-1 on this well. The problem lies in that the well is not able to unload the fluids when it's pinched back to a 214 Mcf per day rate.

Q. Have you provided for a program or a schedule of activity for the one-year test period?

A. Yes, we have, and we've laid out a

testing plan in Exhibit 15. Currently, we have five wells producing the Paddock reservoir on our lease. We have one well we plan to spud in October, and we have two wells that are T & A'd that we'd like to do some more work on.

What we plan to do, though, is take our best wells that we see, to see if we can get the additional oil production, and go ahead and do the step rate testing. So, wells Nos. 6, 7, 10 and 2 will be our top four candidates for testing. We would like to flow the wells to stabilize at each choke setting, to get two or three tests to make sure we have stabilized production data that's representative.

We would like to test the wells at four choke settings each to allow us to present the kind of data that we did before in the No. 2, to show what the optimum flow rate is. At the same time we have other wells out here that are nonPaddock producers, that we need to maintain current testing practices on.

So, we have a lot of time in this 12-month period to adequately test our wells, but also to maintain current operations on our other wells.

Q. Summarize for us, Mr. McClelland, what you believe the status of your data shows you in terms of the necessity for this project?

A. As is, we're not recovering, we're not being efficient in our oil recovery in our Lockhart A-27. In fact, we're probably leaving oil in the ground by preferentially producing the gas through wells that are loaded up.

Q. What does this test allow you to do?

A. This test allows us to produce the gas at higher rates, to watch the oil production, to watch the gas/oil ratio history of these wells in the next 12 months, and to prove that we can't be more efficient producing these wells, with the reservoir pressure we have, at a higher GOR allowable.

Q. Will you share this technical information with other operators in the pool that desire to have this information?

A. Yes.

Q. Do you see any opportunities to impair the correlative rights of any of the immediately offsetting properties?

A. No, I don't.

Q. Why not?

A. Well, the other offset operators will have the opportunity, if we're successful, to come in and seek the same application as we did. And, as we showed earlier, we feel that we are isolated based on the high virgin reservoir pressure we encountered on our lease, compared to the offset production.

Q. Have you looked at both material balance and volumetric calculations to determine what effect you might have on offsetting operators?

A. Yes, I've done as much work as I can with the volumetrics. Material balance, we have two data points to work off of. I've checked my volumetric estimate with material balance, but they do confirm that we are not draining substantially more than our leased area.

Q. On a per well basis, can you give us an approximation of the number of acres per well that might be affected by the project?

A. The wells that border the offset operators are marginal wells, I would estimate are 40 acres or less. That's approximately an 80 MBO cumulative recovery. If you back out the reservoir properties and parameters that Ms.

Haycock presented earlier, you'll come up with a reasonable estimate of 40 acres' drainage area.

Q. Were Exhibits 9 through 15 prepared by you?

A. Yes, they were.

MR. KELLAHIN: We move the introduction of Exhibits 9 through 15.

EXAMINER STOGNER: Exhibits 9 through 15 will be admitted into evidence at this time.

MR. KELLAHIN: That concludes my examination of Mr. McClelland.

EXAMINER STOGNER: Mr. Bruce, your witness.

MR. BRUCE: Just one question, Mr. Examiner.

EXAMINATION

BY MR. BRUCE:

Q. Mr. McClelland, from an engineering standpoint, from what you've examined, is there any reason to not have this same GOR apply to other leases?

A. From an engineering standpoint I would say no, based on the Paddock pool production performance. Historically it's produced greater than the 6,000-to-1 GOR. I have not studied the

other leases in the detail that I studied Lockhart A-27, so I really cannot answer based on the production of the total pool.

MR. BRUCE: Thank you. Nothing further.

EXAMINER STOGNER: Mr. Carr?

MR. CARR: No questions.

EXAMINER STOGNER: Mr. Padilla?

MR. PADILLA: I don't have any questions.

EXAMINER STOGNER: Any redirect, Mr. Kellahin?

MR. KELLAHIN: No, sir.

