BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
November 2, 1960
Examiner Hearing
Case No. 2116

BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO
Westates EXHIBIT No. 6
CASE 2277

IN THE MATTER OF:

Application of Westates Petroleum Company for an oil-oil dual completion. Applicant, in the above-styled cause, seeks an order authorizing the dual completion of its Carlson B 26, Well No. 7, located in unit J, Section 26, Township 25 South, Range 37 East, Lea County, New Mexico, in such a manner as to permit the production of oil from an undesignated Paddock Pool and the production of oil from the Justis-Blinebry Pool through parallel strings of 2 3/8-inch tubing.

BEFORE:

Elvis A. Utz, Examiner

TRANSCRIPT OF HEARING

MR. UTZ: Case 2116.

MR. MORRIS: Case 2116. Application of Westates Petroleum Company for an oil-oil dual completion.

MR. RUSSELL: John F. Russell, Campbell & Russell, Roswell, New Mexico, representing the Applicant. I have two witnesses, Mr. Miller and Mr. Watson.

(Witnesses sworn.)

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

MR. RUSSELL: Mr. Miller, will you take the stand?

CHARLES P. MILLER

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

DIRECT EXAMINATION

BY MR. RUSSELL:

Q Please state your name, residence and occupation.

A Charles P. Miller; I reside in Hobbs, New Mexico; my occupation is Petroleum Geologist.

Q And are you employed by Westates Petroleum Company in connection with the dual completion, Carlson B 26, 7?

A In connection with the drilling of it.

Q Mr. Miller, will you refer to Exhibit No. 1 there?

A That is the map.

Q Now, does it reflect the location of the Applicant's lease?

A Yes, it does.

Q And how does it show it?

A No. 7 well, the location is in the southeast quarter of 26, Township 25 South, Range 37 East, specifically located 2310 feet from the South line, 1600 feet from the east line.

Q And is the lease itself shown in yellow?

A The Exhibit I am looking at here is not colored in yellow; it should be.

MR. RUSSELL: For the record, I will swap with you.

A Yes, it is colored in yellow.

Q Mr. Miller, does that Exhibit show all of the wells

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located on this lease?

A Yes, it does.

Q Does it also show the location of the offset wells and the operators of that?

A Yes, it does.

Q Mr. Miller, referring to Exhibit No. 2 which is the sonic log, have you made a study of that log?

A Yes, I have made a study of it.

Q And is it a log of the well in question here?

A That is right.

Q From the data contained in that log, were you able to locate the top of the Paddock zone?

A Yes, sir. From this log and in connection with the sample analysis, I have located the top of what I call the Paddock.

Q And where did you locate it?

A I have located the Paddock at 5000 feet.

Q That is the top of the Paddock?

A Top of the Paddock formation, yes.

Q And were you also able to locate the top of the Blinebry?

A Yes, sir, from the sample and log I have located the top of the Blinebry at 5105.

Q Mr. Miller, do you have any further statement which you would like to make in connection with the geology of these formations and this application to dually complete in the Blinebry and Paddock?

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A Perhaps the few statements I have to make, Mr. Russell, might simplify the statements which would follow.

The Paddock in this area has been determined to have a rather constant interval from the top of the Glorietta which, in this case, is approximately 275 feet. The Paddock itself is separated from the presently defined Justis Gas Field by shale breaks, thin shale, and they do not show up particularly well in samples, but the evidence is there that there are shale breaks, black shale breaks. The lower boundary of the Justis Gas Field was determined and set by an order of the Commission; in fact, Order No. R-586-E confirmed by Order R-1670. The base of that is established at 240 feet from the top of the Glorietta, which, in this case of this particular well, would make the base of the Justis Gas Field at a depth of 4965 feet, leaving an interval of 35 feet, the low of the base of the Justis Gas Field to the top of what I call my Paddock formation.

Q Now, does that Exhibit 3 show the intervals at which the perforations have been made, or not?

A Well, unfortunately, I am working from a work sheet. They did not furnish us the necessary completed copy, so I will have to refer to this report. The Exhibits which the gentlemen have here do show the perforations, yes. But let me read here to confirm this. Bear with me just a moment. May I refer to yours there just a moment?

MR. UTZ: This?

THE WITNESS: Yes. I have it here, but it would take me a little longer to find it here.

The perforations are shown on these Exhibits by the little red circles on the left of the center of the log, and the Paddock. Let me be specific and find the exact points here. Well, I don't turn to them right quickly.

Q (By Mr. Russell) But they are reflected in the Exhibit?

A Yes. I will give them to you, approximately, if you want, and the man following me testifying will have these exact points, I am sure.

MR. RUSSELL: I have no further questions.

THE WITNESS: I can give you the points now, if you wish.

Q (By Mr. Russell) You are now referring to what has been marked as Exhibit 3?

A I will give you the perforations as shown on Exhibit 2, if that is satisfactory. The perforations in the Paddock section, 5042.5 to 5048.5; from 5054 to 5060 are the two intervals in the Paddock section which were perforated.

Q In connection with the other log which you have there, is there any additional data which you would like to present to the Commission from that log?

A No. At this moment, unless the Examiner wishes to ask some questions, I have nothing in particular that needs to be added at this time.

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MR. RUSSELL: That is the Gamma Ray Log which will be identified as Exhibit 4. Does the Commission have any questions?

MR. UTZ: Yes, when I get my Exhibits straightened out. I lost an Exhibit somewhere. This is Exhibit No. 1?

MR. RUSSELL: No. 1, 2, 3 and 4.

CROSS-EXAMINATION

BY MR. UTZ:

Q All right.

A I certainly shall be glad to try and answer any questions you may have.

Q Both of these are in the Justis Pool, Justis Paddock, Blinebry?

A That is right. I may call to your attention the perforations of the Paddock here were well into the Paddock section, which I might classify as lower Paddock. We have that characteristic developed up in the Eunice area, but it is not developed so prominently in the Justis Field, but I think on this flank well, we are developing, probably, two portions of the Paddock pay.

Q The engineering witness will take up the details as to the mechanical?

A That is right.

MR. UTZ: Any other questions?

THE WITNESS: We will furnish you with a third copy of this Exhibit, if you wish. We only have two copies at the present time.

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MR. UTZ: Two copies will be plenty at this time.

MR. RUSSELL: Mr. Watson, will you take the stand?

DEWEY WATSON

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

DIRECT EXAMINATION

BY MR. RUSSELL:

Q Will you state your name, residence, occupation and employer?

A Dewey Watson; Denver, Colorado, and I am employed by Westates Petroleum, Regional Engineer.

Q Have you previously testified before this Commission as an expert witness?

A Yes, sir, I have.

MR. RUSSELL: Are his qualifications satisfactory?

MR. UTZ: Yes, sir, they are.

Q (By Mr. Russell) Mr. Watson, you are presently employed by Westates Petroleum Company?

A Yes, sir.

Q And are familiar with this application for dual completion?

A Yes, sir, I am.

Q Now, referring to Exhibit No. 3, was it prepared under your direction or to your specifications as recommended by you?

A Yes, sir.

Q Now, will you briefly explain to the Commission the data which is shown on this Exhibit relating to the manner in which the tubing was set and the well completed, and so forth?

A Well, this Exhibit is a diagramatic sketch of dual completion as it is now proposed, and it shows the surface casing, the oil string, the perforations in the Paddock and the Blinebry and the packer setting, depth of tubing on both strings and shows the TD and amount of cement used on the seven-inch casing.

Q Now, one tubing is set in the Paddock zone and the other in the Blinebry, is that correct?

A Yes, sir, it is.

Q And what was done to prevent communication between those two zones?

A There is a Model D Baker permanent packer set at 5088 feet with the receive receptacle.

Q And are you familiar with the initial test of both of these completions?

A Yes, sir I am.

Q What was the result of those tests?

A Well, the initial test on the Paddock was a swabbing test, 24 barrels of oil and 2 barrels of water in two hours, and on a twenty-four-hour basis, it would be 200 oil, 66 barrels of water, and the gravity of the oil was 37.8, and it, at present, is shut in, and the No. 2 test on the Blinebry was 23 barrels of oil and 4 barrels of water in two hours, which, on the twenty-four-

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hour basis, is 276 barrels of oil and 48 barrels of water per day, and the gravity was 37.9, and the pump -- the well Blinebry was -- test of 9-29-60 was 112 barrels of oil per day and 16 barrels of water.

Q Mr. Watson, has your company made application to the Commission for administrative approval to commingle the oil from these two zones?

A Yes, sir.

Q And is it your proposed plan to separately meter the production from each of these zones?

A That is correct.

Q In your opinion, Mr. Watson, are the mechanics of the proposed dual completion feasible and in accordance with good conservation practices?

A Yes, sir, they are.

Q And, in your opinion, will the approval of this application either impair correlative rights, or create waste?

A No, sir.

MR. RUSSELL: No further questions.

CROSS-EXAMINATION

BY MR. UTZ:

Q Do you have any bottom-hole pressure information on these two zones?

A No, sir, we don't.

Q GOR?

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A No, there hasn't been any GOR taken on it, due to the swab test.

Q Do you have the gravity on the Paddock zone?

A Yes, sir, it was 27.8.

Q 37.9, the Blinebry?

A The Blinebry, yes, sir.

Q Do you have any opinion as to what the bottom-hole pressures are going to be?

A Well, due to the fact the wells aren't flowing, I assume it is pretty low. I don't have any guesses on what it is. I do know the gas-oil ratio is very low, there is not much gas with either zone.

Q You wouldn't have any opinion as to what the differential between the two zones might be?

A No, sir.

Q Have you any other wells near this location?

A Do you mean, producing Paddock?

Q Yes.

A The closest Paddock production is approximately two miles to the northeast, Gulf No. 5, and the Western Petroleum No. 5 Well, and those are circled on our map in red.

MR. RUSSELL: Exhibit No. 1?

THE WITNESS: Yes, sir, on the north end of the field, up here.

Q (By Mr. Utz) How much differential will the packer hold?

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A Well, it will certainly hold enough to keep a pair of pumping wells separated, and I don't have the figures that they give, but it is a lot higher than hydrostatic head on either one of them will be.

MR. UTZ: Do you have any questions?

MR. PORTER: Mr. Watson, this would be a discovery well in the Paddock in this particular well, then?

THE WITNESS: Yes, sir.

MR. PORTER: That is all the questions I have.

MR. UTZ: Any further questions? If not, the witness may be excused.

Are there statements in this case?

MR. RUSSELL: I would like to move the introduction of Exhibits 1 through 4.

MR. UTZ: Without objection, they will be entered into the record.

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STATE OF NEW MEXICO)
) ss
COUNTY OF BERNALILLO)

I, LAWRENCE HOLMES, JR., Certified Shorthand 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 this 10th day of November, 1960.

CERTIFIED SHORTHAND REPORTER

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 2116, heard by me on Nov. 2, 1960.

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

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I N D E X

E X H I B I T S

NUMBER	OFFERED	RECEIVED
Applicant's Exhibits 1 through 4	11	11

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
May 17, 1961

IN THE MATTER OF: Application of the Oil Conservation Commission on its own motion to determine the vertical limits of the Justis-Blinebry Pool, Lea County, New Mexico, and to grant an allowable for each zone of any multiple completion previously authorized which is completed within such vertical limits, such allowable to extend for a period not to exceed 18 months from the date allowable was initially granted.	Case 2277

TRANSCRIPT OF HEARING

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
May 17, 1961

IN THE MATTER OF:	
Application of the Oil Conservation Commission on its own motion to determine the vertical limits of the Justis-Blinebry Pool, Lea County, New Mexico, and to grant an allowable for each zone of any multiple completion previously authorized which is completed within such vertical limits, such allowable to extend for a period not to exceed 18 months from the date allowable was initially granted.	Case 2277

BEFORE: Mr. A. L. Porter
Mr. Murray Morgan

TRANSCRIPT OF HEARING

MR. MORRIS: Application of the Oil Conservation Commission on its own motion to determine the vertical limits of the Justis-Blinebry Pool, Lea County, New Mexico, and to grant an allowable for each zone of any multiple completion previously authorized which is completed within such vertical limits, such allowable to extend for a period not to exceed 18 months from the date allowable was initially granted.

Mr. Commissioner, the Commission Staff will present two witnesses in this case, Mr. Engbrecht and Mr. Ramey to testify on geology and engineering aspects of this case and they will be

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brought on in that order.

MR. PORTER: I would like to call for other appearances.

MR. KELLAHIN: Jason Kellahin, Kellahin and Fox, Santa Fe, appearing for Amerada Petroleum Corporation, in association with Mr. H. D. Bushnell.

MR. ROSE: U. M. Rose, resident counsel, Westates Petroleum Company.

MR. BRATTON: Howard Bratton on behalf of Atlantic Refining Company.

MR. WHITE: Charles F. White for Union Texas Natural Gas Corporation.

MR. PORTER: Charles F. White?

MR. WHITE: Yes, local counsel, Gilbert, White and White.

MR. PORTER: Mr. Seth.

MR. SETH: Oliver Seth for Tidewater.

(Witnesses sworn.)

MR. MORRIS: Are you ready for us to proceed?

MR. PORTER: Yes.

(Whereupon, Commission's Exhibits Nos. 1, 2 and 3 were marked for identification.)

ERIC F. ENGBRECHT

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

DIRECT EXAMINATION

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BY MR. MORRIS:

Q Will the witness please state his name and by whom employed?

A The name is Eric F. Engbrecht, and employed by the New Mexico Oil Conservation Commission at Hobbs, New Mexico.

Q Are you a graduate geologist, Mr. Engbrecht?

A Yes, sir.

Q Have you made a geological study to determine the vertical limits of the Justis-Blinebry Pool for presentation in this case?

A Yes, I have.

Q What area have you considered, Mr. Engbrecht, in this study?

A The considered areas are Section 25, Ranges 37 and 38, and I have depicted the area of all the wells in a large circle on the contour map, which is Exhibit No. 1.

Upon Exhibit No. 1 we have the large circles with color. The one color refers to the Blinebry and the other color refers to the other completion. Likewise, we have all the Paddock completions in red.

Q Mr. Engbrecht, Exhibit No. 1 shows, then, only the aerial extent to be considered and it's for no other purpose at this time?

A Yes, sir.

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Q Mr. Engbrecht, why is it necessary to consider in this case establishing the vertical limits of the Justis-Blinebry Pool? What problems are presented that we have to solve here today?

A When the Justis-Blinebry Pool was created by Order R-1248, the vertical limits were defined as just the Blinebry fromation. It now seems that the operators within the pool are not using the same Blinebry top and these two picks are approximately 120 feet apart.

Q Now, you referred to two picks, would you refer to your Exhibit No. 2 and point out to the Commission the two points that you've referred to?

