BEFORE THE

Oil Conservation Commission

SANTA FE, NEW MEXICO

August 18, 1954

IN THE MATTER OF:

CASE NO. 729 - Regular Hearing

TRANSCRIPT OF PROCEEDINGS

ADA DEARNLEY AND ASSOCIATES

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ALBUQUERQUE, NEW MEXICO

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
August 18, 1954

IN THE MATTER OF:

Application of the Commission, upon its own motion to consider an order promulgating rules and regulations affecting and concerning the Fulcher-Kutz - Pictured Cliffs Gas Pool, the Aztec - Pictured Cliffs Gas Pool, and the South Blanco-Pictured Cliffs Gas Pool situated in San Juan and Rio Arriba Counties, New Mexico.

The matters to be considered in the above-styled case will pertain to gas-pool delineation and definition, gas proration gas well spacing, gas well allowables, gas proration units, and related matters, affecting and concerning the Fulcher-Kutz Pictured Cliffs Gas Pool, and the South Blanco-Pictured Cliffs Gas Pool in San Juan and Rio Arriba Counties.

Case No. 729

BEFORE:

Honorable Edwin L. Mechem
Mr. E. S. (Johnny) Walker
Mr. William B. Macey

TRANSCRIPT OF HEARING

MR. MACEY: The next case on the docket is Case 729. Does anyone have any testimony to offer in Case 729?

MR. HOWELL: El Paso Natural Gas Company has some testimony to offer, we have some. Perhaps we can take a short recess.

(Recess.)

MR. MACEY: We will come to order.

F. N O R M A N W O O D R U F F ,

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

DIRECT EXAMINATION

By MR. HOWELL:

Q Will you state your name to the Commission?

A F. Norman Woodruff.

Q What is your position, if any, with El Paso Natural Gas Company?

A I am a Petroleum Engineer in the Reserve Contract Section in Houston.

Q Have you testified previously before this Commission, giving your qualifications and training as an engineer?

A I have.

MR. HOWELL: Are the witnesses qualifications acceptable as an expert witness?

MR. MACEY: They are.

Q Mr. Woodruff, what is the nature of the studies which you have made, or supervised in the making, with reference to the Pictured Cliffs Pools in San Juan County, known now as the South Blanco-Fulcher-Kutz and the Aztec?

A Our company makes continuing studies of these pools, since they are sources of gas to supply our requirements. In an effort to better show the Commission both the pool delineation and an effort to establish appropriate means of allocation, we made studies and have exhibits on the board showing iso-potential evaluations, that is we have plotted on this map --

Q (Interrupting) Will you go there and mark as El Paso

Natural Gas Exhibit No. 1, the map that you are referring to and then refer to it as Exhibit No. 1?

(Marked El Paso Natural Gas Company's Exhibit No. 1, for identification.)

Q Will you state how that map was made and whether it was made under your supervision and direction or not and what is shown on Exhibit Number 1?

A It was made under my supervision and direction. On this map is shown the initial potential for each of the Pictured Cliff Wells which were completed and for which tests were available, as of July 1, 1954. Then we have contoured this map on lines of equal potential. The yellow color represents, or includes, all the wells with initial potentials less than 500 MCF per day. The blue color includes all wells in the initial potential of 500 MCF to one million cubic feet per day. The pink, one million to two million; the light green two million to four million; and the orange, four million or more.

Q Does Exhibit Number 1 then reflect along contour lines the initial potentials of the presently completed wells in these three fields, as well as in the West Kutz Field?

A It does, as of wells completed July 1, 1954.

Q Did you mark on this Exhibit Number 1, any dry holes or have you placed on that Exhibit any evidence showing pinch-out of the sands at the edge of the field, or separation, or corridors which may exist between the fields?

A Yes, we have. We have indicated by circling in red dry holes drilled in this area which went to, or are through the Pictured Cliffs Formation. The dry holes are plugged and abandoned

wells, the wells that did not make commercial producers in the Pictured Cliffs portion. We find that corridors are apparent, as exhibited by dry holes between the West Kutz, Fulcher-Kutz Fields, between the Fulcher-Kutz and Aztec and Fulcher-Kutz and South Blanco Pools, indicated throughout the most of the entire corridor the separation by plugged and abandoned wells.

