BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
March 28, 1962

EXAMINER HEARING

IN THE MATTER OF:

Application of Union Oil Company of California for an order creating a new oil pool, establishing special rules and regulations for said pool, and contracting the Anderson Ranch-Wolfcamp Pool, Lea County, New Mexico. Applicant, in the above-styled cause, seeks an order creating a new oil pool to be designated the North Anderson Ranch-Wolfcamp Pool and comprising portions of Sections 28, 32 and 33, Township 15 South, Range 32 East, and Lots 1, 2, 7 and 8 of Section 2, Township 16 South, Range 32 East, Lea County, New Mexico. Applicant proposes the promulgation of special rules and regulations to govern said pool, including a provision for 80-acre proration units; it is further proposed that the Anderson Ranch-Wolfcamp Pool be contracted by the deletion of the SE/4 and S/2 SW/4 of Section 28, E/2 SE/4 of Section 32 and W/2 and NE/4 of Section 33, Township 15 South, Range 32 East, and Lots 1, 2, 7 and 8 of Section 2, Township 16 South, Range 32 East.

CASE 2507

BEFORE: Elvis A. Utz, Examiner.

TRANSCRIPT OF HEARING

MR. UTZ: The hearing will come to order, please.

Case 2507.

NEW MEXICO OIL CONSERVATION COMMISSION

EXAMINER HEARING - ELVIS A. UTZ

SANTA FE, NEW MEXICO

REGISTER

ILLEGIBLE

HEARING DATE MARCH 28, 1962 TIME: 9 A.M.

NAME:	REPRESENTING:	LOCATION:
E. Norman Woodruff	El Paso Natural Gas	El Paso
[illegible] Selinger	Skelly	Tulsa
Ronald J. [illegible]	Skelly Oil Co	[illegible]
[illegible]	Skelly [illegible]	Tulsa
[illegible]	Skelly Oil Co	[illegible]
Billy J. [illegible]	U.S.G.S.	Roswell
George Lowe	U.S.G.S.	Roswell
[illegible]	Sinclair	[illegible]
[illegible] Watson	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
W. L. Nixon	Union Texas Petroleum Corp.	Okla. City, Okla.
J. T. Sperling	Socony Mobil Oil Co	Albuquerque
W. T. Schreiber		Hobbs
[illegible]	Socony Mobil [illegible]	Hobbs
T. O. Davis	The Atlantic [illegible]	Denver
E. F. Herbeck	" "	"
[illegible]	Gulf Oil Corp	Roswell
[illegible]		

NEW MEXICO OIL CONSERVATION COMMISSION

EXAMINER HEARING - ELVIS A. UTZ

SANTA FE, NEW MEXICO

REGISTER

ILLEGIBLE

HEARING DATE MARCH 28, 1962 TIME: 9 A.M.

NAME:	REPRESENTING:	LOCATION:
JOHN S CAMERON, JR	TIDEWATER Oil Co	Houston, Tex
Jason Kellahin	Kellahin & Fox	Santa Fe
P. J. McGrath	U.S.G.S.	Farmington
R.S. Christie	Amerada	Jules [illegible]
Bill [illegible]	—	—
Joe D. Ramey	NMOCC	Hobbs
[illegible]	USGS	—
[illegible]	El Paso Nat. Gas Prod. Co.	Farmington
John Bannister	"	El Paso, Texas
L.W. Eaton	Pan American	Farmington
Lucy Buell	"	Fort Worth
Howard Bratton	Hervey, Dow, & Hinkle	Roswell
A.L. Baer	The Atlantic Refining Co	Farmington
Edward Mitchell	Union Oil Co	Midland
K.S. Cook	"	"
E.P. Matthies	"	"
J. J. Abbott	The Atlantic Refining Co.	Dallas, Texas

NEW MEXICO OIL CONSERVATION COMMISSION

EXAMINER HEARING - ELVIS A. UTZ

SANTA FE, NEW MEXICO

REGISTER

ILLEGIBLE

HEARING DATE MARCH 28, 1962 TIME: 9 A.M.

NAME:	REPRESENTING:	LOCATION:
Walter Wolf	The Navajo Tribe	Window Rock Ariz
Kenneth A. Swanson	Aztec Oil & Gas Co	Dallas, Texas
W M Barry	Mobil Oil Co.	Durango, Colo
[illegible]	" " "	" "
A. L. Porter, Jr	OCC	Santa Fe,
[illegible] Robinson Jr	TEXACO Inc	Midland, Texas
Jerry Long	USGS	Durango, Colo

MR. MORRIS: Application of Union Oil Company of California for an order creating a new oil pool, establishing special rules and regulations for said pool, and contracting the Anderson Ranch-Wolfcamp Pool, Lea County, New Mexico.

MR. CAMPBELL: I'm Jack M. Campbell, Campbell & Russell, Roswell, New Mexico, appearing on behalf of the applicant Union Oil Company of California.

MR. UTZ: Are there other appearances in this case?

MR. SPERLING: James E. Sperling, Modrall, Seymour, Sperling, Roehl & Harris, Albuquerque, appearing for Socony Mobil Oil Company.

MR. UTZ: Any other appearances?

MR. MORRIS: Mr. Campbell, would you have both your witnesses stand and be sworn?

(Witnesses sworn.)

(Whereupon, Applicant's Exhibit No. 1 was marked for identification.)

EDWARD JOHN MATCHUS

called as a witness, having been first duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. CAMPBELL:

Q Will you state your name, please?

A Edward John Matchus.

Q Where do you live and by whom are you employed?

A I live in Midland, Texas. I am employed by Union Oil of California.

Q What capacity? A Geological engineer.

Q How long have you been with that company?

A Thirteen years.

Q Have you previously testified before the New Mexico Commission or its examiners?

A Yes, sir.

MR. CAMPBELL: Are the witness's qualifications acceptable, Mr. Examiner?

MR. UTZ: Yes, sir, they are. What was the name again?

A Edward M-a-t-c-h-u-s.

Q (By Mr. Campbell) Mr. Matchus, in connection with your employment by Union Oil Company of California, are you acquainted with the application of that company in Case 2507?

A Yes, sir.

Q Have you done some work in the area relative to the geological situation there?

A Yes, sir. I've studied geology of the area and prepared maps which we will submit here in evidence.

Q I refer you to what has been identified as Applicant's

Exhibit No. 1 in this case and ask you to turn to the first exhibit appearing on page 2 which we will denominate "Union Oil Company Exhibit 1-A", and ask you please to state what that is and what it demonstrates.

A Exhibit 1-A is a structure map contoured on the top of the A Limestone Unit of the Wolfcamp. It's contoured in a 25-foot contour interval; the section that this map represents is shown on the type log in the upper left-hand corner of the map. The point of contour is indicated by an arrow there, that is denoted as Limestone A, the limestone we are referring to is of Wolfcamp age. It is productive in the Anderson Ranch Field, and for the purpose of my work I have broken the limestone down into three units, and I will refer to them from here on as Unit A, which is the uppermost productive unit in the Anderson Ranch Field, Unit B and Unit C. The pay is, therefore, divided into three units, A, B and C.

The map represented by Figure 1-A illustrates the attitude of the top of Limestone Unit A. This unit is the uppermost producing limestone of the Anderson Ranch Field. There is, in the center of the Anderson Ranch Field, a stippled area which is labeled "dense limestone".

The intent of this map is to show that there is a division between the North Half and the South Half of the Anderson Ranch

Field. Within the dense limestone area there is one dry hole and one producing well which is a dry hole from the Wolfcamp, but is a Devonian producer. This well is the Sunray-Mid-Continent No. 1 State 76. To the south of this dense limestone barrier it is my intent to show that there is an oil-water contact controlling the production south of the barrier at a datum of minus 5560. To the north of this division there is not established as yet an oil-water contact. The production is established and controlled by the plunging of the C Limestone in a northerly direction.

I would turn to Exhibit 2-B.

Q 1-B.

A Or 1-B, rather.

Q Which is the next exhibit in the book, is that right?

