

BEFORE THE  
OIL CONSERVATION COMMISSION  
STATE OF NEW MEXICO

PROCEEDINGS

The following matter came on for consideration before a hearing of the Oil Conservation Commission of the State of New Mexico, pursuant to legal notice, at Santa Fe, New Mexico, on February 8, 1950, at 10 A. M.

NOTICE OF PUBLICATION  
STATE OF NEW MEXICO  
OIL CONSERVATION COMMISSION

The State of New Mexico by its Oil Conservation Commission hereby gives notice of public hearing to be held February 8, 1950, beginning at 10:00 o'clock A.M. on that day in the Capitol Building, Santa Fe, New Mexico.

STATE OF NEW MEXICO TO:

E. J. McCurdy, c/o Hervey, Dow and Hinkle, White Building, Roswell, New Mexico; E. J. McCurdy, Fort Worth, Texas; Buffalo Oil Company, c/o Jack M. Campbell, Roswell, New Mexico; Buffalo Oil Company, Artesia, New Mexico, and to all persons having an interest in:

Case 205

In the matter of the Oil Conservation Commission's Order No. R-5, dated January 23, 1950, granting a rehearing in Case 205 whereby E. J. McCurdy, Jr., was granted, by Order No. 849, December 27, 1949, authority for an unorthodox location, and Buffalo Oil Company, an interested party having filed application and timely motion for rehearing of said case.

Given under the seal of the Oil Conservation Commission of New Mexico, at Santa Fe, New Mexico, on January 23, 1950.

STATE OF NEW MEXICO  
OIL CONSERVATION COMMISSION

/s/ R. R. Spurrier  
/t/ R. R. SPURRIER, SECRETARY

SEAL

BEFORE:

Guy Shepard, Chairman  
R. R. Spurrier, Secretary  
Don G. McCormick, Attorney for the Commission  
George Graham, Attorney for the Commission

REGISTER:

W. E. Scott  
Artesia, New Mexico  
For Buffalo Oil Company

H. G. Ellis  
Artesia, New Mexico  
For Buffalo Oil Company

Ralph L. Gray  
Artesia, New Mexico  
For Buffalo Oil Company

Jack M. Campbell  
Roswell, New Mexico  
For Buffalo Oil Company

John M. Kelly  
Roswell, New Mexico  
For E. J. McCurdy, Jr.

Haymie R. Edwards  
Fort Worth, Texas  
For E. J. McCurdy

Ford Bradish  
Fort Worth, Texas  
For E. J. McCurdy

R. T. Wilson  
Artesia, New Mexico  
For E. J. McCurdy

E. J. McCurdy  
Fort Worth, Texas  
For himself

John E. Cochran, Jr.  
Artesia, New Mexico  
For General American Oil Co. of Texas

R. J. Heard  
Artesia, New Mexico  
For General American Oil Co. of Texas

N. W. Krouskop  
Loco Hills, New Mexico  
For General American Oil Co. of Texas

R. F. Miller  
Artesia, New Mexico  
For General American Oil Co. of Texas

Foster Morrell  
Roswell, New Mexico  
For the U. S. Geological Survey

W. B. Macey  
Artesia, New Mexico  
For American Republics Corporation

W. C. Williamson  
Houston, Texas  
For American Republics Corporation

E. E. Kinney  
Artesia, New Mexico  
For the New Mexico Bureau of Mines

F. C. Barnes  
Santa Fe, New Mexico  
For the New Mexico Oil Conservation Commission

R. M. Blagden  
Santa Fe, New Mexico  
For the Albuquerque Journal

Betty Wistrand  
Santa Fe, New Mexico  
For the New Mexico Oil Conservation Commission

Glenn Staley  
Hobbs, New Mexico  
For Lea County Operators

Elvis A. Utz  
Santa Fe, New Mexico  
For the New Mexico Oil Conservation Commission

Roy O. Yarbrough  
Hobbs, New Mexico  
For the New Mexico Oil Conservation Commission

Justin Newman  
Artesia, New Mexico  
For the New Mexico Oil Conservation Commission

Raymond Lawt  
Artesia, New Mexico  
For Wilson Oil Company

R. L. Adams  
Ft. Worth, Texas  
For Continental Oil Company

Jack R. Huffmyer  
Artesia, New Mexico  
For American Republics Co.

E. N. Brock  
Artesia, New Mexico  
Brock & Brock Drilling Co.

William D. Morris  
Fort Worth, Texas  
For Worth Drilling Co., Inc.

Clarence E. Hinkle  
Roswell, New Mexico  
For Hervey, Dow & Hinkle

CHAIRMAN SHEPARD: The meeting will come to order. You may read the notice of publication, Mr. Graham.

(Mr. Graham read the notice of publication for Case 205.)

MR. HINKLE: Members of the Commission, for the purposes of the record, I am Clarence E. Hinkle, firm, Hervey, Dow & Hinkle, Roswell, New Mexico, representing E. J. McCurdy. I would like to make a preliminary statement to the Commission concerning the matter of the application of E. J. McCurdy for approval for an unorthodox location upon the northwest quarter of section 20, township 18 south, range 32 east. Application was made in November 1949. Due notice was published by the Commission of hearing which was to be held and which was held on December 1, 1949, at 10 o'clock. After consideration of transcript of proceedings of the hearing an order was entered December 27, 1949, approving the unorthodox location as requested in the application. Mr. McCurdy started the drilling of the well, and before the well was completed, an application was made by Buffalo Oil Company for a rehearing in this matter. And the Commission saw fit to grant the rehearing, and after the order was entered granted a rehearing. We filed in behalf of Mr. McCurdy consent to the modification of order, which contained a typographical error, describing said land as being in range 31 east rather than range 32 east. The heading of the order correctly described the land. That was simply a typographical error. We filed modification of order so

as to correct the description of the acreage. Then we heard that it was contended that the order that was entered in the main was not consistent with previous orders entered by the Commission. I consented that the order be modified so as to provide for the unitization of the northwest quarter of section 20 for proration and allowable purposes and also consented to the modification of the order to provide that no well produce more than top allowable. That had been the intention of the application and we assumed that the order would so provide. We did not draw the order. It was drawn by the Commission. Its real intention was to so provide. Now, the attorney for the Buffalo Oil Company filed a response to the consent to modification of order in which he states in effect that the consent should be considered the same as a new application and that therefore the matter should be heard over. I think that is a little wishful thinking on the part of counsel for Buffalo and so hopes this will shift the burden of proof in the case. The 1949 Act amending the Conservation Act, Section 195 provides that within twenty days after the entering of an order application may be filed for rehearing, and goes on to say, may within ten days grant or deny in event of application for rehearing. If granted the Commission may enter such new order or orders after rehearing. It is contemplated the original order is in full effect today until after the rehearing, and then the Commission can go ahead and enter a new order or modification as it sees fit. The next paragraph goes on to provide that the burden of proof shall be on the party questioning the validity of such action of the Commission. I think it is very clear in this case the burden of proof is upon the

Buffalo Oil Company to show wherein this order in its fullest force and effect is erroneous. I don't think the filing of consent to modification makes any difference. The order is still in effect, and if the Commission takes the view that the consent makes any difference, we would like to withdraw it at this time and submit it later if we see fit to. I submit that the burden of proof is upon the Buffalo Oil Company.

MR. CAMPBELL: If the Commission please, the original application which was filed with the Commission in this case makes a request in which there is no reference to allocation of production in event the fifth well is approved on a normal unit for which the maximum allowable is for four wells. We take the position that the consent to modification constitutes a different suggestion as to allocation. Further, there was no reference to unification of area involved, simply asked for the fifth well. If relief is granted and heard in that light, Mr. Hinkle has suggested that the provisions of the new statutes provides that the procedure in district court should apply to this Commission on rehearing. It is apparent particularly in this case that the applicant has the definite requirement to provide sufficient evidence to justify the retaining of the order or to changing or modifying it as seen fit. In the case of the hearing of the original application no testimony was offered and sworn to sustaining the application. The record was devoid of any prima facie evidence upon which the order was issued by the Commission, and Buffalo Oil Company would like to hear from the applicant itself some testimony, evidence, for the retention of the order or modification of it. Mr. Hinkle

requests that the burden of proof be placed on us as to the proposed order. There is a different situation in this case. The original order is without any basis in that they never entered any testimony on prima facie evidence. I say that in the establishment of the Commission's new rules or procedures, there are no orders we know of in which there was no testimony upon prevention of waste or the protection of correlative rights of adjacent owners. Our position is that it is not a question of who proceeds, but we feel that the Commission is entitled to hear evidence before before promulgation of the case. The hearing of the case is established in order to justify order which has been issued.

MR. HINKLE: I don't think it is a question of the evidence at the original hearing. The matter was given due notice. Buffalo Oil Company was given an opportunity to appear or anybody else who had an interest. They failed to appear. It was a default matter. An order was entered. All jurisdictional requirements were complied with. There were no objections until after the application for rehearing. It is virtually setting aside the order without rehearing.

(Off the record discussion among members of the Commission and their attorneys.)

CHAIRMAN SHEPARD: We are not going to decide who has the burden of proof. Mr. McCurdy will proceed with his testimony. You may go ahead, Mr. Hinkle.

MR. HINKLE: Usually the one who has the burden of proof precedes. Does that mean that the Commission holds that McCurdy has the burden of proof?

CHAIRMAN SHEPARD: We will hold for the purposes of this hearing that you may proceed with the testimony.

E. J. McCURDY, having been first duly sworn, testified as follows:

DIRECT EXAMINATION BY MR. HINKLE:

Q. State your name please.

A. E. J. McCurdy.

Q. Where do you live?

A. Fort Worth, Texas.

Q. What is your business?

A. I am engaged in the oil business.

Q. Do you have any profession other than the oil business?

A. I am a geologist.

Q. Are you the owner of the federal lease covering the northwest quarter of section 20?

A. I am.

Q. When did you acquire that property?

A. Later part of 1944.

Q. Mr. McCurdy, I hand you Exhibit A which purports to be a plat showing what is known as the Young Pool Area in township 18 south, range 32 east and also North Shugart area in township 18 south, range 31 east, and ask you whether or not you prepared that plat or caused it to be prepared under your direction?

A. I did.

Q. Does it correctly show ownership of oil and gas leases in the Young Pool and in North Shugart Area?

A. It does.

Q. Does it correctly show locations of different wells drilled in respective areas?

A. It does.

Q. Does it show correctly depths of wells?

A. In most cases it does.

Q. Does it in connection will all your wells in the Young Pool and Buffalo Oil Company's wells which are also in that area?

A. It does.

Q. Does it also show the amount of production in each of the wells in each area up to January 1, 1950?

A. It does.

Q. Does it also show initial production of respective wells?

A. It does.

Q. Does it also show the elevation of wells and the red sand thickness from which they are producing?

A. It does.

Q. Does the map also correctly show the distance of the respective wells from lease lines or sub-division lines? Particularly as to your wells in the Young Area?

A. Yes, sir.

Q. Does it also correctly show the daily average, daily production of oil from wells in the Young Pool and North Shugart Area for December 1949?

A. It does so far as my lease is concerned.

Q. Mr. McCurdy, you were granted permission by the Commission to drill an unorthodox location located in approximately the center of the northwest quarter, section 20, township 18 south, range 32 east?

A. I was.

Q. The hearing in connection with this order was held December 1, 1949?

A. Yes, sir.

Q. What steps did you take after the hearing was held in

regard to getting ready to drill that well?

A. Well, we went into a drilling contract to drill the well but not to start that well for about 20 days.

Q. Did you make application to the U. S. Geological Survey for drilling that well?

A. We did.

Q. Was notice of intention to drill approved by the Supervisor of the U. S. Geological Survey?

A. It was after we had agreed to keep the tract intact.

Q. You mean a non-segregation agreement?

A. Yes, sir.

Q. Do you recall or recollect the date of approval of that location by the U. S. Geological Survey?

A. I believe it was on December 9, 1949.

Q. Then how long after or what date did you actually commence the drilling of the well, if you did?

A. December 20, 1949.

Q. Did you have any reason to believe or did you know that Buffalo Oil Company or anybody objected to the drilling of this well?