EXAMINATION

BY EXAMINER STOGNER:

Q. In that period of one year, Mr. McClelland, is it Conoco's plan to ask for a 6,000-to-1 GOR pool wide, or make any temporary rules permanent just for this lease alone?

A. We would come back and, upon demonstrating that this is not costing reservoir waste, seek to make it permanent for our lease. As we stand right now, we are not seeking a pool-wide change.

MR. STOVALL: The reason you're not

seeking a pool-wide change is simply because you don't have the data and you haven't done the studies elsewhere? It's not because you don't think it should apply, but rather you don't have the basis to testify for it, is that right?

THE WITNESS: That's correct.

MR. KELLAHIN: Our plan, Mr. Stogner, is that when he concludes his study, if he is positive of the conclusions, then we will ballot the pool operators and solicit cooperation to make a pool-wide change. That's the plan, if his results merit that.

EXAMINER STOGNER: Is that what he said?

MR. KELLAHIN: At this point he's saying he's seeking it for his own project area. If satisfied, he would ask for his project area to be made permanent. But our overall strategy is to take this data, share it with the pool, and see if we can get Conoco and Marathon and Exxon to discuss with us and support a cooperative effort, joined by all of us, to make the pool-wide change.

We're uncomfortable in doing so now because the pool is so large, this is only one of

three areas, and there may be other information that has to be looked at. And we simply can't do it just by ourselves.

EXAMINER STOGNER: Mr. Kellahin, what I'm curious about, too, is how this would be initiated in a pool-wide situation, where all pools have been, how would you say, homogeneously operated? We're entering into a new era now, that you're proposing, that we take a pool and develop just one little area differently than the whole pool.

In some ways, that waterflood might be, you can say, operated the same way. However, if you look, the waterflood is given an area-wide allowable, if you will.

MR. KELLAHIN: They have far greater flexibility than the pool, yes, sir, I see that.

EXAMINER STOGNER: So, how would Conoco propose that? Maybe I'll let you answer that. How will this show up on a proration schedule? How do we follow it?

MR. KELLAHIN: The test period?

EXAMINER STOGNER: Yes, and subsequent--making this permanent just for this area of the pool?

MR. KELLAHIN: What you would do is, you would have what amounts to a shadow oil allowable, I guess. You would continue to track the production, and it may show up on the books as overproduction per proration unit, but the order will provide that that production need not be made. I think that's probably the simplest mechanics of keeping it in the system.

EXAMINER STOGNER: And, of course, we face the same type of a situation that Conoco does. We do not have the personnel nor the people to keep up with that kind of special, itemized, bookkeeping, just for this pool or just for this little section or this pool alone.

So, I can understand Conoco's problem of not having the people. We wouldn't have the people, either, to follow it.

MR. KELLAHIN: And we're sympathetic, too, and have to be clever enough and smart enough to overcome that kind of difficulty within the system to truly manage the reservoir in its most efficient way.

I think what happens in a year is not so cumbersome that we can't invite the operators of the pool, after the test results are in, to

support and help us demonstrate to you a pool-wide change. It's a Catch-22. I don't know how we'd prove it to you now.

MR. STOVALL: Let me interrupt you, Mr. Kellahin, since we have more than one of the other major operators here, Mr. Bruce or Mr. Duncan, what would be your response to the issue that we're concerned with? Are you prepared to get involved and say, "This ought to be a pool-wide rule," so we get uniform rules?

MR. BRUCE: I think Exxon is. I mean, everybody has manpower problems. I think Exxon has seen nothing here which indicates waste, by increasing the GOR. And, in that aspect, Exxon supports Conoco. Exxon doesn't want to do GOR increases for a pool on a lease-by-lease basis.

MR. STOVALL: What would you think of the idea, and then I'll go back to Conoco and ask them the same question, instead of doing it on a lease for a year, you do it on the pool for the year, and everybody can go and run the tests that they want to?

MR. BRUCE: That's really what Exxon wants. They're worried about correlative rights issues; not waste at all.

MR. STOVALL: Mr. Kellahin, why shouldn't we do it for the pool? Say, okay, everybody else, you can go do the same thing. You don't have to come to us on a lease-by-lease basis to get testing?