A Yes. Exhibit 1-B is the structural attitude of the top of the C Limestone Unit of the Wolfcamp. This unit is the major producing limestone of the Anderson Ranch Field. The map is contoured with a 20-foot contour interval; there is in the vicinity of the dense limestone area in the middle of the field some dashed contouring. This represents a point south of which correlation of the top of the C Limestone Unit is subject to some correlation problems because of the fact that the limestone south of the dense barrier shown on the map is generally one massive limestone with little vertical separation; while to the north, in the portion of

the Anderson Ranch Field that is currently shown by solid contouring, this represents definite correlative points that have been tied throughout the north end of the field and represent the top of the C Limestone, which is the major producing interval in the north area. This contoured horizon is shown on the type log in the upper left-hand corner, and it is denoted by bracket there as the C Limestone, for identification.

Q I notice that you have not included the top of the B Limestone, does it contain the same characteristics?

A The map of the B on the left hand is not included, but it is very similar to the C.

Q Does this indicate to you that there is a separation between the north and the south area of the presently-defined field?

A Yes.

Q Will you turn to Exhibit 1-C and refer to the copy of it that's on the board there, please, and state what that indicates to substantiate the statement that you just made?

A Exhibit 1-C is the exhibit to the right here. This is a north-south cross section through the Anderson Ranch Field. The section is based on a subsea datum of minus 5500, correlation shown represented in the green the A Limestone Unit, the yellow represents the B Limestone Unit, the C Limestone unit is represented

by the orange.

We have developed three producing zones, A, B and C. There is separation between the North Half and the South Half of the field in the vicinity of the dense limestone barrier, which is illustrated on this cross section in the vicinity of the Sunray-Mid-Continent No. 2 State 76. There are a number of other facts which bear on the separation of the two fields.

The separation of the A Unit from the north portion of the field to the south portion of the field is controlled by two things. The dense limestone acts as a barrier for the A Unit, the fact that water is produced from the A Unit in the north portion of the Anderson Ranch Field, there is one well that is producing from the A Unit in the north portion of the Anderson Ranch Field that is the highest well north of the barrier, the Gulf No. 1 State "CL" A.

The A Unit traced southward into the South Half of the Anderson Ranch is controlled by the development of porosity above an oil-water contact of minus 5560. The south portion of the Anderson Ranch Field has been denoted to have three producing units, A, B and C. A water drive is present under the oil-water contact of minus 5560 in the South Half of the Anderson Ranch Field south of the limestone barrier. The oil-water contact at minus 5560 has been defined by 35 drill stem tests and production

tests to verify the existence of the oil-water contact at minus 5560.

The upper producing unit in the south portion of the Anderson Ranch Field is operating under a solution gas drive. The north portion of the Anderson Ranch Field, which is separated from the south by the dense limestone barrier is producing under a solution gas drive mechanism. There is not developed an oil-water contact by the presently developed area of the North Anderson Ranch Field. There is, however, an isolated water zone that is five to ten feet thick that occurs at the base of the C Limestone Unit.

This unit bearing water follows the structural configuration of the C Limestone Unit. It is separated above and below by shale or shaly lime which is dense and restricts this zone to within a given ten-foot interval.

Another variation that occurs between the north portion of the Anderson Ranch and the south portion of the Anderson Ranch Field is the development of average porosities that range from 6.9 to 10.5% in the south portion of the area to a dense zone in the center of 1.5% porosity. Drill stem tests of this dense interval have recovered very little if any fluid until the depth of the test is well into the oil-water below at minus 5560. To the north of the dense barrier the average porosity varies from

5.5% to 10.3%.

Additional evidence of separation is shown on this cross section by the development of distinct shale and dense shaly lime breaks between Units A, B and C. This distinct division present in the North Half of the field is not well developed south of the dense limestone barrier in the center of the field. The cross section illustrates the development of this shale break between the unit as continuous into the limestone barrier, then south of the barrier these shale breaks thin and disappear, merging into massive limestone.

The major difference on this section that I wish to point out is basically the difference in the oil-water contact in the south portion of the field which is well established from drill stem and production tests at a minus subsea datum of 5560. North of the barrier the oil-water contact does not exist. Water is encountered within an isolated water zone at the base of the C Limestone Unit.

In summarizing the geology, an isometric projection has been prepared.

Q I'll refer you to what we denominate Exhibit 1-D, which is in the back of the booklet that you have, Mr. Examiner. Will you state what that is and explain this to the Examiner?

A The isometric projection represents an attempt to

show you in three dimensions the attitude of the three producing units, limestone units of the Wolfcamp in the Anderson Ranch Field. This presentation summarizes the drill stem test data, the core data, producing interval, net pay for the various wells, and also illustrates the development of the oil-water contact in the south portion of the field at minus 5560.

In comparing the depth of production in the north portion of the Anderson Ranch Field I would like to show that the control for the production in the field is based on the attitude of the C Limestone Unit. As the unit plunges northward, so does the producing interval. Keep in mind that the south portion of the field is under an oil-water contact of minus 5560, and tracing productive depth northward we find that the producing interval increases in depth as we proceed northward.

I would like to cite as examples the subsea datum of the base of the producing perforations to the north of the dense lime barrier, the Mobil No. 1 State "S" is producing oil from perforations to a subsea depth of minus 5559. The Union No. 1 State "A" is producing to a subsea depth of minus 5558. Due north the Union No. 1 State 33 is producing to a subsea depth of minus 5653.

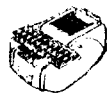
Continuing northward, the Union No. 2 State 33 is producing to a subsea datum of minus 5648. North is the No. 1-28-"B", which

produces to a subsea datum of minus 5630. Northeast, development in the No. 2-33 State "B" is producing water-free from the C Limestone Unit to a depth of minus 5717. These figures cited represent the producing interval from the C Limestone as this unit extends northward.

There is a difference in the Union No. 2 State 33-"B" of 157 feet below the oil-water contact established in the south portion of the field within the B zone and the C zone of the south portion of the field. This area under water drive is definitely separated from the north portion of the field which is under a solution gas drive and water-free to a subsea datum of 157 feet below the oil-water contact south of the limestone barrier.

There is, in addition to the production established from the C Limestone Unit, production established from the B Limestone Unit which also illustrates the same productive interval below the oil-water contact of minus 5560.

In the Union No. 3 State 33, the B Limestone Unit is productive to a subsea datum of minus 5622. The McAlester No. 1 State "JG" is productive to a subsea datum of minus 5611. All of these figures mean that a summation can be stated in this manner for the north portion of the Anderson Ranch Field. As the producing units of A, B and C plunge northward, the producing interval extends with the plunging northward and is controlled



by the structural attitude in a northerly direction. There is not developed an oil-water contact in the North Half of the Anderson Ranch Field. The only water encountered to date has been from an isolated water zone developed at the base of the C Limestone Unit.

There is below the base of the C Unit a limestone which has been termed the D Limestone. It is simply the next limestone separated by the shale break underneath the C. This limestone in the vicinity of the Magnolia or Mobil rather, No. 1 State "S" and the Gulf State "R" and the Union 1-33-"A" is bearing some water. This unit probably extends updip to the south into the dense limestone barrier and may tie with the zone of the Anderson Ranch Field proper or the south portion which has the oil-water contact developed at minus 5560.

With the separation of these three producing units north of the barrier by the distinct shale breaks which separate them, the present production as established has not defined a water table. These three points, then, would be stressed in the summation in the projection of the isometric projection. By tracing the producing depth from the south portion to the north portion of the field, the projection is hung on a minus 5500 datum. Examination of the projection shows that an oil-water contact does exist in the south portion of the field. When you go north of the dense

limestone barrier illustrated in the center of the field, the oil-water contact does not exist as such. There are not the pronounced shale breaks separating the south portion of the area that do exist to divide the A, B and C Units of the Wolfcamp in the northern area.

These three points suggest that there is positive separation on a lithologic basis for the separation of a North Anderson Ranch area and a South Anderson Ranch producing area.

MR. CAMPBELL: That's all the questions I have at this time, Mr. Examiner, of this witness.

MR. UTZ: Are there questions of the witness? Mr. Nutter.

CROSS EXAMINATION

BY MR. NUTTER:

Q Mr. Matchus, in the north end of the structure you have three sands, A, B and C, or three zones of porosity?

A Yes.

Q Do these same three zones actually exist in the south end of the structure?

