STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

CASE 10052

EXAMINER HEARING

IN THE MATTER OF:

Application of Shell Western E & P, Inc., for Amendment of Division Order Nos. R-8539 and R-8541, as Amended, Lea County, New Mexico

TRANSCRIPT OF PROCEEDINGS

BEFORE: DAVID R. CATANACH, EXAMINER

STATE LAND OFFICE BUILDING

SANTA FE, NEW MEXICO

August 22, 1990

A P P E A R A N C E S

FOR THE DIVISION:

ROBERT G. STOVALL
Attorney at Law
Legal Counsel to the Divison
State Land Office Building
Santa Fe, N.M. 87501

FOR THE APPLICANT:

W. PERRY PEARCE, ESQ.
Montgomery & Andrews, P.A.
Post Office Box 2307
Santa Fe, N.M. 87504-2307

FOR JOHN H. HENDRIX:

ERNEST L. PADILLA, ESQ.
Padilla & Snyder
Post Office Box 2523
Santa Fe, N.M. 87504-2523

FOR J. R. and TOM CONE:

W. THOMAS KELLAHIN, ESQ.
Kellahin, Kellahin & Aubrey
Post Office Box 2265
Santa Fe, N.M. 87504-2265

I N D E X

E X H I B I T S

APPLICANT'S EXHIBITS:

EXAMINER CATANACH: At this time we'll call 10052.

MR. STOVALL: Application of Shell Western E & P, Inc., for an amendment of Division Order Nos. R-8539 and R-8541 as amended, Lea County, New Mexico.

EXAMINER CATANACH: Are there appearances in this case?

MR. PEARCE: May it please the Examiner, I'm W. Perry Pearce of the Law Firm of Montgomery & Andrews, appearing in this matter on behalf of Shell Western E & P, Inc., and I have three witnesses who need to be sworn.

MR. PADILLA: Mr. Examiner, I'm Ernest L. Padilla of Santa Fe, New Mexico, for John H. Hendrix Corporation. I have no witnesses.

MR. KELLAHIN: Mr. Examiner, I'm Tom Kellahin of the Santa Fe Law Firm of Kellahin, Kellahin & Aubrey, appearing on behalf of J. R. Cone and Jim Cone. I have no witnesses to present.

EXAMINER CATANACH: Any other appearances?

Will the witnesses please stand to be sworn in.

(Thereupon, the witnesses were sworn.)

MR. PEARCE: Thank you, Mr. Examiner. Before I call my first witness, if I may, I would like to take just a moment to introduce this case and describe what we're doing.

As you may recall, in November of 1987, Shell Western appeared before the Division and asked for the creation of a new Blinebry-Tubb-Drinkard Pool. That Pool was approved by the Division in Order No. 8539 and was named the North Eunice Blinebry-Tubb-Drinkard oil and gas pool.

At the same time, in a consolidated hearing, the Division approved statutory unitization of an area that was the same as the pool boundaries, and approved a waterflood covering that same area.

The order, as is customary, required Shell Western to appear before the Division within three years to discuss why the special pool rules should not lapse and general pool rules should not go into effect.

We're appearing before you today to have that three-year rule review, to request that special pool rules be made permanent after some amendments that result from information that we've gained during the almost three years of waterflood, unit and pool operation.

When we appeared before you in 1987, we indicated that the available production information and geological information seemed to indicate that the gross Blinebry-Tubb-Drinkard interval was composed of separate oil and gas zones. Based on that description, the present pool rules provide for oil wells and gas wells in the pool area.

As I indicated, we've done extensive study during this almost three-year period, and after collecting that data and analyzing it, Shell Western is now ready to demonstrate that gas was originally distributed in the form of gas caps rather than separate zones, that those gas caps are now largely depleted and that almost all of the gas currently being produced in the pool area is coming from the oil column.

That indicates to us that the retention of a separate gas well classification and the imposition of the natural gas prorationing system on that gas production is not necessary and, in fact, is not appropriate.

As part of our case today, we will present data supporting the conclusion to the Division, we will attempt to answer any questions you have, and at the conclusion of the case we have a proposed form of order which contains new special pool rules.

We'll demonstrate that the changes we're requesting will operate to prevent a waste of resources by assisting in a more efficient operation of the pool and the associated waterflood, and we'll indicate that it will operate to protect the correlative rights of interest owners in the pool and interest owners offsetting the pool.

With that introduction, if I may, I would like to call my first witness, Ms. Lisa Corder.

LISA CORDER

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

EXAMINATION

BY MR. PEARCE:

Q. For the record, would you please state your name and place of residence?

A. My name is Lisa Corder, and I live in Houston, Texas.

Q. By whom are you employed?

A. Shell Western Exploration Production.

Q. And in what capacity?

A. I'm a geological engineer in the Western Division Production.

Q. Have you appeared before the Division previously and had your credentials as an expert in the field of petroleum geology made a matter of record?

A. Yes, I have.

Q. Are you familiar with the application filed by Shell Western today?

A. Yes, I am.

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

EXAMINER CATANACH: She is so qualified.

Q. Ms. Corder, at this time I would like for you to look at the exhibits--I have passed out copies to the Examiner and the other parties in this case--and discuss those for the Examiner and those in attendance, please.

A. Okay. As indicated on the Exhibit 1, the North Eunice Blinebry-Tubb-Drinkard Oil and Gas Pool lies within the Penrose Skelly trend, which parallels the western edge of the Central Basin Platform. Drinkard production in the area was discovered in 1944, and most of the drilling activity occurred between 1948 and 1958, when the field was developed on 40-acre spacing.

As shown on Exhibit 2, the North Eunice Blinebry-Tubb-Drinkard Oil and Gas Pool is situated on the northeast end of the north/northwest, south/southeast trending anticline, about one mile north of the town of Eunice.