A. I did not.

Q. How deep were you when you received notice that the Buffalo Oil Company had filed application for rehearing?

A. 2650 feet.

Q. Did you shut down the well after you received notice of rehearing?

A. No, it is shut down now.

Q. Why didn't you shut down at the time you received notice of rehearing?

A. Well, we had a turn key drilling contract.

Q. By that you mean what?

A. The contract was to drill the well to a certain depth?

Q. Were you permitted to shut down under the terms of that contract?

A. No, sir.

Q. Did the contract contain any provisions for shutting down the well?

A. It did not.

Q. Did you continue the drilling of the well after the order for rehearing was granted?

A. I did.

Q. What is the condition and depth of the well at the present time?

A. The well is a little past 3675 feet where we considered would be casing set.

Q. Are you shut down at this time in connection with running of casing in completion of well?

A. Yes, sir.

Q. I believe you are also a geologist?

A. Yes, sir.

Q. Where did you study?

A. Oklahoma University.

Q. What year did you finish your geology course?

A. First part of 1918.

Q. Did you continue your knowledge and practice as geologist after 1918?

A. I did.

Q. What did your work consist of?

A. Field geological work.

Q. Were you with any major company?

A. Carter Oil Company.

Q. For how long?

A. Until 1925 approximately.

Q. After that you continued as a geologist?

A. I did.

Q. In what capacity?

A. I came to Texas and went in for myself.

Q. And were you consulting geologist?

A. Yes, sir.

Q. Were you also in the oil and gas business as an independent operator?

A. Yes, sir.

Q. You have continued that constantly as consulting geologist and independent oil operator?

A. I have.

Q. Up until the present time?

A. Yes, sir.

Q. When did you complete your well No. 1 upon the northwest quarter of section 20?

A. In the latter part of 1944.

Q. At that time was that your discovery well?

A. That was the discovery well.

Q. Did anybody contribute toward the drilling of that well?

A. No, sir.

Q. It was really the discovery well in what was called the Young Pool?

A. Yes, sir.

Q. Did you examine samples or cuttings from the formation, particularly the Red Sand formation, which is the producing formation?

A. I did.

Q. Did you keep close account of other wells you drilled, namely, Nos. 2, 3, and 4?

A. I examined all the samples sent in to the office. On Nos. 1 and 3 I was on the derrick floor when they were drilling and were brought in.

Q. And you examined all samples of red sand in each case?

A. I did.

Q. You also examined sample logs from these wells and other wells?

A. Yes, sir.

Q. You have examined logs from the North Shugart Area?

A. I have.

Q. Have you compared logs of the North Shugart Area with the logs of drilling in Young wells drilled upon your property?

A. Almost the same, a little higher, only difference the dip is to Young Field from the Shugart slightly.

Q. All the wells are producing essentially from the same geological formation?

A. Exactly the same. That is known as the Queen Red Sands.

Q. Queen Red Sands. Now, Mr. McCurdy, have you from your examination of the logs of wells and samples and your knowledge of production in these two areas and other similar areas of the State, have you formed an opinion of the porosity and permeability of Queen Red Sands?

A. I have.

Q. What is that?

A. It is very low, very low.

Q. You mean by that very low permeability?

A. Yes, sir. It is erratic. It could be fairly porous in some spots. That doesn't mean it would be contiguous over 50 feet from there. It might be completely stopped, very silty, low permeability sand.

Q. In your opinion will one well drilled approximately in the center of 40 acres in these areas permit recovery of all oil which economically is possible to recover?

A. It will not.

Q. By that you mean that it will not drain the 40 acres?

A. It will not.

Q. Do you believe, or in your opinion, do you think that it is necessary to drill "five spot" location, which is proposed, to recover all the oil it is economically feasible to recover in the northwest quarter of section 29, township 18 south, range 32 east?

A. It is necessary to drill the "five spot" well.

Q. Would that well permit the recovery of oil that would not otherwise be recovered?

A. It will.

Q. State whether or not in your opinion the drilling of the "five spot" well is in the interest of conservation and prevention of waste?

A. It is.

(Exhibit A, map, is placed on display board.)

Q. Mr. McCurdy, what type of volumetric drive do you have in the Young Pool?

A. It is a gas drive field.

Q. What do you mean by gas drive field?

A. The oil is pushed toward the bore of well by gas expansion.

Q. Do you have any considerable pressure or volume of gas

in this field?

A. No, sir.

Q. What is that indicative of when you have low pressure and low volume of gas in a gas drive field?

A. Very mediocre drainage area for any one well.

Q. In other words, you would say gas drive in this particular area is very inefficient?

A. It is.

Q. Is this low pressure, low volume gas demonstrated by any physical means in the field?

A. Well, we have got our wells on pumps.

Q. Does that indicate they do not have any gas?

A. To flow the wells.

Q. That is true of all the wells, is it not?

A. No. I when we first brought it in went dead numerous times. We had to do considerable work to revive it.

Q. I would like to offer at this time in evidence the plat, Exhibit A.

MR. CAMPBELL: We would like to examine it.

(Mr. Campbell examined the plat.)

CHAIRMAN SHEPARD: It will be accepted.

Q. Mr. McCurdy, I believe you just testified that you had just about reached the pay horizon with the "five spot" well you are drilling?

A. Yes, sir.

Q. I believe you have testified it is the red sands from which the other wells are producing, will you state whether or not it is possible to get a dry hole?

A. Very possible.

Q. Do you know now exactly the type of well you will get?

A. That would be impossible.

Q. It might be 5 or 10 or allowable or could be dry?

A. That's right.

Q. Assuming that the well's production will be paying quantities, state whether or not in your opinion production from that well would infringe on any correlative rights of any adjacent lease owners?

A. It would not.

CROSS EXAMINATION BY MR. CAMPBELL:

Q. Mr. McCurdy, you state that you filed application with the Commission in November 1945 for a "five spot" location?

A. Mr. Hinkle filed.

Q. Did you contact owners of adjoining leases prior to that time with reference to this well?

A. I did not.

Q. You did not contact them?

A. I did not.

Q. Do you have any other "five spot" locations in New Mexico?

A. Yes, sir.

Q. Where?

A. I just drilled a dry hole on one, in the northeast quarter.

Q. In that adjoining lease?

A. Yes, sir.

Q. Did they agree with the drilling of that?

A. We drilled it together.

Q. Do you know the date when you entered into the drilling contract?

A. I can't say right off hand. It was after December 1.

Q. You commenced it December 20?

A. Yes, sir.

Q. You know the date of the Commission's order?

A. I understood it was on the first.

Q. Have you seen the Commission's order?

A. No.

Q. I hand you a copy of the order. State the date of the Commission's order?

A. 27th of December.

Q. You commenced drilling on December 20?

A. I did.

Q. Were you acquainted with the provisions of the laws of New Mexico, which provide for a 20 day period after the entry of the order for granting of a rehearing?

A. I wasn't at that time. I am now.

Q. Mr. McCurdy, when you made the original application for a "five spot" location, what was your intention as to allocation of production from the area involved?

A. I be allowed to produce top allowable well was what I was asking. I wasn't asking for anything but what had been granted to others. That is what I thought I was getting.

Q. What did you think would be the provision as to the marginal wells on that tract?

A. That I would be allowed to produce them still.

Q. What maximum allowable in addition did the Commission give you for the 160 acres?

A. The order gave me considerably more than I thought. I expected a top allowable well if I could get one.

Q. What did you expect?

A. 160 acre unit. Four, allowable from four wells.

Q. What allowable, proration allowable, maximum allowable was your concept of it?

A. Well, just to be as plain as I can make it, I thought I would be allowed a top allowable well from the "five spot"

location, if I was granted that location. That is what I thought.

Q. That is still your intention under the modified order that was filed?

A. Yes, sir.

Q. What do you request the Commission to grant by way of total allowable for the 160 acre unit?

A. What it is producing plus 42 or what the Commission allocates to the producing unit so long as it does not exceed four wells on four units.

Q. Are you asking for four top unit allowable under present concept?

A. No, sir, I have only asked for a top allowable well if I am fortunate enough to obtain one plus what the others will produce so long as it does not exceed the allowable for four regular 40-acre tracts.

Q. Four top allowable wells?

A. I don't think I understand. I wouldn't be allowed to produce more, including the "five spot" well, than top allowable for the four regular legal 40-acre tracts. I would be allowed to produce my other wells up to maximum so long as I didn't produce more than allowable for four under present rules. 42 barrels. Other wells made 109 barrels a day, and 42 and 109 is 151, and four times 42 would be 168. I wouldn't be allowed to produce that unless I can revive those wells some, which I have done in the past.

Q. 160 barrels for five.

A. If we make legal allowable.

Q. When you made these tests, took these samples on Nos. 1 and 3 wells, state to the Commission just the extent of that sampling. How many samples did you examine?

A. I examined them as they drilled through pay.

Q. How much? Did you take core tests?

A. No, sir.

Q. Did you make core analyses?

A. I have studied cores and history of the area.

Q. Have you any core analyses in the Young Pool?

A. No, sir.

Q. Have any been taken to your knowledge?

A. No, Bufalo might have.

Q. As a geologist, you can state what the permeability and porosity is?

A. I can.

Q. You can?

A. I can to a pretty good extent, yes, sir. No. 1 flowed a lot of sand, big hunks.

Q. From the hunks of sand you can make statement as to porosity?

A. Not positively, not exact, you can tell pretty close.

Q. You also stated that you examined logs in the Young Pool and Shugart Pool, what types of logs did you examine in the Young Pool?

A. Our own well logs.

Q. Do you have those well logs?

A. Not with me.

Q. What type of logs did you take on your wells in the Young Pool?

A. You mean?

Q. Did you take radioactivity logs?

A. No.

Q. What kind of logs did you examine?

A. Sample logs.

Q. Did you examine samples for the Shugart Pool?

A. Yes, sir.

Q. Do you have information as to production in the Shugart Pool?

A. No, sir.

Q. Did you drill a dry hole in the Young Pool?

A. Yes, sir, one.

Q. Is it your opinion that this indicates silty conditions?

A. No one can tell. There are erratic sand conditions.

Q. Isn't it your opinion that one can't make an accurate comparison between the two areas?

A. . . . Queen sand, very definitely same horizon.

Q. Any zones?

A. In our immediate vicinity, no, we get the same thing that they get in North Shugart.

Q. What zones--queen sand in the Young Pool?

A. We got the red sand.

Q. In Queen formation, there are different types of zones, aren't there?

A. Not in producing horizon, no. Not in our wells, the only difference between any one well on our lease and another one would be more shallow than the other.

Q. Mr. McCurdy, you testified that you have gas drive in this field, and that there is no considerable pressure. Did you ever take any pressure tests for those wells?

A. I did.

Q. What type?

A. Bottom hole.

Q. When?

A. I took a number after the first well came in, a short while.

Q. How long?

A. Several months.

Q. What were the results?

A. 1221 pounds.

Q. Did you take bottom hole pressure tests upon the completion of every well?

A. No, sir.

Q. You don't have the date on which it was actually taken?

A. No, sir.

Q. Were any other bottom hole pressure tests taken?

A. Not on my lease.

Q. Did you ever take any gas oil ratio tests?

A. No, sir.

Q. The first well was completed when?

A. 1945.

Q. Never been any gas oil ratio tests taken?

A. No, sir.

Q. You have no gas oil ratio--

A. It is very small. On a cold morning there is hardly any.

Q. What are you limited on gas oil ratio?

A. I don't know, maybe you can help on that.

Q. How do you know you aren't in excess?

A. I couldn't conceive of it.

Q. You don't know the gas oil ratio?

A. I know the limits.

Q. You don't know exactly?

A. I know its limitations.

MR. CAMPBELL: That is all.

