NEW MEXICO OIL CONSERVATION DIVISION

STATE LAND OFFICE BUILDING

STATE OF NEW MEXICO

CASE NO. 10494

IN THE MATTER OF:

The Application of Union Oil Company of California d/b/a UNOCAL for pool contraction, pool creation, and special pool rules, Lea County, New Mexico.

BEFORE:

DAVID R. CATANACH

Hearing Examiner

State Land Office Building

JUNE 25, 1992

REPORTED BY:

DEBBIE VESTAL
Certified Shorthand Reporter
for the State of New Mexico

ORIGINAL

A P P E A R A N C E S

FOR THE NEW MEXICO OIL CONSERVATION DIVISION:

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FOR THE APPLICANT:

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BY: **WILLIAM F. CARR, ESQ.**

I N D E X

E X H I B I T S

EXAMINER CATANACH: At this time we'll call Case 10494.

MR. STOVALL: Application of Union Oil Company of California d/b/a UNOCAL for pool contraction, pool creation, and special pool rules, Lea County, New Mexico.

EXAMINER CATANACH: Are there appearances in this case?

MR. CARR: May it please the Examiner, my name is William F. Carr with the law firm, Campbell, Carr, Berge & Sheridan of Santa Fe. I represent Union Oil Company of California. And I have two witnesses.

EXAMINER CATANACH: Any other appearances? The witnesses, please, stand and be sworn in.

[The witnesses were duly sworn.]

THOMAS O. MORROW

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

EXAMINATION

BY MR. CARR:

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

A. My name is Thomas Owen Morrow.

Q. Where do you reside?
A. In Midland, Texas.
Q. Mr. Morrow, by whom are you employed?
A. I am employed by Union Oil of California as an advanced petroleum engineer assigned to the Andrews District.
Q. Have you previously testified before the New Mexico Oil Conservation Division?
A. No, I have not.
Q. Could you just briefly review your educational background and then summarize your work experience for Mr. Catanach?
A. I received a bachelor of science degree in petroleum engineering from Texas Tech University in May of 1984. At that time I began working for SOHIO Petroleum Company in Midland, Texas, as a production engineer. I worked there from May 1984 through December 1987. I was then transferred to the offshore reservoir engineering group in Houston, Texas, where I worked in that capacity from December 1987 through December of 1989.

I was then moved back to the onshore business unit and held a position as senior petroleum engineer from December 1989 through

July 1991. At that time I accepted a position with UNOCAL as advanced petroleum engineer in Midland where I currently work.

Q. As an engineer with UNOCAL, does your geographic area of responsibility include the portion of southeastern New Mexico which is involved in this case?

A. Yes, it does.

Q. Are you familiar with the application filed in this case on behalf of UNOCAL?

A. Yes, I am.

Q. Are you familiar with the Red Hills Pennsylvanian Gas Pool?

A. Yes, I am.

MR. CARR: We tender Mr. Morrow as an expert witness in petroleum engineering.

EXAMINER CATANACH: He is so qualified.

Q. (BY MR. CARR) Mr. Morrow, would you briefly summarize what UNOCAL seeks with this application?

A. UNOCAL seeks the contraction of vertical limits of the Red Hills Pennsylvanian Gas Pool. The proposed amended vertical limits of the Pennsylvanian Pool will include from the

top of the Atoka Lime to the base of the Morrow Formation.

Along with this UNOCAL requests the formation of a new pool to be called the Red Hills Upper Atoka Pool and is to include the interval from the top of the Atoka to the top of the Lower Atoka Lime.

Q. You're also requesting that special rules be promulgated for the new pool, are you not?

A. UNOCAL does request that special pool rules and regulations for the proposed new upper Atoka pool be established including provisions for 640-acre spacing and special well location requirements which provide that no well shall be located nearer than 1650 feet to the outer boundary of the section nor nearer than 330 feet to any governmental quarter-quarter section line.

And due to the limited extent of the proposed Upper Atoka Pool, UNOCAL requests that the pool boundaries be limited to Section 5, Township 26 South, Range 33 East in Lea County, New Mexico.