A I have pointed out that they are not separated or as defined as they are in the north portion of the field. Now, there are the equivalent zones shown on my cross section that represent to me a tentative correlation of A, B and C Wolfcamp

lines.

Q In other words, the zones of porosity are present in both ends of the structure?

A Yes.

Q But in the north end they would be separated by a shale break?

A By a shale break, and this barren portion that separates the center of the field into two units.

Q I meant in the north end these sands or zones are separated from each other by the shale break?

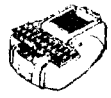
A Yes.

Q Then in the south end they are, the equivalent of B and C is present without the shale breaks?

A Yes. There are a few shale breaks in the south portion of the field that generally rim the flanking portion of the field, but these are not continuous, they are quite discontinuous in some places so that a correlation is difficult, to say that one particular unit is A, B and C. There is generally a correlation that can be made, but it is by projection.

The lime is better developed from the standpoint of being one continuous upward growth of limestone rather than limestone separated by distinct shale breaks.

Q Now, confining ourselves to the south end of the



structure, if you come off the flanks you do find zones of shale in between the sections A, B and C?

A Yes and no, because it depends on the area that you refer to. I would make a general statement that there are some shale breaks that do occur on the flank of the field. Now, there is a question as to where you would correlate an equivalent shale break in the north portion of the field to some shale break in the south portion of the field. The separation by the shale breaks in the north portion of the field is rather straightforward. The breaks are well illustrated, they're well developed. When you try to carry such a correlation in the south portion of the field, you have difficulty trying to carry one continuous shale marker as a marker throughout the field because they will disappear.

Q If you traveled around the side of the structure, and if you were walking around in one of these shale breaks on the side of the structure, would you be able to go from the north end to the south end in the shale?

A I doubt that you can, because I had difficulty correlating around. I had to project some of these through. They're based on the fact that in the south portion of the field we are speaking basically of massive limestone. There are some shale partings and a few shale breaks that do occur, but these are not

as continuously developed and you may trace one around the flank of the field and find that it disappears, and then probably two or three wells over, or one well over, you may pick up another little shale break, possibly higher or lower, that you may carry for another few wells.

Q Now, the Sunray well that encountered the dense limestone, encountered no shale whatever?

A That is straightforward, basically dense limestone. The average porosity in the Sunray No. 2-76 was 1.5%. The net effective pay in the field has been cut off at 3% porosity. The average porosities that I cited earlier indicate that the range of porosity is between five and ten percent; in the producing intervals where you get below 3% you are generally tight enough so that you don't have much effective pay when the porosity is less than 3%.

Q Does this dense limestone being only ½% porosity also have a low permeability?

A Generally it is low. There are permeable streaks in it. There were thin streaks of measurable permeability.

Q Now, here on Exhibit C, the cross section, there's some drill stem notations made to the left of the Sunray-Mid Continent log. Is that the drill stem testing on that log?

A That's the drill stem test plotted on the left side

of the log.

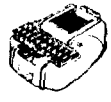
Q Would you read those drill stem tests?

A All right. The Sunray-Mid Continent well, I have not recorded the depths, I'll have to refer to the depth from another source of evidence here.

Q Were all of these drill stem tests made in the dense limestone?

A Yes, with the exception of the basal test in the Sunray-Mid Continent well. There is a test down at the bottom of the hole that recovered 7500 feet of water. This is below the oil-water contact as established for the south portion of the Anderson Ranch Field. The only equivalent to this stratigraphic position that recovered 7500 feet of water to the north is the D Limestone. In other words, it is below, stratigraphically, the A, B and C Units. It is not considered in the productive column.

The drill stem tests taken in the Sunray-Mid Continent No. 2 State 76 were as follows: Drill stem test No. 1, 9703 to 9753, recovered 90 feet of oil and gas-cut mud. Flow pressure, 530. Shut in pressure, 650 pounds. Drill stem test No. 2, 9753 to 9803, recovered 30 feet of drilling mud. Flow pressure, zero; shut in, 650 pounds; drill stem test No. 3, 9806 to 9853; recovered 100 feet of oil-cut mud. Flow pressure, 625, shut in



pressure, 700 pounds. Drill stem test No. 4, recovered 15 feet of drilling mud --

Q What was the interval on that test, please?

A 9844 to 9895. These intervals are plotted on the left side of the Sunray-Mid Continent log.

Q That little zig zag line represents the intervals?

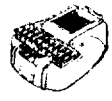
A Yes. The drill stem test is indicated as a Z bracket here. The bracket at the top and the bottom of the Z denotes the tested interval, the results of the test are located immediately to the left of the bracket.

Q In other words, from the recovery on the drill stem test it would appear that the only place there was permeability was down in the water?

A In the water. I will read the last drill stem test that will confirm that. Drill stem test No. 5, 9890 to 9860, recovered 7500 feet of water; flow pressure, 550 to 2120; shut in pressure, 2285 pounds.

Q Now, Mr. Matchus, has any well which is on the structure and not down off the side of it encountered a dense limestone such as this Sunray-Mid Continent well encountered?

A There are several other wells that encountered dense section to the point where the section was dense enough with some minor broken streaks of porosity whereby a commercial well



was completed. Now, by commercial well, the fact that they were able to complete an oil well is indicated on our map. They are shown as a producing well. This tight area extends by my interpretation through the Sunray-Mid Continent No. 1 State 76 westward to the area of the Gulf "CR" State No. 4 and No. 3. These two wells, Gulf "CR" State No. 3 and 4 have been, are poor producers, or rather the No. 4 is still a poor producer. The No. 3 "CR" State produced a total of 5,000 barrels of oil and was then abandoned and converted to a salt water disposal well.

The trace of the dense limestone barrier as interpreted by the isometric projection and the north-south cross section shows that the main axis, if we may use that for the dense limestone barrier, exists in generally an east-west direction through the two Sunray-Mid Continent wells.

Q How about the log on that Devonian well of Sunray's, does it show this dense lime in the Wolfcamp formation?

A It was drill stem tested and it was not as dense as the well that was cored. The No. 2 State 76 "A" was cored and actually had the best information on the well. The No. 1 State 76 is illustrated on the isometric projection in the uppermost portion of the bracket D dense limestone area. The Sunray-Mid Continent Well No. 1 State 76 did recover 1,010 feet of mud-cut oil and 90 feet of oil.

Tests following that below this interval failed to recover measurable amounts of oil. These tests are shown on the projection and they are shown on the left side of the log within the bracketed interval for each drill stem test. These zones are correlated with producing units north and south. Can you follow the correlation between the green and across to the dense shown and then into the south portion of the Anderson Ranch Field? In the vicinity of the A Unit, just south of the barrier, there is porosity developed that has an average of between 7½% to 10% porosity. It is good porosity, but it is not continuously developed over the major portion of the south portion of the Anderson Ranch Field.

This is locally developed, and it is my impression that a portion of that recovered oil in the uppermost drill stem test in the Sunray-Mid Continent No. 1 State 76 was encountered from one of these thin developed streaks, and as you proceed down the drill stem test record on the left side of the log of the No. 1 State 76 you will see that nowhere below there did they encounter anything that warrants an attempt being made to complete the well. It was considered dry. They drilled the well to the Devonian and made a Devonian producer of it.

Q They didn't think of it in the Wolfcamp?

A No. That same condition does exist, however, from the

upper portion of the Wolfcamp just to the west. The one well that was completed from both the A and the B zone on the isometric projection is the Gulf No. 3 "CL" A. This well produced a cumulative of 5,000 barrels of oil and was abandoned. It was converted to a salt water disposal well. This is indicative of the tightness of this immediate area.

The No. 4 "CL" A is also a poor well. It's not capable of making its allowable.

Q What is its cumulative production?

A The No. 4 is a little better than average because they are completed from the lower unit of the C, and it has a cumulative as of 9-1-60 of 65,500 barrels.

Q What was it making now?

A It is producing about 30 to 40 barrels of oil and 60 to 70 barrels of water per day.

Q Now, Mr. Matchus, is any well in the north end of the pool producing from below the water sand that you mentioned?