REDIRECT EXAMINATION BY MR. HINKLE:

Q. Mr. McCurdy, it was never your intention on filing this application to produce more than top allowable from any well in the area?

A. No, sir.

Q. Isn't it a fact that it is easy to tell whether a well is making very much gas?

A. Very simple.

Q. Simple observation, is it not?

A. Yes, sir. In my opinion the gas is all in solution. On a cold day when it gets really cold, there is hardly any gas, comes out separately in solution. On hot days there is more gas which will come out. That I have noticed time and time again.

MR. McCORMICK: If this well for which you have filed should be completed as top allowable well similar to other well in same forty, do you have any opinion as to whether or not that well for which you are applying would drain any oil from the one under 40-acre tract immediately north, the Buffalo Oil Company's tract?

A. I do not think it would. I have a definite opinion that the drainage of one well is very small. They could have asked if you drilled six and you got oil, I would have to say no. It just doesn't drain a very big area.

MR. McCORMICK: You don't believe it would drain from the Buffalo tract to the north?

A. It would not. We have produced our best well over three years and a half approximately, the Buffalo didn't drill offsetting for a long time. They then drilled a well and got the best well in the field.

MR. SPURRIER: Would you care to estimate what the porosity of the sand is in this particular area?

A. Yes, sir.

MR. SPURRIER: Within certain percentage limits what would it be?

A. I would say in the neighborhood of between ten per cent and eighteen per cent.

MR. SPURRIER: How about permeability?

A. Well, the best I could say is low.

MR. SPURRIER: Low.

A. And erratic, you might have fair permeability in one well, but how far from the bore of that hole no one in the world can tell. Not in that red sand area.

MR. SPURRIER: Did you shoot these wells?

A. I shot 2 and 3. I did not shoot 1 and 4.

MR. SPURRIER: Did it materially increase production?

A. In one case, yes; in another case, no.

MR. SPURRIER: Have you finished?

MR. CAMPBELL: I have one more question.

RECROSS EXAMINATION BY MR. CAMPBELL:

Q. I believe you stated when you identified the exhibit that it reflects the thickness of the pay?

A. Well, it does in the red sands on your well, for instance, is 3736 to 3778.

Q. Is that pay?

A. No, sir.

Q. I will state it in a different way, do you have anything to show the thickness of the pay under those wells?

A. Yes, sir.

Q. What is the thickness of the pay under No. 1?

A. Approximately 13 feet.

Q. No. 2?

A. I wouldn't want to say. I know very positive about No. 1.

MR. CAMPBELL: That is all.

CHAIRMAN SHEPARD: You may be excused.

JOHN M. KELLY, having been first duly sworn, testified as follows:

DIRECT EXAMINATION BY MR. HINKLE:

Q. State your name?

A. John M. Kelly.

Q. Where do you live?

A. Roswell, New Mexico.

Q. Are you a graduate mining engineer?

A. I am.

Q. Where did you graduate?

A. New Mexico School of Mines.

MR. CAMPBELL: We will waive the qualifications of this witness.

MR. SPURRIER: He has qualified before.

MR. HINKLE: We think the qualifications should show in the record in case this should go into court.

Q. When did you graduate?

A. 1936.

Q. After graduation from school what business were you engaged in?

A. The oil business.

Q. In what capacity.

A. I was in the proration office of the Lea County Operators from 1937 to 1941, State Geologist and Director, Oil Commission 1941 to 1945. Production, George P. Livermore, Inc., in 1945, and independent consulting geologist and operator since that time.

Q. You are still a consulting geologist at this time and independent oil operator?

A. I am.

Q. Have you had any experience with red sands production in New Mexico?

A. I have.

Q. When and where.

A. In 1945 I completed approximately 12 wells in the Caprock Field. That was red sands.

Q. Was that during time you were superintendent of George P. Livermore Company?

A. It was.

Q. In connection with the drilling and completion of those wells, did you have occasion to check samples?

A. I drilled in 12 wells, yes, sir.

Q. Of red sands formation?

A. Yes, sir.

Q. Have you checked the sample logs of red sand wells in the Young and North Shugart Pool areas?

A. Yes, sir.

Q. How do the logs with those wells compare with those of the Caprock Field?

A. They have similar characteristics--pay zone section of Caprock and Young Pool and North Shugart appears to be silty sand.

Q. You would say the sand characteristics of all wells is silty red sand?

A. Yes, sir.

Q. What is your opinion as to the porosity and permeability of red sands in these respective areas?

A. The red sand zone appears to have a wide range of

of permeability and porosity due to its characteristics, I would say very erratic.

Q. By that, you mean what?

A. Streaks wouldn't carry any considerable distance from the well bore.

Q. Have you formed any opinion as to production in New Mexico, whether or not one well located in the center of one tract would drain all the oil from the 40 acres?

A. I don't believe that it will. In Caprock we conducted interference tests and found no interference.

Q. None whatever?

A. No interference.

Q. In your opinion is it necessary to drill "five spot" locations in these red sand areas to recover all oil economically feasible to recover from these areas?

A. I would state that the drilling of "five spot" wells will allow a greater percent of recovery than you would get with just one well.

Q. You would recover oil that would not otherwise be recovered from the normal center locations?

A. In my opinion it would.

Q. State whether or not in your opinion the drilling of "five spot" locations is in the interest of conservation and prevention of waste?

A. Yes, sir, recovery of more oil economically is in the interest of conservation.

Q. Are you familiar with the "five spot" well which is being drilled on the northwest quarter of section 20, township 18 south, range 32 east?

A. I am.

Q. State whether or not in your opinion that well would infringe upon the correlative right of adjacent lease owners?

A. By that you mean drain oil from under their land?

Q. Yes, sir.

A. I don't believe it would.

Q. It is your opinion that production from the completion of that "five spot" location will not drain any oil from adjoining lands to the northwest quarter?

A. That is right.

Q. Do you know whether or not the Young Pool and the North Shugar Pool have water?

A. They are gas drive. They appear to be gas drive fields.

Q. Do you know whether or not they have high pressure in connection with any of the wells.

A. It appears that the gas volume is very low in amount.

Q. Are there any physical facts that show that to be the case?

A. Part of the wells are pumping in that area.

Q. Isn't it a fact that their low gas pressure, low volume of gas is indicative of inefficient drainage or recovery of oil from the field?

A. Yes, sir, due to fact the volume of gas in the formation is small, that relatively small expansion, therefore your drive toward the bore holes would be very weak and would not carry back too far.

Q. You are saying in effect your recovery from any particular one would not be from a very large distance?

A. That is right.

MR. HINKLE: That is all.

CROSS EXAMINATION BY MR. CAMPBELL:

Q. Where is Caprock Field with respect to the Young Pool?

A. North of it.

Q. How far?

A. 25 miles.

Q. What types of tests did you examine in the Young Pool?

A. None.

Q. Have you ever seen any bottom hole pressure tests from that pool?

A. No, sir.

Q. Have you ever seen any gas oil ratio test results?

A. No, sir.

Q. Have you ever seen any cores?

A. In the Young Pool, no, sir.

Q. Have you seen core analyses taken from the Young Pool?

A. No, sir.

Q. Have you examined logs from the Young Pool?

A. I have seen samples.

Q. Samples is all you have seen?

A. Screenings.

Q. Anything with reference to the thickness of the pay sand in the Young Pool?

A. I have knowledge of the thickness of the red sand.

Q. At any particular well?

A. All four wells.

Q. What is it? You have this information from inspecting of pay sand?

A. No, sir, I have knowledge of the thickness of red sand.

Q. Do you have any estimate based upon examination of samples in consideration of Young Pool as to what the recoverable

reserves may be, say on McCurdy Young Well No. 1?

A. I have not made such an estimate.

Q. How did you make the interference test in the Caprock Pool?

A. By flowing wells completed wide open and shut down offset wells for several days to several weeks.

Q. How many?

A. Varied according to the capacity of the wells, until they filled the tanks.

Q. Do you have any opinion as to whether the Young Pool and the Caprock Pool are producing from the same sand?

A. Producing from the same red sand zone.

MR. CAMPBELL: That is all.

CHAIRMAN SHEPARD: Any further questions? You are excused. We will take a five minute recess now.

(Recess.)

CHAIRMAN SHEPARD: The meeting will come to order. Mr. Hinkle, do you have any further witnesses?

MR. HINKLE: I would like to call Mr. Ford Bradish.

FORD BRADISH, having been first duly sworn, testified as follows:

DIRECT EXAMINATION BY MR. HINKLE:

Q. State your name, please.

A. Ford Bradish.

Q. Where do you live, Mr. Bradish?

A. Fort Worth, Texas.

Q. What business are you engaged in?

A. Consulting geologist and engineer.

Q. Are you a graduate geologist?

A. Yes, sir, from the University of Chicago.

Q. What year did you graduate?

A. 1917.

Q. After your graduation, in what business were you engaged?

A. Geological profession.

Q. Did you work for any major companies?

A. I worked for major companies.

Q. For how long?

A. From 1917 until 1922, and in 1923 I was consultant in Okmulgee, Oklahoma. From 1923 to 1926 I was with Landright Production Company. Since 1926 I have been consulting geologist and engineer.

Q. Do you belong to the American Association of Geologists?

A. Since 1919.

Q. Have you qualified as an expert witness and testified in different cases in court?

A. Yes, sir.

Q. Have you ever had experience in a geological way in New Mexico?

A. Yes, sir.

Q. When was the first time you ever had any geological experience in New Mexico?

A. About 1932.

Q. What did that consist of?

A. That first work was a reconnaissance job, later surface and sub-surface.

Q. Was this in New Mexico?

A. Yes, sir.

Q. Have you had continuous geological contacts in New Mexico since that time?

A. Yes, sir.

Q. Do you now have any knowlege of the producing wells of the Worth Drilling Company, Inc., et al, in the south half

of the southwest quarter, section 12, township 18 south, range 32 east and the northwest quarter of section 13?

A. Yes, sir.

Q. What was your first contact?

A. Made first locations on original well. I was back several times, examined the records which came into the office when first three wells were drilled.

Q. Are you familiar with the plat, Exhibit A.

A. Yes, sir.

Q. Does that correctly show the locations of the Worth Drilling Company, Inc., et al, situated in North Shugart Area?

A. I believe it does as I know them?

Q. Does the plat correctly show the amount of production up to January 1, 1950, from the respective producing wells in that area?

A. Yes, sir.

Q. Have you examined sample logs of all wells in that area?

A. All that they have.

Q. Have you examined sample logs from the McCurdy Young Pool Area?

A. Those available, yes, sir.

Q. How do they compare as to red sands?

A. As far as I am concerned they are almost identical, minor differences.

Q. How far between the closest producing wells in North Shugart and Young Pool?

A. About a mile, mile and three quarters, maybe two miles.

Q. From a geological standpoint, they are all, in your opinion, in the same area?

A. Yes, sir.

Q. Tell the Commission your opinion as to the geological comparison, generally speaking, of the areas in the relation of the two pools.

A. They are both producing from the same geological horizon without exception. There is a dip in this particular area more east and southeast, little higher on map on top of red sand, dip over North Shugart, 40 feet, near the east to the mile, little southeast, general dip down southeast to Young Pool, there are little contours, nothing unusual.

Q. State whether in your opinion they are structural conditions?

A. I think structural conditions have very little to do with production.

Q. What does?

A. The character of the formation in which production is found.

Q. What do you mean?

A. It lacks permeability and porosity to such an extent in certain dry areas and producing areas.

Q. Probably a stratigraphic trap?

A. Type of stratigraphic trap, yes, sir.

Q. Have you formed an opinion as to the porosity and permeability of the red sands in the two areas?

A. I have.

Q. What?

A. Permeability is very low; porosity, low. Some stringers have high porosity, some fair porosity; very low permeability.

Q. You think both areas are the same in that respect?

A. I do.

Q. State whether or not in your opinion one well located in

approximately the center of a legal 40-acre subdivision in these areas would drain all the oil from 40 acres?