A Exhibit No. 2 is a west to east cross section. The top of Blinebry marker No. 1 is the lower pick, the top of Blinebry No. 2 is the upper pick.

Q We will refer in our testimony here today to those markers as marker No. 1 and marker No. 2, as you have pointed them out on Exhibit No. 2, is that correct?

A We will refer to the lower one as top of Blinebry, marker No. 1, and the upper one as Blinebry No. 2.

Q Mr. Engbrecht, would you explain to the Commission how your marker No. 1 became a recognized marker in the area that we're considering today?

A The Blinebry marker No. 1 is the lower marker that's being used in this area. There are many operators that refer

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to this as the top of the Blinebry. Some of the operators refer to it as the base of San Andres. Some of the operators refer to it as their tops, it seems not to be a clear and distinct point of what this top is.

Q Would it be a fair statement, Mr. Engbrecht, to say that it is a correlative marker in this area but not a top?

A Yes, sir, I would say it was a correlative marker within this Justis area.

Q Mr. Engbrecht, would you explain how marker No. 2, that you've referred to, how it became a recognized marker?

A Blinebry No. 2 became a recognized marker, I think, by most of the companies, because it's a good lithologic break, and I think it's a good mapable unit in my opinion, and I believe it would be a good place to map on. Likewise, on January 27 of 1961 the Hobbs office called a meeting and here they have set out a poll of which marker should be used.

Q In other words, Mr. Engbrecht, the marker No. 2 is a good lithological break and it's also a good correlative point across the field that we're considering here today?

A Yes, sir, it's an excellent break, I believe.

Q In your opinion, which of these two markers that you have just referred to, which of the two represents the top of the Blinebry pay in this area?

A In my opinion I would say that the upper marker No. 2

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is the break for the Blinebry Pool, after looking at sample logs, also sample logs that were submitted to us from other operators, and looking at gamma ray neutrons, electronic logs and other available data, I feel that the Blinebry No. 2 is the top of the Blinebry reservoir.

There's also an impervious barrier, and immediately above this marker, as we come down, we have a real dense dark brown dolomite and within a very short distance we have a trace of light tan dolomite, and then we move to a silty, ardulacious clay earthy material. The matrix of the earthy material is the dolomite. The dolomites will run anywhere from 30 to 60% dolomite. This change takes place within anywhere from 4 to 6 feet.

The samples that I was looking at were quoted by the company's geologists as two foot samples. It was on the Blinebry Wimberly No. 4. The Blinebry No. 2 marker is distinctive in this case. You have a rapid change of lithology in a very short distance. Blinebry marker No. 1 is not as good.

I wish to point out on Exhibit 3, which is the long north-south cross section within this Justis area, we start in from the Gulf Ramsey B No. 8, which sets down here in Section 36. We move up to the No. 6, then we move into Section 25, we move over to Well No. 9, which is in the northwest corner; then we move across the Justis area pool to No. 7, which is in the northeast or Unit A. Then we move back to Wimberly No. 13 and we move to

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Well No. 4, which I wish to recommend as the type log in this area. Then we move to No. 4, which is the Section 24 Western Wimberly No. 4, and then we move back west to Section 23 of a well that was just drilled and just completed. It is the Skelly Las Cruces C No. 1. Then we move further north to No. 7 over to Section 13 and No. 5, and then again north to another Well No. 5, and then to Well No. 7, Gulf 7, and then back to Well No. 6.

Q Mr. Engbrecht, all of these wells that you have referred to on Exhibit No. 3 are within the aerial extent as shown on Exhibit No. 1. They're all in the Justis-Blinebry Pool area?

A Yes, they are all within the Justis area, each one of these pools. Some are drilled deeper, but the cross section was taken in a zigzag fashion in order to show the correlative points from one side to the other.

If we observe Blinebry marker No. 2 from the short west to east cross section, it is a heavy line on the long north-south cross section. Blinebry marker No. 1 is not. I did not place it on there because I was having a little difficulty to correlate it in places.

Within the Wimberly No. 4 your dense sand, your second sand comes in right below this break. This dense sand is not prevalent throughout the Justis area. It moves in and out. For example, I would like to show you this log on Wimberly No. 9. You have the correlative point, but this definite sand is not there, it's

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no longer present.

As we move into the flanks, I think we are going to have a change in sedimentation with the sand below, what I wish to refer to as Blinebry marker 2, and then on the 4 we come in on another sand, it isn't off sand. Then we come to another sand, it's the lower sand we picked for marker No. 1. These two sands, they come in and out, they fade in, out within the Justis area. I feel this, that the Blinebry marker No. 2 is a better correlative point, and I feel it's the top of the Blinebry Pool within this area.

Q In summary of what you have just pointed out with reference to these two cross sections, then, Mr. Engbrecht, would you say that what you have designated as the marker No. 2, that it is correlative across the pool, meaning the Justis-Blinebry Pool area that we're considering today?

A Yes, sir.

Q Would you say that the No. 2 marker is better as a correlative marker across the pool than the No. 1 marker in this reservoir?

A Yes, sir.

Q Would you say that there is a significant lithological break across the marker No. 2?

A Yes, and I feel that the lithological break across No. 2 can be correlated across the Justis area pool, while I feel

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that the No. 1 might not be.

Q In other words, there is a more significant lithological break across the No. 2 marker than across the No. 1?

A Over the Justis area, yes.

Q Yes. A Yes, sir.

Q Based on these factors, Mr. Engbrecht, is it your recommendation that the No. 2 marker be established as the top of the Justis-Blinebry Pool?

A Yes. I wish to also point out on the Exhibit No. 2 that we also have the top of the Tubb marker on there which comes in approximately, oh, I forget about 5623, which would be the top of the Justis-Drinkard Pool.

Q While you are up, Mr. Engbrecht, would you refer to the Amerada Wimberly Well No. 4 and pick on that log, pick the marker No. 2 that you have recommended as the top of the Justis-Blinebry Pool?

A You mean by putting a circle?

Q If you will, please.

A Upon the Amerada Petroleum Corporation Ida Wimberly No. 4, 660 from the south and 990 from the west in Section 24, 23 South, Range 37 east. I wish to pick the top of the Blinebry marker No. 2, Blinebry 2, at 4980.

Q Would you also, on the same log, pick the base of the Justis-Blinebry Pool?

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A The base of the Blinebry Pool would be at 5623.

Q The later point that you have picked as a recognized base, is it not?

A Yes, sir, observing the C-105's within the Commission records, all the operators pick either the top or the bottom of that break, which is approximately four feet.

Q Does this marker No. 2 that we have been talking about, does it have a general acceptance among the operators in the Justis-Blinebry Pool?

A Yes, sir. I believe that the No. 2 marker has been generally accepted. I always have personal knowledge that some operators use this pick as the Blinebry top, that is upon the central plat form. We have conducted a survey and the majority of the operators chose marker No. 2 as the top of the Blinebry in the Justis area.

Q If the No. 2 is established as the top of the Justis-Blinebry Pool in accordance with your recommendation, what problems will that present to any or all of the operators in the field?

A It will present two problems. We will either have one Blinebry-Blinebry dual completion or we will have a Paddock-Paddock dual completion.

Q This will work a hardship on the operators of one of these two wells, will it not?

A Yes, sir. So I would --

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Q Now, Mr. Engbrecht, if the No. 2 marker is established, that wouldn't necessary create a Paddock-Paddock dual, will it? It will just complete a Blinebry-Blinebry dual?

A Yes, sir.

Q What could be done to alleviate the hardship on the operator of the well that would be a Blinebry-Blinebry dual if the Commission saw fit to adopt your recommendations?

A I recommend that an eighteen-month allowable be granted for this completion and that would be from the date of approval in the upper zone.

Q Let's identify the well specifically that we're talking about.

A That's the Amerada Wimberly 13 in Unit M.

Q That will be the Blinebry dual?

A Yes, sir.

Q Now, if an eighteen-month allowable were assigned, as you have recommended, to the upper zone of this well, in the event the Commission adopted your top, would this allow reasonable time for paying out the additional cost of dually completing this well?

A In my opinion I think it might.

Q Do you have anything further to add to your testimony, Mr. Engbrecht?

A No, sir.

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Q Did you prepare Exhibits Nos. 1, 2 and 3?

A Yes, sir.

MR. MORRIS: At this time, Mr. Commissioner, I move the introduction of Commission Exhibits 1, 2 and 3 into evidence and that completes the direct examination of this witness.

MR. PORTER: Without objection, the exhibits will be admitted to the record. Does anyone have any questions of Mr. Engbrecht? Mr. Bushnell.

CROSS EXAMINATION

BY MR. BUSHNELL:

Q That fourth exhibit is not your exhibit?

A No, sir, that is not my exhibit.

Q In the course of preparing for this study, how many electric logs of wells in this area did you examine?

A Within the Justis area I looked at all the logs that we had within our own records, plus the fact of a few that are on this cross section, this long north-south cross section. We went to the United States Geological Survey and borrowed some of their logs. They were kind enough to loan them to us.

Q In the course of your study, how many sample logs did you have available for your study?

A Mr. Bushnell, I looked at two sample logs through this section. The other sample logs the other operators were kind enough to let us, they loaned them to us.

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Q You had the sample log on the Well No. 4?

A Yes, sir.

Q You had a sample log on what other well?

A 13 and most of Tidewater's.

Q As I understand your testimony that the top of the Blinebry marker No. 1 that you have put on your exhibit here does not represent, in your opinion, the top of where there is any geological or lithological change, do I understand your testimony?

A No, I don't think I said that, Mr. Bushnell. I just said that it was a correlative point.

Q You are testifying that marker No. 1 is a relative point and that it does represent a possible change of lithology, is that what I understand?

A A relative point?

Q Correlative point.

A Correlative point. It can be correlated, yes, sir.

Q It does represent the top of some geologic change or change of lithology?

A Yes, sir.

Q Your marker No. 1?

A Yes, I think I mentioned that when I went through the description of the No. 4 that we did have a sand coming in at the top of this point.

Q Is it not true that above the marker No. 1 that you

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could find several points in this interval that are correlative throughout the field by looking at the electric logs only?

A Not easily correlative.

Q But there are points that can be picked correlative throughout the field?

A With the sample logs, looking at sample logs and the sample from any logs, I think you could pick my points that would be correlative in this area.

Q Let me rephrase my question. Based on a study of the electric logs only, don't you think that above the marker No. 1 there are several points that could be picked as being correlative throughout the field?

A Yes, sir, Mr. Bushnell, there are. I can point to quite a few points.

Q Go ahead.

A We can start from down here, I'm well aware that some operators map on this kick right here, which is on the Wimberly No. 4, it comes in at 54, 5556-50.

Q My question was limited to above your marker No. 1.

A Well, may I walk up?

Q All right.

A We have another point that can be correlative, and I would say it would be very difficult at 52, or approximately 5210-20-28. Then, you have another one that would come in at

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approximately 5118, you would have another one that would come in at 5101. You would have another definite one that might come in about, oh, 5055, and we have many little kicks up there that would come in and out.

Q Does the marker at 5101 on Well No. 4, which is the well that you referred to on that exhibit, I believe, you referred to the Wimberly No. 4 log?

A Yes, sir.

Q Does the marker at 5101 not only represent a point that may be correlative throughout the field, but also represents a change of lithology at that point?

A As I mentioned in the original on No. 4, I mentioned you do have a sand above that point.

Q Now, referring to your testimony as to marker No. 2 --

A Yes, sir.

Q -- did I understand you to say that you picked that marker because it was easily correlated throughout the field?

A Yes, sir.

Q I think you have said that there are other points in this immediate area above marker No. 1 that could be correlated throughout the field?

A Yes, sir.

Q Then why did you pick the one that you picked if it is not based on any change of lithology?

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A On which the No. 2 is based.

Q The No. 2?

A No. 2 is based upon a change of lithology, sir, if I may go back and, that you move from a dark brown dolomite with a trace of tan dolomite into a real dense, silty ardulacious clay with a matrix of the earthy material. Then you, in about ten feet you move into another dolomitic string. You do have a definite break and I think this break is correlative throughout the Justis area.

Q It is my understanding that you picked marker No. 2 because it was the most correlative point throughout the field?

A I felt it was the top of the Blinebry Pool.

Q Let me ask you this, you have looked at the sample log of Well No. 4?

A Yes, sir.

Q Would you say, do you recall, you don't have the sample log on your exhibit, but do you recall from your examination of that sample log that there are characteristics in the sample log above and below the point that you pick which are similar?

A Which point are you speaking of?

Q The point marker No. 2.

A There are points similar?

Q Yes.

A What do you mean by similar?

Q You find the existence of sand above and below the point.

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A Between 1 and 2?

Q I'm referring to marker No. 2, which is your recommended top.

A You have sands immediately before it, yes.

Q Yes.

A Below marker No. 2.

Q So, to the extent of sand and silt merely, there was a similarity shown in the sample log above it and below the marker that you are recommending here?

A No, not sands above and below. No, you have the dolomite and you have the silty dolomite below.

Q You are referring to marker No. 2?

A Yes. I assumed you were.

Q And marker No. 2 is your recommended top at 4980 as encountered in your Well No. 4?

A Yes, sir.

MR. BUSHNELL: If the Commission please, I have an exhibit that contains a section of the sample log of the Well No. 4 of this interval which will later be offered into evidence, and I would like to show this to the witness to make some inquiry with reference to that log.

MR. PORTER: We would have no objection to that, Mr. Bushnell.

Q (By Mr. Bushnell) For the record, I refer to a

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reduced size of sheet here which will later be identified as Amerada's Exhibit No. 1, and it is a sheet which will be designated as a montague containing five separate exhibits on it. Included on this sheet or montague is a portion of the sample log of the Well No. 4 in the interval which we're talking about here. Do you recognize this sample log from the basis of your study?

A Yes, sir. Also it looks almost like the one that we have copied, but it isn't quite. I mean it's in essence there, yes, sir.

Q Would you pick for me the point which you recommend as the top of the Blinebry? In other words, your marker No. 2. That's that 5980, is that correct?

A No, sir. It comes in at 49.

Q 4980?

A As this sand is a heavy body sand, it would be here. You show a little more sand development in this area than it is there. I would have to check my detailed description to find out. I don't remember my sand being that prevalent unless this is your designation for a trace sand, sir.

Q Let me ask you this, put your pencil on the point of the 4980 marker which is the marker that you are recommending as the top.

A Yes, it would be right at the top there.

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Q Do you have any above and below that marker? This sample log shows the existence of sand.

A We move into the depositional sequence of the whole development of the Yeso formation, sir. We are going to have this sandy condition developing in and out on the platform. I would say that's just part of your depositional sequence in the Yeso formation.