A No, the water zone at the base of the C Limestone Unit is the lowest known occurrence of water in the north portion of the Anderson Ranch Field, and there is not at present any production developed below this zone. The attitude of the C Limestone as it plunges northward is such that the base of the C Limestone where the developed water zone exists also plunges to

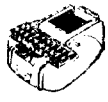
the north and northeast. As this zone plunges, our production has simply followed the C Limestone Unit downdip.

Q And has not encountered water?

A And has not encountered water. In fact, I have given into the testimony the record of what is being produced from given subsea datums. This evidence is further substantiated by the fact that these wells are not producing any water. There is but one well north of the dense limestone barrier that is producing any measureable water or any water to speak of. It is the highest well, it is the Gulf No.1 "CL" A, which is due north of the dense barrier on the isometric projection or the cross section. This well is the only well that is producing from the A Limestone Unit.

The A Limestone was tested to the north in the Mobil No. 1 State "S" and the Union No. 1-33 "A". In both of these wells water was encountered. From the basis of these two wells, I would say that water would be encountered below a datum of minus 5420, while to the south of dense limestone barrier, as shown here, a production is established down to the oil-water contact at minus 5560. There is a separation between the A producing unit in the south portion of the field against the north portion of the field.

Q I presume that this blue line that's drawn across here at the base of the C is this water sample?

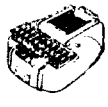


A Yes. As you can see, the C section has one common line, it is the minus 5500 datum which is a dashed bar through the center of the well logs. That represents a subsea datum of minus 5500.

Q Did I understand you correctly to say that you believe the principal drive in the south is a water drive?

A In the south there is evidence of an active water drive under the C Limestone Unit as correlated here. There is also evidence that the uppermost producing member, the A Limestone, is producing under a solution gas mechanism. This information was revealed by some re-entry, reworking of the Anderson Ranch Unit wells, where in 1956 a number of the wells started making water they were plugged back, in turn the producing interval was converted to the A Unit. In other words, they plugged back to the A Limestone and produced that for a number of years.

When this A Unit started to show depletion, a number of the older wells were opened up again to provide entry for C zone oil to the bore hole. Well, when this was done they encountered an increase in bottom hole pressure of approximately 4,000 pounds. However, this is not my story. But entry was made into the plugged back portion of the hole, and in doing so they found that their bottom hole pressures had again returned to a point higher than their original bottom hole pressure was for the initial



development of the field.

MR. UTZ: Is this in the north part?

A This is in the south portion of the field. I'm getting off my field there unless you want to pursue that any further. The basic control for the oil-water contact is more than 35 drill stem tests and production tests in the south portion of the field. I don't think there are too many areas where you can have an original oil-water contact as clearly defined as it exists in this south portion of the Anderson Ranch Field. There is ample evidence to support this existence of a water table at minus 5560.

Q (By Mr. Nutter) It is your belief you have a solution gas drive mechanism?

A In the north portion we have a solution gas drive mechanism and there is no other but the water drive restricted.

Q Which well was it that was perforated down to 5717?

A The Union No. 2-33 State "B" is perforated and completed to a subsea datum of minus 5717. This well was drill stem tested and flowed oil with no evidence of water prior to completion to a subsea datum of minus 5717. This represents a column 146 feet below the oil-water column in the Anderson Ranch Field, yet by all geological evidence this is still the same Wolfcamp reservoir, from the standpoint of age it is Wolfcamp lime, but there is a separation between the south and the north

portions of the Anderson Ranch Field.

Q Is this the northernmost well on the cross section?

A The northernmost well on the cross section, it falls at the point of A-A^{1}.

BY MR. UTZ:

Q Did you say that there was very good vertical communication between the three zones in the south portion of the field?

A In the south portion, yes, I would say there is vertical communication.

Q Do you feel that the water drive in this section is effective for all three zones?

A I can not make that statement for this reason, I have studied the south portion of the field and I do not have a thorough record of all workovers. My information leads me to believe that the A Unit is a solution gas drive unit. In other words, only the B and the C Units, as illustrated on this cross section, are affected by the oil-water contact at minus 5560 being under a water drive. The A Unit has been depleted and their pressures have dropped. It is a normal solution completion problem. When they re-entered some of the old oils, or re-entered and reopened some of the bottom perforated intervals in these producing wells in the south portion of the field, they found that they were getting the effect of the water drive.

Q Well, there must not be very good vertical communication between the A zone and the two lower zones?

A No. I can say that there should not be, I can not prove that there is and I can not prove there isn't in the south portion of the Anderson Ranch Field. This column represented by A, B and C Limestone in the south portion of the Anderson Ranch Unit in areas does not have a definite break horizontally to show vertical separation. There are dense zones that separate zones of porosity. Now, whether you could say that one zone of porosity separated by a dense zone here might be the same zone of porosity in the next well is subject to interpretation, and it could exist or could not exist. I do not think there is vertical communication between the portion of the Anderson Ranch Field that is affected by the oil-water drive at minus 5560 and the A Unit in the top of the Wolfcamp. I think that their water drive affects the lower pay.

In general there is a two-fold division of the pay. You would generally find that most of your porosity or net pay is established in the equivalent to the C Unit. This can extend into the B Unit. The A Unit seems to be a separate zone of porosity. That is based on the plot of net pay and perforated interval.

Q I believe you gave three reasons why you felt that this

pool was separated. One was your water drive system in the south part, the isolated water below the C zone in the north part. I wonder if you would give me the others that you gave?

A The existence of the dense limestone area between the North Half and the South Half of the field. Essentially a non-productive zone, the average porosity in the well cored was 1.5%. The fact that the shale separation of the three units to the north is well defined and terminates in the southward direction into the vicinity of the dense barrier. South of this barrier those shale breaks do not exist. I think that evidence here is that we have three producing units to the north. They are separated by well-defined shale breaks. There is a dense limestone barrier between the A, B and C Unit of the north, of the A, B and C Unit of the south. I think the fact that dry holes are encountered in this belt and the fact that there are poor producers adjacent to this belt of dense limestone supports its existence.

MR. UTZ: Will your next witness have some pressure information?

MR. CAMPBELL: Yes, he will.

MR. UTZ: Oil characteristics and so forth?

MR. CAMPBELL: Yes.

MR. UTZ: Any other questions of the witness? The witness

may be excused.

(Witness excused.)

PETER MATTEHIES

called as a witness, having been first duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. CAMPBELL:

Q Will you state your name, please?

A Peter Mattehies, M-a-t-t-e-h-i-e-s.

Q Where do you live and by whom are you employed?

A I live right now in Montana, but prior to March 1st I lived in Midland, Texas, and am employed by Union Oil of California.

Q You have testified previously before the Examiner or the Commission?

A Yes, sir, I have.

Q Did you testify before them at the time the original authority was granted to conduct interference tests in this area?

A Yes, sir.

Q Will you refer to the booklet of exhibits, and I call your attention to what we will identify as Exhibit 1-E. Will you state what that is, please?

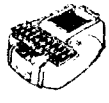
A In this exhibit we show the bottom hole pressure history for the south part of the field and the north part of

the field. This was the first information we obtained which led us to believe that we're talking about two different fields. On the left side of the graph I show the history for the south part of the field while in the right, upper corner I show the history for the north part of the field. The numbers beside the dots represent the numbers of wells used to arrive at the shown average.

The initial pressure in the south part was 3740 psi. This pressure declined very rapidly, and the last pressure survey taken was in 1960 when the average field pressure, or the average pressure of the south area was 2,092 psi. As was mentioned before, three of the wells were reworked and showed considerably higher pressures than were ever measured before in the entire field. Neglecting those three wells, the average pressure of the five wells is only 1086 psi.

At the same time the pressure in the north part of the field was 3356 psi, or pressure differential of 2250 psi. It will be shown later in our testimony that the transmissibility of the reservoir rock in the northern part is very high and that the pressure will equalize within a few weeks over more than half a mile. The failure to do the same over a period of years proves to us that we are talking about two different fields in this area.

Q Will you refer to what has been identified as Exhibit



No. 1-F, "Fluid Analyses Comparison", and state to the Examiner what this comparison indicates to you.

A Here we show the fluid analyses of the two parts of the field, one analysis was taken by Union Oil in the State No. 1-33 in July, 1960 and the other sample was taken by the Continental Oil Company in September of 1953. Continental took at that time two bottom hole samples and both of them proved to be alike, so I show only one, since the other is the same.