Q. Now, Mr. Morrow, what we actually have

here is a well that was original drilled to the Devonian; is that correct?

A. That is correct.

Q. And you have now come back up the hole and have been able to complete it in an Atoka sand that isn't present or producing in other properties in the field?

A. That's correct.

Q. And the pool rules you're requesting are consistent with the pool rules for the Devonian Formation?

A. That's correct.

Q. Also the Wolfcamp above this is spaced on 640 acres with similar rules; correct?

A. That's correct.

Q. Let's go to your Exhibit No. 1. Could you identify that for the Examiner and then review it, please?

A. Exhibit No. 1 is a map identifying the current Red Hills Pennsylvanian Pool boundaries. This pool includes Sections 31, 32, and 33, of Township 25 South, Range 33 East, also Sections 4, 5, and 6 of Township 26 South, Range 33 East.

Also indicated on the map are the boundaries of the UNOCAL operated Red Hills Unit,

which consists of Sections 32 and 33 and Sections 4 and 5. Also identified on the map are the proposed horizontal boundaries of the new Upper Atoka Pool, and this includes only Section 5.

The well locations which are colored in red are those wells which have been completed in the Red Hills Pennsylvanian Pool.

Q. Now, in the Red Hills Unit, what formations are unitized?

A. All depth -- in the Red Hills Unit all depth intervals are included.

Q. And what formations are currently producing in this unit?

A. The formations which have produced are the Devonian, the Atoka, and the Wolfcamp.

Q. And at this time the Wolfcamp and Devonian are on 640-acre spacing?

A. That is correct.

Q. Is there any other operator in this pool other than UNOCAL?

A. Yes, there is. Kaiser-Francis operates the Federal No. 1 well located in Section 6, which was completed in the Atoka Lime in December of 1975. The Atoka is currently shut-in and not producing.

Q. Is it producing in any other zone at this time?

A. Yes, it is. It is currently in the Wolfcamp.

Q. This is the second application filed with the Division concerning the No. 3 well. Could you briefly review that prior application with the Examiner?

A. On March 10, 1992, UNOCAL filed an application with the Oil Conservation Division requesting special pool rules and regulations for the Red Hills Pennsylvanian Pool including 640-acre spacing.

After filing the application, discussions with the representative of Kaiser-Francis indicated that they would like for the application to exclude Section 6 and Section 31 which they hold acreage.

Kaiser Francis wrote a letter to the Commission formalizing their request. UNOCAL then contacted a staff member of the Conservation Division concerning Kaiser-Francis' request. And at that time it was related to UNOCAL that for such action to be taken, Sections 6 and 31 would have to be removed from the Red Hills

Pennsylvanian Pool, which was not possible due to the Federal No. 1 well which is completed in the Pennsylvanian pool and is located in Section 6.

UNOCAL at that time decided to file an application with the Commission requesting formation of the new Upper Atoka Pool. Kaiser-Francis was notified of our intentions prior to the filing and indicated that they would have no problems with the application.

The request to dismiss the original application was filed on May 13, 1992, and the application for a new Red Hills Upper Atoka Pool was filed on June 2, 1992.

Q. Mr. Morrow, when was the Red Hills Pennsylvanian Gas Pool discovered?

A. It was discovered in December of 1964.

Q. Let's go to Exhibit No. 2. And I'd ask you first to identify that and then review it for Mr. Catanach.

A. Exhibit No. 2 provides a summary of the four wells which have been completed in the Pennsylvanian within the Red Hills Pennsylvanian Pool.

Q. Included on this summary is such data as well name, location, the original operator,

the dates the wells were completed, the interval, all intervals which have been completed in the wells, and also the original and current production data.

It should be noted that the current rates are for March of 1992 with the cumulative production being also through March of 1992.

Q. If we look at this exhibit, the four Pennsylvanian wells in the field are shaded; is that correct?

A. That is correct.

Q. Now, that includes the No. 3 well, which is the subject of today's hearing?

A. That is correct. And it is currently the only well producing in the Penn.

Q. And the other three Pennsylvanian completions, where were they completed as compared to the completions in the No. 3 well?