I would like to ask the Examiners at this time to note that the North Eunice Blinebry-Tubb-Drinkard Oil and Gas Pool and the Northeast Drinkard Unit may be used interchangeably by the SWEPI witnesses throughout the rest of the testimony, and also there may be occasion where the Northeast Drinkard Unit is abbreviated NEDU, or referred to simply as NEDU.

I would like to now direct your attention to Exhibits 3 and 4. As indicated on these exhibits, the North Eunice Blinebry-Tubb-Drinkard Oil and Gas Pool and the Northeast Drinkard Unit became effective in December of 1987. Water injection for secondary recovery operations began in August of 1988.

Currently the pool is producing approximately 560 barrels of oil a day, 11,600 Mcf of gas a day, and 680 barrels of water per day.

As you can see on Exhibit 4, current production is approximately 200 barrels of oil a day above the 1987 forecast. That is basically the result of an aggressive workover program to open all pay in all of the producers.

Water injection currently averages about

25,400 barrels of water per day. Cumulative protection is 28 million barrels of oil and 438 Bcf of gas, and since unitization we've recovered 556,000 barrels of oil and 12 Bcf of gas.

Exhibit 5 is a map of the pool area. This map outlines the status of all the Northeast Drinkard Unit wells at mid-year 1990. Included on this map are oil wells, pre-unit gas wells, post-unit gas wells, observation wells, injectors, water source wells, future water source wells, TA'd and shut in wells and also plugged and abandoned wells. Of particular note are the oil well and gas well classification.

Oil wells correspond to all those wells open in oil zones, and gas wells correspond to those wells open only in gas zones. So this sort of nomenclature may or may not correspond to how the State currently classifies a particular well.

This same exhibit will be used with slight modifications later in the testimony by the reservoir engineer.

As shown on Exhibit 6, the formations within the area dip approximately one to two degrees to the northeast. This particular map is contoured on the Blinebry Marker, but the Tubb and the Drinkard formations more or less follow this same general structure. The structurally highest point within the Unit is in the southwest corner, in Section 22. This same structural interpretation will be displayed later with the aid of a structural cross-section through the field.

Exhibit 7 is a log from the Northeast Drinkard Unit #221. Shown in black on the left-hand side of this is the conventional gamma ray curve, shown in yellow in the center track is the silt index curve, shown in blue on the right-hand side is the porosity curve.

The top of the Unit is defined by the NMOCD Blinebry, and the bottom of the Unit is defined by the top of the Abo formation. As indicated on the left-hand side of this exhibit, the Blinebry has been subdivided into five porosity zones that are correlative across the Unit area. The Tubb has been subdivided into four zones based on lithologic breaks, and the Drinkard has been subdivided into five zones based on lithology and porosity zonation.

The zonation shown on this exhibit is consistent with our revised interpretation of the geology of the pool, which I will go into in more detail later in the testimony.

Limited core data, in combination with

production data, was used to develop the original reservoir production description as presented in the 1987 unitization hearing. Since unitization, we've acquired a much better understanding of the reservoir with the aid of (1) more complete and detailed production information by the working interest owners, (2) more complete log data provided by the working interest owners, and (3) a series of additional cased whole log suites that have been run in many of the wells in conjunction with the post-unitization workover program.

One of the most significant results of the detailed cased hole log program was the development of a lithologic model over the entire vertical interval. As I will demonstrate later in the testimony, that revised lithologic model has had a significant impact on the fluid distribution model.

I would like to direct your attention now to Exhibit 8. This exhibits compares the vertical distribution of lithology data that was available at the time of unitization with the distribution of lithology data that's available at the present.

Shown in red on the left-hand side of this exhibit is a vertical distribution of lithology data that was available at unitization. This was in the form of actual core and covered only one-third of the unitized interval. We had a little bit of core coverage in the upper part of the Blinebry and then the upper to middle part of the Drinkard Formation.

Since unitization, we have run detailed cased hole logs in several wells over the entire vertical interval, as shown in blue on the right-hand side of this diagram. Those detailed cased hole logs have been used to develop a lithologic model over the entire vertical interval that's resulted in a more detailed and accurate reservoir description.

As indicated on Exhibit 9, the detailed cased hole log suites have been run in five key wells located in strategic positions across the field. The well in the northwest corner of this exhibit is Northeast Drinkard Unit #108. We have actual core and core data available over portions of the Blinebry and Drinkard in that well, and they have been used to calibrate the cased hole log suite.

Exhibit 10 shows simplified results of the lithology data that was obtained from the detailed cased hole logging of that well, which is Northeast Drinkard Unit #108. The mineralogical log suite was used to identify and approximate the relative volumetric abundance of four main matrix components, and those included limestone, dolomite, anhydrite and silt.

The component that's most important to an understanding of the fluid distribution is silt. The silt, as we have defined it here is composed primarily of quartz and potassium bearing feldspars and clays. Silt, on this particular diagram, is indicated in orange and spikes on that silt curve above the background value indicate zones where there is significant silt content. Those zones will be referred throughout the rest of the testimony simply as silts. Continuous silts are believed to constitute reservoir seals, preventing the vertical migration of fluid over geologic time.

The continuous silts that are present in the North Eunice Blinebry-Tubb-Drinkard Oil and Gas Pool are shown in yellow on Exhibit 11.

Q. At this time, Ms. Corder, I would ask you to approach Exhibit 11 which we've hung on the wall. The exhibit set contains smaller copies. If you would just be careful to speak up as you discuss it.

A. Okay.

Q. Thank you.

A. Before I get into the details of this, I'm just going to briefly summarize the main points that

I'm going to make with the aid of this exhibit throughout the rest of the testimony.

The first point is that the silts within this interval are confined to basically two packages; secondly, that those silts acted as seals over geologic time; third, that we've identified a gas/oil contact within the Blinebry at a depth of minus 225; that the upper part of the Tubb is actually a continuation of the Blinebry hydrocarbon column; that the remainder of the Tubb is generally gas productive high on structure and oil productive across the rest of the unit; and that a gas/oil contact was discovered or identified within the Drinkard at a depth of minus 3025.