A. No, I do not think so.

Q. You are familiar with the location of the E. J. McCurdy "five spot" location in the northwest quarter, section 20, township 18 south, range 32 east, N.M.P.M.?

A. Yes, sir.

Q. State whether or not in your opinion it is capable of draining any oil from any of the surrounding acreages, that is, contiguous acreage to the northwest quarter of Section 20?

A. In my opinion it would not.

Q. State whether or not in your opinion the drilling of these "five spot" wells is necessary in order to recover all oil economically feasible to recover from 160 acre tract?

A. Well, it will recover a lot of oil that would not otherwise be recovered, whether economically I couldn't say positively. It will recover oil that will not be recovered otherwise.

Q. State whether or not in your opinion if it is approved it would interfere with any correlative rights of any of the adjacent lease owners?

A. I can't see how it would in any way.

Q. Do you know what kind of drive--gas drive or water drive?

A. In my judgment it is gas drive.

Q. On what basis is that opinion?

A. Size of wells, action of them.

Q. Do any of these make any considerable gas?

A. I don't know about all the wells, but none that I know about make any volume of gas.

Q. Have you made any tests as to quantity of gas?

A. No, sir, I have not.

Q. Is it an easy matter or hard to determine whether or not it is making gas of any amount?

A. There is lots of pop off from the gas as the wells are producing.

Q. That doesn't seem to be the case here?

A. No, it is not the case here.

Q. Do most of the wells in these two areas have to be pumped?

A. Nearly all.

Q. Is that indicative that the pressure volume is low?

A. Not enough pressure to raise oil for flowing.

Q. In an area such as this with very low gas pressure, your low gas volume, is that conducive to greater or less drainage?

A. Indicates lesser drainage.

Q. By that you mean there would be a smaller area drained by that individual well?

A. Yes, sir.

Q. Now, Mr. Bradish, are you familiar with Well No. 7A which has just recently been drilled by the Worth Drilling Company?

A. As to the records of it, yes, sir, from talking with owners and so forth.

Q. That well according to Exhibit A which has been introduced is located approximately in the center of four--two wells in the south half of southwest quarter, section 12 and the north half of the northwest quarter of section 13?

A. Yes, sir.

Q. That is a "five spot" well?

A. Yes, sir.

Q. Are you familiar and do you know of your own knowledge if it is completed?

A. Yes, sir.

Q. What is the production?

A. 65 barrels.

Q. When was it completed?

A. I believe--I don't know what date it was, within the last month.

Q. It has been within the last month?

A. Month or so ago.

Q. The production, amount of oil, from the four wells which surround it up to January 1, 1950, can you tell that as to number of each well?

A. Yes, No. 1, northwest of that 7A has 83,000 barrels.

Q. And how long has that well been in?

A. Since 1938, I believe it was in '38.

Q. All right, the production of the next well?

A. No. 3, northeast of No. 7 has produced 31,506 barrels.

Q. When was that completed?

A. Probably in '45. No. 4, southwest of No. 7A, 25,761 barrels.

Q. How long has it been producing?

A. I don't have the completion date of No. 4 offhand; 4 and 5 have been completed since I have had charge of the geological work.

Q. What is the production of the No. 5 well?

A. No. 5, southeast of the No. 7 well, initial production 200 barrels, approximately 21,829 barrels.

Q. What would you say the initial production of the "five spot" location well is as compared to others?

A. An average well for the area.

Q. What if anything does it indicate?

A. It indicates to me that there is no drainage in other wells.

Q. Otherwise normal after wells have been in production for a number of years?

A. That is right.

Q. With your knowledge of red sand in these two areas, state whether or not in your opinion it would be possible for "five spot" location being drilled by Mr. McCurdy to be a dry hole?

A. Yes, it would be possible.

Q. Why do you say that?

A. Character of formation is such that it can change very quickly. Just look at the dry offsetting wells that will find both north and south.

Q. In your opinion is it possible for anyone to predict the character of the well to be obtained when that is completed-- could be 5 or 10 or allowable?

A. It could be anything, dry hole or big well.

MR. HINKLE: I believe that is all.

CROSS EXAMINATION BY MR. CAMPBELL:

Q. Mr. Bradish, with reference to the statement that it is impossible for anyone to tell what may happen in this particular well for this particular area, how can you make a positive statement that it won't result in an increase of drainage from the Buffalo Oil Company's tract?

A. If this is a producer or if it is not a producer doesn't have anything to do with your question.

Q. If true, it might be possible that character of producing zone changing rapidly might change in any direction?

A. Yes, sir.

Q. Perhaps to any degree?

A. Yes, sir.

Q. It is also possible that this well's pressures may result in drainage, is that correct?

A. Not over a distance of a quarter of a mile.

Q. Would it make any difference as to rate of production?

A. Certainly, if producing more, naturally drainage if any offset outside territory.

Q. Would it make any difference in low pressure area already in existence, would it make any difference in rate of production of wells already in existence?

A. Not in overall net in the big area in my judgment.

Q. What is the basis for your opinion?

A. Looking at the map, half dozen or more of areas I have produced, and dry holes, these wells that just--No. 7 itself producing quantities of oil.

Q. That is not in the Young Pool?

A. I think it is similar, the two areas.

Q. Position of producing--

A. Identical, the North Shugart, identical horizon.

Q. You say it is the same producing horizon?

A. Yes, sir.

Q. On what do you base that?

A. By study of the logs.

Q. What logs?

A. For the whole area.

Q. Sample logs?

A. Yes, sir.

Q. Did you ever see a radio-activity log from this area?

A. No, sir.

Q. Have you ever seen a bottom hole pressure test from this area?

A. No, sir.

Q. Gas-oil ratio?

A. No, sir.

Q. Did you ever see any core analyses of any wells drilled in the Young Pool?

A. No.

Q. On what basis did you form your opinion that one well will not drain 40 acres?

A. What I have studied of red sands led to the conclusion. As far as I can see the samples given indicates that.

Q. Yet it is your opinion that because of changing conditions, it might be a dry hole or a very fine well?

A. It is very erratic.

Q. Mr. Bradish, where is 7A with reference to intersection line?

A. 25 feet north.

Q. Is that a customary "five spot" location?

A. I don't know.

Q. Do you know where this "five spot" is?

A. I believe 125 feet north of line, if I may read, I believe that--

MR. SPURRIER: Can you go to the map and find out?

(Witness went to map and indicates location.)

A. This No. 7 well isn't on this map. It doesn't show on this map.

CHAIRMAN SHEPARD: Are there any further questions?

You may be excused.

MR. HINKLE: I would like, if the Commission please, to have identified and to offer in evidence certified copies of orders heretofore entered by the Commission in a number of cases.

In fact, I believe, most all of the cases which have heretofore been decided by the Commission in connection with applications for "five spot" locations, and also would like

to offer at the same time a plat which has been compiled and which shows the different areas affected by these orders. Of course, I realize that this information is not necessary as far as the Commission is concerned. This is for the purpose of putting this information in the record in case this goes up to court for review. It would be a simple matter to place this information in the record at this time and less expensive for both parties concerned.

CHAIRMAN SHEPARD: Any objection?

MR. CAMPBELL: I have strenuous objection. If these orders are to be considered, the Commission should also consider certified copies of all other orders which have not followed this method of allocation. In my opinion we should confine our consideration to the pool which is here involved, not the fact that in other situations it may have followed that particular method of allocation. In this hearing the correlative rights of an adjacent owner are affected, a situation not present in previous cases. It is our opinion that what happened in other cases is wholly immaterial to this case. Each case is to stand on its own merits. I would further request counsel if he is going to offer the plat in evidence to state what the source of the plat is.

MR. HINKLE: It was prepared under the direction of Mr. McCurdy from orders which have been entered showing all "five spot" locations which have been granted, showing history, order number, case number, dates, names of applicants, spacing units involved.

MR. CAMPBELL: Legal 40-acre subdivisions with unorthodox "five spot" locations?

MR. HINKLE: Yes, colored areas showing unitization, and present production from 40-acres.

MR. CAMPBELL: We will state that we object to the introduction of this evidence as being wholly immaterial to this case. Buffalo Oil Company objects to the granting of this application as not being material here. Orders issued are questionable in this case and ask the Commission to deny admission to the evidence presented here with reference to the Young Pool.

MR. HINKLE: If the Commission care to permit the introduction of all other orders, we have no objection. If the counsel wants to present any other orders, we won't object. We do want these which show clearly the method followed. We are not asking any more. There are already numerous other cases. If the case goes on to appeal, we want the record to show clearly the action of the Commission in the various areas, and we think it is very material. I would like to offer these orders and the plat.

MR. McCORMICK: If it is appealed, this would probably not be necessary as the court would take judicial notice of the orders without their being in the record.

MR. HINKLE: I don't know of any decisions on that. I would be afraid to take a chance. I doubt if it would take judicial notice of the decisions of this Commission.

CHAIRMAN SHEPARD: The exhibits will be received. We will try to get all the information in the record. The court can strain it out.

MR. CAMPBELL: If these exhibits are to be admitted, we would like to have the opportunity of having certified copies presented of decisions contrary to this method of allocation.

CHAIRMAN SHEPARD: You may do so. Do you have any further witnesses?

MR. HINKLE: That is all of our case.

CHAIRMAN SHEPARD: We will recess until 1:30.

(The Commission accepted McCurdy's Exhibits B through K.)

(Noon Recess.)

CHAIRMAN SHEPARD: The meeting will come to order. You may proceed, Mr. Campbell.

MR. HINKLE: Excuse me, if the Commission please, I understand that there is a signed order for the Worth Drilling Company, which was heard yesterday. I would like to obtain a certified copy of that order and introduce it along with the others.

CHAIRMAN SHEPARD: Have it introduced by order number and that will be sufficient, order number rather than certified copy. Are there any objections?

MR. HINKLE: Let the record show that the Order \_\_\_\_\_ entered by the Commission in Case No. 210, Worth Drilling Company, be a part of the record in this case.

CHAIRMAN SHEPARD: Don't you feel that would be sufficient?

MR. HINKLE: Yes, sir.

W. E. SCOTT, having been first duly sworn, testified as follows:

DIRECT EXAMINATION BY MR. CAMPBELL:

Q. State your name?

A. E. E. Scott.

Q. Where do you reside?

A. Artesia.

Q. By whome are you employed?

A. Buffalo Oil Company.

Q. In what capacity.

A. Geologist.

Q. Have you testified on previous occasions before the Commission?

A. Yes, sir.

Q. You have testified on those occasions as a geologist?

A. Yes, sir.

MR. HINKLE: We will accept his qualifications.

MR. CAMPBELL: Will the Commission accept his qualifications on the basis of previous testimony?

CHAIRMAN SHEPARD: Yes, sir.

Q. Are you acquainted with the Young Pool in Lea County, New Mexico?

A. Yes, sir.

Q. For how long?

A. Since the completion of the first well.

Q. I hand you what has been identified as Exhibit B1 and ask you to state what it is, if you know?

A. It is a plat of the pool showing the locations of various wells which are producing within the legal 40-acre proration units within the pool.

Q. We would like to offer Buffalo Oil Company's Exhibit B1 in evidence.

MR. HINKLE: (Examined plat.) No objections.

CHAIRMAN SHEPARD: It will be admitted.

Q. Mr. Scott, referring to that plat, point out to the Commission and identify the wells of the Buffalo Oil Company in that area?

A. Buffalo Oil Company has one producing oil well in the Young Pool, that being their No. 1-X Cox. It is located 685 feet from the west line and 510 feet from the south line of Section 17. They also drilled No. 2 Cox 660 feet from south and west lines in that same section, which was a dry hole.

Q. Have you examined samples from all wells drilled in the Young Pool?

A. I have.

Q. Wells drilled by the Buffalo Oil Company and wells drilled by E. J. McCurdy?

A. That is right. That includes all producing and dry hole wells in that immediate area.

Q. Solely from examination of samples and study of logs, do you have an opinion as to the porosity and permeability of formations or the extent of drainage?