A. They were completed in the Penn Lime, which is the lower limits of the Pennsylvanian.

Q. And about how many vertical feet below the current production or producing interval would you estimate they were completed?

A. I believe that was approximately 200 feet.

Q. Could you briefly review the history of the Red Hills Unit No. 3 well for the Examiner?

A. The Red Hills Unit No. 3 was drilled to a total depth of 17,597 feet and completed as a Devonian producer in September of 1983.

The calculated absolute open flow for the Devonian was 1.6 million cubic feet per day. The well continued to produce from the Devonian until April 1991, at which time the well was recompleted in the Atoka at a depth of 14,528 to 14,545. The calculated absolute open flow for that interval was also 1.6 million cubic feet per day.

Q. UNOCAL will be calling a geological witness to review the reservoir characteristics; correct?

A. That is correct.

Q. Why don't we go to Exhibit No. 5, and I'd ask you to identify and review that for Mr. Catanach.

A. Exhibit No. 5 is a summary of the test data for the Red Hills Unit No. 3 following completion into the Penn interval. As you can see, the well was perforated on April 13, 1991, and achieved a test rate of 1.9 million cubic

feet per day with a flowing tubing pressure of 8,130 PSI. Maximum shut-in tubing pressure following the test was 9,350 PSI.

The well was shut in on April 15, 1991, in preparation to run a tie-back liner for safety reasons. On July 14, 91, the tie-back liner was run; however, extreme difficulties were encountered in the operations and severe formation damage resulted.

This is evident when comparing the test data following running the liner as compared to the original. After the liner was run, a maximum rate of 1.5 million cubic feet per day with only a flowing tubing pressure of 2,500 PSI was achieved. This is a decrease of 5,630 PSI from the original test.

Also it can be noted that the calculated absolute open flow, as mentioned previously, was 1.6 million as compared to the original test of 1.9. The well was then returned to normal production. And included on the exhibit are the monthly well tests through January of 1992. As you can see, the well has decreased from about 1.1 million per day to 40 Mcf per day.

On February 2, 1992, the well was shut-in in order to obtain a static bottom-hole pressure in order to ensure that the decrease in flow rates was due to damage and not due to depletion.

A bottom-hole pressure gauge was run on March 14, 1992, and recorded a bottom-hole pressure of 10,355 PSI, which did eliminate the depletion as a cause of the reduced rate.

Q. What are your plans for this well?

A. Following finalization of the working interests' assignment, which is dependent upon the spacing, we will prepare a treatment designed to remove the formation damage present.

Q. What general conclusions has UNOCAL reached about this particular well and this particular producing interval?

A. Although the well is only producing a current rate of 40 Mcf per day, we feel the well can be worked over to remove the damage caused by the work-over and return to the original producing conditions, which was a rate of about 2 million cubic feet per day.

And based on geological interpretation of the Atoka, which you'll see later, the

reservoir is of limited extent and the well can effectively drain the reserves present at this rate.

Assignment of 640-acre spacing for the Atoka will prevent the drilling of unnecessary wells and will be consistent with the spacing requirements for the Devonian and the Wolfcamp Formations in the field.

Q. Okay. Mr. Morrow, the nature of the reservoir will be reviewed by the geological witness?

A. That is correct.

Q. As to this particular well, after remedial work, you anticipate that this will drain this Atoka reservoir?

A. That is correct.

Q. And do you not intend to drill additional wells to produce the reserves from this section in the Atoka Sand?

A. No, we do not.

Q. Those would be in fact unnecessary, would they not?

A. Yes.

Q. Would approval of this application therefore be in the best interests of

conservation and the prevention of waste?

A. Yes, it would.

Q. Would the correlative rights of any interest owner in this pool be impaired in any way by approval of the application?

A. No, they would not.

Q. In fact, the only other interest owner in the pool is Kaiser-Francis, is it not?

A. That's correct. They're the only other operator.

Q. Is Exhibit No. 6 a copy of an affidavit confirming that notice of this hearing has been provided to the other interest owners in the pool and in the area of this pool as required by OCD rules?