The overall result is that the original gas bearing pore volume is currently believed to be much less than that which was presented at the 1987 unitization hearing.

Before I go into the details concerning the lithology and the fluid distribution, I'm just going to briefly summarize the cross-section construction.

This is a structural cross-section constructed using logs that have been acquired since unitization. Five of the six wells, excluding NEDU 910, have been logged with detailed cased hole log suites and portions of those logs are what you see displayed.

As indicated in the lower right-hand corner of this exhibit, the cross-section generally runs from north to south. Beginning in a downdip position at NEDU 221, continues updip to NEDU 910 and slightly downdip at NEDU 918.

The green curve on the left-hand side of the logs is the conventional gamma ray. Shown shaded in red next to the gamma ray is the silt indicator curve, and shown in blue on the right-hand side of each of these logs is the porosity curve.

Pay corresponds to those intervals that are shaded blue but do not have a significant silt content. Also Noted on the left-hand side of this exhibit is formation tops, NMOCD Blinebry NMOCD Tubb, the Drinkard, and the top of the Abo formation. We've shown between NEDU #108 and NDU #407 the subzone nomenclature, and that nomenclature is consistent with that which was described and presented on Exhibit 7.

I'm now going to summarize in detail the lithologic model over the entire vertical interval and I'll emphasize the position of the silts and their control on fluid distribution.

The 75-foot interval from the NMOCD

Blinebry to the Blinebry Marker is a silty interval that forms the upper seal to the Blinebry hydrocarbon column. The interval from the Blinebry Marker to the NMOCD Tubb basically consists of dolomite and various amounts of nodular pore filling and replacement anhydrite. There are a few discontinuous silt stringers that are present within this interval.

Correlative porosity zones corresponding to the Blinebry subzones are correlative across the unit area. Within this interval there are no continuous barriers other than variations within porosity.

The 100-foot international from the NMOCD Tubb to the Tubb Marker, which is commonly referred to as Tubb I Upper, is very similar in lithology to the overlying Blinebry. There are no lithologic breaks that separate Blinebry V from the Tubb I Upper. And, as I will mention again later in the testimony, we now feel that that Tubb I Upper is actually a continuation of the Blinebry oil column.

The Tubb Marker is the first silt of the Tubb silt package and it's correlative or continuous across the unit area. Three other silts of varying thicknesses are also continuous across the unit area. They are separated by relatively clean intervals of dolomite that do have a little bit of porosity development. The lower part of the Tubb, referred to as Tubb III, has very little, if any, porosity development.

There's no lithologic break separating Tubb III from the Drinkard I. The Drinkard I is basically dolomite with some anhydrite in the form of pore filling replacement and nodular anhydrite. The porosity within the Drinkard I is relatively low as indicated by NEDU #704. Drinkard II through V consists of interbedded stringers of limestone and dolomite, and most of the porosity within that interval appears to be developed within the limestone units. Locally those porous units are correlative. Again, within the Drinkard, there are no continuous barriers other than variations in porosity.

Using detailed original completion information provided by working interest owners, we've superimposed or revised the fluid distribution model on top of this lithology model, and I'll now summarize that fluid distribution model.

Based on original completion information we've identified an original gas/oil contact within the Blinebry at minus 2225. This differs from the original reservoir description or fluid distribution for the Blinebry at the 1987 unitization hearing.

At that time Blinebry I and II were believed to essentially be gas-bearing across the entire unit area. The change in the fluid distribution for the Blinebry is a result of detailed analysis of all available data, including data that's been acquired since unitization.

Given the gas/oil contact is at minus 2225 for the Blinebry, the downdip portions of Blinebry I are oil-bearing, and Blinebry II is oil-bearing across most of the unit area. Only the southwestern corner of the unit falls within the Blinebry II gas wedge.

So the overall result of the change in the fluid distribution is that the original gas-bearing pore volume is currently believed to be much less than that which was presented in the 1987 hearing.

The Tubb fluid distribution is also different from that which was presented at the 1987 hearing. At that time the entire interval from the NMOCD Tubb to the top of the Drinkard was believed to be more or less discrete pods of oil and gas distributed more or less randomly across the unit area.

Based on lithologic data that we've acquired since unitization, we do not see any lithologic break separating Blinebry V from the Tubb I

Upper. 1988 selective zone tests of Tubb I Upper indicates that the zone is oil-bearing across the entire unit area, and we now believe that that interval, the Tubb I Upper, is actually a continuation of the Blinebry oil column.

This, again, results in a substantial reduction of the original gas-bearing pore volume from that which was presented at the 1987 hearing. Again, at that time, we thought the Tubb I Upper was predominantly gas-bearing.

Tubb I Lower and Tubb II generally appear to be gas-bearing, high on structure and oil-bearing across the rest of the structure. Data does not support a single gas/oil contact for those zones, but it does support the existence of a transition from gas to oil about at the mid-structure of the pool area.

A very thick, tight and largely nonproductive interval, referred to as the Tubb III, separates the upper zones of the Tubb from the Drinkard. Based on original completion information, we've identified an original gas/oil contact within the Drinkard at a depth of minus 3025. As a result, Drinkard I is partially gas-bearing in the southwestern corner of the Unit. However, the pore volume associated with that gas cap is relatively small or very small due to the fact that there is very little porosity development in Drinkard I, as evidenced by NEDU #704.

The remainder of the Drinkard, including all of the downdip portions of Drinkard I, all of Drinkard II, III, IV and V are completely oil-bearing across the entire unit area.

So, to summarize the fluid distribution model, the changes that we've seen have resulted in a substantial reduction of the original gas-bearing pore volume from that which was presented at the 1987 hearing.

Blinebry I was found to be oil-bearing in the downdip portions of the unit; Blinebry II was oil-bearing across most of the unit area; Tubb I Upper is oil-bearing across the entire unit area and is now considered to be a continuation of Blinebry oil column and not predominantly gas-bearing as original thought.