Q Do I understand your answer to be that you do see the existence of sand on either side of that point?

A What do you mean, above this point?

Q Your 4980 marker.

A Yes, sir. I believe that when I testified on the No. 4 I did say there was sand above and below this marker, but I say that you move from a dolomite, from 48 you move from a dolomite into a dense sand. The other sand stringers come in and out within the Justis area, Mr. Bushnell.

MR. BUSHNELL: That's all the questions I have.

MR. PORTER: Anyone else have any questions of Mr. Engbrecht?

MR. MORRIS: I have questions on redirect.

MR. PORTER: Suppose we let Mr. Nutter ask his questions first.

BY MR. NUTTER:

Q You stated that the marker No. 2 was at 4980 in this No. 4 well?

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A I believe that's right, Dan.

Q What did you give as the top of the Tubb in that well?

A 5623.

Q What is the elevation that those points are taken from?

A Drill floor, 3979.

Q 3979?

A Three seven and seven nine.

Q Three zero seven nine?

A Yes, sir.

MR. NUTTER: Thank you, that's all.

REDIRECT EXAMINATION

BY MR. MORRIS:

Q Mr. Engbrecht, you were asked on cross examination whether the marker No. 1 was a lithological break, to which, of course, you answered that it was.

A Within the Wimberly No. 4, yes, sir.

Q Would you not say how far that the marker No. 2 is a better lithological break and makes a better correlative point across the field as a whole?

A I would say within the Justis area that the Blinebry marker No. 2 is a better correlative point to establish the top of the Blinebry Pool.

Q Also on cross examination you were asked to make other picks above marker No. 1, which you did, but are those markers

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that you picked correlative in every well in this region?

A As I mentioned on cross examination with Mr. Bushnell, we can find many points that are correlative within this area.

Q Let me put it this way, Mr. Engbrecht --

A And you have a change in lithology of the lower two sands within the Justis area that come in and out, that is the sand change, you still have your porosity.

Q The other picks that you made both above and below the marker No. 1 are not as good correlatively, for correlative purposes, as the markers that we're discussing here, either the No. 1 or the No. 2, is that correct? In other words, Mr. Engbrecht, you picked several other points?

A Yes, sir.

Q On one log that possibly couldn't be correlated across the pool as either marker No. 1 or marker No. 2?

A Yes, sir.

Q Now, you picked the marker No. 2, not just because it was the top of the Justis-Blinebry Pool, not just because it was a correlative point, you also picked it because it was a more significant lithological break across the pool as a whole, did you not?

A Yes, sir. As a matter of fact, that was the reason that I picked this point.

MR. MORRIS: That's all the questions I have.

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MR. BUSHNELL: I have one question to ask.

RECROSS EXAMINATION

BY MR. BUSHNELL:

Q I asked you at the beginning how many electric logs you had examined in this area and your answer was not specific, and I let it go until counsel for the Commission has posed now questions that require you to make conclusions as to the existence of correlative points on all the wells in this pool. Would you give me a rough idea numerically of how many logs you have examined in all the wells of this pool available?

A Mr. Bushnell, may I point to Exhibit No. 1, that each well that has a minus datum plane is a log that I have looked at, whether it is an electric log, a gamma ray neutron, acoustic sonic log or a sample log.

Q On Exhibit No. 1 did you say?

A Yes, sir. Each one of those logs that have a minus datum plane is a log that I have looked at or I have looked at that individual record.

MR. BUSHNELL: All right. Thank you. That's all the questions I have.

MR. PORTER: Mr. Rose.

MR. ROSE: I have one question I would like to ask.

BY MR. ROSE:

Q From your examination of the sample log, Amerada's

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proposed Exhibit No. 1, do you say that that log does or does not take into consideration the sample log?

A Mr. Rose, that I could not answer. With the samples that Amerada loaned us on the No. 4, their geologist, Amerada informed me that they had calculated lag upon it. When I platted the points, I assumed the lag was calculated. I would say it was close because when you take the footage that they record and place it on the log for correlation, I would say it's almost perfect, as perfect as it could be within human purposes.

MR. ROSE: No further questions.

MR. PORTER: Anyone else have a question? The witness may be excused.

(Witness excused.)

MR. PORTER: We will take a ten-minute break.

(Whereupon, a recess was held.)

MR. PORTER: The meeting will come to order. Mr. Morris, would you have your next witness stand to be sworn?

MR. MORRIS: He has already been sworn, Mr. Porter.

MR. PORTER: Let's get under way then.

JOE D. RAMEY

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

DIRECT EXAMINATION

BY MR. MORRIS:

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Q Will the witness state his name and position, please?

A Joe D. Ramey, proration manager for the New Mexico Oil Conservation Commission.

Q Mr. Ramey, in your official capacity with the Oil Conservation Commission have you made an engineering study of the Justis-Blinebry Pool in connection with this case?

A Yes, sir, I have.

Q Would you give us an idea of what this study indicates?

A Well, before going into this study, why I was of the opinion that was probably a solution gas type reservoir, which would be bounded on the flanks by a water table and there probably would be present a small gas cap. This is essentially the case, but after I delved a little more deeply into it, why there were several things which made this appear to be a very complex reservoir.

Q What were some of these complexities that you ran into in making the study?

A Well, gravities of the produced fluids range from a low of 35 to a high of 44. There are porosity stringers which appear and disappear from well to well, also there's been water indicated where for all practical purposes no water should have been found.

Q In making your study did you specifically look at the performance of the Amerada Wimberly Well No. 13?

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A Yes, I did.

Q What conclusions did you reach from that study?

A Well, first, this well is a dual completion with the upper zone perforated a few feet below what has been referred to as marker No. 2 or Blinebry No. 2. The lower zone is perforated some 300 feet below this marker, the upper zone is presently classified as producing from an undesignated horizon and the lower zone is classified as Blinebry. At first glance, why it certainly appeared that this well was producing from two separate and distinct reservoirs. The gravities of the produced fluids were 42.1 for the upper zone and 37.8 for the lower. GOR's are now 18,313 for the upper and 1,035 for the lower.

There is a distinct bottom hole pressure differential, 2303 for the upper compared to 2211 for the lower. Also there was drill stem test information on this well and other Amerada wells in the immediate area which indicated that there was an apparent water table within the first one hundred feet below this Blinebry No. 2.

Q Did you then compare the characteristics of this Amerada Wimberly No. 13, did you compare those characteristics with the pool as a whole?

A Yes, I did, and as a result of this comparison, why these things didn't seem to be as outstanding as they had first appeared. The gravity of the upper zone is high for the field

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average, but there are two wells in the field which report gravities of 44 degrees. The producing gas-oil ratio of the upper zone in this well is high for the field average, but then the well is also perforated at higher subsea elevation than any other well in the pool.

Q What did you conclude, Mr. Ramey, with respect to the existence of the apparent water table in the Well No. 13?

A Well, after noting this apparent water table in this well and the other Amerada wells, I checked into all the available drill stem test information throughout the whole pool. Drill stem test information over this interval between markers 1 and 2, the tests weren't plentiful, but only those tests on Amerada wells indicated that there was water present in this interval.

For example, I'll read the results of three drill stem tests, the first of which is on the Amerada Wimberly No. 13. I picked the marker No. 2 at 5,005 in this well. The drill stem test was taken from 5,020 to 5110. There was gas to the surface in ten minutes at the rate of 327 MCF. Recovery was 235 feet of salty sulphur water with a trace of oil and 118 feet of salty sulphur water and mud cut 27% oil. Flow pressures were 180 to 305 and 60-minute shutin pressure was 2302.

Another drill stem test would be on the Gulf MacBuffington No. 11. That is in the Southeast Quarter of the Southeast Quarter of Section 13, 25, 37. I picked Blinebry marker No. 2 in this

well at 5,001. Drill Stem test was taken from 5,060 to 5160. Recovery was 200 feet of gas cut mud, no oil or water; flow pressure, 160, 30-minute shutin pressure, 2,050.

Third drill stem test was on the Tidewater Coates C No. 6, which is located in the Northwest Quarter, Northeast Quarter of Section 13, picked Blinebry marker No. 2 at 5,004. Drill stem test was taken from 5,032 to 82; had gas in 13 minutes. I didn't have a report of volume on that. The recovery was 1750 feet of oil and gas cut mud and 1400 feet of heavy oil and gas cut mud. No water. Flow pressure, 95 to 150, 30-minute shutin pressure was 1235.

Q Mr. Ramey, you examined the drill stem test on these three wells. From what you've said, you found water in the No. 13, but you found no water in the other two wells. Even though those wells were completed, were they not in the interval between marker No. 1 and marker No. 2?

A The drill stem tests were taken over that interval.

Q Yes.

A Or within that interval. I also, these were just examples. There were several other drill stem tests, some of which did not cover the whole interval, some would take in the upper portion and then some would take in the lower portion.

Q What conclusion would you reach from observing that phenomena?

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A I would just have to conclude that this water was a local thing just in the area of the Amerada wells. It doesn't seem to be apparent anywhere else in the pool.

Q Mr. Ramey, you testified, I believe, that you found a pressure differential in the Well No. 13. Could you explain that?

A Well, first, these are not unusually high pressures since the original reservoir pressure was around 2400 pounds. This reservoir, for the most part, is a very low permeability reservoir. There is probably very little, if any, vertical permeability and horizontal permeability from well to well, would probably not be too effective because of the characteristic of the pay.

I think both zones have apparently experienced some drainage by offset wells, and I would say that the lower zone has experienced more drainage due to the fact that there are some 43 completions well below what we would term Blinebry marker 1 compared to only six completions in the interval between Blinebry marker No. 2 and 1.

Q Mr. Ramey, a few minutes ago you said that when you first began this study, especially with reference to Well No. 13, you thought that it might be producing from two separate reservoirs. After examining its characteristics a little bit closer in comparison with the field as a whole, what do you think now?

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A Well, I think because of the pay characteristics in this pool, it could very well be possible to perforate two separate stringers in this Blinebry within one well bore and have each stringer perform as a complete, separate reservoir. We have the significance here in the Blinebry where porous stringers appear and disappear. Some of the stringers are probably connected from well to well and some are not. Each of these non-connected stringers could perform as separate reservoirs, but I don't think they could or should be classified as separate reservoirs.

Q Are you indicating, then, that in your opinion there's no porosity across the marker No. 1 in this area?

A Well, in the Amerada well, why there's apparently a dense section between the two producing intervals. However, this is not a dense section in all wells in the pool. Also, I might state that in looking at some of the sample logs, I'm not a geologist, I don't want to try to try to testify as a geologist, but I did note that in some of the sample logs that porosity was from the top of Blinebry marker No. 2 through the complete Blinebry interval.

Q Would you refer, Mr. Ramey, to what has been marked as Commission's Exhibit No. 4 and explain that, if you please?

A Exhibit No. 4 is an acoustic gamma log on the Skelly Oil Company Las Cruces C No. 1. This is a recently completed Blinebry well and is located in the Southwest Quarter of the

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Northeast Quarter of Section 23, 25 South, 37 East. I have transposed on this log, or in the center of the log, in black, Skelly's picks for what they considered to be effective porosity. I think that this log illustrates that there is a porosity development immediately above the Blinebry 1. Marked on this log, which would be Blinebry 2, and this would be Blinebry 1, give or take a few feet. We have pretty good porosity indicated here and pretty good porosity indicated here. There's approximately seven feet of separation between these two good porous intervals.

Q So, at least in that one well you do find porosity existing across the No. 1 marker?

A Well, not necessarily across the marker, but I did find it present immediately below and immediately above. I might point out that on our letter ballot on it, we had set out picks for Blinebry 2, was 4980 and picks of Blinebry 1 as 5118. Amerada, in answer to our letter ballot, pointed out that the interval at 5101, or some 17 feet higher than what we had picked as marker 1, was a good correlative marker in this pool; moving this up 17 feet would immediately split this porous interval.

Q In any event, Mr. Ramey, you wouldn't consider the No. 1 marker a good pick as the top of the pool in this area, would you?

A No, I wouldn't.

Q There's very definitely the possibility of porosity directly above and directly below that marker?

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A Yes, I think porosity could develop anywhere in this pool. It is illustrated that it has to date, porosity will be present in one well that isn't present in another.

Q What is your recommendation, Mr. Ramey, as to the top of the Justis-Blinebry Pool?

A Well, I would concur with the recommendations of Mr. Engbrecht.

Q That is that the top be at marker No. 2?

A At marker 2, right.

Q What basis do you see for establishing marker No. 2 as the top of the Justis-Blinebry Pool?

A Well, for one thing, I think it is a good impermeable barrier and as far as I was able to determine, why it could be the only impermeable barrier. This marker, it is this dirty section, earthy section, is indicated to be impermeable all over the pool. It's readily correlatable over the whole pool. It is present in every log that I have seen, I have been able to pick it and I just think it would make the best top.

Q What other considerations would you take into account in making this recommendation?

A Well, I would like to point to the Westates Carlson B 26 No. 7, which is located in the Northwest Quarter of the Southeast Quarter of Section 26, 25, 37. This well is a dual completion, which is classified as Paddock and Blinebry. The well

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is completed with only 50 feet of vertical separation between the zones. In other words, the base of the Paddock perforations are only 50 feet above the top of the Blinebry perforations. The Paddock zone, or the upper zone, is producing at around 95 barrels of water per day while the lower zone, or what is classified as Blinebry, is producing just a trace of water.

Q In other words, an examination of this well will show that there's a water table in the Paddock just above our marker No. 2, is that correct?

A It indicates as such. There's not much data to go on, but this is a pretty good supply of water and so I think it could be termed a water table.

Q So that would show a separation between what you are recommending as the top of the Blinebry and the formation that's just above it?

A Right. That is true.

Q Are there any other factors that affected your pick as marker No. 2 as the top?

A Well, the majority of the operators have been using this marker No. 2 as the top of the Blinebry and, also, prior to the completion of the Amerada well there were five other wells completed in the interval between marker 2 and No. 1. These wells were classified as Blinebry. To change the classification of these wells at this time would create operational difficulties

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for the operators involved.

Q Mr. Ramey, you heard, I believe, Mr. Engbrecht's recommendation concerning the Wimberly, Amerada's Wimberly Well No. 13 as to an eighteen-month special allowable from the date the allowable was initially granted. Do you concur in that recommendation?

A Yes, I concur in that recommendation. I disagree with his statement that"I think the well would be paid out in eighteen months". I think that with the present producing gas-oil ratio, I doubt if it would be paid out in eighteen months.

Q Where did you obtain the log that's been marked as Exhibit No. 4?