The sampling depth in the Union well is 9966, while it was 9750 feet in the Continental well. The sampling pressures are almost alike, the difference of 20 psi only, also the pressures were taken seven years apart. The bubble point pressure in the northern part of the field was determined to be 34, or 3435 psi at 139 degrees, while it was only 3002 psi in the south part of the field.

The formation volume factor at the saturation pressure in the north part is 1.964 while it is in the south part 1.8777. There's also a difference in the solution gas-oil ratio, in the north part we have 1833 cubic feet of gas per barrel of oil in solution, while in the south part there is only 1665 cubic feet of gas per barrel of oil in solution.

The viscosity at bubble point is almost alike, so is the gravity of the fluid, and the compressibility factor is slightly

higher in the north part, which is mainly due to the higher solution gas-oil ratio. So the difference in the bubble point and in the solution gas-oil ratio indicates, again, that these two fluids come out of two different fields.

Q Based upon the pressure analysis that you have made and upon the fluid analysis, is it your opinion as a petroleum engineer that these are two separate reservoirs?

A Yes, it is.

Q I refer you now to what has been identified as Exhibit No. 1-G.

A This exhibit we show the outline of the field which we request for designation. Every lease shown within the hatched outline is presently allocated to the Anderson Ranch-Wolfcamp Pool, with the exception of the Northeast Northeast Quarter of Section 32, which is a northwestern corner of the North Anderson Ranch Unit. We request that this 40-acre tract shall be included in the field since it's part of the unit, and we believe it is productive.

Q And the exterior hash marks indicate the area which you are requesting the Commission to designate as the North Anderson Ranch-Wolfcamp Field, is that correct?

A Yes, sir.

Q Turning now to Exhibit No. 1-H, will you state to the

Examiner what this reflects with regard to the field history? You are talking there, I assume, about the North Anderson Ranch area?

A Yes, it's only for the wells directly north of the permeability barrier. The first well drilled up there was in 1958, and by the end of the year there were three producing wells, and upon the completion of the Union Well No. 1-33, which was a one-mile stepout, there was started kind of a drilling boom and now we have 11 producing from the Wolfcamp, 10 of which are flowing top allowable as only a small amount of water produced which is made only out of the southernmost well of this field to be requested. The cumulative production as of February 1st, 1962 was 813,000 barrels, most of which was produced by the three oldest wells in the field.

You will note that there is no increase in the gas-oil ratio. At the present time I think our application today stirred up another drilling boom. There are four more wells drilling, and Sinclair announced one location in their North Anderson Ranch-Wolfcamp Field.

Q You stated that you were the witness when Union requested authority to conduct some interference tests in this North Anderson Ranch area. Have these tests been conducted under your supervision?

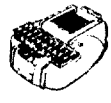
A Yes, sir, I was out in the field all the time.

Q I refer you to Exhibit No. 1-I and referring to that where necessary, will you describe to the Examiner the tests which were conducted, the results of those tests and the conclusions which you drew from them?

A Yes, sir. I show on Exhibit 1-I the graphical form of the interference test, while the next Exhibit 1-J shows the same data in tabular form. The test pattern was on a five spot pattern whereby we produced the four corner wells and had the center well shut in. The center well is designated here as the red well, and its pressure behavior through the interference test is shown on the upper part of the graph while on the lower part we show the pressure performance of the flowing well.

The scale in the upper part of the graph is different to the one in the lower part. We had a dual 72-hour Amerada bomb in the observation well while we took the flowing pressures in the producing wells only every 24 hours. The producing rates were the following: About 1100 barrels, 1100 to a thousand barrels of oil out of the blue well, 2,000 out of the brown well and six to seven hundred out of the two wells on the State "B" lease. These two wells produced into a common tank battery with no way to break the production down.

You will note that the pressure drawdown obtained in the



producing wells even under the high producing rates were only very small, which was expected since the PI values of these wells are as high as 11 barrels of oil per day psi drawdown. There's one exception to this one, that is the State "C" No. 1-28, you will note that the pressure went as low as 1400 psi. At the completion of the interference test on February 7 all wells were shut in and the buildups taken and their PI values and capacities calculated from these buildup tests.

The calculation of the buildup on the State "C" 1-28 proved that the well, besides being completed in a rather tight part of the reservoir, exhibited a skin effect or formation damage, and it was recommended that this well had to be worked over, which was done, and we improved the production capacity considerably.

From the interference test we noticed a slight buildup in the observation well; at the start of the interference test, the bottom hole pressure in the red well, the observation well was 3090 psi, which had built up after 58 hours, another 58 hours, to 3094 psi, and that the drawdown started and at the end of the test on February 9th, the pressure had dropped to 3083 psi, or total drop off of 11 psi, without having produced a barrel of oil out of the well.

After completion of the buildup tests, the producing wells,

the blue, brown, orange and green wells were opened up again or placed back on production to produce their remaining allowable for the month of February, with the exception of the State No. 1, the blue well, which produced two allowables. The observation well remained shut in.

On February 22nd the allowable was produced and all wells were shut in again, and on February 27 the bottom hole pressures were taken again in all five wells, and by then the pressure had dropped in the observation well down to 3065 psi, or total pressure drop of 29 psi, without having produced a barrel of oil out of the well. This proved to us that each well will drain an area with a radius of more than a quarter of a mile, or that each well will drain up to 250 acres.

Q Now, moving to Exhibit No. 1-K, which is your theoretical interference calculation, will you briefly explain that and indicate to the Examiner how well that compares with the actual tests, interference tests that you took?

A Yes. The formula adduced to calculate the interference which should have taken place during the test, the formulae used for these calculations are developed for application to the radial flow of heat or diffusion of heat. Basically, the flow of heat or the flow of electricity and the flow of fluids in permeable rocks can be described by the same mathematical forms.

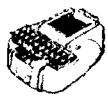
The diffusivity constant determines the rate at which fluid will readjust in response to a pressure disturbance imposed on the system. The values used in these calculations are either obtained during the interference test as the production rates and the total time involved, or they were obtained from the calculation of the buildup tests as to the total capacity of the well, or we used electric logs or core analyses to calculate porosity, pay thicknesses or fluid analyses to calculate viscosities or to determine for viscosities and for information for volume factors.

The total drawdown caused by each producing well in the observation well should add up to the total, or should theoretically be the drawdown obtained in the observation well, and you will note that the calculation results in a drawdown of 11.8 psi while the actual drawdown obtained was 11 psi, which was, in my opinion, an awful close check, which proves to us that the analyses of the reservoir is right.

Q Have you made some calculations with regard to the bottom hole pressure history of the wells in this northern portion of the Anderson Ranch Field?

A Yes, sir.

Q Refer as you see fit to Exhibit 1-L, and state to the Examiner what that exhibit shows in relation to the drainage of wells in this area.



A Yes, sir. On this exhibit we show the bottom hole pressure history of the wells in the north part of the field which are completed in the C zone. You will note that on the blue well, the first well drilled by Union up there, was completed in July, 1960. The initial bottom hole pressure on this well was 3585 psi. After five months of production out of this well, the No. 2 well was completed, which is the red well, at which time the reservoir pressure had dropped down to 3442 psi, or a total decline of 143 psi, which proves that by the production out of the No. 1, oil was drained away from the No. 2.

The same is true for every other well completed; the last well completed in the field is a Union State "C" No. 1-28, which is a brown well, which had an initial pressure of 3152 psi, or more than 400 pounds less than was encountered in the No. 1 Unit. A fieldwide bottom hole pressure survey taken revealed that all the other wells exhibited the same pressure. This proves that each well will drain an area again, or a radius of a quarter of a mile, which was as much as 250 acres, and it proves again to us that the field can adequately drain and produce on an 80-acre spacing.

Q What other types of calculations have you made in connection with the drainage area of these wells?

A The calculations are shown on Exhibit 1-M. I show the material balance calculation for the production history of the

Union No. 1-33, the time of the initial completion to the time when the second well in the unit was completed. I have used this production period in my material balance calculation, because at that time the reservoir pressure for the most of the time was above the bubble point, and for the second reason, is that at this time this well was a sole producer within a mile of that.