The rest of the Tubb is generally gas-bearing high on structure, and oil-bearing in the downdip portions of the pool area. A small gas cap is identified within the Drinkard, but again the pore volume associated with that gas cap is very small. The remainder of the Drinkard is completely oil-bearing.

So again, the overall result of the revised lithology model and fluid distribution model is that the original gas-bearing pore volume is currently believed to be much less than that which was presented at the 1987 unitization hearing.

As the reservoir engineer will demonstrate, the intervals that were gas-bearing are now depleted and are contributing very little to the current gas production from the unit.

Q. Is there anything else you want to point out right now?

A. No.

MR. PEARCE: Mr. Examiner, that's all the questions I didn't have of this witness at this time. She's available for questions, if you have any.

EXAMINATION

BY EXAMINER CATANACH:

Q. Ms. Corder, you've come to the conclusion that the only real gas-bearing zones are high on structure, and those would be mostly in the southeast parts of the units?

A. That's right.

Q. Basically, what would that area consist of, the gas-bearing portion?

A. It's basically going to be confined to Sections 15, 22 and portions of 23, but given the gas/oil contacts, it's going to vary a little bit for each of the horizons, Blinebry I, Blinebry II, Tubb and the Drinkard.

Q. You're saying the remainder of the unit, there really isn't any recoverable gas or pore gas volume?

A. Originally, there was a little bit of gas in portions of the Tubb, like in Section 10 and Section 3, although it was very spotty. Based on the results that we've seen from recent completions--and the reservoir engineer will go into that in a little more detail--we're just not seeing any producible volumes at the present time, so what gas was there is now depleted. The majority of the gas at the time of field discovery was in the updip portions of the unit which I described as Sections 15, 22 and parts of 23.

Q. Now, there are some gas wells in Sections 3 and 4 and 10. Are those currently not producing?

A. The reservoir engineer is going to show those.

EXAMINER CATANACH: I have no further questions at this time.

Any other questions of this witness? She may be excused.

WILLIAM R. LANCASTER

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

EXAMINATION

BY MR. PEARCE:

Q. For the record, would you please state your name and place of residence?

A. William R. Lancaster, Houston, Texas.

Q. Mr. Lancaster, by whom are you employed?

A. Shell Western Exploration and Production.

Q. In what capacity, sir?

A. As a reservoir engineer.

Q. Mr. Lancaster, have you appeared before the Division and had your qualifications as an expert in the field of reservoir engineering accepted and made a matter of record?

A. Yes.

Q. Are you familiar with the application filed by Shell Western under consideration today?

A. Yes, I am.

MR. PEARCE: Mr. Examiner, at this time I would ask Mr. Lancaster be recognized as an expert in the field of reservoir engineering.

EXAMINER CATANACH: He is so qualified.

Q. Mr. Lancaster, you have some information. Would you please discussion that for the Examiner?

A. In this portion of the testimony, I would like to cover how, as operator of the Drinkard unit, Shell Western has changed their concept as to the makeup of the gas reserves and how this has related to the need for gas zone injection.

As illustrated by the geologist, there is a revised description and considerably less pore volume of the free gas than was originally thought, but we do not anticipate any change in the initial estimate of 54 billion cubic feet of gas that was given when we formed the unit.

The basis for this statement is our observed performance of the unit and tests that we've made on different zones that have if confirmed (1) that the gas zones are largely depleted and have a bottom hole pressure of something in the range of 250 psi and (2) that some 95 percent of the gas is coming from wells that are completed in the oil column.

Now, to demonstrate what we mean when we say the gas zones are depleted, I would like to call your attention to Exhibit 12. That is a plot of the pressure as given in the Drinkard Unit versus the ultimate recovery that you would receive from a gas zone.

On the Y axis we have the Drinkard pressure that would range from 0 to 2400 pounds, and on the X axis is the recovery of ultimate, from 0 to 100 percent, assuming an abandonment pressure of 100 psi.

As you can see on this plot, at 250 psi we've recovered some 95 percent of the ultimate oil. Now, one of the things that we found in order to confirm what we had seen here, that were these zones really depleted, we went in and tested eight wells. These eight wells are shown on Exhibit 13, their location.

This is the same exhibit as was shown on 5, except that we've included in the lower right-hand corner a tabulation of the wells that we've tested, the zones, and the rates and the bottom hole pressures that we observed.

These wells were scattered across the unit, and we've selected four Blinebry Zone 1 and four Tubb to test the completions. The northernmost well, 201, was a Blinebry well that we were unable to establish production in even though we spent extensive time and money trying to bring it in. Its average bottom hole pressure, that we measured later after an extended shut-in period was only 135 pounds.

The test rates that you can see range from 20 to 72 Mcf per day and really are uneconomical. Several of the wells, I might point out, you talked about the gas wells in Sections 3--or 2 and 10, these wells, although we tested them as gas wells, the gas zones actually produced as oil wells, produced with rather low gas/oil ratios.

These rates, which average probably some 33 Mcf per day, are essentially uneconomical and we can't really afford to make any additional recompletions at this rate. The pipelines feel the same way. In fact, the pipelines refused to hook up the last three wells we had, and the only way we were able to test them was to receive permission from the Commission to test them through our unit facilities rather than have the pipelines hook up to them.

What we've seen here where we've seen these low rates is really consistent with what we've seen in the field in our observations, in that when we would recomplete wells, squeeze off the gas zones and recomplete into the oil zones, we would see little or no change in the gas rate of the producing well. Now, given this sort of production and performance, I would like to--

Q. Excuse me. Before we do that, Mr.

Lancaster, I want to back up, please, to Exhibit 12. You indicated that this exhibit indicates that 95 percent of the gas has been recoverable gas from the gas zone so far? Is that what it says?

A. Yes.

Q. I apologize for interrupting. Let's go to 14.

A. In Exhibit 14 we have two pie charts. The upper pie chart is our gas production as of mid-1990 and the lower one is our gas reserves. Given the production that we see in these seven wells that we produced, plus the other three gas producers that are completed in the gas zones only, the total gas production from the gas wells in this field is about five percent.