MR. KELLAHIN: I'm delighted with that solution. The difficulty for me, as the lawyer, is the notice issue. We've attempted to address that with notification to all the operators. Maybe that's enough. I was concerned that the status of the technical case, while specific on this area, might not be enough to satisfy the Examiner for a pool-wide change now, so we were dividing that issue into two parts, the initial test period, followed by the pool rule change, which we often do dealing with gas/oil ratios, because they're a sensitive problem.

MR. STOVALL: Let me suggest, I understand what you're saying, you didn't want to come in here and ask for something that you were not prepared to prove--

MR. KELLAHIN: That's right.

MR. STOVALL: --and I respect that. And I guess what I'm hearing now, Mr. Carr and Mr. Padilla, who are also representing operators

in the pool, do you have any comments on the idea of instead of trying to do a lease test, let's just give everybody the flexibility to do it.

MR. CARR: I can tell you that Marathon, after looking at this, decided to support it because of the data that could be obtained, that would ultimately result in an optimization of pool-wide primary oil allowables. So Marathon would support a pool-wide temporary allowable.

MR. PADILLA: Speaking for John Hendrix, I was suppose to have a technical person here with me today, and he called yesterday and said he couldn't be here today, but from talking with him, it appeared that they were in favor of this application. I cannot speak entirely--

MR. STOVALL: I understand your limitations on authority, but you at least know you're not coming in here opposed to them doing this testing?

MR. PADILLA: No, I think it's more information gathering, and my inclination is to believe that John Hendrix would favor the application.

MR. STOVALL: Assuming that we are

inclined to say yeah, okay, there's a potential for waste if we don't do it, would you agree, Mr. Kellahin, and all counsel here, that by--that there has been sufficient evidence to say that there won't be substantial impairment of correlative rights if the increased GOR were allowed for a period of time? That there would not be waste if that were allowed for a period of time? and, in fact, there might be valuable information gained?

In other words, the burden of proof to ask for a testing period, it seems to me, isn't so significant that you can't overcome it, even if you only looked at 320 acres.

MR. KELLAHIN: In light of Mr. McClelland's proof that the actual historic gas/oil ratio in the pool is between 6 to 10, it's already happened. And everyone here is in agreement that waste is not going to occur.

Mr. McClelland's testimony is it's going to prevent waste. Perhaps this is the expedient solution, is to apply the test for the whole pool. Maybe we need to supplement the notice, continue it to the 7th or something, and we'll get some more notices out and see if we

generate a complaint, but that would solve the mechanics of all the clerical things you do with tracking a project allowable in a prorated oil pool, which is a pain in the neck.

MR. STOVALL: Do we have any other operators here? There's a gentleman out there, who's not an attorney. You're with?

MR. SYKES: My name is Bob Sykes, with Shell. I'm not an attorney, but I'm a reservoir engineer. I can support letting all operators in the pool have the same test period. I think that would be the correct procedure to protect correlative rights, and also sounds like there wouldn't be any waste from that one year. Shell supports that idea.

MR. STOVALL: Maybe the way to do it, Mr. Kellahin, if we amend the application and get together and perhaps we take care of the notice issue with a publication by the operators, addressed to--and your concern is you have some undeveloped tracts that have unknown working interest owners and a massive title problem to try to find them all, right?

MR. KELLAHIN: I would propose to plead it in the alternative, to ask for a pool-wide

change, and if for some reason that becomes not possible, at least we presented our case for your consideration today to give the special project approval.

MR. STOVALL: My other feeling, in terms of the notice, to the extent you have undeveloped tracts, you don't have some established interest in current producing rates which is adversely affected by looking at the other approach to that, that somebody else had gotten us into?

MR. KELLAHIN: We've struggled with that for months, and if you'll give us some direction on whether notification to the operators, for this purpose, is sufficient, then that's an easy list to do.

If we have to go to working interest owners in nonproducing spacing unit plots, we're going to have to have some help from our friends.

MR. STOVALL: Would you agree with my premise that, in fact, if a tract is not developed that a change in the GOR doesn't create any fundamental change in a property right that would rise to the level of requiring personal notice?