A. It is.

Q. Would you identify what has been marked as UNOCAL Exhibit No. 7?

A. Exhibit No. 7 is the letter which was referred to earlier written by Kaiser Francis to the New Mexico Oil Conservation Division. In the letter it states, Kaiser Francis states that in its opinion that there is no evidence that conditions or parameters exist and that UNOCAL's wells drilled within the four-section unit exist

outside this unit.

Q. And UNOCAL is requesting that the special pool rules be limited in application to the pool boundary, which would be just Section 5?

A. That's correct.

Q. Were Exhibits 1, 2, and 5 through 7 prepared by you or compiled under your direction?

A. Yes, they were.

MR. CARR: At this time, Mr. Catanach, we move the admission of UNOCAL Exhibits 1, 2, 5, 6, and 7.

EXAMINER CATANACH: Okay. Exhibits 1, 2, 5, 6, and 7 will be admitted as evidence.

MR. CARR: That concludes my direct examination of this witness.

EXAMINATION

BY EXAMINER CATANACH:

Q. Mr. Morrow, is it my understanding that this new zone has not been previously produced in any of these Penn wells?

A. That is correct.

Q. Does the --

A. Excuse me. I believe that there were a couple of perforations open in the Red Hills Unit No. 1. Our geologist will be able to confirm

this. But the No. 1 produced for 16 days before it was shut-in. It was also perforated in the Penn Lime. I'm not for sure if that was the Red Hills Unit No. 1 or No. 2, but the geologist will be able to.

Q. Okay. Do the formation characteristics vary significantly between the main producing zone in the Red Hills Penn and this new zone?

A. Yes, sir. The main producing interval in the Red Hills Pennsylvanian Pool is a limestone. This is a clean sand.

Q. Is this sandstone present and potentially productive in any of the other three wells?

A. It is present in the No. 1 and No. 2, but it thins considerably and is not commercially productive and is not at present in the Federal No. 1 well located in Section 6.

Q. Did you say it was not commercially --

A. Productive.

Q. -- in the No. 1 and 2?

A. That's correct. It's extremely thin.

Q. And that's just determined from the logs?

A. Yes, sir.

Q. Is the Red Hills Pennsylvanian Pool, that's spaced on what?

A. 320-acre spacing, statewide rules.

Q. UNOCAL doesn't have any evidence or data available at this time which would demonstrate that that will drain 640 acres?

A. No, sir. We only have one data point currently as far as pressure data.

Q. What do you base your opinion on that this well, this well will drain 640 acres in this zone?

A. Based primarily on the initial test upon perforating the well that we feel that at rates of 2 million cubic feet per day that the well could effectively drain 640-acre spacings.

Q. Is this likely to be the only well that's going to be produced from this zone?

A. On this section definitely. The well control that we have now does not indicate that it extends beyond Section 5 other than up in the Red Hills No. 1, which is extremely thin.

Q. You mentioned something about a working interest assignment that was dependent on the spacing or something. What's that all about?

A. The working interest will vary

depending upon if the well is assigned 320-acre spacing or 640. BTA holds the acreage in the north half of the section. And if it is assigned 640, they will become working interest owners in the Red Hills Unit No. 3 well.

Q. Is it all Union acreage in the south half of Section 5?

A. I believe it is.

Q. Okay. You requested for a setback 1650 feet from the outer boundaries, 330 feet from the inner boundaries?

A. That's correct. I believe, and backing up on the previous question, I do believe BTA owns 80 acres in the south half of the section. So they would have a significantly reduced working interest in the well if it was only based on 320 acres.

Q. Now, you stated that -- I believe you stated that the Devonian and the Wolfcamp are on 640 acres in this area?

A. That's correct.

Q. Do the Devonian and Wolfcamp show similar types of formation, or do they show any similarities in this respect?

A. I believe our geologist will probably

be better equipped to answer that question.

Q. And Kaiser-Francis is the only other operator in the pool?

A. That's correct.

Q. Are you requesting temporary rules so that you can gather some data to come back in and --

A. We would prefer permanent rules, but if temporary rules were enforced, then we would request that the time period be as long as possible to allow the acquisition of data to more adequately determine the drainage area.