Given five percent of the gas production we've assumed we have five percent of the reserves remaining in the gas zones. Given this gas production, and I would like to draw your attention to Exhibit 15, which is a plot, a comparison of the plot of the forecast of the gas production as given in 1987 and the current 1990 forecast.

There's two similarities and two differences in these. The similarities are that we have assumed or recommended--we base the reserves the same in both cases, they're 54.7 Bcf of gas. The total rate of production really hasn't changed very much. Our total rate that we now forecast is about equivalent to what they had forecast then.

The differences in what we see is in the makeup of the gas. Where we see significant amounts of the gas now coming from the oil column and only minor from the gas zones, we've extended the life from 2018 to 2033 to tie into the oil forecasts that we're going to show a little later.

Now, given the evidence that we've seen, where we have gas caps instead of gas zones, where we have indications that there's some communication by similarities in pressures, there's a concern that repressuring the oil column to 1,000 pounds or more could result in displacing some of the secondary oil into the gas cap. And, under this scenario, we could lose at least a million barrels of the 15 million barrels of secondary recovery. And, to prevent these losses, we would propose to include the gas zones as part of our injection.

We would anticipate no loss in gas reserves as a result of this and conceivably could actually have a slight increase in the gas reserves by injecting water into a depleted gas zone.

So, in summation, I would like to say that we see no current--because we've seen a change in the makeup, we see no current change in the ultimate gas recovery; that 95 percent of the gas we now believe is coming from wells completed in the oil column; the gas zones are largely depleted, which was confirmed with the completion of eight wells, four completed in the Tubb and four completed in the Blinebry.

Additional gas zones recompletion are uneconomical, and based on this we would recommend that the NMOCD eliminate the gas well classification which would allow us to increase our operating efficiency and to maximize the ultimate recovery of gas and oil.

MR. PEARCE: Mr. Examiner, at this time Mr. Lancaster has completed his discussion of the reservoir engineering aspects of the case and he is available for questioning on those.

If I may, after he has been questioned about reservoir engineering, I would like to excuse Mr. Lancaster, bring on our third witness, and then subsequently bring Mr. Lancaster back to discuss unit operations since formation of the unit and approval of the waterflood. But reservoir engineering information is now before you.

EXAMINATION

BY EXAMINER CATANACH:

Q. Mr. Lancaster, how would the injection of water into these gas zones increase your gas production?

A. It would be very negligible, but when you have depleted gas and no more gas to recover, injecting water could possibly move some water into the drainage area of your gas well. Some gas.

Q. Do you propose this in the entire unit, to inject water into these gas zones in the entire unit?

A. In selected wells, yes; not every well.

Q. You don't propose to exclude the southwest structurally high gas zones?

A. Initially we probably would, yes, until we get it completely drained.

Q. So you would continue to produce the gas in the southwest quarter, that portion?

A. That we have, yes.

Q. Is most of the gas production from gas wells coming from that southwest portion of that unit?

A. Yes, it is.

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

MR. STOVALL: I just have one probably

naive question.

EXAMINATION

BY MR. STOVALL:

Q. The wells that are identified as gas wells at the present time, are they perforated in the oil column?

A. No, they are completed.

Q. They're strictly in the gas?

A. Only in the gas column.

Q. Can they be? Are they drilled through to the oil? Could they be converted to oil production without any--

A. Some of them. I would have to look and tell you which ones. Probably

Q. Do you have any intent to try to make them into into oil wells?

A. No.

MR. STOVALL: That's all I need to know.

EXAMINER CATANACH: Mr. Pearce, why don't we take a 10-minute break now.

(Thereupon, a recess was taken.)

EXAMINER CATANACH: Let's proceed, Mr. Pearce.

MR. PEARCE: Thank, you, Mr. Examiner.

JOE D. RAMEY

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

EXAMINATION

BY MR. PEARCE:

Q. For the record, sir, would you please state your name and place of residence?

A. Joe D. Ramey, Hobbs, New Mexico.

Q. Mr. Ramey, have you been retained by Shell Western E & P, Inc. to testify in regard to the matter under consideration today?

A. Yes, I have.

Q. And have you previously appeared before the Division or one of its Examiners and had your credentials accepted as an expert in the field of oil and gas regulatory matters?

A. Yes, I have.

MR. PEARCE: Mr. Examiner, at this time I would ask that Mr. Ramey be so accepted.

EXAMINER CATANACH: He is so accepted.

Q. At this time, Mr. Ramey, would you describe for us briefly the purpose of your testimony today?

A. The purpose of my testimony is to illustrate the differences in casinghead allowables under the present rules and the proposed new rules.

MR. PEARCE: Mr. Examiner, at this time I would like to briefly skip over Exhibit 16 and we'll return to that exhibit when Mr. Lancaster returns.

Q. Mr. Ramey, at this time I would like for you to address your attention to Exhibit No. 17, please, and describe that exhibit for the Examiner and those in attendance?

A. This exhibit illustrates the allowables or the top casinghead gas allowables or gas allowables in the North Eunice Blinebry-Tubb-Drinkard Pool.

The first three lines are the current allowables for a 40-acre North Eunice oil well, which is 107 barrels per day times the limiting gas/oil ratio of 6,000 cubic feet per barrel. The Blinebry gas well, that's the average daily allowable based on the last year's production for allowables for a 160-acre unit, and the same with the Tubb.

Under the heading "Potential Gas Allowables Mcf Per Day for a 160-Acre Tract," under the current rules a fully developed 160-acre tract would have four North Eunice Blinebry-Tubb-Drinkard oil wells, one Blinebry gas well and one Tubb gas wells, which would give you a daily gas allowable of 3468 Mcf.

Under the current rules, the fully developed tract would only go down to four net North Eunice Blinebry-Tubb-Drinkard oil wells.