A. No, sir, I would not be qualified.

Q. Do you have any information as to structural conditions in the Young Pool?

A. Yes, sir.

Q. What is the basis of this information?

A. Examination of samples on all the wells correlation of correlative points from well to well.

Q. I hand you what has been identified as Exhibit B2, state what it is.

A. It is a Radioactivity Log of Buffalo Oil Company<sup>1</sup> No. 1-X Cox.

Q. We offer Buffalo Oil Company's Exhibit B-1 in evidence.

(Mr. Hinkle examined the exhibit.)

A. I might add on that log I have outlined my interpretation of the top of Queen Formation and the pay zone in that well.

MR. HINKLE: That is your interpretation. Not--you have put on the log your own interpretation where the red sand, queen sand is?

A. I put on there the top of Queen Formation, and the hand lettering shows where it is.

MR. HINKLE: The information in the hand lettering under the

red line and on top of it, that is your part, rather your interpretation.

A. Yes, sir.

MR. HINKLE: No objection.

CHAIRMAN SHEPARD: It will be admitted.

Q. I hand you Buffalo Oil Company's Exhibit B3 and ask you to state what it is, if you know?

A. That is a plat of the Young Pool contoured on top of Queen Formation.

Q. This is an interpretation of contours based upon your information of the history of the pool?

A. That is correct.

MR. CAMPBELL: I offer Exhibit B3 in evidence.

MR. HINKLE: (Looked at Exhibit B3) No objection.

CHAIRMAN SHEPARD: It will be admitted.

Q. I hand you Exhibit B4 and ask you to state what that is, if you know?

A. That is contour plat of the Young Pool. The contours showing the thickness of the pay zones in various wells as determined by sample examinations.

Q. That is your interpretation of the contours and pay thickness in the Young Pool?

A. That is correct.

MR. CAMPBELL: Exhibit B4 is offered in evidence.

MR. HINKLE: (Examined Exhibit B4.) No objection.

CHAIRMAN SHEPARD: It will be admitted.

Q. Referring to the Exhibit B4 and based upon your knowledge of the history of the pool, state to the Commission your opinion as to the structural conditions in the Young Pool and producing zone?

A. As contoured on top of the Queen Formation, the Young Pool indicates a slight nosing effect on the top of that formation. The Buffalo No. 1-X Cox actually reflects a slight closure on top of that formation is my opinion. That very slight closure is not a result of folding of the beds, but rather a build up of the sand in that area. The accumulation apparently is due to a stratigraphic type trap much more than it is structural, and the slight nosing probably has some effect not so much on an accumulation as a result of that you have a deposit of sand on the flange of this slight nose. The Young Pool is producing from a red sand formation in the upper part of the Queen Formation. Immediately underlying the main body of the Artesia Red Sand is the top member of the Queen Formation. The main body of the Artesia Red Sand is very silty sand, and nowhere does it indicate any productivity. The actual producing zone immediately underlies this main body of sand and is separated from the main body by limestone stringers, but is very similar in many characteristics to the main body. But within the limits of production of the Young Pool, this lower sand is clearer, less silty than the main body of sand.

Q. Have you had access to any information as to geological conditions in the Caprock Pool?

A. I examined a number of logs and samples in that pool.

Q. Based upon the facts of those logs and samples and your knowledge of conditions in the Young Pool, do you have any opinion as to the comparison of producing zones in the two pools?

A. The two pools are producing from sands of the Queen Formations, however, the Caprock Pool produces from the very

top of the Artesia Red Sand whereas the Young Pool produces from sand stringers below that main body. Actually the two pools are not producing from identical zones of sand.

MR. CAMPBELL: That is all.

CROSS EXAMINATION BY MR. HINKLE:

Q. Mr. Scott, how long have you been with the Buffalo Oil Company?

A. Approximately six years.

Q. Were you with them at the time they acquired the southeast quarter of the southwest quarter of section 17 on which No. 1-X is located?

A. I believe it was 1943 the Buffalo Oil Company purchased outstanding leases of Maljamar Oil and Gas Corporation. This lease was a part of that purchase. I went to work for Buffalo Oil Company some six months after that purchase.

Q. You know they had that lease at the time Mr. McCurdy drilled on the northwest quarter of section 20?

A. Yes, they did.

Q. Did you have samples on all wells McCurdy drilled?

A. Yes, sir, I have.

Q. You were familiar with the entire operation, acquainted with Mr. McCurdy's wells as far as the results of drilling these wells is concerned?

A. Yes, sir.

Q. From your examination of those logs and results obtained in drilling the wells and watching production, isn't it a fact, that you reached the conclusion that it was rather hazardous?

A. Yes, sir, in so far as defining the limits of the pool was concerned, that is true.

Q. You drilled a dry hole in the southwest of the southwest of section 17?

A. That is correct.

Q. The first well drilled on that acreage was a producer?

A. That is correct.

Q. How far north do you think, that 40 acres on which No. 1-X is located, do you think, in other words how far above that well could you drill and still get a producer?

A. From present information that would be very hard to say because the producing sand silts up or becomes impermeable rather rapidly as indicated by the presence of the dry hole offsetting our No. 1-S both to the east and to the west, and it would be suppositional to speculate on how far north the sand might remain clean and be reservoir sand.

Q. Is that same thing true going either east or west of the producing well?

A. East and west of our producing well are dry holes, which do limit the area to the extent of producing sand in those directions.

Q. You can't positively say how large the producing area is at the present time?

A. Exactly, no, sir. All I can do is to take thickness of sand as we know exists in pools that have been drilled and assume a very even body of clean sand, outside of slight nose, we can contour out and assume that is fairly accurate.

Q. The way you have it contoured?

A. Yes, sir.

Q. Your top contour on one exhibit which you have introduced shows pay thickness, you show highest contour to be a little bit south and east of your No. 1-X. Does that mean that the best production probably can be obtained there on account

of thickness?

A. That is probably true, yes, sir.

Q. Then the contours toward the north are going down, less thickness, that might indicate to you that you might not get production all over the 40?

A. You will notice going north those contours are dashed in, realizing, of course, it is a suppositional matter.

Q. In other words, it is impossible for you to say positively that that is the case?

A. I think the picture presented is a reasonable estimate of known facts.

Q. Now, do you know, Mr. Scott, when the McCurdy No. 1 well was completed?

A. I believe that No. 1 was completed in February 1945.

Q. According to the map introduced in evidence, it was Feb. 14, 1945, when it was completed. The plat also shows that well No. 2 was completed January 3, 1946; Well No. 3, May 31, 1946. When Buffalo Oil Company's No. 1-X was completed November 15, 1948, that was approximately 3 years and 10 months after the completion of McCurdy No. 1 well.

A. That is about right, yes, sir.

Q. Also approximately 2 years and 7 months after the completion of McCurdy No. 4 well?

A. That sounds about right, yes, sir.

Q. I believe you have testified after years of watching the results of the McCurdy wells, you considered this a hazardous area, and when you started to drill No. 1-X, it was 3 years and 10 months after the completion of McCurdy No. 1, you made application 330 feet from the lease line?

A. That is correct.

Q. Did Mr. McCurdy protest your geological survey for the drilling of that well?

A. He did.

Q. Mr. Scott, I hand you Mr. McCurdy's Exhibit K, which purports to be photostatic copy of a letter which you wrote to Mr. McCurdy, dated August 3, 1948, state whether or not that is your signature and if you didn't write the letter?

A. Yes, sir.

(Exhibit examined by Mr. Campbell.)

MR. HINKLE: I would like to offer the Exhibit K in evidence and read it to the Commission.

(Mr. Hinkle reads Exhibit K to the Commission.)

Q. Now, Mr. Scott, in connection with this same matter, that is the protest which Mr. McCurdy made to the Buffalo Oil Company's location for the drilling of 330 feet from the lease line, did you write this letter, under date of May 14, 1948, to Mr. John A. Frost, Artesia, New Mexico, I ask if this is a copy of a letter which you wrote?

A. I assume that it is, yes, sir.

MR. HINKLE: I would like to read this letter into the record, if you please. This is dated May 14, 1948, Buffalo Oil Company, signed by Wilton E. Scott.

"Dear Mr. Fost: Attached hereto you will find a Notice of Intention to Drill the Buffalo Oil Company No. 1 Cox, to be located in the Center SW $\frac{1}{4}$  SE $\frac{1}{4}$  SW $\frac{1}{4}$  section 17, T. 18S., R. 32E., Lea County, New Mexico. Since this is a Center 10 acre location, the purpose of this letter is to explain our reasons for applying for it rather than in regular Center 40 acre unit location.

"This proposed location is a direct north offset to the E. J. McCurdy, Jr. No. 1 Young, which was the discovery

well of the Young Pool. That well was completed in February 1945, with an initial flowing gauge of 47 barrels of oil in three hours from a total depth of 3783' with the pay being from the Artesia Red Sand of the Queen Formation. Our last information on that test was that it now pumps approximately 50 barrels of oil per day.

" After the completion of the No. 1 Young by McCurdy, the Minn-Tex Oil Company of Dallas, Texas, drilled their No. 1 Young in the Center SW $\frac{1}{4}$  SE $\frac{1}{4}$  of Section 17, which is a direct east offset to the unit on which we now propose to drill. This test was completely dry in the Artesia Red Sand, yet the sand itself appeared to carry as much porosity as that encountered in the McCurdy No. 1 Young. On the top of the Artesia Red Sand the Minn-Tex test was only 9 feet lower than McCurdy No. 1 and was one foot higher than McCurdy No. 2, located in the Center SE $\frac{1}{4}$  NW $\frac{1}{4}$  of Section 20 and 4 feet higher than McCurdy No. 3, located in the Center SW $\frac{1}{4}$  NW $\frac{1}{4}$  of Section 20, both of which were completed as producers. Structure does not, therefore, seem to be the basic reason for the accumulation in the Red Sand in this Field. It is our interpretation that accumulation is due to a shoreline or near shore line bar deposit of clean sand with a barrier of silt within the sand, causing the trap. Such a barrier must occur within the sand between the Min-Tex dry hole and the four producing wells on the McCurdy Lease in Section 20.

"Naturally further development towards the north of the present producers would be quite hazardous and it is our desire to reduce these hazards as much as possible by drilling as far south and west on this unit as permissible.

By drilling in the southwest corner of this 40 acres, we will only be 330 ft. north of our lease line. We do not

believe, however, that the McCurdy Lease to the south will suffer any drainage from such a location, as it is our information that his No. 1 Young has produced in excess of 60,000 barrels of oil and is now capable of producing only approximately one-half of its original potential. If any migration can be expected across the lease line, which is doubtful, we would expect it to be towards the south, rather than towards the north.

If there be any further information you might need before approving our application, please advise."

MR. CAMPBELL: If the Commission please, if this letter is a copy of a letter directed to Mr. John A. Frost, Director of the U. S. Geological Survey, the record should show that it came from the files of the U. S. Geological Survey.

MR. HINKLE: We have no objection to that.

CHAIRMAN SHEPARD: The record will so show.

Q. Now, Mr. Scott, you stated that this is a hazardous area, and you decided on that account to wait 3 years and 10 months before drilling No. 1-X. You weren't too much worried about drainage during that time with No. 1 well?

A. Well, we were possibly concerned about drainage, that was the reason that we were desirous of determining if any portion of our lease was productive even though the drilling of a well was a hazardous undertaking under the stratigraphic conditions we thought to exist.

Q. You failed to get the approval of the 330-foot location?

A. Yes, sir.

Q. You did get 510 feet from the north line of Mr. McCurdy's lease?

A. That's right.

Q. That is as close as you were permitted by the U. S. Geological regulations?

A. That is correct.

Q. When you did complete well No. 1-X, what did it result in initial production?

A. I don't have before me the initial production on that.

Q. It was a good well?

A. Yes, sir.

Q. In fact it is the best well in the Young Pool, is it not?

A. According to my interpretation, it has less pay than No. 1 Young of Mr. McCurdy. It is a good well. I don't know how it compares with his No. 1 at this time.