A That was obtained from Skelly Oil Company's offices in Hobbs. I was aware that the well was being completed and I requested the log from them. It is a rush print, it is the only one available. I'm sorry I don't have more for you people.

Q Is there anything further you would like to add to your testimony?

A No, that's all I have.

MR. MORRIS: At this time, Mr. Commissioner, we move the introduction of Commission's Exhibit No. 4. I believe Exhibits Nos. 1 through 3 were offered previously. That concludes the direct examination of this witness.

MR. PORTER: Without objection the exhibit will be admitted. Does anyone have a question of Mr. Ramey? Mr. Bushnell.

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CROSS EXAMINATION

BY MR. BUSHNELL:

Q Mr. Ramey, would you state again the basis for your conclusion as to Amerada's Wimberly No. 13 well, that the two zones to which that well is now perforated are not separated?

A Oh, I think they are separated in that well. I think it would be possible to perforate many stringers in the Blinebry within a well bore, and illustrate no vertical permeability and they could perform as completely--

Q Excuse me.

A -- as completely separate reservoirs. There could be a pressure differential, I mean one stringer could have a wider aerial extent than the other stringer, and the drawdown could be as to that.

Q As to the Well No. 13, it would appear that those two wells are separated?

A Yes.

Q Now, looking across the field, is it not true that there is an existence of a gas cap above the lower interval completed in the No. 13 well?

A Above the lower interval?

Q Yes.

A Yes. I think your Well No. 13 might be perforated, the upper portion might be perforated.

Q Is it your opinion that the gas cap exists throughout the field beyond the limits of Well 13?

A I believe, I think there will be further tests that will establish. Some of this information wasn't available to me. To date I don't think any of the wells have necessarily illustrated there is a gas cap, with the exception of your completion, your upper completion in Well 13, but I did not have information such as cores available to me.

Q Would your answer be that you do not care to answer that question?

A I don't think I would be qualified.

Q If you knew there was a gas cap above the lower interval completed at 13 and below the upper inverval completed in 13, would that change your conclusion?

A I could visualize where this could happen with this type of porosity in this pool. I think you could possibly have several independent gas caps.

Q Let me ask you this --

A You are referring, a gas cap between the intervals producing in your No. 13, are you not?

Q That's right. A Okay.

Q You stated one time in your direct examination that you knew that sample studies indicated permeability throughout this area. I believe that was the word you used.

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A Porosity. If I said permeability, I meant porosity.

Q All right, you were not indicating that there is evidence of vertical permeability in this area, were you?

A No. I made a statement to the contrary, that there's very little vertical permeability.

MR. BUSHNELL: That's all the questions I have.

MR. PORTER: Anyone else have a question of Mr. Ramey?

MR. MORRIS: One question.

MR. PORTER: Mr. Morris.

REDIRECT EXAMINATION

BY MR. MORRIS:

Q Mr. Ramey, Mr. Bushnell just put a question to you asking if you would change your conclusion if you knew of the gas cap existing above the lower perforations in the No. 13. Now, would it be a fair statement to say that you'd change your conclusion only if this were shown to be a pool-wide condition, not just a condition that might exist in one stringer or one localized area?

A From what I have been able to determine, just about anything could happen in here. I wouldn't change my conclusion because one stringer illustrated a gas cap. I wouldn't necessarily conclude that anything below this gas cap should be one reservoir and anything above should be another.

Q You have to consider the pool on a pool-wide basis and

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not look at one localized area to determine what conditions are everywhere, is that correct?

A That's right.

MR. MORRIS: No further questions.

MR. PORTER: Anyone else have a question? The witness may be excused.

(Witness excused.)

MR. PORTER: Mr. Seth.

MR. SETH: We have two witnesses, if the Commission please.

MR. PORTER: Would you have your witnesses come forward and be sworn, please?

(Witnesses sworn.)

J. P. CLARK

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

DIRECT EXAMINATION

BY MR. SETH:

Q Will you state your name, please?

A J. P. Clark.

Q By whom are you employed?

A Employed by Tidewater Oil Company.

Q In what capacity?

A District exploitation geologist for New Mexico and West

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Texas.

Q Have you testified before this Commission at any previous hearing?

A No, sir.

Q Would you give us a brief statement of your educational background?

A I have a Bachelor Degree in geology from Texas Christian University.

Q What has been your experience?

A I have been associated with the company for the past three years full time, for the past thirteen months spent in the Permian Basin.

Q Have you had direct experience with the pool which is the subject of this hearing?

A Yes, sir.

Q Have you made a particular study of it and its characteristics?

A Yes, sir.

MR. SETH: May the witness testify as a geologist?

MR. PORTER: Yes, sir, his qualifications are acceptable.

Q (By Mr. Seth) You heard the testimony of Mr. Engbrecht and would you please refer to the exhibits which are currently posted and give us a brief comment on them and also a brief

background on your views on the geology of this field?

A Yes, sir. In general I wholeheartedly concur with their correlations of the Blinebry marker No. 2 in the Justis Pool. I might say that in 1957 when Tidewater completed the No. 6 C Coates as the discovery well for the multi-pay Justis Pool, that in determining our correlative tops mapable horizons, we have always tended to use clastic breaks in the geologic section. Undoubtedly, the Blinebry marker No. 2 is a clastic break in the geologic section.

Q Do you recommend to the Commission that that be used as the top of the Blinebry for these purposes?

A Yes, sir.

Q In your study of the geology of the field, have you had access to sample logs and to samples?

A Yes, sir.

Q What has been your actual field experience?

A I have sat on several of the wells in the Justis Pool. Tidewater, as of March the 1st, had approximately thirty wells in the Justis Pool. Of course, we had access to all these sample logs. I have seen sample logs of other operators in the field, and we have used these sample logs, as I mentioned previously, for divining a clastic break at the top of the Blinebry section.

Q Do you have a sample log before you now?

A Yes, sir, I do have, I have two.

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MR. SETH: Would you please mark those?

(Whereupon, Tidewater's Exhibits 1 and 2 were marked for identification.)

Q (By Mr. Seth) Refer to what has been marked as Exhibit 1.

A Exhibit 1 is a sample log on the Coates No. 6 C well.

Q What is the well location?

A 1990 from the East line and 1980 from the South line of Section 24, 25 South, 37 East.

Q What does this show?

A This sample log indicates, without a doubt, that there's a definite break in deposition at approximately 5,040. This is structurally a sample pick based on a change in deposition. It is typified by ten to twenty to thirty percent of fine grain, light tan sand, light tan to gray sand.

Q Describe a little more fully how does this log show this break, describe this particular sand for us a little more fully.

A A sample description at 5,000, which is above the Blinebry top, is described as a very fine chrystaline dense brown dolomite. At 5,040, a sand is encountered, the dolomite is a gray-brown dolomite, and we have a very fine grained gray dolomitic sand present.

I would like to say that in some instances where the sand may not be present and a larger percent is found in the other

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wells, the dolomite tends to take on a sandy character. We believe this to be also indicative of a clastic break in section.

Q Would you say this is typical throughout the horizontal limits of the field?

A Yes, sir, of the sample logs that I have looked at, all of Tidewater's and other operators, I have seen this sand present in each and every case.

Q How would you characterize this, would you characterize it as a permeability barrier or change in permeability?

A I think it's definitely to be considered a permeability barrier. It's a change in deposition from a pure dolomite type rock to a sand with some dolomite, or a sandy dolomite.

Q Now, refer to Exhibit No. 2. Tell us what that shows.

A Exhibit No. 2 is a sample log on the Tidewater 19-C Coates, located 990 from the South and East line of Section 24, 25 South, 37 East. Here again, the top of the Blinebry, as we're calling it, marker 2 is typified by the presence of approximately ten to fifteen percent fine, light gray sand. The rocks immediately above the Blinebry marker described as a gray dolomite, tan, brown to gray dolomite. The dolomite immediately below the marker described as a tan to brown dolomite.

Q In the actual examination of the actual samples, is it easy to recognize the top that you have referred to?

A Yes, sir, I think it is a fairly easy sample pick,

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of course, contingent on the quality of your samples. This is very good porosity and with good samples and with diligent searching, an individual is able to locate this sand in each and every case.

Q Do you consider logs of this type to be a useful tool in solving the problem we are confronted with here now?

A Yes.

Q Leaving that for a moment, what about the use of electric logs?

A Well, it's apparent from the cross sections that are on the board here that there's definitely a good log marker, which to me indicates a change in lithology.

Q Would you refer, point it out to us, if you would. You are referring to Commission's Exhibit No. --

A Yes, No. 2.

Q No. 2.

A To me this is very indicative. There's no question that it's a very good marker. The marker carries throughout the field, due to, I think, the sand and shaley section immediately below this low resistivity kick as found on induction electric logs.

Q Does the electric log and your sample logs pretty much confirm each other?

A Yes, sir.

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Q Do you have any other comments on the electric logs?

A No, sir, I don't believe so.

Q Do you have any recommendations to make to the Commission or any conclusions based on your study of the field?

A Well, strictly a conclusion, that Tidewater, speaking for Tidewater, has developed the Justis-Blinebry Pool, that the top was located as approximately 4998, as found in Amerada No. 4 Wimberly.

Now, that 4998 is not the exact top that the Commission is requiring or asking or recommending. It's right here. But, at various times, various people work in the field, the top is moved several times, and I think it's of no importance whether it's at the top of the break or below.

As I have seen, we have developed our properties in the Justis Pool along this line, the majority of the operators have developed their property along this premise, that that is where the top was located, and, in using the Amerada No. 4 Wimberly as a typical log for the Justis Pool, Tidewater would wholeheartedly concur with the Commission's proposed Blinebry top.

Q Do you have any further comments you would like to make?

A No, sir.

MR. SETH: We would like to offer Exhibits 1 and 2. They're the only copies that are available, and, with the permission of the Commission to withdraw them and substitute copies

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as soon as they would be prepared. That's all our direct.

MR. PORTER: Without objection, the exhibits will be admitted. Does anyone have questions of Mr. Clark?

CROSS EXAMINATION

BY MR. BUSHNELL:

Q Mr. Clark, looking to your Exhibits 1 and 2, do the red lines here indicating the word Blinebry 5040 represent the top in this particular well, as you just testified?

A The red line there represents an electrical log top, and I'll also indicate here that the pencil line is the sample log top and, if you'll notice, there may be possibly two feet difference in the sample top pick and the electrical log pick.

Q Which well are you referring to here?

A This well here.

Q What's the name of that well?

A This is the Tidewater No. 19, C Coates.

Q Now, referring to -- which exhibit number is that, Mr. Clark?

A No. 2.

Q Now, referring to Exhibit No. 1, would you point out to me where you picked the top on the basis of this sample log?

A On the basis of the sample log this would have to be picked right on top of the first sand. The first sand encountered.

Q What does the yellow below that marker indicate?

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A Below which marker, sir?

Q The marker that you picked on this log.

A This sand right here, is this what you are referring to?

Q You have picked a marker right here.

A I picked the top of the Blinebry right here. The yellow is indicative of the sand.

Q What does the yellow below that line indicate?

A Well, it could indicate several things. It can indicate a different sand body, it can indicate surging of sand up the hole.

Q Does it indicate the existence of sand?

A Possibly. In looking at sample logs throughout the field, this sand can not be typified as being one hundred feet from the time you top it until the time you go out of it. It varies, thickening and thinning.

MR. BUSHNELL: That's all the questions I have.

MR. PORTER: Anyone else have a question? The witness may be excused.

(Witness excused.)

MR. PORTER: We'll call the next witness.

MR. SETH: We will call Mr. White. We have some exhibits to put up.

(Whereupon, Tidewater's Exhibits 2A, 3 and 4 were marked for identification.)

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ROBERT L. WHITE

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

DIRECT EXAMINATION

BY MR. SETH:

Q State your name and position, please, Mr. White.

A Robert L. White. I'm the district reservoir engineer for Tidewater Oil Company.

Q You have not testified before before this Commission, have you?

A That is correct.

Q Would you tell us your educational background and your experience as an engineer?

A I graduated from Texas Technological College with a degree in petroleum engineering. I have been with Tidewater Oil Company for five years.

Q In your present work, is it part of your duties to consider the field which is the subject of this hearing?

A That's correct, it is.

Q Have you made a study of it prior to this hearing?

A Yes. Yes, I have.

MR. SETH: May he testify as an engineer, Mr. Porter?

MR. PORTER: Yes, sir, his qualifications are accepted.

Q (By Mr. Seth) Would you give us a brief description

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of the general characteristics of the reservoir?

A The reservoir is a fractured reservoir with an average porosity of about 4.9%, permeability that averages around two million millidarcies, and water saturation in the productive zones that average between 35 and 40%.

Q Have you made a study as far as the pressure distributions are concerned?

A I have.

Q Do you have an exhibit there?

A Exhibit 2A is a plot of the bottom hole pressures versus time taken in the individual wells throughout the field. The point to be made out of this is the fact that the Amerada well --

Q Excuse me, Mr. White. Would you describe the makeup of the exhibit? Which way is the pressure and which way is time?

A The pressures are running from the bottom to the top, the left-hand side. The time, starting with 1958, January, '58, running along the bottom, progressing to the right.

Q Go ahead.

A The purpose of the exhibit is to show the relationship between individual bottom hole pressures in the wells throughout the field. On the exhibit we have colored the upper Amerada 13 perforations red and the lower one, lower Amerada 13 perforations a bluegreen.

When the bottom hole pressures were taken and plotted versus

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time, they fell in these two relative positions. The purpose of this is to show that actually neither one of them are abnormal compared to the rest of the field. Had they been perforated any place in the Blinebry interval, they would be expected to fall somewhere in this range.

These, by the way, have been corrected to the datum pressure for the field as carried by the state. So, we conclude from this, from just a plot or just the bottom hole pressure at the time it was taken, that there was no reason to believe that there's a separation between the Amerada well and the rest of the field.

Q And this shows it was generally a wide variation in bottom hole pressures throughout the field?

A That's correct.

Q And the pressures on this particular well are pretty much typical of what you would expect?

A That's correct.

Q Anything else on that exhibit that you would like to tell us about?

A Not on that particular exhibit.

Q Now, go ahead with Exhibit No. 3.

A Exhibit No. 3 we have plotted bottom hole pressure starting with zero at the bottom and progressing upwards from the left-hand side versus cumulative production in thousands of barrels of oil, stock tank barrels, on the bottom progressing from

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left to right.

In this exhibit we were again showing the relationship, attempting to show the relationship between the Amerada 13 pressures and all of the other pressures in the field. At the time the pressure was taken there was substantially no production, so it's plotted on the zero production line, it falls right in the group of nearly all wells that are completed and have an initial pressures run. In other words, here, again, is no particular variation between it and any other well completed in the Blinebry field.