Q. That's if the gas well classification is dropped from the pool rules, is that correct?

A. Yes, that's right, and then the gas wells would turn out to be second wells on a proration unit, and the allowable would be 2568 Mcf per day.

Q. After determining what the allowable for an average 160-acre tract would be, under the current rules and then current rules without a gas well classification, have you attempted to determine the average producing capability of certain 160-acre tracts within the unit area?

A. Yes, I have, and that's illustrated on Exhibit 18. There are nine tracts listed which encompass what we consider the higher gas producing area of the pool. They are in the southwest portion of the pool. Each square illustrated is a 160-acre tract. And, as you can see, the farthest north 160-acre tract is the highest gas-producing tract, and it makes around 1300 Mcf per day.

Q. As I understand it, once again this is the area of highest gas productivity in the unit area?

A. Yes, it is. This is approximately one-third of the 160-acre units, and it produces about two-thirds of the gas that is being produced currently from the pools.

Q. Let's look at Exhibits 17 and 18 together. As I understand the information you've presented, the highest 160-acre gas-producing tract now currently can produce about 1300 Mcf a day, with an average current allowable of perhaps 3468 Mcf, and if you subtract out the gas wells, that allowable would be about 2500, is that correct?

A. That is correct.

Q. Mr. Ramey, when you look at the average allowables which would be available to wells within the North Eunice Blinebry-Tubb-Drinkard Oil and Gas Pool and you compare that with the 160-acre tract's producing ability, do you believe that it is necessary to have controls on the gas production within the unit area?

A. No, I don't think that's necessary at all. I think we've shown today that what we have at this time in the pool is essentially a solution gas reservoir, and so we have a waterflood in a solution gas reservoir at this time.

And I would, you know, like to throw something out for the Examiner's consideration. If you'll refer to Rule 701(F)(3), it says, "Allowables in waterfloods are equal to the ability to produce, and they are not subject to the depth bracket allowable." So the Examiner might consider treating this waterflood as any other waterflood is treated in the state.

Q. Mr. Ramey, do you believe that the elimination of the gas well classification from the rules governing the North Eunice Pool and allowing that pool to be regulated under normal waterflood rules is in the best interest of the prevention of waste and the protection of correlative rights?

A. Yes.

Q. Mr. Ramey, do you have anything further at this time?

A. I think not. I think just to add a little something, these are current gas rates and we have, you know, every indication is that these gas rates will decline as the injection volume increases and we start realizing fill-up. I think the gas volumes will decline, so I don't think there will be any additional gas or additional gas volumes produced on a daily basis or a monthly basis.

MR. PEARCE: Mr. Examiner, I have nothing further of this witness at this time. He's available for questioning.

/

/

EXAMINATION

BY EXAMINER CATANACH:

Q. Mr. Ramey, on Exhibit 18, where's the gas coming from on these tracts? Are they from gas wells or does that also include oil wells?

A. There are gas wells on those tracts. I think the tract, the 1300 tract has four oil wells or four North Eunice Blinebry-Tubb-Drinkard wells and a Tubb gas well and a Blinebry gas well.

Q. So most of these tracts do contain some oil wells that are producing gas?

A. Yes. There are four oil wells on each of these tracts.

Q. There are? In addition to--

A. Or three wells and an injection well, but basically four North Eunice Blinebry-Tubb-Drinkard wells on each of the tracts.

Q. And each of the tracts also has a gas well?

A. No, I don't think--not each of them.

MR. PEARCE: No.

EXAMINER CATANACH: That's all right. I can get that from the other exhibit here.

EXAMINATION

BY MR. STOVALL:

Q. Mr. Ramey, let me clarify. Exhibit 18, the squares drawn with the numbers in them are sections, 160-acre tracts?

A. Yes, they're 160-acre tracts.

Q. The four 160-acre tracts, 100 in the northwest, 200 in the northeast, 1100 in the southeast and 1000 southwest, is the southwestmost section of the unit, is that correct? I don't see the number on the exhibit?

A. All of Section 22, would it be the west half of Section 23, and all but the northeast quarter of Section 15 is what the area encompasses. It's essentially the area that Ms. Corder outlined in her testimony.

If you'll look up in the upper right-hand corner of the exhibit, there's a small unit outlined with the 160-acre tracts outlined in them.

MR. STOVALL: I just wanted to be sure my interpretation of that was correct.

EXAMINER CATANACH: Mr. Ramey, did you give a percentage of the amount of gas that's being produced from this area right here?

THE WITNESS: Yes, about two-thirds of the gas comes from this approximately one-third of the unit.

MR. STOVALL: Approximately how much of the gas coming from this area delineated comes from the gas wells? Do you have that information?

MR. PEARCE: Counselor, I think when we get Mr. Lancaster back on, he may have detailed production records from each of those wells and we can probably figure that out with him if you'll hold off on that question for a couple of minutes.

MR. STOVALL: I can do that.

EXAMINER CATANACH: Any further questions? The witness may be excused.

MR. PEARCE: Mr. Lancaster, if you would return, please.

<u>WILLIAM L. LANCASTER</u>

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

EXAMINATION

BY MR. PEARCE:

Q. Before we go, Mr. Lancaster, to the second part of your testimony, I would ask you to look at the previous exhibits that Ms. Corder introduced, and it may be that 13 is the best exhibit to use. We were having some questions from the Examiner and Counsel about relative production in the study area. Can you address those for us?

A. Yes. The gas production from the gas wells primarily comes from this area. There are two gas producers listed that are not included in this area, and they're 305 and 405, that make 70 Mcf a day.

Q. Where are the wells you just mentioned?

A. They're up here in Section 2 and 15--2 and 10. I beg your pardon. 201 is not producing.

So what you really see in Exhibit 18 is that the 1300, the 160 acres with 1300 Mcf a day has two gas wells, one of which is very marginal.

160 acres south of that with 1000 Mcf a day has four wells and no gas wells. The two leases south of that have three oil wells and one gas well each. And the gas wells make maybe 150 Mcf a day each.