During the five-month period a total of 20,510 barrels of oil were produced with a pressure drop of 140 psi. Using these values in the material balance shown on this exhibit, a total of 6,620,000 barrels of oil were affected to some extent by the production out of the No. 1.

Referring to the volumetric calculation, I attempted to calculate the total barrels of oil in place per acre. Using the thickness which we encountered, the pay thickness which we encountered in the No. 1, of 64 feet of net pay, an average porosity of 9.6% and a water saturation of 25%, we have a total of 18,240 barrels of oil per acre in place. This results in an area affected by the production out of the State No. 1-33 over the first five months of 363 acres.

This assumes that the entire 363 acres had a uniform thickness of 64 feet of pay. The actual average pay thickness is about 40 feet, so this resulted actually that the area affected by the production out of the No. 1 was as much as 500 acres.

Now, assuming that this well drained 40 acres only, or affected 40 acres only, the effective pay thickness should have been 581 feet, and this, again, proves to us that 80-acre spacing, or 160-acre spacing would be adequate to produce the reservoir.

Q In addition to your engineering studies in this reservoir, have you made some economic calculations with regard to the 40-acre and 80-acre spacing?

A Yes, sir, I have. And they are shown on Exhibit 1-N.

Q Will you relate to the Examiner generally what those show?

A Yes. We have calculated the reserves per acre from isopach maps done by Mr. Matchus, and from bottom hole pressure decline versus cumulative production. We calculated the total recoverable reserves of 3800 barrels per acre, which is 20 to 25% of the oil in place.

The capital investment per well, we used $139,000.00, which is the average of the three most recent wells drilled by Union Oil in that area. The land acquisition costs are $300.00 per acre. The income per barrel, $3.01 for the oil and $0.20 for the gas which is produced with every barrel of oil, or a total of $3.21 per barrel.

The operating costs, $0.40 for royalties, $0.22 for taxes, and $0.20 for lifting costs, or a total of $0.82, so this results

in a net income to the working interest owner of $2.39 per barrel of oil.

The reserves per well are 152,000 barrels of oil for a 40-acre well and 304,000 barrels of oil for an 80-acre well. The net operating income is at $363,000 for a 40-acre well and $726,000 for an 80-acre well. The land acquisition costs are twice as high on an 80 as on a 40-acre well, so this results in a total investment per well of $151,000 on a 40-acre well and $163,000 on an 80-acre, or net profit per well of $212,000 on a 40-acre spacing and $563,000 on an 80-acre spacing.

The profit to investment ratio is 1.4 to 1 on a 40-acre and 3.45 to 1 on 80-acre spacing. So this means nobody is losing money on 40 acres, but the profit to investment ratio is not satisfactory to our company for development drilling.

Q Based upon your engineering studies, observations, the interference tests, and based also upon the economic calculations, is it your opinion that this North Anderson Ranch-Wolfcamp Pool should be developed upon 80-acre spacing?

A Yes, sir, in my opinion it would be enough if it was developed on 160.

Q Do you believe this could be done without waste?

A Yes, it can.

Q Do you believe it can be done without adversely affecting

correlative rights?

A Yes, sir, the only royalty owner up there is the State of New Mexico.

Q Have you set up some suggested special rules and regulations for the North Anderson Ranch-Wolfcamp Pool in the event the Commission sees fit to grant your application?

A Yes, I have.

Q Will you refer in Exhibit 1 to the next to the last page which contains proposed special rules and regulations and describe to the Examiner what you are suggesting by the way of these rules?

A Yes. I don't think I have to read Rule No. 1, this is a standard rule in the State of New Mexico. Rule No. 2, "Each well completed or recompleted in the North Anderson Ranch Wolfcamp Pool shall be located in a unit containing 80 acres, more or less, which unit shall contain two governmental quarter-quarter sections or lots joined by a common bordering side; provided, however, that nothing .." and everything else is standard.

Q You have added the words "or lots", is part of this area involved in a township line where there are lots with odd number of acres?

A Yes, two wells out of the township line, the Gulf State "AR" No. 1 and the Mobil State "S" No. 1. We propose such 80-acre

units which are not regular like on the South Half or North Half or West Halves or East Halves of governmental quarter section for the reason that when the unit was formed nobody thought about 80 acres, and we spotted a week ago the Unit No. 4-32 in the Northeast of the Southeast of Section 32.

Q You are referring now to Exhibit 1-O on the next page, are you not?

A Yes.

Q Yes.

A Upon a successful completion we wish to allocate the Northeast of the Southeast and the Southeast of the Northeast of Section 32 as an 80-acre unit to the Union No. 4-32, which is within the blue outline, the southeastern corner, the southwestern corner of the unit. This is the sole reason why Union proposes such an allocation of acreage.

As to Rule 3, "Any well which was drilled to and producing from the North Anderson Ranch Wolfcamp Pool prior to April 1, 1962, which presently has 40 acres or more dedicated to it and to which cannot be dedicated an 80-acre unit which can reasonably be presumed to be productive of oil from the North Anderson Ranch Wolfcamp Pool, shall continue to be assigned an allowable equal to the normal unit allowable times the 40 acre proportional factor for said pool of 3.77 times the ratio the total dedicated acreage

bears to 40 acres."

Q Will you explain why that rule is suggested?

A Yes. I have to make one correction to my Exhibit 1-O. I was informed today that the acreage factor allocated to the Gulf "RA" No. 1, which is drilled on Lot 1 in Section 2 will be Lot 1 and Lot 8 of Section 2 rather than the 50 acres I have only shown outlined by red, while the Gulf Well "CL"-A No. 1 will be on a 40-acre tract only. This well is not capable of producing the top allowable either for 40 or for 80 acres.

This Rule 3 has only one well in this pool to which Rule 3 applies, that is Mobil State "S" No. 1, which is drilled in Lot 2 of Section 2, Township 16 South, Range 32 East. This well was drilled in 1958 and the only acreage owned by Mobil Oil up there is this 50-acre tract. Actually, the 50-acre allowable we propose will be almost as high as the 80-acre allowable in case our application is approved.

Actually, this is a question of ownership only rather than of productive acreage. In our opinion, the Sunray-Mid Continent tract west of the Mobil tract and all, or at least part of the Humble tract north of the Mobil tract are productive, in our opinion, but this acreage is not owned by Mobil Oil, and, therefore, they can not allocate it to their tract. The first wells which will be drained will be the Union State "A" No. 1 and the Gulf

"RA" No. 1. Both companies have no objections to the adoption of this rule. There's no impairment of correlative rights as far as the royalty owner is concerned, since the only royalty owner in this area is the State of New Mexico.

A similar rule, or similar exception to the regular rules, was granted by the Commission in the 80-acre spacing rule in the Ranger Lake Pennsylvanian Field in the Order No. R-1418-B and for the South Vacuum Devonian Pool in Order 1382-C.

Q Now, refer to Rule 4 and state how it differs from previous rules of the Commission, if it does differ.

A I would say similar rules are ordered by the Commission in some other 80-acre spacing rules. Union proposes that the initial well shall be drilled either in the Northeast Quarter or the Southwest Quarter of a governmental quarter section, but that such well to be no closer than 330 feet to the boundary lines of the quarter-quarter section in which the well is located. We propose the 330 feet or the flexibility which will give us the 330 feet which will improve or which will make it easier to develop the pool.

The reservoir can be adequately drained on a staggered 40-acre spacing, which is prevailing right out over the entire area with the exception of the three wells drilled north and south of the township line.

Q Just a moment, on Rule 4 would it be necessary in the event the Commission approved this type of drilling to establish exceptions in any instances?

A Yes.

Q Where are those exceptions?

A The Gulf Oil Company is in process of drilling a well in Lot 4 of Section -- well, which would be the Northwest Quarter. There would be an exception necessary for this well, and the Mobil well is in the Northwest Quarter, the Mobil State "S" is in the Northwest Quarter, so there would have to be an exception to this well, too.

Q Are you suggesting now that the Commission include in any order it issues such exceptions for existing or drilling wells?

A Yes, sir.

Q How about Rules 5 and 6?

A Rules 5 and 6 are standard rules. I don't think it's necessary to read through them.

Q Do you have anything further to offer to the Examiner in connection with this matter?

A No, sir.