MR. BRUCE: I would agree with you, Mr. Stovall. All it is is aiding in the production of the pool.

MR. STOVALL: Mr. Carr, you're nodding your head?

MR. CARR: I agree with you.

MR. STOVALL: Mr. Padilla?

MR. PADILLA: Purely regulatory, I believe.

MR. STOVALL: That's what I thought in the other case, but that didn't work.

EXAMINER STOGNER: Also Mr. Stovall, one other thing. Here we have Exxon, and a man from Shell. Are you up from Midland or Houston?

MR. SYKES: Houston.

EXAMINER STOGNER: Well, that would throw my getting together in Midland theory out of whack, but some sort of a committee or whatever. You've got some sort of a core group now. You've got Exxon, you've got Shell, that thought enough of it to be here today. And this is the reason I was asking Ms. Haycock about this. Perhaps the pool needs to be split up, where maybe this portion of the pool, the far, extreme, northeast corner can maybe be paired

off?

MR. STOVALL: This might be something you can learn. If everybody decides to go ahead and produce at the higher rates and see what happens.

MR. KELLAHIN: This is an option, to have a subsequent hearing a year from now, as to how to further manage the reservoir. It might divide itself into three new pools.

I think we've gone a long way today, in getting a handle on how to get some more data. We are not opposed to asking for the increase for the pool.

MR. STOVALL: Let me make a suggestion, then, and see if you concur, is that Conoco amend its application to ask for--and I understand you want to preserve the lease--but ask for in the alternative, a temporary change in the GOR for the entire pool; that you notify operators in the pool of that amended application; and that you publish a notice to persons owning lands in this area.

And I'll put that burden on the operators, to publish that notice in Lea County, to get general notice out, if you will. And

again, I don't believe we're rising to a property rights protection, but just an information type of thing. That means we'll have to move it to not the 7th, but the 21st.

MR. KELLAHIN: Let me make sure I can do this.

[Discussion off the record.]

MR. KELLAHIN: I have approval to do that, Mr. Stovall.

MR. STOVALL: In that case, I suggest that we-- Well, Mr. Bruce, were you planning on putting Mr. Duncan on?

MR. BRUCE: No, sir.

MR. STOVALL: So we're not cutting any witnesses off here?

MR. BRUCE: No.

MR. KELLAHIN: I would move we continue the case to allow it to be readvertised and amended, and placed on this Examiner's docket for October 21st.

EXAMINER STOGNER: So be it. Mr. Kellahin, you and Mr. Bruce, Mr. Carr and Mr. Padilla, perhaps, work with me and Mr. Stovall on how this would be readvertised.

With that, then, why don't we conclude

this case at this time, and, like Mr. Kellahin suggested, continue it to the October 21, 1993 docket.

If there's nothing further in this matter at this time, we're going to break for lunch for 30 minutes.

(And the proceedings concluded.)

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 10830 heard by me on 23 Sept. 1993.

, Examiner
Oil Conservation Division

CERTIFICATE OF REPORTER

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

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

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

WITNESS MY HAND AND SEAL October 4, 1993.

CARLA DIANE RODRIGUEZ, RPR
CCR No. 4

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

IN THE MATTER OF THE HEARING CALLED BY THE OIL CONSERVATION DIVISION FOR THE PURPOSE OF CONSIDERING:) CASE NO. 10,830

APPLICATION OF CONOCO, INC.

ORIGINAL

REPORTER'S TRANSCRIPT OF PROCEEDINGS

EXAMINER HEARING

BEFORE: Michael E. Stogner, Hearing Examiner

October 21, 1993

Santa Fe, New Mexico

This matter came on for hearing before the Oil Conservation Division on Thursday, October 21, 1993, at Morgan Hall, State Land Office Building, 310 Old Santa Fe Trail, Santa Fe, New Mexico, before Steven T. Brenner, Certified Court Reporter No. 7 for the State of New Mexico.