Q. I believe No. 1 well at the time you made the application had already produced about 60,000 barrels of oil?

A. I believe that is right, yes, sir.

Q. If it is a fact that you got a good well after waiting 3 years and 10 months and after No. 1 well had produced 60,000 barrels of oil, doesn't that indicate there wasn't any material drainage on account of production from No. 1 well?

A. That would be whether or not that location--would be a matter of bottom hole pressures. I do not have the information on bottom hole pressures here.

Q. I believe that you stated on direct examination, you couldn't express positive opinion that one well in this area would adequately drain a 40-acre legal subdivision?

A. At that time we had very limited information on the pool so far as bottom hole pressure was concerned. We had nothing to base any opinion on.

Q. Now, Mr. Scott, as you know it has been testified time and time again before this Commission, and the Commission

has found and entered a number of orders that is the case that one of these wells would not drain the 40-acre legal subdivision. Do you take a stand contrary to the stand taken by most all of the gentlemen on the Commission?

A. Looking at it strictly from a geological point of view, I don't think from a visual examination it is possible to state whether or not one well will drain 40 acres, or less or more.

Q. You can't state positively that it will?

A. From the examination of samples, no, sir.

Q. Has Buffalo Oil Company run bottom hole pressures on your well?

A. I believe they have.

Q. They have?

MR. CAMPBELL: I don't believe Mr. Scott has that information. Mr. Gray, our engineer does have since that is engineering information.

Q. This being a hazardous area as you have testified, a dry hole offsetting a producing well demonstrates that, can you state positively what type of well we would get on the "five spot" location?

A. No, sir, I could not state positively.

Q. It could be a dry hole, could it not?

A. It is possible. I wouldn't anticipate it.

Q. It could be a very small well?

A. It could be, yes, sir.

Q. Well, now, if that is the case, how can you state positively that the well it is proposed to drill will drain the Buffalo Oil Company's acreage in any respect?

MR. CAMPBELL: If the Commission please, the witness--

MR. HINKLE: I will ask, could he state.

CHAIRMAN SHEPARD: He may answer if he can.

Q. I will ask whether or not you could make a positive statement at this time that the proposed unorthodox well of Mr. McCurdy's, not knowing what kind and character of well it is going to be, will drain from the acreage of the Buffalo Oil Company in which is located well No. 1-X?

A. From a geological point of view, no, sir--would depend on allowable they gave it.

Q. It would depend on what it was capable of, small or large?

A. Allowable and withdrawal.

Q. Now, Mr. Scott, when was the first knowledge that you had that Mr. McCurdy had started this "five spot" well?

A. Well, I was advised by Mr. Ellis of our organization, which I believe was January 1.

Q. You had no previous knowledge that the well was being drilled?

A. I did not.

Q. Would your testimony be otherwise if Mr. Wilson should testify that he told you about the 22d or 23d of December that they had started drilling operations?

A. No, sir, my testimony would not be otherwise.

Q. You have no recollection of that conversation?

CHAIRMAN SHEPARD: Who is Mr. Wilson?

MR. HINKLE: Superintendent of production for Mr. McCurdy.

Q. Now, you keep a man, do you not, in charge of your lease out there at the producing well?

A. That lease is pumped by one of our men who lives at Maljamar.

Q. They couldn't very well have moved in on this "five spot" location without your man seeing them?

A. I think they could.

Q. It is open country. It would be easy to observe?

A. I am not aware of surface conditions. I imagine our man makes two trips to our well a day carrying out his duties of pumping that well. I doubt if he pays any attention to what Mr. McCurdy is doing. As a matter of fact, I doubt if he feels that that is part of his duties to see what is going on on Mr. McCurdy's lease.

Q. Now, Mr. Scott, I believe you testified that you made some notations, entries on that electrical, what do you call that?

A. Radioactivity log.

Q. That has been introduced in evidence, did you compare that, have you electric logs of the Caprock Pool made up in same way?

A. No, sir.

Q. You have no others in this area that you compared it with?

A. Not on radioactivity logs, no, sir.

MR. HINKLE: I think that is all.

REDIRECT EXAMINATION BY MR. CAMPBELL:

Q. When you wrote this letter to Mr. McCurdy, August 3, 1948, did you receive a reply?

A. Yes, sir.

Q. Enclosed in that reply was a copy of a letter from Lester S. Grant?

A. Yes, sir.

MR. CAMPBELL: I would like to read a copy of this letter into the record. Is there any question as to this letter? Do you have a copy of it, Mr. Hinkle?

MR. HINKLE: Yes, sir.

MR. CAMPBELL: McElroy Ranch Company, Oil Production and Royalties, Cattle Growers, 114 Leggett Building, Box 912, Midland, Texas, Lester S. Grant, Manager, August 9, 1948. (to) Mr. E. J. McCurdy, Jr., 1602 Fair Building, Fort Worth, Texas. Dear Mr. McCurdy: "Replying to the letter received from the Buffalo Oil Company geologist, Mr. Wilton E. Scott, and which you handed me in Fort Worth:

"The argument of Mr. Scott regarding the underground conditions along the line of our Young Lease and the Buffalo property seems to be one of having made the conditions fit his case, as I do not believe it possible that any geologist can say where there is or where there is not a silting up in any of those sands. I am entirely unimpressed by his argument. Mr. Scott also says that they wish to recover only the oil under their acreage. There is one simple and sure way to insure this and that is for them to conform to the pattern already established. We certainly recommend that you take such action as is necessary to prevent them from drilling on a location 330 feet from our line. That a geologist can tell that there will be a change of formation within 330 feet is too ridiculous to need comment.

"While we would have no objection to meeting Mr. Scott and his people before the Supervisor of the United States Geological Survey at Roswell, we see no need whatever for the meeting as the law is clear on the matter and the expenses of attendance by you or other representative of the Joint Account would be considerable and should be borne by them in such case.

"With kindest regards, Sincerely yours, /s/ Lester S. Grant."

Q. Is that your recollection of the letter--copy of letter--

enclosed with the reply?

A. Yes, sir.

Q. Mr. Scott, at the time you wrote the letter, did you anticipate any request for production from 40 acre legal subdiviion in excess of top unit allowable?

A. No, sir.

Q. When you wrote this letter, what was your opinion as to whether your company had suffered drainage from 40 acres?

A. We were fearful of that, and although we recognized the fact that the limits were hard to define, at that time we decided that the risk involved was worth attempting to protect our rights in our lease.

RE CROSS EXAMINATION BY MR. HINKLE:

Q. Mr. Scott, as a matter of fact, Mr. Grant's letter has been shown to be good. You got back and got a good well, have you not?

A. His letter is shown to be true in that a geologist can not anticipate from visual examination exact limits of a pool.

Q. That goes to show all the more the uncertainty, you can't testify postively one well is going to drain 40 acres?

A. I think that would clearly illustrate from what information we had, it was impossible to limit pool at that time. I don't see where drainage has anything to do with limitations of producing sand.

Q. Do you know whether or not the northeast quarter of section 20 will produce?

A. I haven't studied that situation. I wouldn't be prepared to state whether or not it would produce.

Q. Is it possible for you to say what any unproven portion

will produce?

A. No, sir.

Q. Because of erratic conditions?

A. Any unproven portion, no, sir.

MR. MORRELL: I am Foster Morrell of the United States Geological Survey. I have something to add to this application. This is in respect to receiving evidence, admission of evidence. I am not testifying. It is in reference to admissibility of evidence. A letter was introduced, dated May 14, 1948, signed by Wilton E. Scott, to Mr. John A. Frost, U. S. Geological Survey, Artesia, New Mexico, to which Mr. Campbell made reference that it was from the files of the U. S. Geological Survey. I would like to say that that letter was obtained without my information or consent. From that standpoint it is not official. I would ask that it be withdrawn.

MR. HINKLE: It was admitted on the answer of the witness if he had written such a letter.

CHAIRMAN SHEPARD: We admitted it. Let it stand as introduced.

RALPH L. GRAY, having been first duly sworn, testified as follows:

DIRECT EXAMINATION BY MR. CAMPBELL:

Q. State your name, please.

A. Ralph L. Gray.

Q. Where do you reside?

A. Artesia, New Mexico.

Q. By whom are you employed?

A. Buffalo Oil Company.

Q. In what capacity?

A. Assistant Superintendent and Petroleum Engineer.

Q. Have you testified before the Commission before?

A. I have.

Q. On those occasions you testified as a petroleum engineer?

A. I did.

CHAIRMAN SHEPARD: His qualifications will be accepted.

MR. HINKLE: We will accept his qualifications.

Q. Are you acquainted with the Young Pool, Lea County, New Mexico?

A. Yes, sir.

Q. In your capacity as petroleum engineer did you have occasion to take bottom hole pressure tests of Cox 1-X well in the Young Pool?

A. We have taken several pressures.

Q. You maintain records of the tests?

A. Yes.

Q. Will you give the results of the bottom hole pressure tests of that well?

A. An initial bottom hole pressure test was taken December 4, 1948, before well was completed but the pressure at a depth of 3600 feet was found to be 1,022 pounds per square inch, correction, sea level datum, which is near pay section, pressure would be 1,072 pounds per square inch. The well was shut in 72 hours before taking pressure. Another pressure test was taken in July 1949 and pressure was found to be 947 pounds per square inch at a depth of 3750 feet. A third pressure was taken in January 1950, which showed 933 pounds per square inch at 3750 feet.

Q. Have you had occasion to take gas-oil ratio tests on Cox No. 1-X?

A. We have.

Q. Do you maintain records of those tests?

A. Yes, sir.

Q. Give the Commission the data on those?

A. Our first gas oil ratio test was made January 19, 1949, the well produced 45 barrels of oil in 11.2 hours, with a gas oil ratio of 322 cubic feet per barrel. On July 12, 1949, another test was made. The well produced 50 barrels of oil in 12.8 hours, with a gas oil ratio of 466 cubic feet per barrel. Another test was taken January 10, 1950. The well produced 52 barrels of oil in 14 hours, with a gas oil ratio of 944 cubic feet per barrel.

Q. What is the limiting gas oil ratios in the Young Pool?

A. 2,000 cubic feet per barrel.

Q. Do you know the gas oil ratio of the Young Pool?

A. Yes, we have knowledge of tests made by McCurdy on their Young No. 1.

Q. I believe you testified--do you recall the bottom hole pressure test at that time, what was the result of that?

A. The test was made at a depth of 3700 feet, which is 50 feet higher than sea level datum we use correcting downward oil gradient to put it on same basis of comparison with other bottom hole pressures. It would be 1229 pounds per square inch.

Q. That was in March 1946?

A. Approximately that is right.

Q. How long had the well be producing prior to that time?

A. It had been producing over a year.

Q. Now, Mr. Gray, have you made any analyses of reservoir conditions based upon tests you have taken and information available?

A. We have made an analysis.

Q. This is your interpretation of available facts as to reservoir conditions?

A. Yes, sir.

Q. Will you state how the analysis was made and the results?

A. There are methods for detecting oil drainage other than just mere guess work, the migration of oil or drainage, commonly speaking. Studies of reservoir pressures, reduction in reservoir pressure is evidence that some drainage has occurred. The movement of oil from an area of relatively high pressure to an area of low pressure. Once differential in pressure is established in reservoir tendency, equally reach state of equilibrium, movement of oil flows from high pressure to low pressure area. In the latter part of 1948 the Buffalo Cox No. 1-X well was completed. The offsetting McCurdy lease had four producing wells. Those wells had produced a total of 139,943 barrels, of which the No. 1 well which offset our Cox No. 1-X produced a total of 58,429 barrels. Before Cox No. 1-X was ready for production, it was shut in for 72 hours, and a bottom hole pressure was taken as I have previously stated. The pressure was found to be 1,072 pounds per square inch at sea level datum plan. This pressure is approximately 338 pounds lower than initial reservoir pressure, which was approximately 1410 pounds per square inch. This large decline in pressure on the Cox Lease shows that some oil had been drained from our lease before our well was drilled.