Q Is it your opinion also that the area which you are seeking to have declared to be a new pool is a completely separate reservoir from the balance of the presently defined pool?

A Yes, sir, it is my opinion.

MR. CAMPBELL: I would like to offer in evidence Applicant's Exhibit 1, including 1-A through 1-O, inclusive.

MR. UTZ: That includes your geological exhibits?

MR. CAMPBELL: Yes, sir.

MR. UTZ: Without objection Applicant's Exhibits 1-A through 1-O will be entered into the record in this case.

MR. CAMPBELL: That's all the questions I have at this time.

MR. UTZ: Are there questions of the witness? Mr. Nutter.

CROSS EXAMINATION

BY MR. NUTTER:

Q Mr. Mattehies, your Exhibit No. E there which reflects the bottom hole pressures of the two areas --

A Yes, sir.

Q -- in each case where you've got the little number in parenthesis, does it represent an average of the wells there?

A Yes.

Q In the north end of the field where you have three pressures or three wells, five wells and eight wells on the last three pressures --

A Yes, sir.

Q -- do those include any initial pressures?

A Yes, sir, the pressures where we used five wells, there was one initial pressure and the 8 is one initial pressure, and I believe where we have three, that's one initial pressure, yes, sir. All three of them include one initial pressure.

Q One initial pressure in each one?

A Yes.

Q So this decline would have been greater than is shown here if it hadn't included an initial pressure?

A No, sir, the initial pressure of every well is exactly the fieldwide pressure, except for the first well, we never had such a high original pressure in a well again, as you will note. Here later on in Exhibit 1-L, that the State "C", that the initial pressure of the State "C" is only 3,152 psi. The pressure in the Union State No. 1-33 at the same time, 3,145 psi.

Q The State "C" is the brown well?

A Yes.

Q And you compared it with which one?

A With the blue well. And the same with the red well, which had at that time a pressure of 3141, so it was a difference of those three pressures of seven pounds.

Q You said the brown well was in tight sand?

A Yes, but still we were experiencing drainage.

Q You feel like you got a representative fully built up pressure when this was taken?

A Yes, sir.

MR. PORTER: What makes you feel like that?

A Because there was 50 barrels of oil produced out of this well prior to this test upon the initial completion of the well, and after that the well was shut in eight days before this pressure was taken.

MR. PORTER: That was my question, how long the well was shut in.

Q (By Mr. Nutter) In other words, you are comparing the second to the last pressure for the 1-33 to the first pressure shown for the 1-C?

A Yes, and the same on the red well.

Q In the South Half of the pool you've shown averages of three and five wells for the last pressures that were taken. Were those the only wells that had pressures taken on them?

A Yes. The information shown on this graph was furnished to me by the Continental Oil Company.

Q The only characteristics on Exhibit F which reflect a separation of these two pools would be the bubble point and the solution GOR, would they not?

A Yes, sir.

Q Would the one degree difference at which the bubble point was determined make any difference in the bubble point?

A No, I don't think so. Probably it was a matter of the temperature gauge, because when we went in for our interference test we measured the temperature every day, 138, 139, it varies.

Q Over here on your Exhibit No. H, then, the little line down at the bottom which is connected by the series of dots is the GOR line, is it not?

A Yes, it is.

Q Is this pool in the north end being produced down below the bubble point?

A Yes, it is.

Q But there has been no indication here on the GOR's that they have start --

A On the calculations there shouldn't be any, because whenever the bubble point is reached you will first notice a decline of the gas-oil ratio before it will go up.

Q For a short time?

A Yes, sir, and that's what we experienced here.

Q Now, this bottom line is water production?

A Yes, sir.

Q Where is this water being produced, mostly from one well?

A I think McAlester reports one barrel of acid water per

day. So it's the production of one well only, which is the Gulf "CL"-A, which is the southernmost well.

Q What is the scale for the water production?

A The water production per month, the same as for the oil, so the water production is between 2,000, 3,000 barrels per month.

Q Which well did you say produces one barrel per day?

A The McAlester State "G" No. 1, which is in the Southwest of the Northeast in Section 33, but this well is a producer out of the B Limestone, and upon the completion, McAlester acidized this well very heavy and they are still recovering some of their acid.

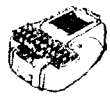
Q Where does the remainder of the water come from, then?

A Out of the Gulf "CL"-A No. 1, the well being drilled in Lot 1, Section 2, which is the only water producer. It varies between 50, 80 to 100 barrels of water a day.

Q Referring to Exhibit I, you indicated that you had a high PI on these wells. Does the "C" 1-28 have a high PI also?

A No, the PI taken before the recent workover was only 0.158, I believe, and we haven't taken a PI after the workover, but I was told yesterday that upon the acid job, the tubing pressure was on a 16/64 choke, five to six hundred pounds, while it was during this test as low as one hundred pounds only.

Q So, evidently this acid job has cleaned up this?



A Yes, and it produces on a 16/64 choke more oil than it did before on a 21/64.

Q This interference test was taken prior to the workover of the well?

A Yes, sir, because we noticed on the skin effect after the buildup tests were taken.

Q So the big drawdown here is under this low IP of .158?

A Yes, sir. The PI in the orange well is 3 and in the blue well is 10, and 11 in the State No. 2-B in the green well.

Q Your interference calculation on Exhibit K, your change in pressure would have to depend completely on the compressibility factor of the oil, would it not, in the top part of the calculation? This was taken at a time, was it not, when the bottom hole pressure was above the bubble point so expansion of the fluids would be the driving factor here?

A I don't get it quite.

Q The calculation which is made on Exhibit K --

A Yes.

Q -- uses the compressibility factor?

A Yes, sir, for the diffusivity constant.

Q So, in order to make this computation, the only force that's driving the oil to the well bore --

A Is the gas in solution.

Q -- is the compression of the fluids?

A Yes, sir.

Q Your material balance calculation on Exhibit M, Mr. Mattehies, represents a total production here of 20,000 barrels?

A Yes, sir, out of this one well only. Out of the State No. 1-33.

Q What was the nearest producing well to this well at the time that it produced 20,000 barrels?

A Well, either the well in Lot 1 or Lot 2 in the Section 2, of Section 2, which is about three-quarters of a mile.

Q So, by this computation you figured that 3,000 barrels of oil was being affected?

A Yes, sir.

MR. NUTTER: I believe that's all.

MR. UTZ: Are there any other questions? Mr. Morris.

BY MR. MORRIS:

Q Mr. Mattehies, referring to your proposed rules, your Rule No. 4, I failed to follow your logic concerning why a 50-acre tract should receive substantially the same allowable as the 80-acre tract.

A You mean Rule 3?

Q Rule 3, correct.

A Under 36 barrels unit allowable the 50-acre well will

have a daily allowable of 169 barrels of oil per day while an 80-acre well will have 172 barrels of oil per day allowable. There's a difference of three barrels of oil per day.

Q I fail to follow your logic, however, as to why a 50-acre tract should receive the same allowable as the 80-acre tract.

A It shouldn't, but that's the way the rule is.

Q I fail to follow your logic in proposing this type of rule.

A Because Mobil Oil has no more acreage which it could allocate to this well. There's enough productive acreage around this well, but it's not owned by Mobil Oil, and to not penalize them by us obtaining 80 acres, it's fair that they retain their present allowable.

Q Isn't it just too bad that Mobil doesn't own additional acreage? Why should they receive an allowable based on acreage they don't own? I fail to see this is equitable at all.

MR. CAMPBELL: Mr. Morris, I think he pointed out that if the equities involved resulted to some extent by the unwillingness or failure of the offset operators to object to this and the fact that the royalty is commonly owned, equities do not mean very much unless they relate to something. If those who conceivably may be losing oil have no objection, I can't see

whose correlative rights are affected. That's a matter for Mobil to explain.

MR. MORRIS: Mobil should be quite satisfied with the ruling, Mr. Campbell.

MR. CAMPBELL: I mean to explain it to your satisfaction.

Q (By Mr. Morris) Mr. Mattehies, the rules that you referred to in the Ranger Lake and South Vacuum Devonian, correct me if I'm wrong, but those rules provide only an exception in the case of wells located on 40-acre tracts, allowing those wells to continue to produce at a 40-acre, regular 40-acre allowable?