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I N D E X

October 21, 1993
Examiner Hearing
CASE NO. 10,830

* * *

A P P E A R A N C E S

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* * *

WHEREUPON, the following proceedings were had at 10:28 a.m.:

EXAMINER STOGNER: At this time I'll call next case, which is Case Number 10,830, which is the Application of Conoco, Inc., for special pool rules or, in the alternative, for a temporary special testing allowable, Lea County, New Mexico.

This case was begun at the September 23rd, 1993, hearing, and at that time it was just an application by Conoco for temporary special testing allowable, Lea County, New Mexico.

As discussed on the record at that particular time, it was decided to readvertise and request a special provision poolwide.

At this time I'll call for appearances.

MR. KELLAHIN: Mr. Examiner, I'm Tom Kellahin of the Santa Fe law firm of Kellahin and Kellahin, appearing on behalf of Conoco, Inc.

EXAMINER STOGNER: Other appearances?

MR. BRUCE: Mr. Examiner, Jim Bruce from the Hinkle law firm in Santa Fe, representing Exxon Corporation.

MR. PADILLA: Mr. Examiner, Ernest L. Padilla for John Hendrix Corporation.

EXAMINER STOGNER: Any other appearances?

Okay, Mr. Kellahin? It's your case, so...

MR. KELLAHIN: Mr. Examiner, perhaps the record also ought to represent a representative of -- Is it Shell --

MR. SYKES: Shell Western; BMP, Incorporated.

MR. KELLAHIN: All right, sir.

EXAMINER STOGNER: Why don't you go ahead and state your name at this time?

MR. SYKES: My name is Robert L. Sykes, S-y-k-e-s.

MR. KELLAHIN: Mr. Sykes was present at the earlier hearing as a representative of his company in this case.

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

Well, that covers everybody in the room, so I'll let you go ahead and talk, Mr. Kellahin.

MR. KELLAHIN: Okay. Mr. Examiner, based upon the discussion at the last hearing, I have filed a First Amended Application in this case, which we filed on September 27th.

The Application is amended to add the opportunity for other operators in the Paddock Pool to utilize a higher gas-oil ratio for their wells for testing purposes.

We have supplied a copy of the Amended

Application to the same list of parties that were originally notified. I have reduced that to a certificate of mailing, and we have attached, then, copies of all the return receipt cards, verifying the parties to whom we have sent notification.

I have discussed with Conoco whether or not they have received any objections, comments, concerns from anyone with regards to applying the proposed solution to the entire Paddock Pool. I am told that there have been no objections, comments or such discussions. This was an opportunity for any other party to provide additional technical evidence if they desired.

My client believes that they have completed their technical presentation at the earlier hearing, and they have nothing in addition to present to you.

We have no objection to you granting this Application for the Pool.

Should you choose not to do so, we would ask that you grant our alternative remedy, which was to create a special project for the north half of that particular section, for which we were applying for the special project area.

We believe that it's appropriate that whatever you do, it be for a temporary period of not less than one year, and then we'll report back to you the results of the

temporary change in the gas-oil ratio.

If you desire to make that change permanent, based upon the evidence you have now, that is certainly acceptable to my client.

And that's all I have.

EXAMINER STOGNER: Thank you, Mr. Kellahin.

Mr. Bruce, do you have anything further?

MR. BRUCE: No, sir.

EXAMINER STOGNER: Mr. Padilla?

MR. PADILLA: No, sir.

EXAMINER STOGNER: Since we're somewhat informal -- I'm sorry, Sykes is it?

MR. SYKES: Yes, sir.

EXAMINER STOGNER: Do you have anything that you would like to add?

MR. SYKES: No, we still fully support the poolwide Application.

EXAMINER STOGNER: Okay. Thank you, sir.

(Off the record)

EXAMINER STOGNER: Since there's nothing further in this particular matter, then I will take Case Number 10,830 under advisement at this time.

(Thereupon, these proceedings were concluded at 10:34 a.m.)

* * *

CERTIFICATE OF REPORTER

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

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

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

WITNESS MY HAND AND SEAL October 27th, 1993.

STEVEN T. BRENNER
CCR No. 7

My commission expires: October 14, 1994

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 10830 heard by me on 21 October 1993.

Examiner
Oil Conservation Division