Q. Mr. Morrow, in your opinion what is the initial potential of this well? How does that relate to spacing? I notice here on Exhibit No. 2 that the well Nos. 1, the Red Hills Unit No. 1 and the Federal No. 1 had considerably higher absolute open-flow potentials in the Penn than this well does. Yet that's still spaced on 320 acres.

A. The Red Hills Unit No. 3, the four-part test was conducted after the liner was run. In fact, after the formation -- severe formation damage had occurred. The absolute open-flow was 300 Mcf below the original test data.

If we had conducted a four-point test prior to the running the liner, the absolute open-flow would have been much higher, I believe.

Q. But you believe that the initial open-flow does indicate something about the drainage characteristics?

A. The 1.6 that was measured on the four-point test?

Q. Well, any.

A. I believe that the producing capabilities of the well would have some indication of the drainage area.

A. And we feel they're much higher than what was evident on the four-point test.

Q. Will you have some more geologic evidence to this assumption?

A. The geological evidence which will be presented will show the limited extent of the reservoir.

EXAMINER CATANACH: Okay. I have nothing further.

MR. STOVALL: Not me.

EXAMINER CATANACH: The witness may be excused.

MR. CARR: At this time we call Mr.

Altany, Robert Altany.

ROBERT ALTANY

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

EXAMINATION

BY MR. CARR:

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

A. Robert McRae Altany.

Q. And where do you reside?

A. Midland, Texas.

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

A. By UNOCAL as a senior development geologist.

Q. Mr. Altany, have you previously testified before this Division and had your credentials as a geologist accepted and made a matter of record?

A. Yes, I have.

Q. Are you familiar with the application filed in this case and behalf of UNOCAL?

A. Yes, I am.

Q. And have you made a study of the area which is the subject of this application?

A. Yes, I have.

MR. CARR: Are the witness' qualifications acceptable.

EXAMINER CATANACH: They are.

Q. (BY MR. CARR) Would you refer to what has been marked as UNOCAL Exhibit No. 3, identify this, and review it for the Examiner?

A. This is a structure map on the top of the Lower Atoka Lime, which is the primary producing interval up to now in the Red Hills Penn Pool. This is based on well data and some seismic data.

Highlighted in orange are wells that have a completion in the Pennsylvanian. The only one currently producing from the Pennsylvanian, and that's in the upper Atoka Sandstone, is the Red Hills No. 3.

Q. Do you have traces on this which tend to indicate reservoir limit?

A. Yes. As shown, the dashed lines are inferred limits of the Red Hills No. 3 producing Upper Atoka Sandstone.

Q. And this structure map is based on well control and seismic data?

A. Yes, it was.

Q. Let's go to the cross-section, Exhibit No. 4, and review that now.

A. This is a cross-section, structural cross-section through the Atoka and Red Hills field. And a trace of this cross-section is shown on the structure map previously mentioned. Extends from the well in Section 6 which was drilled by Mesa here. It's currently operated by Kaiser-Francis. In the middle is the Red Hills No. 3. Also shown are the UNOCAL No. 1 and 2 Red Hills.

Highlighted is the sandstone producing in the Red Hills No. 3. This is the Upper Atoka Sand. It is located above the Lower Atoka Limestone, which is the primary producing interval as shown of the other Penn producing wells. This sandstone is well developed locally around No. 3 Red Hills. It is not present in Kaiser-Francis' well to the left, which is to the west.

Going to the north and northeast, it thins drastically into the No. 2 Red Hills and No. 1. In the No. 2 Red Hills well, you can see that it was perforated in that zone; however, only about one foot of the sand will make the 5

percent porosity criterion we generally use for a sand of this type as the lower limit of the productive porosity. So this zone would be marginally productive at best.

In that well you have the majority of the production came from the Lower Atoka Limestone. None of the zones above that that were perforated show very much producing capability on logs, and there is no test data to independently evaluate these. In other words, they do not appear to be commercial. The only well which we have evidence of commercial productivity of this sandstone is in the No. 3.