A Yes.

Q They do not propose rules similar to the rules you have proposed here today for acreage dedication between 40 and 80 acres?

A I think this tract has 50 acres. It is an odd shaped tract and all we're asking, that in our case Mobil will retain or will keep their present allowable, which was done in the Ranger Lake or South Vacuum, where these wells kept their allowable. That's why I referred to those two cases. If this well would have been on a 40-acre tract only we would have asked for a 40-acre exception, but since it is a 50-acre tract, we have to ask for a 50-acre exception.

Q Will Mobil's well there, do you know of your own

knowledge that that well will produce 169 barrels per day on 36 barrel normal unit allowable?

A Yes, sir, it is capable of producing it.

MR. MORRIS: No further questions.

BY MR. NUTTER:

Q Mr. Mattehies, on that point of allowables, now, none of the wells which would go to 80-acre allowables would receive any additional depth factor credit for acreage above 40, is that correct?

A No, sir.

Q In other words, the way the 80-acre factors are arranged doesn't, when you dedicate two 40-acre tracts to a well, one of those tracts receives a normal unit allowable times a depth factor?

A Yes, sir.

Q The other 40-acre tract receives only a normal unit allowable?

A Yes, sir.

Q Would it be more equitable if we were to give an exception to the Mobil well to give it 40 acres times the depth factor, plus 10 acres without the depth factor?

A Which would be 26 barrels a day cut in the allowable.

Q Is that what it would amount to?

A Yes.

Q This would put the well on the same basis for assigning an allowable for excess acreage that all the other wells in the pool would have, wouldn't it?

A Yes, it would.

MR. NUTTER: Thank you.

MR. UTZ: That is the only well which can only dedicate 50 acres?

A Yes, sir.

MR. UTZ: Are there any other questions of the witness? The witness may be excused.

(Witness excused.)

MR. UTZ: Any statements in this case?

MR. MORRIS: If the Examiner please, before statements are made by parties present, I would like to comment on several pieces of correspondence that the Commission has received. The correspondence is too lengthy to read in its entirety into the record. However, I will hope I will state the essence of each.

I have a letter from Texaco, Inc., signed by Mr. R. M. Bischoff as Division Manager with reference to this case, stating that Texaco does not concur with the proposed Rules Nos. 3 and 4. Phillips Petroleum Company has also submitted a letter with reference to this case, signed by Mr. L. E. Fitzgerald, Vice

President, urging that the proposed Rule 3 be deleted from the proposed rules. I have a letter from Goldstone Oil Corporation favoring all phases of Union's application. I have a letter from McAlester Fuel Company also favoring all phases of Union's application.

MR. UTZ: Are there any other statements?

MR. CAMPBELL: Are these being entered into the record?

MR. MORRIS: They will be a part of the case file, Mr. Campbell.

MR. SPERLING: Mr. Examiner, Jim Sperling, representing Mobil. I would like to ask Mr. Morris if the letters he received indicate the location of the acreage of the protestants, Texaco and whoever it was.

MR. MORRIS: Mr. Sperling, would you care to see the correspondence?

MR. SPERLING: I just wanted the Examiner to understand that we consider that the location of the acreage with reference to the location of the Mobil well is of some significance, and I would like the record to show the location of the acreage held by the companies which have submitted the correspondence with relation to this well.

MR. MORRIS: I do not believe that the letters from Phillips and Texaco show in their content the location of their

own wells.

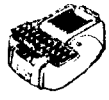
MR. SPERLING: I have a statement on behalf of Socony Mobil.

MR. UTZ: You may proceed.

MR. SPERLING: Socony Mobil concurs in the application and the proposed rules under consideration. Mobil would be opposed to any rule relating to allowables in the proposed pool which had the effect of substantially reducing an allowable allocation presently existing in the existing pool and under which Mobil drilled its well.

This well was drilled in good faith under statewide spacing rules then existing. Since this is the only acreage that Mobil has in the proposed area of North Anderson Ranch-Wolfcamp Pool, Mobil has no flexibility in acreage dedication. If a rule which had the effect of substantially reducing the allowable in the presently established Anderson Ranch-Wolfcamp Pool were to be seriously urged or considered, Mobil must take the position that the more or less arbitrary line of separation between the proposed pool and the presently designated pool is not supported by sufficiently reliable evidence to justify the line location, and the establishment of such a line results in deprivation of Mobil's correlative rights as well as its vested property rights and that of its lessor, the State of New Mexico.

The proposed rules recognize that injustice would result



from a substantial variation from existing allowable allocation and their adoption would result in no injury to those opposing the rules. It would, therefore, appear that they should be adopted as proposed, since they prevent injury and do none to anyone. What I have said is that we're flexible on this thing, and so long as you don't commit mayhem on the allowable which you have already given us on a good faith well, we're in favor of the application and the rules as proposed.

MR. BRATTON: Mr. Examiner, Howard Bratton on behalf of Humble Oil and Refining Company. Humble Oil and Refining, as a participant in the North Anderson Ranch Unit concurs in Union Oil Company's request for a designation of a North Anderson Ranch-Wolfcamp Pool. Humble recommends the adoption of 80-acre spacing based on interference test data.

In regard to the proposed rules offered by Union Oil Company, Humble believes these rules to be satisfactory with the exception of Rule No. 3. In the case of existing wells which cannot be assigned 80 acres, it is recommended that the 40-acre proportional factor of 3.77 be adjusted by adding a fraction, the numerator of which is the acreage in excess of 40 acres and the denominator of which is 40 acres, with the resultant factor to be multiplied by the normal unit allowable.

I might say, Mr. Nutter, this was exactly the proposal

that you were making. I will hand to the Examiner and to Mobil a copy of this statement which has on it an example of how the two different rules would work. I would ask that the reporter include the example in there. This is based on a 35 barrel normal unit allowable rather than the 36. However, I think the significant difference, of course, is that under the Rule No. 3, as proposed by Union, you introduce a multiplication factor times a depth factor, which is contrary to the concept of 80-acre proportional factors as set out in Rule 505.

As an example of the problem involved in adopting the Union rule, you come out with a well with 50 acres would get a factor of 4.71 times the normal unit allowable, a well with 80 acres would get 4.77 times the normal unit allowable, and a well with 51 acres would get 4.806 times the normal unit allowable. So, a 51-acre well would get more than an 80-acre well.

It is respectfully urged that the Commission adopt the proposed rules including the exception proposed herein.

MR. KASTLER: Bill Kastler, appearing on behalf of Gulf Oil Corporation. We concur in all respects of Union's case.

MR. KELLY: Booker Kelly of Gilbert, White and Gilbert for Sinclair. Sinclair concurs in the application with the exception of Rule 4. Sinclair's position has always been in favor of flexibile spacing and they feel that this type of rigid

spacing would be a disadvantage to operators that could not drill on the best structures in their areas, and also it would affect, because of that, correlative rights to operators that were penalized in drilling in the poorer areas of their acreage.

MR. UTZ: Does Sinclair have acreage in this pool?

MR. KELLY: Sinclair has acreage in Section 28, and they are also acquiring the Champlain's acreage in Section 28.

MR. UTZ: Thank you. Are there any other statements?

MR. SPERLING: I might make an observation in connection with the rule as proposed by Mr. Bratton, that it means a reduction of allowable of 8,070 barrels per year, or about $25,000.00.

MR. UTZ: For the life of the well?

MR. SPERLING: Yes, sir.

MR. PORTER: That would be deferred income?

MR. SPERLING: It certainly would be deferred.

MR. UTZ: Any other statements? If no further statements, the case will be taken under advisement. We will take a ten-minute recess.

STATE OF NEW MEXICO)
) ss
COUNTY OF BERNALILLO)

I, ADA DEARNLEY, Court Reporter, do hereby certify that the foregoing and attached transcript of proceedings before the New Mexico Oil Conservation Commission at Santa Fe, New Mexico, is a true and correct record to the best of my knowledge, skill and ability.

IN WITNESS WHEREOF I have affixed my hand and notarial seal this 10th day of April, 1962.

Notary Public-Court Reporter

My commission expires:

June 19, 1963.

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 2507, heard by me on March 28, 1962.

....., Examiner
New Mexico Oil Conservation Commission