Q. Do you know what methods were used in arriving at the original bottom hole pressure since no test was taken?

A. That is right, no actual pressure was taken in initial reservoir. In our study we have found pools in Lea County,

which have similar producing depths have initial reservoir pressures which fall within very close range of one another. We took several pools, in fact took all the pools in Lea County, which have initial reservoir pressure established, which are taken and all engineering reports of Lea County Operators. Pressure gradients of pools producing at depths similar to the Young Pool, and took average pressure in pounds per foot of depth, which was found to be .376 pounds per foot of depth; this was used to calculate initial pressure in the Young Pool.

Q. Did you use any other methods to obtain these facts?

A. We did. 1410 pounds per square inch, to check that figure we used information which was developed on our Cox No. 1-X. The pressure decline to January 1950 in our well amounted to 139 pounds per square inch. This corresponded to 122 barrels of oil for each pound of drop in bottom hole pressure. The same amount of decline applied to McCurdy's lease, using the pressure it established, 1292 pounds per square inch, which figure we had obtained from the records, the amount of production that well produced up to that time; this was found to be 23,122 barrels of oil. The drop in bottom hole pressure calculated the No. 1 Young--22,132 by 122 pressure decline found in our well, and that gave us a decline of 190 pounds per square inch. Then the initial reservoir was established by adding this figure--1229 pounds, which gives initial pressure 1491 pounds per square inch--very close agreement with our first estimate.

Q. Based on the analysis of information of bottom hole pressure of Cox No. 1-X well and a bottom hole pressure test of McCurdy No. 1 well immediately offsetting, what conclusion

did you reach as to drainage at that time?

A. Well, in view of the fact that a large amount of oil had already been withdrawn from the offsetting McCurdy Lease, we knew reservoir pressure had been reduced substantially and we would suffer drainage because of the fact the pressure was lower than the initial pressure, and we had already lost some production from under our lease. Should McCurdy be permitted to increase withdrawals from 40-acre unit offsetting ours, we certainly would suffer additional drainage.

Q. What would be the effect of production of an additional well in the 40 acres immediately offsetting your acreage at this time?

A. Well, if another well is completed on the 40 acres offsetting ours, and an additional allowable given it in addition to No. 1 well, it would result in unequal withdrawals from our 40 acres--more withdrawal from the McCurdy Lease than from our lease. That in itself would cause unequal depletion of reservoirs, which changes the oil to migrate from our lease to McCurdy lease.

Q. What effect--what is the extent of the pressure area?

A. Another well would enlarge the area of low pressure, and when you enlarge low pressure area, you permit a wider area to be effected by drainage from that lease, from that unit.

Q. What effect does the rate at which a well is produced have on reservoir conditions?

A. The rate has a very large effect upon your pressures, of course, as you increase withdrawals from the reservoir, increase the rate of withdrawal, the reservoir pressure is depleted correspondingly faster.

Q. Mr. Gray, have you made computations as to estimated recovery under McCurdy No. 1 well?

A. I have.

Q. Explain to the Commission that computation.

A. It was our intention to determine what would be reasonable recovery figure for 40 acres on which No. 1 Young is located. For this purpose our calculations we used average pay thickness of 12 feet, which we feel is ample, maybe even thicker than average would be as can be found on pay thickness. We assumed an average porosity of 15, a content of water of 25 per cent, and assumed that they would recover 22 per cent of the oil in place. Using these figures, the amount of oil which would recoverable was calculated to be 2310 barrels per acre, or assuming one well would drain 40 acres, the well should recover about 92,400 barrels of oil as of January 1, 1950. Assuming again that No. 1 Young well will drain 40 acres, the well has already recovered a total of 1815 barrels per acre, which is a very substantial part of total ultimate recovery which we estimated would be produced. We feel that additional evidence that this well will drain at least 40 acres possibly more. Even assuming that the well will drain 40 acres, it is very evident that it will recover substantially more oil than our calculations showed it should recover.

Q. The pay thickness you used was 1 foot less than that testified to this morning?

A. I used the figure 12. It has been testified that the pay thickness is 13 feet, but the pay thickness in all directions from No. 1 well varies some, so we thought 12 would be liberal average for total 40-acre unit.

Q. The fact that on computations the amount of oil heretofore

drained through No. 1 well is 1815 barrels per acre and the ultimate amount is 2310 barrels per acre, what does that indicate as to drainage?

A. It indicates that they have already recovered close to the total amount recoverable, and the well producing at top allowable indicates that they can very reasonably expect quite a great deal more oil to be recovered, and probably will drain more than the 40 acres.

Q. Based upon your knowledge of this pool, what is your opinion as to the effect upon the reservoir of assumed production of a top allowable well at the location which is proposed?

A. The producing of another top allowable well from No. 5 well would increase amount of oil withdrawn from the 40-acre unit on which the well is located. As previously explained, any increase in permitted withdrawal from the 40 acres would cause us to lose a volume from our 40-acre unit.

Q. You 40-acre unit has received one top unit allowable in all?

A. Yes, sir.

CROSS EXAMINATION BY MR. HINKLE:

Q. Mr. Gray, I don't understand all your figures. These conclusions you have are wholly your own?

A. These conclusions are based on engineering data that we possess.

Q. Are these public record on figures?

A. The figures that I have used are public record. However, those that are developed through calculations are not.

Q. The bottom hole pressure figures are taken from public records?

A. Yes, sir, filed--gas oil ratio figures are on state forms.

State Form C116 we filed with the Commission of the pressure data, I am quite sure that is in the Lea County Operators' files.

Q. Do you know what the bottom hole pressure is on the McCurdy wells is at the present time?

A. No, sir, I do not.

Q. It could be as low or lower than that of the Buffalo well?

A. I would not make any predictions. There is no point in guessing. I assume on all McCurdy wells it is much less than ours withdrawals have been considerably more.

Q. You can not state from oil gas ratios taken on just one well what whole field--or what drainage across lines would be?

A. I can state that the drainage will be from area of high pressure to low pressure, migration of the oil is in that direction.

Q. How can you tell?

A. We can tell--we have all agreed that this is a volumetric type reservoir. One of the recognized characteristics is as you produce oil, pressures decline. The more oil withdrawn the more decline. The more oil withdrawn from any particular area, the lower the pressure.

Q. That would be true if the permeability and porosity carried that far?

A. We feel that the permeability does carry since the pressure on our 338 initial reservoir pressure reduced, it could only mean that there was oil draining from under the lease.

Q. Isn't it a natural thing for pressure to drop as you produce?

A. Our initial pressure test was made before the well was put in operation.

Q. It dropped after that?

A. Yes, sir, after it had been in production.

Q. That is a natural condition?

A. That is right.

Q. You don't propose to tell this Commission that the unorthodox well that Mr. McCurdy is drilling is going to be a well, or the size of that well--it is possible to be a dry hole or a small well--in that case how could it drain the Buffalo Oil Company's lease?

A. We don't propose to say what type well it will be, but we do say if withdrawals from under the 40-acre unit are increased, we would suffer. If they assign No. 5 well top allowable, certainly withdrawals from under the unit would be increased.

Q. Isn't it true that the well approximately in the center would drain also from other units, not all northeast of northwest?

A. Certainly it all comes from one pool, might say most of it would.

Q. Isn't it a fact that No. 1 zone of interference makes it impossible to drain beyond that, beyond any other wells?

A. No, sir, what happens if No. 5 is produced, it sets a comparatively low pressure area which surrounds that particular well bore. The same as there is around there a low pressure area which extends approximately, you might say, in a circle around a well. If you want to get ideal use particularly as you create more low pressure areas, they tend to tie into one and enlarge the low pressure area and increase the distance away from that point that would be affected by withdrawals from that area.

Q. That same thing holds true on No. 1 and also on your

well being located as it is, the boundary of the circle you have drawn is farther than Mr. McCurdy's circle will extend around on your lease?

A. You have to follow contour lines of equal pressures, as I mentioned before, we don't have present pressures on Mr. McCurdy's lease. We assume that the pressure is much lower under his lease with a lower pressure area around the well bore of No. 1 well. You have considerable reservoir pressure under that 40-acre unit at all points.

MR. HINKLE: I believe that is all.

MR. CAMPBELL: No questions.

MR. SPURRIER: Mr. Gray, do you know whether Buffalo Oil Company paid compensatory royalty to the Government during those 3 years there was no offset?

A. I am not prepared to answer. I don't know whether they did or not. Possibly one of the other representatives would know.

CHAIRMAN SHEPARD: The witness may be excused.

H. G. ELLIS, having been first duly sworn, testified as follows:

DIRECT EXAMINATION BY MR. CAMPBELL:

Q. State your name, please.

A. H. G. Ellis.

Q. Speak up, please.

A. I have a bad throat.

Q. Where do you reside?

A. Artesia, New Mexico.

Q. By whom are you employed?

A. Buffalo Oil Company.

Q. In what capacity?

A. Vice-president in charge of production.

Q. Do you have available the information as to the cost of Cox No. 1-X and costs of wells in the Young Pool?

A. I do.

Q. The source of that information is the records of the company?

A. It comes through the books of our company, actual expenses.

Q. Those are records upon all wells drilled in the course of their business?

A. That is right.

Q. Based upon that information state last cost of No. 1-X Cox?

A. Cox No. 1-X cost \$33,689.75

Q. What is production cost?

A. Fifteen cents a barrel.

Q. At time of drilling of the well, were any unusual conditions encountered to affect the normal cost of a well?

A. Contract, lost first hole at 700 feet. We compensated them about, as I recall, about a thousand dollars.

Q. How did the cost of No. 1-X compare with the dry hole?

A. The dry hole cost \$22,088.09, and from that well we recovered most of the casing.

Q. In your opinion has there been any appreciable change in the cost of drilling during the past--since your well was drilled?

A. No, no appreciable change.

Q. Based upon present price of crude oil and understanding there are royalty payments of approximately 15 per cent of your well, what period of time would it take to pay out to your company on the basis of 16 barrels per day?

A. It would take about 3 years.

Q. At 10 barrels per day?

A. About 5 years.

MR. CAMPBELL: That is all.

CHAIRMAN SHEPARD: We will take a five minute recess.

(Recess.)

CHAIRMAN SHEPARD: The meeting will come to order.

MR. HINKLE: If the Commission please, we have two witnesses whom we would like to have testify. Their testimony will be short as far as we are concerned.

R. T. WILSON, having been first duly sworn, testified as follows:

DIRECT EXAMINATION BY MR. HINKLE:

Q. State your name.

A. R. T. Wilson.

Q. Where do you live?

A. Artesia, New Mexico.

Q. Are you employed by Mr. E. J. McCurdy?

A. Yes, sir.

Q. In what capacity?

A. Production superintendent.

Q. How long?

A. Since 1940.

Q. Have you spent all that time in New Mexico?

A. No, sir, not all the time.

Q. When did you first come to New Mexico with Mr. McCurdy?

A. 1946.

Q. Where were you prior to 1946?

A. Lockridge, Idaho.

Q. Were you there in connection with Mr. McCurdy's business?

A. Yes, sir.

Q. Have you had complete charge of production since 1946?

A. Yes, sir.

Q. You are familiar with his property in the northwest quarter, section 20, township 18 south, range 32 east?

A. Yes, sir.

Q. You are acquainted with all the wells, conditions that exist, and production from wells, and how they are produced?

A. Yes, sir.

Q. As wells No. 2, 3, and 4 declined, do you know whether or not Mr. McCurdy gave any thought to drilling a "five spot" well?