Q This well had a bottom hole pressure that you would be anticipating for any new well drilled in the reservoir, is that right?

A That is correct.

Q Have build up tests been taken, Mr. White?

A Yes, sir. We have at our disposal three build up tests. All three of these build up tests show that there is a very limited drainage radius. All three of them calculated a drainage radius of less than 35 acres. Consequently, we would expect only a very, very little drawdown, if any drawdown, in this Amerada No. 13 Well. I believe the two exhibits demonstrate that fact in apparently that they are not disturbed to any great extent.

Q And this is just a typical Blinebry well, as you see it?

A That's correct.

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Q Have you made a schematic drawing of the number of wells in the field there?

A This is our schematic.

Q You are referring to Exhibit No. 4?

A This is Exhibit No. 4, Tidewater's Exhibit No. 4. These wells have no relation to each other in geography. They are plotted from left to right, starting with the well that penetrated the top, what Tidewater is calling the top of the Blinebry, which the Commission is calling the No. 2 marker.

Q Which is the high end of the section?

A This is the high end, progressing from low to high.

Q The way it's put up there I wasn't sure.

A It's hard to see, there's not actually very much variation in the elevation. The well that found the Blinebry at the lowest subsea interval is on the left, progressing steadily to the right, to where the furthest well on the right is the well that penetrated the No. 2 top at the highest subsea elevation.

Now, the purpose of this particular exhibit is to try to see if there is a continuity across the reservoir with subsea relationship. We have attempted, at one time we made a rather extensive study to attemot to get a porosity correlation, and we could get no correlation between wells according to porosity zones. On the Westates 7 Carlson B 7 in Section 26, 25 South, 37 East, two zones have been perforated, one of them being a true pattern,

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the second zone being the zone in question that lies between the No. 2 top and the No. 1 top. In this particular well, this well is now producing water. It found water initially and is now producing water at approximately a hundred barrels a day rate.

We believe it is, in the opinion of Tidewater, that this is a true water table. Below this is the second set of perforations, and there's no appreciable amount of water being produced from this second set of perforations. Considering that this is a true water table, then this well either is in a separate reservoir if it produces water, or it has to be producing below a water table which is very, very unlikely. In our opinion there is a definite break between the Paddock and this zone in question.

To the right there's, Tidewater is of the opinion that there is a gas-oil contact at minus 1950 subsea. This contact is based on core analysis data, and it is based also on drill stem tests. In this particular portion of the reservoir Amerada has drilled their No. 13, and it's completed in this upper portion. This completed in what we believe is the gas cap. It came in for an extremely high gas-oil ratio well, and it has performed just as we have predicted that it would perform.

Again, there is a Paddock completion that is in the Gulf Buffington No. 5 in Section 13, 25 South, 37 East. This well is not producing at a high gas-oil ratio. Consequently, it can't be just above a gas cap, it must be on a separate reservoir.

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We again feel, based on that, that there is a barrier or break between the Paddock and the zone in question. Therefore, we believe that the zone in question is completely separate from the Paddock. According to producing characteristics, for instance, the Westates Carlson B No. 6 in Section 26, 25 South, 37 East, is completed in this zone in question. As it is presently producing 41 barrels of oil per day, no appreciable water, a gas-oil ratio of a thousand and thirty to one, and a 38 degree API gravity oil. Those are the latest figures as reported in the March issue of the Engineering Committee Reports, Statistical Report.

In the Anderson Prichard, that is what was Anderson Prichard Westates Carlson B No. 5, which is in Section 26, 25 South, 37 East, we are there producing about 40 barrels per day and a gas-oil ratio of 1130 and 40 degrees API and no water, very similar between those two wells. Yet, over in a Westates well, the Westates Carlson B No. 2, 25 South, no, Section 25, 25 South, 37 East, is producing with fairly similar characteristics. All of those are producing with fairly similar characteristics in this zone except the Amerada well is producing with completely different characteristics, which is also in this same zone.

We also produced in the lower zone, many of them produce with identical characteristics as well, found in this upper zone here. Just based strictly on production alone, production

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experience, and the reservoir experience, we can find no reason at all to distinguish between these two zones.

Q And you would recommend to the Commission that the top one be selected as the top of the Blinebry, is that correct?

A That is true, the No. 2 should be, we believe, selected as the top of the Blinebry.

Q Do you have any other comments you would like to make, Mr. White?

A No, I believe that pretty well covers it.

MR. SETH: We would like to offer our Exhibits 2A, 3 and 4, if the Commission please.

MR. WALKER: Without objection, the exhibit will be received.

MR. SETH: That's all the direct we have of this witness.

MR. WALKER: Does anyone have a question of the witness?

CROSS EXAMINATION

BY MR. BUSHNELL:

Q Mr. White, in a field such as this, or in a pool or pools such as this, characterized by low permeability, and one of limestone, isn't it natural that you would find a variation of bottom hole pressures?

A Do you mean just initial bottom hole pressures or do you mean bottom hole pressures as you go along in the line?

Q Initial bottom hole pressures.

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A Initial bottom hole pressures, yes, quite often.

Q On your long white exhibit, which I believe is shown here as No. 3 --

A It should be No. 4.

Q -- No. 4, I note that you have been successful in plotting a line marked as Amerada's top.

A I am sorry, that was done before we knew how it was going to be called, and we had to call it something for our own convenience.

Q Did you use that as a basis of picks from electric logs?

A That has been based on, well, not just electric logs, by electric log you mean logging in general?

Q Yes.

A All reservoir line logs?

Q Yes, isn't it?

A Has been based to a great extent.

Q In contrast to sample logs?

A Actually that has been picked by our geological section.

Q You don't know, then, whether it's picked on sample log or picked on a basis of electric log of one type or another?

A I could not answer that definitely, that is true.

MR. BUSHNELL: That's all the questions I have.

MR. PORTER: Anyone else have any questions of the witness? He may be excused.

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(Witness excused.)

MR. SETH: We have nothing further.

MR. ROSE: Westates Petroleum Company has one witness. I would like to ask, though, if the Commission proposes to permit his complete examination, direct, cross, this afternoon. Do you propose to stay here through another witness?

MR. PORTER: We hope to stay here until we finish the case.

(Witness sworn.)

MR. ROSE: Will you please mark Westates' Exhibits 1 through 5?

(Whereupon, Westates' Exhibits Nos. 1 through 5 were marked for identification.)

DEWEY WATSON

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

DIRECT EXAMINATION

BY MR. ROSE:

Q Please state your name.

A Dewey Watson.

Q Where do you live, Mr. Watson?

A Denver, Colorado.

Q What is your employment?

A Westates Petroleum Company.

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Q What is your title with that company?

A Division engineer.

Q What has your professional education been?

A B. S. degree from the University of Oklahoma in geological engineering.

Q What has been your practical experience since graduating from Oklahoma University?

A I worked in the Jal area of New Mexico and West Texas, Oklahoma.

Q When did you graduate and when did you work there?

A 1950, and I went to Jal in 1950 and have been there for ten years. I worked for Olsen eight and a half years and about a year and a half for El Paso Natural Gas Company.

Q Is your company the operator of any wells that may be affected by the definition of the vertical limits of the Blinebry-Justis Pool?

A Yes.

Q What wells are they and in what 40 acres are they located?

A We have four wells, the Carlson B-26 #5 in the Northeast of the Southeast Quarter of Section 26, the Carlson B-26 #6 in the Southeast of the Southeast of Section 26, and the Carlson B-26 #7 in the Northwest of the Southeast Quarter of Section 26, and all these are 25 South, 37 East.

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Q Are any of these wells dually completed?

A Yes, sir.

Q Which ones?

A All of them. I missed one well, the Carlson B-25 #2 in the Southeast, Southeast Quarter of Section 25.

Q Were these dual completions approved by the Commission?

A Yes, they were.

Q Do you have the dates and the numbers of the orders approving those dual completions? If so, read them into the record.

A The Carlson B-26 #5 was dated March 21, 1960 DC Order 915; the B-26 #6, September 6, 1960, DC Order No. 980; the Carlson B-26 #7, was heard in Santa Fe November 3, 1960, Case No. 2116, and out of that was issued the dual completion Order R-1818.

Q Take each of these wells in turn and state, if you will, from what zones they are producing, from what zones each is producing.

A The B-26 #5 is producing out of what was formerly called the Drinkard and now the Tubb, Drinkard and the Blinebry, the B-26 #6 is Tubb and Blinebry, the B-26 #7 is Blinebry and Paddock, the B-25 #2 is Tubb-Blinebry.

Q Let me go back to this witness's qualifications. I wish to ask him, have you, Mr. Watson, testified before the Commission before?

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A Yes, I have.

MR. ROSE: Are there any questions as to his qualifications?

MR. PORTER: His qualifications are accepted.

Q (By Mr. Rose) Have you made, or had your company made, or had made for it any tests from any of these dually completed wells?

A Yes, they have all been tested.

Q What tests have been made?

A Annual gas-oil ratio and packer leakage tests required.

Q Have you studied the results of those tests?

A Yes, I have.

Q Can you state what they show?

A Starting with the Carlson B-26 #5, the date of the test was 3-5-61, and the Justis-Blinebry zone was 59 oil, gravity 38.9, no water, gas-oil ratio 912 to 1. The Drinkard zone, 51 barrels of oil, 38.3 gravity, 549 barrels of water, gas-oil ratio, 1,118 to 1. The Carlson B-26 #6, the date of the test was 2-26-61, Justis-Blinebry zone, 58 oil, gravity 38.2, trace of water, gas-oil ratio 1130 to 1. The Tubb-Drinkard completion, 59 barrels of oil, 37.8 gravity, no water and 1171 to 1 gas-oil ratio.

The Carlson B-26 #7, undesignated Paddock, 58 oil, 38.5 gravity, 95 barrels of water, a gas-oil ratio of 1,381 to 1.

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That comes out 62% water. The Justis-Blinebry zone, 52 oil, 38.2 gravity, and 3 barrels of water, and I don't have the gas-oil ratio on that particular one.

These are tests filed with the Oil Conservation Commission. I don't have the test on the B-25 #2, but there's no water produced in the Blinebry zone on it.

Q Are those the initial packer tests?

A No, sir. These are the tests that are required one year, each year of the oil dual completions. This would be the second test on the well.

Q In what, did you state the year for which those are?

A Those were all taken in 1961.

Q Do the results of those tests indicate to you, a geological engineer, that the reservoirs are separate or the same?

A Are you talking about the Paddock and the Blinebry?

Q Yes, the reservoirs that are germane to this case.

A Referring to the Carlson B-26 #7, the well makes approximately 62% water from the zone above the Blinebry zone, which only makes about 6% water, or about 3 barrels a day. To me, that means that there is a water table in the Paddock above the Blinebry zone.

Q For that reason you consider them to be separate zones?

A Yes, sir, I would.

Q I've handed you the exhibits marked as Westates proposed

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Exhibits 1 and 2, so marked for identification. Would you state what those are?

A These are copies of the gas analysis.

Q What is No. 1 now?

A No. 1 is a copy of the gas analysis made by El Paso Natural Gas Company on the Paddock gas in the Carlson B-26 #7 Well.

Q What is No. 2?

A No. 2 is a copy of the gas analysis made by El Paso Natural Gas from the Blinebry zone on the Carlson B-26 #7.

Q Would you state what each of those exhibits reflects?

A Well, there's a very marked difference in the quality of the gas in these wells, and I will point out the major differences. The calculated BTU on the No. 1 exhibit, the Paddock zone, is 1107, and on the Exhibit No. 2, the Blinebry zone, it is 1374. The specific gravity of the gas on Exhibit No. 1 is 0.678, and on Exhibit No. 2 it is 0.838. The sulphur content is 15.74 grains on the Exhibit No. 1 and 54.0 on No. 2. The GPN on Exhibit No. 1 is 1.415 and on No. 2 Exhibit it is 4.616.

Now, to me, this means that those gases came from separate reservoirs due to the large differences in each case.

Q Is that your opinion, as a geological engineer?

A Yes, sir.

MR. ROSE: I move the introduction of Westates Exhibits

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1 and 2 in evidence.

MR. PORTER: Without objection, the exhibits will be admitted.

Q (By Mr. Rose) Mr. Watson, has your company had any logs run on any of these wells in the Justis-Blinebry Pool?

A Yes, sir, they have.

Q Do you have any of the logs with you?

A Yes, sir.

Q Are they the ones that have been marked as Exhibits 3, 4 and 5?

A Yes, sir, they are.

Q Will you state which well each of those refers to?

A I do not have a log on the Carlson B-25 #2, there's a log on Carlson B-26 #5, B-26 #6 and B-26 #7.

Q Are those logs the Exhibits 3, 4 and 5 at which you are looking?

A Yes, sir, they are.

Q Who made those logs?

A Schlumberger. They were made at the time of completion of the wells.

Q Have you studied these logs?

A Yes, sir, I have.

Q Is the Blinebry formation included on any of these logs?

A Yes, sir, it is included on all of them.

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Q Have you located the top of the formation as it is shown on any of these logs?

A Yes, sir.

Q On all of them? A On all of them.

Q Have you located the bottom?

A Yes, sir, it is located on all of them there.

Q Can this same top of the Blinebry that you have located be correlated throughout the entire Justis area?

A Yes, sir, it can.

Q How about the bottom, would you say it can be correlated?

A Yes, sir.

Q How do you, as a geological engineer, correlate it from those logs?

A Well, the character of the logs themselves, plus the correlation with the sample analysis on the wells.

Q As to each of these exhibits identified as 3, 4 and 5, what depth did you show on your location as the top of the Blinebry?

A On the No. 3, the top of the Blinebry was 5,035; on Exhibit No. 4 it was 5,037, and on Exhibit No. 5 it was 5,103 feet.

Q Have you located your perforated interval on any of these logs comprising the proposed exhibits identified as Exhibits 3, 4 and 5?

A Yes, sir, all the perforations in both zones are located.

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Q As to each of those three logs, state the interval zone of perforation.

A For expediting this I'll read only the top and the bottom of the perforations rather than all different zones. In Exhibit No. 3, in the Drinkard zone, it's 5880 to 5930; the Blinebry zone, 5,054 to 5,098; in Exhibit No. 4, the Tubb is 5810 to 5820; the Blinebry is 5056 to 5084; in the Exhibit No. 5, the Blinebry perforations are from 5110 to 5162, the Paddock perforations are 5041 to 5060.

I would like to point out here that the top marked on these logs is approximately six or seven feet above the top picked by the Commission.

Q The Blinebry interval is relatively the same, then, as to each of these three wells?

A Yes, sir, it is.

MR. ROSE: I move the introduction of Westates Exhibits identified as 3, 4 and 5, in evidence.