EXAMINATION

BY MR. STOVALL:

Q. In each of those areas?

A. No, just the two southern wells.

Q. When you're saying the two, down in Section 22?

A. The west half of Section 22, yes.

Q. Okay. It appears to me there's a gas well in the northwest quarter, a gas well in the southwest quarter and a gas well in the northeast quarter, is that correct, of Section 22?

A. Yes. 806 is essentially shut in. 804 and 902 are the two gas wells.

Q. And those each make about 150 Mcf?

A. Approximately.

Q. So they're making their proportionate share of the gas, approximately, is what you're saying, is that correct? The oil wells are making as much or more gas than those wells?

A. The oil wells make as much or more gas than the gas wells do.

Q. Is that true in Section 15 as well, where it looks like there's four gas wells that appear in the area of study in Section 15, two in the northwest and two in the southeast?

A. Essentially the oil wells probably make the majority of the production. And then, from there, north, we have literally no gas production from the gas.

Q. Let me make sure I understand your concern on why you're seeking the rule changes. One is that by classifying these as gas wells, they're subject to proration and limitations on production, is that correct? Is that one of your concerns?

A. Our concern here is that--well, we have several concerns. One is that we have to treat them separately and produce them through the pipeline and this is a problem. So, we would like to produce them through the unit facilities and just kind of put them in with the unit. And accounting for them and keeping them separate is a very definite burden. The few gas wells we have, we would just like to put in with the rest of the oil wells and produce them until they deplete, and then abandon them.

MR. PEARCE: If I may clarify, under the previous order there was a requirement that the gas wells be squeezed so that they are only open in the gas zones. We're before you because, as shown by Exhibit 13, when Shell did that to eight wells, it got very marginal gas producers.

Shell is being forced to do extensive workover on a number of wells, and the previous order required us to keep, I believe, the number was, 22 gas wells in the unit area. In fact, the last three wells, as the previous witness mentioned, the last three wells that were drilled, the pipeline was not willing to lay line to connect them, they were producing so little gas.

So, we're in a situation in which the present order requires us to produce gas wells that are not even marginally economic, and the cost of doing that, plus the administrative burden of maintaining separate gas well records and classification, we believe, is unnecessary.

MR. STOVALL: Referring to the eight wells, Mr. Pearce, those are the eight on Exhibit 13 that are blocked in red?

MR. PEARCE: That is correct.

Q. (BY MR. STOVALL) And what would you propose to do with those wells if the relief you're seeking in this hearing is granted?

A. We would basically produce them to their economic limit, or produce them until-- If any one of them had a mechanical failure, it would be abandoned because we just could not afford to work it over.

Q. I think you told me before, there would be no intent to put them in the oil column or turn them into oil wells, if you eliminate that classification?

A. Right.

MR. STOVALL: Would it be possible to amend the order or get an exception to rules to allow the gas from gas wells to go through the unit operation? What would cause a problem as far as seeking that relief?

MR. PEARCE: Well, the present order, as I mentioned, requires us to maintain a set number of gas wells in the unit so that we have a problem of system that the gas can go through, we have a problem of converting wells with uneconomic workovers, we have a problem of dual administration through the Hobbs office, with marginal wells being subject to the gas prorationing system.

The witness has indicated that their intention is to produce these wells to their economic limit and eventually there just won't be any straight gas wells in this area because Shell has no intention of drilling additional gas wells.

Q. (BY MR. STOVALL) Is there any allowable problem with respect to the oil wells in the unit, based on a GOR or anything of that nature?

A. No. The average production here is around, like we said, 560 barrels of oil with 11,600 Mcf per barrel of gas. The problem is having to separate the gas in our work, day-to-day work, separate and accounting separate and keeping it separate from the oil in just some of the wells, having to squeeze it off. And this is a very expensive operation, something that we would rather not have to do.

MR. STOVALL: I don't have any further questions at this time.

MR. PEARCE: All right.

EXAMINATION

BY MR. PEARCE:

Q. At this point, Mr. Lancaster, let's go back and I would ask you to pick out Exhibit 16.

MR. PEARCE: In this part of our testimony, Mr. Examiner, we want to have Mr. Lancaster provide an overview of unit and waterflood operations since formation.

A. One of the requirements in the original pool orders were that after three years we would come before you and show cause why the pool rules should be made permanent. That's what we're doing in this portion of the testimony, is fulfilling that requirement.

What we will do is show that the waterflood in our opinion is performing satisfactorily and we would recommend that the pool rules, with slight modifications, be made permanent.

To date we have expended some $18.4 million or 92 percent of the total $20 million that will be spent to install this waterflood as initially recommended. The facilities are completed and most of the remaining expenditures will be for well work.

Again, as stated earlier, our production is about 560 barrels of oil a day and our gas is 11,600

Mcf a day. Our injection at 25,400 barrels a day is the one thing that's less than forecast. However, we intend to add a source well and three co-op wells offsetting the Cone acreage later this year, and by the end of the year we would hope to have injection up to 35,000 barrels a day.

Profile survey work has shown that we put about 60 percent of the water into the Blinebry, five percent into the Tubb, and 35 percent into the Drinkard, and we think this is satisfactory for an effective waterflood.

We've run a large number of bottom hole pressures, and we've observed a normal range of values and an average reservoir pressure of something less than 250 psi. We've also observed relatively little vertical or horizontal variation in these pressures.

I would like to draw your attention to Exhibit 16, which is the current forecast of the oil production for this pool. Like the gas forecast, there are several similarities and differences; the similarity being that the reserves used in this forecast were the same as those predicted back in 1987, of a little over a million barrels of remaining primary and 15 million barrels of secondary oil.

The difference is in the time required to reach maximum production or fill-up. Given the fact that we now envision most of the gas coming out of the oil column, our fill-up requirements are significantly higher and will require a longer period of time. So, instead of, say, six years, we now anticipate something like 11 years to fill up the reservoir and the corresponding lengthening of the life from 2018 to 2033.