A. Yes, sir, we did.

Q. Did you make any investigation to see if it was feasible to drill such a well?

A. Yes, sir.

Q. Did you make any tests?

A. Yes, sir, I made an interference test.

Q. What do you mean by that?

A. Filling one hole completely full of fluid while other wells pumped.

Q. You would take one well, fill it with fluid, and produce other three wells?

A. Yes, sir.

Q. For how long a period of time?

A. Approximately 17 hours.

Q. Did you take each well successively?

A. Yes, sir.

Q. What were the results of the test?

A. After 17 hours our offset No. 4 pumping with No. 1

completely full of oil. After 17 hours it was still full of oil indicating no interference between the two wells.

Q. What did the other wells show?

A. They showed approximately the same thing. That column indicated to me that it had at least 1275 pounds bottom hole pressure or that hole would have taken the fluid.

Q. In other words, the contents of that column would have gone back into the formation?

A. Yes, sir, certain amount of it.

MR. HINKLE: That is all.

CHAIRMAN SHEPARD: Any cross examination?

CROSS EXAMINATION BY MR. CAMPBELL:

Q. Are you an engineer?

A. No, sir, I am an electrical engineer.

Q. Was 17 hours the longest interference test you made on any occasion?

A. Yes, sir.

MR. CAMPBELL: That is all.

CHAIRMAN SHEPARD: You may be excused.

MR. HINKLE: I want to recall Mr. John Kelly for a question or two.

MR. HINKLE: May I ask Mr. Gray one question? What kind of test did you make on No. 1 with regards to bottom hole pressure, just how did you take that test?

MR. GRAY: The first test was made before the rods--it was made with Humble Bomb. The other measurements were made by an Edrometer device.

REDIRECT EXAMINATION OF MR. KELLY BY MR. HINKLE:

Q. Mr. Kelly, you are the same witness who testified in this case this morning?

A. I am.

Q. You have heard the testimony of Mr. Gray in regard to bottom hole pressures, oil and gas ratios?

A. I have.

Q. State whether or not these tests made in Buffalo Well No. 1-X are indicative of conditions that may exist in respect to the reservoir or area?

A. With respect to these tests which were conducted by Mr. Gray, I would state in my opinion in the southeastern part the volumetric drive fields, these tests show normal conditions. Gas-oil ratio increases with production of oil from the reservoir, therefore, I would state they probably show a normal condition. I do not believe testing just one well would indicate the condition of the field as a whole due to erratic condition of the reservoir.

Q. You have also heard the testimony of Mr. Wilson in regard to interference tests, what are your conclusions as to bottom hole pressures?

A. It would occur to me that the test of the McCurdy wells is equivalent to the weight of the column of oil which figured around 1275, which is higher than pressures as shown on the offsetting lease. This is standard data of a normal volumetric drive field.

Q. Is it your opinion that most of the Young Pool is erratic?

A. As erratic as a field could be.

Q. Was bottom hole pressures of No. 1 well and No. 1-X Buffalo, the wells which are involved--do you recall the testimony as to bottom hole pressures of No. 1 McCurdy well?

A. Yes, sir.

Q. Did he testify as to more than one well?

A. He testified, to my knowledge, to 1229 pounds per square inch in 24 hours in No. 1 well and 1072 pounds per square inch in 72 hours in Buffalo well to answer the question about pressures taken in two wells, that is all.

MR. HINKLE: I believe that concludes our case.

CHAIRMAN SHEPARD: Any other testimony?

MR. CAMPBELL: No, sir, I have a statement to make when the Commission wishes to hear it.

CHAIRMAN SHEPARD: Mr. Hinkle, do you have a statement you would like to make?

MR. HINKLE: I don't know whether the Commission would like to hear argument on this unorthodox location, but if you will give me a little time and listen, I would like to make a few remarks as briefly as I can. I think that the evidence which has been introduced on behalf of Mr. McCurdy shows conclusively that the correlative rights, so to speak, of the Buffalo Oil Company will not be infringed upon by the drilling of the proposed well on the unorthodox location on the northwest quarter of section 20. All the testimony here has been to the effect that one well will not drain a 40-acre legal subdivision. As you well know, mention has been made repeatedly that it is found that the red sand is the area of production. I believe that is the generally accepted theory among geologists, a few disagree, but as a whole you find all agree on that principle. Mr. Scott also stated plainly twice in two letters when they made application to the United States Geological Survey to locate a well 330 feet from the McCurdy line that there would likely not be any drainage across lines. He didn't make any statement. His testimony, as I take it today, was almost the same thing.

I don't see how the Commission can reach any other conclusion than to grant this application of Mr. McCurdy. I think it would be eminently unfair to Mr. McCurdy not to grant the application as the Commission has approved other "five spot" locations as it has and in virtually the same situations as in this instance, and it would be unfair to treat him any differently from the way the Commission has treated all other applicants in connection with the "five spot" locations. The principle of "five spot" locations is one which should be encouraged, not contradicted. It will make possible recovery of oil that would not otherwise be recovered from drilling regular locations. I think it is a sound policy and one which should be encouraged by the Commission so that the greatest recovery of oil can be obtained, especially in cases such as this where the wells are marginal wells, so to speak. I think the testimony has supported the case with a preponderance of evidence for the application. I don't think there is any question beyond a shadow of a doubt about this. I think it would certainly be unfair and unequal if this should not be granted in face of the fact that the application has already been granted.

MR. CAMPBELL: If the Commission please, I find it necessary to again express the opinion and feeling of the Buffalo Oil Company that this case does not involve "five spot" drilling. This case in our opinion involves one proposition wherein allocation is contemplated. Assuming top or any degree less than top is obtained, it is uncompensated drainage from the Buffalo lease. That is the sole question in cases which have been heretofore and may hereafter be presented. That finding can be made so as not to drain from adjacent acreage. As to the proposition presented that one well will never drain

40 acres, I think that is not exactly correct. I think it is unfortunate if they have come to that conclusion. It has not been too long ago that a number of very reputable men appeared before this Commission and contended that it certainly would drain 80 acres. I don't think it can be determined except upon each application within each pool. When that comes about, the question of whether five wells or 10 or 15, how produced, and how allowable is to be given as relating to correlative rights--these rights of adjacent lease owners. That is our position. The only testimony we had to offer was meager, to say the least. Everybody realizes the analysis Mr. Gray made is based upon all available information and is a reasonable one sustained at least by some testimony given before. The testimony does show that this will, on the basis as proposed, result in uncompensated drainage to Buffalo Oil Company.

MR. J. O. SETH: I appear in behalf of Amerada Petroleum Company. They asked me to make this statement:

"An extra well on a proration unit should not be allowed where the existing well is capable of making the full allowable. If an extra well is permitted to be drilled on a proration unit, it should only be for good cause shown after notice and hearing before the Commission. In the event any operator, after such hearing, drills more than one well to the same producing horizon on any authorized proration unit and in accordance with the rules and regulations or special orders of the Commission, the additional well or wells on the unit should not result in the allowable oil or gas production for such unit being increased above the amount which such unit would receive from one unpenalized top unit allowable well on the unit."

Stanolind Oil and Gas Company would like to submit the following letter:

"Subject: Rehearing Case No. 205, Order No. 848, New Mexico Oil Conservation Commission. (To) State of New Mexico Oil Conservation Commission, Santa Fe, New Mexico. Gentlemen:

"This will have reference to Case No. 205, Order No. 849, as well as Order R-5 granting Buffalo Oil Company's motion for rehearing on Case No. 205.

"At the outset, Stanolind Oil and Gas Company would like to respectfully point out that it has no immediate interest in the Young Pool nor in the area immediately surrounding. Stanolind does feel, however, that the consequences of Order No. 849, if allowed to stand unmodified, may establish a dangerous precedent throught the State of New Mexico and eventually lead to the complete disruption of the present system of forty (40) acre unit allocation in this state.

"We respectfully invite your attention to the next to last paragraph of Order No. 849 which reads as follows: "Provided however, that the production from the five wells shall be prorated and never be allowed to produce in excess of the allowable for four regular 40-acre tracts as now or may hereafter be allocated to the Young Pool - -." At its face value this paragraph does not appear particularly offensive; however, if one delves into and regards it closely, it is seen that the ramifications are widespread. We have made a thorough study of the order and, in our opinion, it has the following objectionable implied provisions:

"1. It sets up a lease allowable as opposed to the 40-acre unit allowable.

"2. It allows the lease, when the productivity of one

or all of the wells thereon decreases to the "stripper" stage, a decided advantage over the offset leases due to the fact that allowable at such time will then be on a "per well" basis.

"3. It tacitly approves the taking of the entire lease allowable from any one of the five wells which in turn would permit the operator to take the entire lease allowable from one of the outside wells and, in so doing, effect immediate drainage from the offset lease or leases.

"4. It allows this lease to drain more than its fair share of the reserves, therefore, not protecting correlative rights.

"5. It allows the drilling of wells which will not increase ultimate recovery, thereby resulting in waste of natural resources, and, in so doing, reducing the resources available for the finding and developing of additional reserves.

"6. It tends to jeopardize the entire system of forty (40) acre unit allocation in New Mexico.

"We respectfully urge the Commission to set aside this order or, in the alternative, to modify same to the end that production will be allocated on the forty (40) acre unit basis. Yours very truly, /s/ C. F. Bedord."

MR. BOB ADAMS: The Continental Oil Company, although not involved in this case, wishes to make a voluntary statement for the record, and with your permission I will read it into the record: "That in general it is opposed to the granting of an allowable to an acreage (or production being from the same horizon) which will permit the production of more oil from a 40 acre tract in that acreage than would normally be top allowable for it as a 40 acre proration unit. Continental

is of the opinion that any deviation from the 40 acre pro-  
ration unit should be done with caution and only in special  
cases which are in the interest of conservation."

MR. EDWARDS: Letters testifying as to "five spot" location,  
I don't think should be taken into consideration in this case.

CHAIRMAN SHEPARD: Everybody may state his position.

Anyone else? Mr. Morrell? Mr. Staley?

MR. SPURRIER: I have a letter, rather a telegram from  
Humble Oil & Refining Company, which I will read:

"Midland, Texas, February 6, 1950. Mr. R. R. Spurrier,  
Conservation Commission, State of New Mexico, Santa Fe,  
New Mexico. With reference hearing February 8, Order 849,  
Humble Oil & Refining Company approves the right of any  
operator to drill as many wells on any 40-acre unit as he  
may desire to drill provided the location of such wells is  
in accordance with the rules and regulations or the special  
orders of the Conservation Commission, and further provided  
that the drilling of such additional wells will in no event  
result in the allowable from any 40-acre unit being increased  
above the amount which such 40-acre unit would receive from  
one unpenalized top unit allowable well completed on the unit  
stop To permit the allowable of any 40-acre unit to be in-  
creased above unpenalized top unit allowable jeopardizes the  
15 year old system of allocation in Lea County and contravenes  
Section 13 of which the Conservation statutes by creating  
waste in forcing operators to drill wells which are not  
reasonable necessary to secure their proportionate share of  
the production. /s/ HUMBLE OIL & REFINING COMPANY, BY:  
J. W. HOUSE."

MR. MORRELL: With these generalized statements, I merely would

like to comment in Lea County, many aren't familiar with the elements you have under Commission Orders, there are many large pressure units in which wells exist which can drain in excess of 40 acres and where they don't, they are under unitization. What is involved is the right of the Commission to set its spacing allowable for proration unit allowable-- for proration single unit and for unitization, for the Conservation Commission to set any unit for proration purposes.

CHAIRMAN SHEPARD: Does anybody have anything further?

I regret at this time not to decide this case and deviate from our usual practice of deciding on the spot, but I don't know anything about it, and I am sure Mr. Spurrier doesn't either. We will make a decision within a week or so. If there is nothing further, we will stand adjourned.

- - -

### C E R T I F I C A T E

I hereby certify that the foregoing is a true and correct transcript of the proceedings before the New Mexico Oil Conservation Commission, 10 o'clock, A.M., Santa Fe, New Mexico, February 8, 1950, to the best of my knowledge, skill and ability.

Dated this 28th day of February, 1950, at Albuquerque, N.M.

Margaret Powell  
REPORTER