MR. PORTER: Without objection the exhibits will be admitted.

Q Mr. Watson, you have heard the testimony of the two Commission's witnesses this afternoon in this case, I believe?

A Yes, sir, I did.

Q From your logs, Mr. Watson, and from the other tests you described, have you, as a geological engineer, formed an

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opinion as to whether you agree or disagree with the depth of the upper and lower limits of the Blinebry proposed by those two Commission witnesses?

A Yes, sir, I have. I agree with the Commission's indicated upper and lower limits of the Blinebry producing zone, and I think the amount of fluid and the quality of gas produced from Westates Carlson B-26 #7 would clearly indicate that there is a separate reservoir in each, the Blinebry and the Paddock.

The top of the formation, as designated by the Commission, is clearly, can be clearly correlated from both sample tops and logs in the Justis area, and it's a logical and desirable top.

Q Is there anything else which you wish to cover?

A I believe that's all.

MR. ROSE: May I borrow from the Commission the Commission's file in Case 2116? Will you mark for identification Westates Exhibits 1, 6 and 7?

(Whereupon, Westates Exhibits No. 6 and 7 were marked for identification.)

MR. ROSE: If it please the Commission, I move the introduction of Westates proposed exhibits identified as No. 6, which is the transcript of the hearing in Case No. 2116 heard by Examiner Utz on November 2, 1960, and Exhibit No. 7, which is Order No. R-1818 issued out of that case also on November 2nd, 1960. In moving the introduction of these proposed exhibits

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which come from the Commission's original file in that case, I would like permission, if they're received in evidence, to withdraw them for return to the original file on substituting copies thereof in the record in this case. I offer those exhibits in evidence.

MR. PORTER: Mr. Rose, would you like to move for introduction of the entire case and incorporate it into this case and then it wouldn't be necessary to confuse the two case files?

MR. ROSE: These reproductions would be rather simple. Yes, I will so move. By the way, the proposed introduction of the order would most probably be by asking the Commission to take judicial notice of it. We will introduce the entire case file and we will produce the number of copies if received.

MR. PORTER: Are there any objections?

MR. BUSHNELL: No objection.

MR. PORTER: The case file in Case 2116 will be incorporated in this case.

MR. ROSE: I have completed the direct examination of this witness.

MR. PORTER: Any questions? Mr. Bushnell.

CROSS EXAMINATION

BY MR. BUSHNELL:

Q Mr. Watson --

A Yes, sir.

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Q -- so far as your conclusions about separation of producing zones that you've testified to here, you are only referring to the two zones completed in your Westates No. 7 Carlson B-26, is that correct?

A Yes, sir.

Q And you are concluding that there's separation between two producing zones, one above and one below the No. 2 marker on the Commission's exhibit?

A Yes, sir.

Q In the course of your setting out the markers on these exhibits, which cover your three electric logs, did you use as additional source information any sample logs?

A I did not pick those tops. Those were picked by Mr. Charlie Miller on the original completions.

Q They were picked solely on the information based solely from the electric logs offered?

A Mr. Miller actually picked the tops and I plotted them on the logs as he picked them. He correlated his samples with the log and both were used.

Q Both were used? A Yes.

Q You don't have the sample logs here with you?

A No, sir, I do not.

MR. BUSHNELL: That's all the questions I have.

MR. PORTER: Anyone else have a question?

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MR. ROSE: No further questions.

MR. PORTER: The witness may be excused.

(Witness excused.)

MR. ROSE: That's the only witness that Westates Petroleum Company will offer.

MR. PORTER: Anybody else desire to present testimony?

MR. WHITE: Charles White, Union Texas Natural Gas. We had one exhibit which we thought that we might introduce. In that connection I rather hesitate to commit that we only had one exhibit, because everyone else had four or five. We proposed introducing this exhibit for the sole purpose of attempting to prove that the porosity stringers in the Blinebry come and go as between wells and that it's rather difficult to trace them.

In that connection, our testimony will merely corroborate the testimony of Mr. Ramey, in particular, when he indicated in his testimony that those porosity stringers are rather difficult to correlate. In the interest of saving time, we will not introduce that exhibit, but I would like to make a statement at the conclusion of the case.

MR. PORTER: Sure, Mr. White. Anyone else?

MR. BUSHNELL: I have two witnesses to be sworn.

(Witnesses sworn.)

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

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ORVILLE E. PHELPS

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

DIRECT EXAMINATION

BY MR. BUSHNELL:

Q Would you state your name, company for which you are employed?

A Orville E. Phelps, Amerada Petroleum Company, Tulsa, Oklahoma.

Q In what capacity?

A Geologist.

Q Have you testified as a geologist in prior hearings before this Commission?

A Yes, I have.

Q Mr. Phelps, in the course of making a study of the matter of this hearing today, have you been acquainted with this field for several years professionally?

A Yes, I have.

Q You heard the testimony of the geologist on behalf of the Commission recommend that the top of the Blinebry should be at that point which he called marker No. 2 on his exhibit. Do you agree?

A No, I do not.

Q Why?

A Because that does not represent the top of the Blinebry formation.

Q Where do you place the top of the Blinebry as encountered in Amerada's Wimberly No. 4 Well?

A It is encountered in the Amerada Wimberly No. 4, the top of the Blinebry would be at 5101 depth, a minus datum of 2,022.

Q Why do you set it there?

A Because that is the top of the Blinebry formation.

Q What do you define as the Blinebry?

A The Blinebry formation is that portion of the permian section starting at the base of the clastic section below the base of the San Andres and going down to the top of the Tubb section consisting of a carbonate section.

Q What is its characteristic?

A Its characteristic of the Blinebry is going into the top clean carbonate section.

Q I would like to have you go up to the Exhibit No. 1 hanging on the board and I would like to ask that the small exhibits be distributed. These small exhibits are one-third scale. In the course of preparing your testimony, approximately how many electric logs have you examined from wells in this pool?

A The total number of wells in the pool has been 98 that I have examined.

Q How many sample logs have you examined?

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I have examined ten sample logs that have penetrated the Blinebry formation.

Q Now, I refer to what is marked as Amerada's Exhibit No. 1 which is uncommonly known as a monlague, containing five separate exhibits. The first exhibit I refer to is the so-called location map, which is merely put on there as a reference to show the relationship of location of this field in the State of New Mexico in Lea County in particular. I refer next to the contour map on the left side of this Exhibit No. 1 and ask you, is that on the top of the Blinebry marker as you have set it?

A Yes, it is.

Q What do the green circled wells mean?

A The wells colored green indicate those wells producing from the Blinebry formation below the top, as we have picked it to contour this map.

Q And what do the red arrows pointing to wells indicate?

A The red arrows indicate the wells that are producing from the formation above the top of the Blinebry.

Q Now, referring to the right of the contour map is what is marked as portion of electric log showing lithology of the Justis area entitled "Amerada No. 4 Wimberly". As I understand it, you used this electric and a sample log from this section because that is the well that we understood the Commission was going to use as a basis for defining the vertical limits, is

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that correct?

A That is correct.

Q Does the colored vertical line or column in blue substantially represent a portion of a sample log from that well?

A Yes, sir, it does.

Q Would you explain to the Commission what those different colors mean and how you interpret it when you see them in that log?

A Well, here we use the yellow to indicate a sand or silty clastic section, using purple to indicate anhydrite present in the formation. The blue indicates the dolomite, and where we use the blue and the purple, that indicates that we have an anhydritic dolomite. Where we use the yellow and the blue it indicates sandy dolomite, where we use the yellow with the blue in the middle and then more blue, the first part is a dolomitic sand and also dolomites present. And, again, below that we have anhydritic dolomites consisting of the blue and purple and the yellow and the blue, indicating a sandy dolomite. We have a small zone there of dolomite only, and immediately below that is a sandy dolomite. Below this green line we go back into a carbonate section consisting of anhydritic dolomites.

Q What general conclusion do you draw about this interval from your interpretation of that sample log?

A Well, the conclusions from this sample log would indicate that you have separate geological units present here.

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Q How many?

A Well, this shows to have three, from the red line up would be one unit, from the red line down to the green line would represent another geological unit, and from the green line down would indicate another geological unit, indicating that at the time of deposition there had to be different environmental conditions to deposit a section of this type.

Q What does the red line represent?

A The red line represents the top of the Glorieta..

Q That happens to be the marker that the Commission has used in prior orders for defining the top of the Justis Gas Pool, the top of the Glorieta,. I'm sorry.

A That's correct.

Q What does the green line represent?

A The green line represents the top of the Blinebry formation.

Q As you have picked it in this well?

A Yes.

Q Now, you've carried this red and green line for purposes of convenience of those looking at this exhibit, across the field on the two cross sections A and A^1, B and B^1 as containing the balance of this exhibit, is that right?

A Yes, it is.

Q That has been cross referenced over showing your

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location of these cross sections on your contour map?

A Yes.

Q Did you use the sample log as a basis for picking the top of your green line representing your pick of the top of the Blinebry?

A Yes, we did.

Q Did you correlate that into the No. 4 electric log, that's the Wimberly No. 4?

A Yes, we did.

Q What does that electric log show?

A Well, the electric log shows at this break that you did have a change in character as indicated on all logs that's shown in this cross section.

Q In other words, the No. 4 log, electric log, supports the conclusion that you make with reference to the interpretation of the sample log of that well?

A Yes, it does.

Q Do you find the same thing true as to those logs shown on your two cross sections?

A Yes.

Q Have you correlated the marker from the electric log in the No. 4 to the other wells in this pool for the purpose of preparing your contour map?

A Yes, I have.

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Q You have also done so for the purpose of preparing your two cross sections, is that correct?

A That is correct.

Q And did you readily find a marker once you were able to pick it off your sample log of your No. 4 well?

A Yes.

Q Is it your opinion that you could pick a correlated marker with this only off sample logs and be assured that you are picking a marker that represents the top of a separate geological unit?

A Would you give me that again?

Q Yes. I will ask that question again. I found I made a mistake. Is it your opinion, that based on knowledge of electric logs only, that you could pick a marker correlated across the field which would necessarily represent the top of a separate geological unit?

A No.

Q Is it your opinion that you have to have a sample log as a starter to pick a marker representing the top of a separate geological unit?

A Yes.

Q Is it your opinion that the marker you have picked in the Amerada Wimberly No. 4 Well represents the top of the Blinebry as a separate geological unit?

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A Yes, it is.

Q And does it conform with your definition of the Blinebry geological unit?

A Yes.

Q Would you state again for the record what is that marker in the No. 4 Well?

A That marker is the basis of the clastic section going from the sandy dolomite into anhydritic dolomite at the point 5101 in the No. 4 Wimberly.

Q Would it be consistent if the Commission were to pick the top of the Blinebry on the basis of your marker, which represents the top of a separate geological unit, when the Commission has already picked the top of the Glorieta as a basis for defining the separate zone?

A Yes.

MR. BUSHNELL: That's all the questions I have of this witness on direct.

MR. PORTER: Any questions of Mr. Phelps?

MR. MORRIS: Yes, sir. Just a minute, please.

MR. ROSE: I have one question.

MR. PORTER: Mr. Rose.

CROSS EXAMINATION

BY MR. ROSE:

Q I don't believe it's clear to me what you used in

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making your pick for the top of the Blinebry. Will you tell me?

A Yes, we picked the top of the Blinebry at the base of the clastic section in this zone that starts in below the base of the San Andres section. There's an interval there of four to five hundred feet consisting of carbonates and clastics; the base of this clastic section is the top of the Blinebry.

Q What did you use to correlate this point that's marked by the green marker in the Pan American No. 6 Well on your exhibit?

A Could you give me the location of that, please?

Q On the exhibit, the one at the lower right-hand.

A Yes, I have it here in the Southwest, Southwest of Section 30. The electric log that we have available was used to pick that top, correlating from other logs over the top.

Q Is it a good correlation, in your opinion?

A Yes, it is.

MR. ROSE: That's all.

MR. PORTER: Mr. Morris.

BY MR. MORRIS:

Q Mr. Phelps, referring to what we have referred to as the marker No. 2, do you find that to be a good correlative point across this field?

A Yes.

Q Do you also find it to be a lithological break, as you have said that you found the marker No. 1 to be?

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A Yes, it is a break in lithology.

Q It would be a break, be the first break in lithology that you would find moving down from the top of the Glorieta?

A No, it would not be the first break from the top of the Glorieta.

Q Would it be the first significant break that you would find?

A Well, what do you mean by significant, whether it's clastic or carbonate?

Q Well, that's a word without definition. Would it be one of the significant breaks, then, that you would find?

A It would be one of the significant breaks, but there's other significant breaks above that point that's encountered below the top of the Glorieta.

Q Would you repeat why you thought your marker No. 1 represented a greater lithological break than say from marker No. 2?

A Yes. The No. 1, you are referring to as the top of the Blinebry, as I have picked it on my exhibit?

Q Yes.

A At that point you are going from one geological unit into another and at break No. 2, that you referred to from the exhibit of Mr. Engbrecht, you are within a geological unit there, you are picking the top within a geological unit, not going from one to another.

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Q Would it be possible for one geologist to interpret the top of one unit in different ways in this area, though?

A Yes, it would.

Q Do you think that it would be possible, Mr. Phelps, for porosity to extend through marker No. 1 in this area?

A Would it be possible?

Q Yes. A Yes.

Q Do you have indications that it does in some places?

A To my knowledge, I don't have that information.

Q I'm not referring just to the Well No. 4 but throughout the pool, have you found instances where there are areas of porosity directly above and directly below your marker No. 1?

A No, sir, I have not. I have not made a study of that.

Q Mr. Phelps, why, in your opinion, would other operators in this pool use marker No. 2 as the top of the Blinebry and as a good correlative point?

MR. BUSHNELL: I don't know if this witness is qualified to answer why the other operators would.

MR. MORRIS: I will withdraw the question, Mr. Bushnell. I think that's all the questions we have.

MR. PORTER: Anyone else have a question? Mr. Bratton.

MR. BRATTON: Howard Bratton, for Atlantic.

BY MR. BRATTON:

Q Mr. Phelps, referring to your Exhibit No. 1, I am not

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sure what a montague is and I am certainly not sure what a clastic break is, but referring to the red line and the green line, the red line is the top of the Glorieta, is that correct?

A That is correct.

Q As I take it, that is picked on the top of the sand there, is that correct?

A Well, it's picked on the top of a clastic section, which here is a sandy dolomite.

Q All right. Down here your top of the Blinebry, you have not picked where you go into the top of the sand, instead you have picked where you go into the anhydritic dolomite, is that correct?

A That is correct.

Q The carbonate where the sand goes to carbon in this case?

A That is correct.