Q. Anything further, Mr. Lancaster?

A. That's all I have.

Q. Mr. Lancaster, you've studied the operations of the pool, the unit and the waterflood.

Do you believe that the continuation of the North Eunice Blinebry-Tubb-Drinkard Pool and the continuation of waterflood operations in this area are in the best interests of conservation of natural resources?

A. Yes, I do.

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

EXAMINATION

BY EXAMINER CATANACH:

Q. Mr. Lancaster, Shell doesn't plan to inject into the zones that were previously thought to be gas, is that correct? They don't plan to actively inject into those zones that were thought to be gas caps--

A. Not into what we anticipate to be gas caps. Now, into zones that we have reinterpreted to have oil, like the downdip portion of Blinebry II and the downdip of the Tubb, yes, we would probably actively inject into those.

Q. That would not include or would that include the southwest portion of the unit?

A. Not immediately, no.

Q. You would deplete the gas out of those zones and then maybe go with injection?

A. Yes. And it could be 10 years from now. It wouldn't be in the next immediate future at all.

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

MR. PEARCE: A couple of additional matters at this time, Mr. Examiner, if I may. I would like to bring the Examiner's attention to what we have marked as Exhibit No. 19. That's is an Affidavit of service with an attached list of people receiving notice of this case; and also to what we've marked as Exhibit No. 20, which is a draft order in this matter adopting new pool rules which have the effect of eliminating the gas well classification, returning the waterflood to normal waterflood operational and regulatory procedures, and have the effect of conforming the waterflood order itself to these changes of gas/oil classification elimination.

If you could, I would ask you to turn to page 4 of the draft order, Exhibit No. 20, and focus your attention for a minute on proposed Rule No. 5. The last part of that proposed rule has been added to a previously existing North Eunice rule after discussions of this matter with offset operators.

In addition to that, this morning we have been asked to add another phrase at the end of that proposed rule. The last part of that presently reads that Shell will seek permission from such office, and that's the Hobbs's office, before perforating the gas-bearing intervals of the Blinebry Zones I and II and any additional producing well.

To that we have been asked this morning to add a phrase that says "after giving notice to offset operators." As I say, we've been asked by an offset operator to include that provision. Shell has no objection to that. I would ask you to amend the exhibit to show the addition of that phrase.

At this time, Mr. Examiner, I would ask that Shell Western Exhibits 1 through 20 be admitted into this record.

EXAMINER CATANACH: Exhibits 1 through 20 are hereby admitted.

MR. PEARCE: Thank you. Mr. Examiner, if I may very briefly, Shell has appeared before you today seeking some changes to the present rules for the North Eunice Blinebry-Tubb-Drinkard Oil and Gas Pool. We appear because after almost three years of operation in this area we have gained a better technical petroleum engineering and geological understanding of the reservoir, we have examined available cores and core data, we have collected and analyzed detailed cased hole log suites, we've reviewed detailed original completion data, and we've conducted numerous bottom hole pressure surveys and zonal production surveys.

This data has been summarized for you today and demonstrates that a small amount of remaining gas reserves can be produced from nearly depleted gas caps but that approximately 95 percent of gas production from the North Eunice Blinebry-Tubb-Drinkard Pool is being produced from the oil column.

Based on this information, we are requesting that the temporary pool rules eliminate the minimum number of gas well provision and that the gas prorationing restrictions on production from this pool be eliminated.

We've demonstrated that such elimination will not adversely affect ultimate recovery; that, in fact, it may increase the efficiency and therefore the ultimate recovery from the pool, will therefore prevent waste, and we're of the opinion that it will not impair correlative rights of any interest owners in the pool or surrounding the pool.

Our Exhibit No. 20, as I've said, is a proposed order with new rules which have the effect of eliminating that gas well classification, and the witnesses have testified for you that that elimination will be in the best interests of the prevention of waste and the protection of correlative rights.

We, therefore, recommend that the draft order be reviewed and that the proposed Rule 5, as we have suggested the amendment, and the other special pool rules be adopted. Thank you, sir.

MR. STOVALL: Mr. Pearce, do we have the return receipt cards on your--

MR. PEARCE: I do not have them. We will get them for you.

MR. LANCASTER: I have them.

MR. PEARCE: You have them with you?

MR. LANCASTER: Yes.

MR. PEARCE: I will copy them immediately after the hearing and put them in the case file.

EXAMINER CATANACH: Mr. Pearce, if I may, I have two questions for Ms. Corder.

MR. PEARCE: Certainly. Ms. Corder, can you come back please?

<u>LISA CORDER</u>

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

EXAMINATION

BY EXAMINER CATANACH:

Q. Ms. Corder, Mr. Lancaster has testified that Shell may inject into some of those previously bearing gas zones.

Have you looked at any of the acreage surrounding the units, and do you have an opinion as to whether that might have any detrimental effect to any other operators outside of the unit?

A. I have not went and looked in detail at the logs from wells surrounding the unit area, but based on the fact or just assuming there's similarities between our unit area and the offsetting area, the porosity stringers themselves are continuous locally but they're not continuous in such a degree that I think it's really going to impair the offsetting operators. Especially the fact that we don't plan injecting along the lease lines until we get some sort of co-op agreement with those offsetting operators.

So, if we inject into those gas caps, we're going to be well away from the lease line unless we've gotten approval from the offsetting operators to do so.

EXAMINER CATANACH: Okay. That's all I have.

Is there anything further in this case?

MR. PEARCE: Nothing further, Mr. Examiner.

EXAMINER CATANACH: Case 10052 will be taken under advisement.

MR. PEARCE: Thank you.

CERTIFICATE OF REPORTER

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

I, Carla Diane Rodriguez, 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 August 30, 1990.

Carla Diane Rodriguez
CARLA DIANE RODRIGUEZ
CSR No. 91

My commission expires: May 25, 1991

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 10052, heard by me on August 22 1990.

David R. Catanach, Examiner
Oil Conservation Division