Also shown in here is the Lower Atoka Limestone, which the previous structure map was contoured on is shown here. And we're requesting that the Red Hills Penn Pool be restricted with its top at the lower -- the top of the Lower Atoka Limestone and extending down to the base of the Morrow, which is below the scale of the cross-section.

And we're defining the Upper Atoka for our application, the base of which will be at the top of the Lower Atoka Limestone and at the top of the Atoka Formation.

Q. Which of these wells has produced? Is it the No. 1 or No. 2 that has actually produced from this sandstone in the past?

A. It would be the No. 2.

Q. And that is also located within Section 5?

A. Yes, it is.

Q. So it would be within the proposed new pool?

A. It would.

Q. Now, the breaking point between the old pool and what you're proposing be the new Atoka Pool is the Lower Atoka Lime?

A. Yes.

Q. Is this an easily defined marker?

A. Yes, it is. It's easily defined in wells and on seismic data.

Q. And the zone that we're focusing on here today in the Atoka Sand is not present at all in the Kaiser-Francis well?

A. No, sir, it is not.

Q. Do you have an opinion as to the limits of this Atoka Reservoir?

A. Appears to be around one section in area.

Q. Now, you haven't closed off the reservoir boundaries on your previous exhibit on your structure map to the north and south, and why is that?

A. There is insufficient information in these directions.

Q. Were Exhibits 4 and 5 prepared by you?

A. Yes, they were.

MR. CARR: At this time, Mr. Catanach, we would move the admission of UNOCAL Exhibits 4 and 5.

EXAMINER CATANACH: Exhibits 4 and 5 will be admitted as evidence.

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

EXAMINATION

BY EXAMINER CATANACH:

Q. Mr. Altany, is the Well No. 2, that's currently plugged back from the Penn?

A. Yes, it is.

Q. It's not producing from any interval?

A. Produced only very briefly from the Penn.

Q. The perforations in the Atoka Sandstone were not tested separately?

A. No, sir, they were not.
Q. It's basically your opinion that this sandstone is essentially limited to Section 5?
A. Most likely it is.
Q. Do you have any information regarding the permeability of this sandstone?
A. We do not have any direct permeability information. But from log data and cuttings examination, it is a fairly clean sand and should have relatively good permeability. I should add that analogous sandstones in the area in the Upper Atoka show good permeability.
Q. Above this sand?
A. Correlative with this sand and above it.
Q. There are some correlative sands in this area that --
A. Yes, sir. Correlative but not continuous with this one.
Q. But they show similar characteristics?
A. Many of them do.
Q. Are you aware of any other Atoka pools that are spaced on 640 acres?
A. I am not aware of one. I believe that the Pitchfork Ranch Atoka Field is on 640.

Q. Where is that relative to this field?

A. Approximately five miles to the northeast.

Q. Would you say that the drainage characteristics probably vary significantly from the sandstone to the limestone that's being produced in this area?

A. They most certainly do. The limestone that produced in the area, a lot of the porosity appears to be secondary and vugular, which is often very discontinuous, non-interconnected and not as producible and doesn't drain as well as a continuous sandstone should.

Also the wells that produce from the Lower Atoka Lime, most of the zones perforated showed high water saturations which limited their produceability. We do not have that case in the sandstone. It has water saturations in the 30 to 40 percent range; whereas, many of the limestone zones had 80 percent water saturation.

EXAMINER CATANACH: I believe that's all I have of the witness.

MR. STOVALL: No.

EXAMINER CATANACH: The witness may be excused.

Is there anything further in this case?

MR. CARR: Nothing further, Mr. Catanach.

EXAMINER CATANACH: There being nothing further, Case 10494 will be taken under advisement.

[And the proceedings were concluded.]

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 10494, heard by me on June 25 1992.

David R. Catanach, Examiner
Oil Conservation Division

CERTIFICATE OF REPORTER

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

I, Debbie Vestal, 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 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 JUNE 29, 1992.

DEBBIE VESTAL, RPR
NEW MEXICO CSR NO. 3