Q Above where the Commission has picked their point No. 2, that is the top of the sand section, is that correct?

A Yes, that is correct.

Q So, if you picked that point, that would be consistent with what you picked for the top of the Glorieta going into the sand?

A Yes.

Q And, if you picked the Commission point No. 2, that would be going into the top of the sand?

A Yes.

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Q Actually, the Commission's point No. 2, the one that they recommend, is the first non-conformity below the top of the Glorieta, is it not?

A No, sir, it is not. You have a sandy dolomite here, you go back into a clean carbonate section consisting of an anhydritic dolomite and back into another sandy dolomite and back into an anhydritic dolomite and again a sandy dolomite.

Q Let me put it this way, I don't understand the sample logs, but as I understand it, you can plot them either percentage-wise or you can plot them strictly interpretive?

A Yes, sir, you can.

Q How is this one plotted?

A This is a percentage type log.

Q Is it true that the Commission's point No. 2 is the first, what I would call the first major non-conformity below the top of the Glorieta?

A No, sir, I wouldn't say that. In my way of thinking the major conformity here, you are going from a carbonate clastic section to a carbonate section, and you go back into another carbonate clastic that is a major carried upon a clastic carbonate compared to a carbonate section. You have that condition existing within the zone from the red line down to the green line.

Q Do I understand correctly you have studied, I think, some 98 wells?

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A Yes, I have.

Q Can the Commission point No. 2 be readily picked in the wells that you have examined?

A Yes, it can.

Q Throughout the entire field?

A Yes.

Q Is your second sand below the top of the Glorieta present in all of the wells that you have examined?

A I've only examined the sample log of the wells that Amerada has drilled.

Q I believe that was ten?

A To the best of my knowledge, it is present in the wells that I have had opportunity to examine the sample logs.

Q To the best of your recollection at this point?

A Yes.

MR. PORTER: Any further questions of the witness? Mr. Bushnell, did you offer your exhibit?

MR. BUSHNELL: I offer Exhibit No. 1.

REDIRECT EXAMINATION

BY MR. BUSHNELL:

Q Was this prepared by you or under your supervision?

A Yes, it was.

MR. BUSHNELL: I would like to offer it into the record.

MR. PORTER: If no further questions, the witness

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may be excused.

(Whereupon, Amerada's Exhibit No. 2 was marked for identification.)

O. C. McBRYDE

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

DIRECT EXAMINATION

BY MR. BUSHNELL:

Q Would you state your name and the company for which you are employed?

A I am O. C. McBryde, Jr., employed as petroleum engineer with Amerada Petroleum Corporation in Tulsa, Oklahoma.

Q Have you testified before this Commission in that capacity in prior hearings and had your qualifications so accepted as an expert witness?

A Yes, I have.

Q Mr. McBryde, you are acquainted with the marker known as the marker No. 2 which the geologist on behalf of the Commission Staff testified to, is that correct?

A Are you referring to the top that Amerada picks at the top of the Blinebry?

Q No, are you acquainted with the marker that the Commission Staff has recommended as marker No. 2?

A Yes, I saw the exhibits.

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Q What will be the effect, in your opinion, if the Commission were to adopt that as the marker for the top of the Blinebry?

A If the upper marker, or marker No. 2, is selected as the top of the Blinebry, it will place two separate pools in one pool.

Q Now, what will be the effect, in your opinion, if the Commission were to adopt as the vertical limits of the Blinebry, the marker as recommended by Amerada's Mr. Phelps?

A If the marker, as recommended by the previous witness, is selected as the correct top of the Blinebry, we will recognize the condition that exists in the Justis area and create these two separate pools.

Q In other words, Amerada's recommendation of the marker picked in Amerada's Wimberly No. 4 Well is, in your opinion, in recognition that there are two separate pools, is that correct?

A That is correct.

Q Now, am I correct that Amerada is not taking any position in this case with reference to whether there is separation of producing horizons between what the Commission calls as marker No. 2?

A That is correct. We are testifying as to the separation between the interval that is completed in six wells above the top of the Blinebry and the other wells completed below the top of the Blinebry.

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Q And the two intervals of production to which your conclusions of separation apply is applicable to the line more similarly located on the Commission's Exhibit, which is known as marker No. 1, is that correct?

A Yes.

Q May I ask you to go to the map, while doing so I ask that the small reproductions be handed out. Was this Exhibit No. 2 prepared by you and by others under your supervision?

A Yes, it was.

Q This, again, as an exhibit which you could refer to as a montague, is that right?

A That is correct.

Q But, in any event, for identification purposes for the record, it contains four exhibits, including a contour map, a portion of the log from the Amerada No. 13 Wimberly, and below that a chart and then to the right two cross sections?

A That's correct.

Q Now, the contour map and the two cross sections are basically the same information that were contained on Exhibit No. 1, is that correct?

A The contour map is precisely the same as contained on Exhibit No. 1, the two cross sections contain the same wells and the same logs, but with additional information added.

Q Now, referring first to the contour map, and referring

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particularly to the green wells and those wells designated by a red arrow, would you state for the benefit of the Commission, briefly, a little history of the development of this field?

A Yes. I would like to repeat what the previous witness testified to, that the green circles represent wells completed below the top of the Blinebry as Amerada recognizes it. The red arrows point to six wells that are presently completed above that marker, the first Blinebry well, and I will refer to the Blinebry wells as those below the green marker, the first Blinebry well was completed in Section 13.

I believe it was the Gulf MacBuffington No. 6 and was completed early in 1958. Later in the same year the second well in the Blinebry reservoir was completed, which was the Gulf MacBuffington No. 4, which was in the same section. There was no further development in the Blinebry reservoir for the remainder of 1958. Early in 1959 Gulf completed two more Blinebry wells, but these were on the opposite end of the field in the far south end, one on the Gulf Vincent Lease and the other on the Gulf Ramsey F Lease, which are both in Section 36.

During 1959 the development of this Blinebry reservoir continued until toward the end of 1959 there were approximately 20 Blinebry oil wells, and the field was essentially defined as shown on this contour map. Late in 1959, the first well in this zone above the Blinebry marker was completed, which was the

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Westates Carlson Federal B-25 #2, which is shown in the Southeast Quarter of the Southeast Quarter of Section 25 on the map. Both the Blinebry reservoir and this upper reservoir were developed further during the remainder of 1959 and 1960, until at the present time there are forty-six Blinebry completions and six undesignated completions.

Q During the course --

A Let me point out one additional thing.

Q Excuse me.

A At one time there had been forty-seven Blinebry wells completed, but the Gulf MacBuffington No. 4, which was the second well completed in the field in the Southeast of the Southwest of Section 13, was abandoned sometime late in 1959 because it went to high gas-oil ratio.

Q During the course of the development, Amerada drilled its Wimberly No. 13 Well, is that correct?

A It was drilled late in 1960, that's correct.

Q In the course of drilling this well, two zones were encountered as shown by the second exhibit, the one immediately to the right of the contour map. Would you explain that exhibit?

A The upper portion of this exhibit is a portion of the Wimberly No. 13 log. It shows the top of the Blinebry with a green line through it. It shows the producing interval above the top of the Blinebry, which I'll refer to as the undesignated

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producing interval, it shows in green the interval producing from the Blinebry reservoir, which goes from 5318 down to 5450. I've also shown on this log the approximate gas-oil contact in the Blinebry reservoir of minus 2100 feet.

Q How many foot interval is there between the base of the red zone and the top of the producing interval, the green zone?

A From the base of the undesignated producing interval, which is shown in red, to the top of the Blinebry producing interval, which is shown in green, is a distance of some 261 feet.

Q Now, the green horizontal line is the marker which Amerada recommends as the pick, is that correct?

A That's correct.

Q The correlated marker. Is it your opinion that these two sources shown, the red and the green, are separated?

A Yes.

Q What do you base that conclusion on?

A Well, a number of things. The first evidence is a separation test, if you will, that we ran in Wimberly No. 13 shortly after the well was completed on January the 16th.

Q You are now referring to the chart at the bottom of this Wimberly No. 13 log.

A Yes, I am referring to the chart characterized by the red and green lines at the bottom of the portion of the Wimberly 13 log. This chart shows the results of a pressure test, or

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separation test, that we conducted in Wimberly 13 in January of this year. The line that is marked in red represents the bottom hole pressure at a minus 2300 feet in the undesignated completion, which, as you recall, is indicated in red on the log of Wimberly 13.

Further, the green line represents the bottom hole pressure in the Blinebry producing interval as indicated on the log in green. On January the 16th of this year, the undesignated completion had been shut in for a total of 624 hours, after which time the bottom hole pressure had increased to 2343 PSI. At that time we opened the well on a 26-64 inch choke and flowed it for thirty hours, during which period the well produced 211 barrels of oil.

On the day of January the 17th, the undesignated interval was closed in and allowed to build up for an additional 65 hours, after which time the bottom hole pressure had increased to 2303 PSI. Now, during the time that the undesignated interval was first closed in and then opened and then closed in again, the Blinebry interval remained closed in for the entire period.

On January the 16th, which was the day that the undesignated interval was opened, the Blinebry interval had been shut in for a total of 120 hours, the pressure was 2165 PSI. It remained shut in during the entire time that the upper completion was produced and we found that it was shut in after the producing period, and the pressure in the Blinebry interval continued to

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increase until after 216 hours shut in, it was 2,211 PSI. This, to me, shows rather significant lack of communication between these two completions.

Q Now, do you have any evidence that these two zones are separated throughout the field?

A Yes, I would like to refer to the two cross sections which are on the right-hand side of the exhibit. The first cross section A-A^{1}, which, as shown on the map, is a west-east cross section through Wimberly 13 and Wimberly 4. Now, Wimberly 13 log also appears here in reduced scale. On these cross sections I have indicated, as the previous witness did, the top of the Glorieta in red, the top of the Blinebry in green, and further I have shown in red those wells that have been completed in this undesignated interval.

Notice that Wimberly 13 is completed there, which is the only well on the upper cross section. On the lower cross section, which is also a west-east cross section through a line a little south of the upper one, there are three wells which are completed in this undesignated producing interval, the first two on the left-hand side of the cross section and the next to the last one as shown by the red interval here.

I've also shown the Blinebry producing intervals on the wells that produced from the Blinebry, on these cross sections they're shown in green, the first two wells on the upper cross section,

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and then two more on the upper and then I think there are two on the lower cross section.

Q Now, referring first to your approximate gas-oil contact line at minus 2100 feet, what conclusion do you reach with reference to that exhibit information?

A I have shown this approximate gas-oil contact as being at minus 2100 feet. Actually, there's some question it might actually be lower than that, but I've taken the pessimistic attitude here and shown it as high as I think it possibly could be. If you will note Amerada's Wimberly No. 13 log, which is the second one from the left on the upper cross section, it shows Wimberly 13, producing from an interval considerably above the approximate gas-oil contact in the Blinebry reservoir.

Now, the first test submitted on this well did show a high gas-oil ratio. I think one of the previous witnesses testified to the existence of a gas-oil contact in this interval. I will agree with that. In fact, I pick it right close to where he picks it, I think he had it at minus 1950. I picked it at 1965, but I don't think that's enough difference to be significant.

We have perforated our well, both above and below that gas-oil contact, which is the reason for its high gas-oil ratio. I might add that since the time of that first test we have experimented with the well and have, by intermitting and stopcocking, have reduced the gas-oil ratio to about 2800, and this test

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has been submitted to the Commission.

Q Is it your opinion that there is a gas cap throughout the field?

A Yes.

Q Underlying the green marker?

A Yes. I think very definitely there is a gas cap. One indication that there is, I picked it here, as I said, at minus 2100 feet, all of these 47 wells that have ever been completed in the Blinebry, except two have been perforated below this minus 2100 feet and are now producing from below there. Of course, some of them have started to show increasing gas-oil ratios because of proximity to this large gas cap.

Q What conclusion do you reach with reference to that information as to the separation across this field between these two zones?

A Could I talk for a mirute about this lower cross section? I want to point out the thinning, the conditions down there, the approximate gas-oil contact minus 2100 feet and its relationship to the three wells that are completed above the top of the Blinebry on the cross section. The Westates Carlson B-26 #7 is producing from the undesignated producing interval and also the Paddock. If we extend this minus 2100 feet line across, it will probably intersect this producing interval here in the Westates Carlson B-26 #7.

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Under the log I have shown some data that I copied out of the March proration schedule, which showed the lower completion in this Westates #7 well to have a top daily allowable of 47 with a gas-oil ratio of 588. So, certainly if it was in the same reservoir with these wells down here, it should at least start exhibiting a little higher gas-oil ratio. In like manner, the next well on the cross section, which is the Westates B-26 #5, as I think you can see rather easily, is perforated considerably above this gas-oil contact.

The March schedule showed a similar low ratio, 645 in this case. The Anderson Prichard No. 5 Carlson A, which is the next to the last log on the bottom cross section, you can see that the completion interval is considerably above the gas-oil contact in the Blinebry reservoir. It does have a little higher gas-oil ratio than the other wells, but there is a gas cap in this other producing interval also.

Based on this evidence, I would say that it is rather clear that we are dealing with two separate reservoirs here.

Q And that it is your opinion that these two separate reservoirs exist throughout the field and beyond the limits of the No. 13 Well?

A Yes, sir. I might add one further item here. About the time this well was completed, or slightly before, we installed a central tank battery on our lease in which we commingled

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through meters all the oil from not only the Blinebry, but the Fussleman, the Drinkard, Tubb-Drinkard and so on. We attempted, after we completed Wimberly 13, to run this oil from these two completions through the same commingling setup and sell it with our LACT unit well. The pipeline company that purhcases our oil has declared the oil from the Blinebry producing interval to be sweet and they allow us to send it through our commingling setup and sell it to the LACT unit.

On the other hand, they have declared the oil from the undesignated producing interval to be sour and have refused to allow us to sell it through the LACT unit and commingle it with the other sweet oil on the lease. In fact, they have laid a pipeline from the sour oil line in the vicinity of this lease over to a tank that we've had to set out aside separately to handle the oil that's produced from this undesignated producing interval in our Wimberly 13.

Q You also agree with Mr. Ramey that there's a difference of gravity of the two oils?

A Yes, sir, the upper interval in our Wimberly 13 undesignated interval currently has a gravity of about 45 degrees. I think the last run ticket I saw on that it was 45. The Blinebry is slightly above 40, the run tickets I saw for the last month that we had records in Tulsa, I think five tanks had gravity between 40 and 41 and one had gravity about 39 something.

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Q Is it your opinion that this knowledge gives you further basis for your conclusion that these two producing horizons that are now being dually produced from the No. 13 well are separate not only as to that well, but throughout the field?

A Well, it certainly doesn't detract from our position.

Q It is your position that the recommendation of the Commission that if they will set the marker where recommended by Amerada, that it will be a recognition of the separation of those two zones?

A That is correct.

MR. BUSHNELL: That's all the questions I have of this witness on direct.

MR. PORTER: Are you going to offer your exhibit?

MR. BUSHNELL: I would like to offer Amerada's Exhibit No. 2.

MR. PORTER: Amerada's Exhibit No. 2 will be admitted. Any questions?

MR. MORRIS: Yes.

MR. PORTER: Mr. Morris.

CROSS EXAMINATION

BY MR. MORRIS:

Q Mr. McBryde, do you think that we've got two separate reservoirs here and there's a possibility that there might be many more reservoirs amounting to a lot of stringers in this area?

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A No, I don't think so, Mr. Morris. The performance of all of these 46 Blinebry wells that I mentioned has been very similar. I have seen the results of one pressure survey in the field and, of course, the pressures are different, as you would expect in a tight limestone reservoir like the Justis-Blinebry reservoir. However, there was a pattern there, the high pressures were generally in the middle, as you might expect, with their being closer to this gas cap.

The lower pressures were generally on the edges of the pool. There was a definite recognizable pattern. Similarly, the gas-oil ratio performance of these wells is very similar, there's nothing that I have seen to indicate that we're dealing with anything but one common source below the green line on my exhibit.

Q You didn't find the anomalous conditions that Mr. Ramey testified to?

A Oh, on the contrary, I think that very certainly the porosity is scattered in this reservoir and in the one above it and in the one below it. That is a fact that I think everybody recognizes. Nevertheless, it still doesn't prove to me that we're not dealing with something that is in communication even though it might be slow.

Q Mr. McBryde, have you examined the characteristics in most of the wells in this pool in making your study? In particular I am wondering if you have examined the characteristics of

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Western Natural Gas Well No. 6.

A I have looked at the drill stem tests, as I recall, I believe that's the lease immediately north of our Wimberly lease.

Q Yes, it's a Wimberly lease also.

A Yes.

Q If I'm not mistaken, I understand that this well that I have referred to is completed some 200 feet below your Wimberly No. 13 and yet it shows a GOR of, in excess of 20,000 to 1. Could you explain this anomaly, why would you find a gas-oil ratio of that magnitude at a depth of 200 feet lower than completion in your Wimberly No. 13?

A I could attempt to explain it, Mr. Morris, if I may. During the course of our development of our lease we tested our Wimberly No. 5, which you will find in the Northeast Quarter of the Northwest Quarter of Section 25. We perforated probably every zone of porosity in the Blinebry.

Q May I interrupt you, I may have misstated the question just a little bit. I mean that this well that I have referred to is some 200 feet below the gas-oil contact that you have picked here.

A Yes, if you don't mind, I would like to get it to you.

Q Go ahead.

A However, we perforated most of the zones here, I might add that we did it without the knowledge of a gas-oil contact

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at that time, and found gas in all the sands, but we didn't believe that that was conclusive at all, because during the course of our testing we had very definite indications that the cement bond behind the pipe was not holding and that would be one possible explanation for their abnormally high gas-oil ratio communication behind the pipe. I would believe that that is probably what's causing it in this case.

Q Do you think it might also be possible that you have a localized situation and an anomaly existing in that well?

A Well, I haven't seen the results of the test on that well. I do have most of the tests that were submitted to the Commission last week. I believe at the time we picked those up that one was not in yet. It's -- I don't know how much oil it made on the test or how much gas. It's possible that it might have made a small amount of oil, and a small amount of gas, but the gas-oil ratio could have calculated it to be 20,000.

Q You may have heard Mr. Ramey's testimony that on a drill stem test in your No. 13 water was found and yet in the Gulf MacBuffington No. 11 and the Tidewater Coates C-6 there was no water found in the same area and he could not find a way to explain that anomaly. I am wondering if you could have any explanation for it?

A I heard Mr. Ramey's testimony but I don't remember the depths that he was referring to.

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Q He was referring to the depth just above the, what we've referred to as marker No. 1.

A Which is, yes. Well, it's possible that there would be water in some stringers in there, certainly we have evidence of it. I don't see how that could do anything but help prove that there is separation between this Blinebry reservoir and the upper interval, however.

Q It might tend to prove that in the Wimberly No. 13, but the absence of it in the other wells would tend to show that you had a localized condition in your No. 13, would it not?

A I don't know the subsea depths of the drill stem test on the other well. It could be above the water-oil contact, if such there be.

MR. MORRIS: I have no further questions of this witness. Thank you, Mr. McBryde.

MR. PORTER: Any further questions? Mr. Bratton.

MR. BRATTON: Howard Bratton with Atlantic.

BY MR. BRATTON:

Q Mr. McBryde, referring to your Exhibit No. 2 on Wimberly No. 13, and using the terminology that you have used, the Blinebry zone and the undesignated zone, how long before the Blinebry zone was shut in, how long had it been producing, how many months or years?

A A matter of days I think on both of them.

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Q No, how long was your Blinebry zone completed before you dually completed in this undesignated zone?

A Our Wimberly 13 was completed in December, I believe. It might have been in January. If you don't mind, I could find it right quick if you want to get the exact date. Mr. Bratton, our Wimberly 13 was completed on January 7 of this year, 1961.

Q Was your Blinebry interval produced from then?

A Yes.

Q Up until it was shut in for the 72 hours?

A The Blinebry interval produced a total of 531 barrels off hole before it was shut in for the extended shut in test. I might add that the undesignated produced a like amount, somewhere around 300 barrels.

Q Referring then to your Exhibits No. 3 and 4, those intervals that you have completed, or show completed in the upper or the undesignated zone in your Wimberly 13, the Westates Carlson B-26 and the No. 7 and 5, those were the relatively low gas-oil ratios. I believe you concluded from that, Mr. McBryde, that you have a gas cap down below that?

A We have a gas cap in the Blinebry reservoir which in some cases is below the intervals that are perforated or producing in this undesignated zone.

Q Is it possible that your GOR differences are a result of a solution gas drive and the natural consequence of it in that

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individual zone? In other words, as you reach a further stage of depletion in your undesignated zones, are your gas-oil ratios not going to go up there?

A Yes, I think they will go up. I am satisfied that they're probably producing from a, well, certainly we have a gas cap in the undesignated zone and those that are completed close to the gas cap will no doubt start having increasing ratios.

Q Your GOR differences, then, could be a difference of your stage of completion of a solution gas drive reservoir?

A Not in this case I don't believe, Mr. Bratton. As I testified, take the Anderson Prichard No. 5 Carlson A, for instance, which is the next to the last log on the bottom cross section. It is completed some, I would say, 60 or 70 feet above the minus 2100 foot datum. If it were in the same reservoir as these wells down here, I would expect it to produce all gas, but it's a top allowable well, or it was in March.

Q Assuming that you don't have a different stringer in there with poor vertical communication?

A Well, I think we do have something in there with no vertical communication.

Q You say no vertical communication?

A We certainly do.

Q Your theory would be equally applicable to gas caps or to two separate solution gas drive reservoirs?

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A I'm not sure I understand the question.

Q In other words, your theory as to the difference in the distinction between the completion below and above in the Wimberly zone, your Wimberly zone and your undesignated zone, you base that on the conclusion you have a gas cap above the Wimberly zone, a gas cap above the undesignated zone?

A I think we know rather definitely that we have gas caps above both of them.

Q Could it not be a two solution gas mechanism?

A It could be. I don't know that that has a bearing on this.

Q But your conclusions would be equally applicable to either conclusion?

A I'm not sure I understand just what you are getting at, Mr. Bratton. I'm sorry.

Q I could restate it once more, but I believe your conclusion is drawn on the basis of two separate gas caps and that possibly you have two solution gas mechanisms if you adopt your theory of a complete separation.

A Certainly we have two separate reservoirs and both of them could be producing under solution gas in combination with gas cap expansion, since they both have a gas cap above them.

Q And your gas-oil ratio, then, would increase in a solution gas reservoir as you reach an advanced stage of depletion?

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A Yes, sir.

MR. PORTER: Anyone else have a question? Mr. Rose.

BY MR. ROSE:

Q Mr. McBryde, you have heard the testimony of the Commission's witness, Eric F. Engbrecht, did you not?

A Yes, sir.

Q You heard where he picked his, what he called his markers No. 1 and No. 2?

A Yes, sir.

Q Picking the Commission's marker No. 1 would place the Wimberly No. 13 in the situation of producing from two zones in one interval, would it not?

A It would place the Wimberly 13, which has two separate pools completed in it at the present time, in what would then be designated as a common source.

Q All right, then, if you use No. 2 pick, then what?

A I am confused as to just what No. 2 and No. 1 is. No. 2 is the upper pick, is that right?

Q Yes, No. 2 the upper and No. 1 the lower.

A If they pick No. 2 it will place both zones that are presently completed in Wimberly 13 in what would then be designated as a common source, you are right.

Q Would it place any other wells shown on your Exhibit No. 2 in the same situation if that pick is used?

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A Wimberly 13 is the only well in the field that is presently completed in both of these intervals as dually completed in these two intervals.

Q Would the pick No. 1 put any other well on your exhibits in the same situation?

A If No. 1 pick, which is the green line on our exhibit, is selected, it would leave an interval from this green line up about half way in this intermediate interval, as we call it, that would not be defined as to vertical limits by Commission order. I think that we did not mention that the Justis Gas Pool, as presently defined by the Commission, consists of roughly the upper half of this interval between our red line and our blue line. So, if the pick, as we recommend, is chosen as the top of the Blinebry, there will be an interval which is not defined as to vertical limits at the present time.

Q What would be the effect of that on the Westates Carlson B-26 #7, which is shown?

A I don't know.

Q Would it not be the same as your Wimberly No. 13?

A Well, certainly evidence has been offered here that those two are separated and we are not contesting that, I assume that, well, two things could happen. One, it could be another hearing to further establish vertical limits in this interval here or some such arrangement as was recommended for our well

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could apply.

Q Your Wimberly No. 13 was completed, I believe you said January 7, 1961?

A Yes, sir.

Q And was that later than the date of completion of Westates Carlson B-26 #7?

A Yes, sir.

MR. ROSE: That's all.

MR. PORTER: Anyone else have a question? The witness may be excused.

(Witness excused.)

MR. BUSHNELL: I have no more witnesses and that's the end of our case.

MR. PORTER: Does anyone have any statements to make?

MR. WHITE: If the Commission please, I have a brief statement I would like to make.

MR. PORTER: Mr. White.

MR. WHITE: Throughout the testimony, Anderson Prichard Oil Corporation has been referred to at various times. The Union Texas Natural Gas has succeeded in interest formerly owned by Anderson Prichard. In our opinion it is significant that the majority of the operators in this field have recognized the vertical limits of the Blinebry, Justis-Blinebry Pool as proposed by the Commission Staff. And the majority of the operators have

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developed their leases in reliance that those vertical limits were the true vertical limits. Anderson Prichard Oil Corporation developed its leases with the understanding that those were the vertical limits. It goes without saying almost that I think there has to be a certain degree of stability in matters of this kind.

I think an operator likes to know when it goes out to drill a well that if it completes a well in a certain interval it has fulfilled its offset obligations as to the Blinebry zone. It would be considered quite a shock to wake up the next day and find that the Blinebry section had been disected and that you were suddenly faced with unwanted and unexpected offset obligations.

We feel that the field has been substantially developed and it's our position that it's a little late in the game to go back now and break out this one sand stringer. In that regard there's considerably testimony in the record about the possibility of several separate reservoirs. I think even the Amerada witness testified that there was varying porosity in that portion of the Blinebry below the Blinebry 1 marker.

So, it seems to me that this is a practical problem which requires a practical solution, and I think if you go to breaking out these individual sand stringers, which apparently vary from well to well, you can sometimes reach rather ridiculous results.

We, therefore, feel that a practical solution should be taken in the problem and we feel that the approach which the

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Commission has proposed is such a practical solution. We, therefore, concur in the Commission Staff's recommendations.

MR. PORTER: Mr. Bratton.

MR. BRATTON: I would like to refer back to Mr. Engbrecht's remarks, as I have them noted down here, in which he gave his reason for picking the point No. 2 which we support. As I have it noted down, he said it's a good lithologic break, it's a good place to map on. It's a good correlative point across the entire field, it is the break for the Blinebry Pool, as he interprets it is the top of the Blinebry reservoir, and also it's a better correlative marker across the entire pool.

In addition to that, as Mr. Ramey pointed out in his testimony, and the gentleman just referred to, I think you have to use a practical approach to these reservoirs, and, if you start picking out stringer by stringer you are going to wind up with some amazing results.

I believe, as pointed by Westates, and it was never referred to again, the difference in the gas analysis in their well is a strong indication that the two completions there are not from the same pool or the same reservoir. Further, as previously pointed out, we also have developed on the basis of the top of the Blinebry being point No. 2, and it would be rather startling to find at this point the pay disected or the pool disected at this point and find a new area above this point No. 1 which Amerada

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recommends. We very strongly urge the Commission to adopt the recommendation that Mr. Engbrecht and Mr. Ramey made and adopt point No. 2.

MR. PORTER: Mr. Bushnell.

MR. BUSHNELL: I didn't intend to say anything, and to be very brief, but I would just like to say I don't want anything implied by anything put on in this case that Amerada is in favor of a separate zone for each separate stringer. We feel that the top of the Blinebry should be picked on the basis of a separate geological unit, and the Commission should adopt the pick just like it did and as consistently as it did in picking the top of the Glorietta and defining another zone.

I think our evidence has shown here, I think I'm safe in saying it uncontested, that ours is the only pick that is in support of a separate geological unit. I think our evidence is uncontested, that perhaps I had better not say that is all that Mr. Ramey included, but I'll say that I feel that our exhibits and testimony has shown by preponderance that there is a separation in Well 13 as extended across the field.

MR. PORTER: Anyone have anything further to offer in this case?

MR. MORRIS: Yes, sir, I have a telegram from Gulf Oil Corporation recommending that the top of the Blinebry be at the marker found at minus 2,022 feet subsea in Amerada's Wimberly

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Well No. 4.

MR. BUSHNELL: Is that the upper or the lower point?

MR. MORRIS: I believe that's the marker No. 1.

MR. PORTER: What was the conclusion, Mr. Morris.

MR. MORRIS: Of this telegram?

MR. PORTER: No, as to whose marker this is.

MR. MORRIS: This is Amerada's marker.

MR. PORTER: If nothing further to be offered in the case, the Commission will take it under advisement and proceed to Case 2278.

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 31st day of May, 1961.

Notary Public-Court Reporter

My commission expires:

June 19, 1963.

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