Q Did you also prepare a map which contains your recommendations as to the boundaries of the several pools that we have mentioned?

A Yes, sir, I have.

Q Will you mark upon that map, El Pasc Natural Gas No. 2?

(Marked El Paso Natural Gas Company's Exhibit No. 2, for identification.)

Q Will you state to the Commission how that map was prepared, what was the data used in preparing the map and the basis of the conclusions as shown by Exhibit Number 2?

A Outlined in a heavy red line on Exhibit 2 are our recommended outlines of Pictured Cliffs Pools in the San Juan Basin. Also shown, circled in red, are those dry and abandoned or plugged and abandoned wells which so far as our records reflect, have had no indication of shows of gas in the Pictured Cliffs Formation. There are also shown wells, half circled in red, for which some show of gas was indicated in the Pictured Cliffs Formation.

Q Have you placed on Exhibit No. 2 any pressure data?

A Yes, we have. We have shown around the extremities of each of the recommended pools, pressures, initial pressures recorded for wells. Those pressures are indicated in various colors. We have pressures of three to four hundred pounds in red; four to five

hundred in blue; five to six hundred in dark brown, which on the map looks very much like black; six to seven hundred orange; seven to eight hundred, purple; eight to nine hundred, light brown; nine hundred to 1,000, green; and 1,000 to 1,100, dark gray.

Q Does that Exhibit No. 2 also show the outlines of the pools as presently delineated?

A Yes, it does. Such outlines are shown in dark, or heavy pencil lines.

Q Would you point out, referring to the pools by name, any significant changes in the pool delineations that you wish to recommend as a result of your studies?

A Yes, sir, I will. Presently, as presently shown or recognized by the Commission, the Aztec Pool encompasses this area outlined with the dark pencil, heavy pencil mark (indicating), which, as may be seen, is in the northern extremity of the Aztec-South Blanco trend. The southern extremity, the Commission recognizes the South Blanco Pool which covers this area outlined with the heavy pencil. In between the presently designated South Blanco and Aztec Pool is a portion of the Fulcher-Kutz, or which is presently designated as Fulcher-Kutz. This present designation of Fulcher-Kutz goes in this manner, encompassing a portion of what we would call the South Blanco Pool. Development in the middle portion of the Aztec-South Blanco trend has been very sparse, making it very difficult to pin-point the point of separation between those two pools. We do find considerable pressure variation between the extremities, of approximately 400 pounds, increasing from the northwest portion of the Aztec Field to the Southeast portion of the

South Blanco.

We have shown a line separating our recommended limits of Aztec and South Blanco Pools. This line is located in a sparsely developed area and it is not proven by dry holes. There is indicated that there may be an expected pressure differential between wells in the Aztec portion of the South Blanco portion, of approximately 100 pounds; a well being drilled on South Blanco, approximately 100 pounds greater. Subsequent development may indicate a need for moving that line one direction or the other.

Q So that line of, that line which divides the Aztec from the South Blanco in your recommendations is a tentative line and subject to change as more information becomes available, you think?

A That is correct. I believe that for the present, for gas proration purposes, this line may be used as a separation between the two pools without causing any inequities.

Q I believe you have removed from the Fulcher-Kutz Pool some of the acreage to the south and to the east there, and have found the existence of a corridor between the Fulcher-Kutz and the Aztec and South Blanco. What is the basis for making that separation there?

A May I ask if you refer to this separation between Ranges 9, 8 and 9, in this general area?

Q Which you are now indicating on Exhibit Number 2?

A Yes, sir. We have recommended that separation based on all studies made. We have based it both on the dry-holes or abandoned wells there that were not commercial producers. We have based it on differential in pressures noted for initially recorded pressures

of individual wells. We find that there is approximately 200 pounds variation between the average well in the Aztec Pool and a well in the Fulcher-Kutz Pool. Similar differences were noted in the southern portion of the Fulcher-Kutz Pool and the South Blanco Pool, which indicates to us a separate pool. It is also indicated by erratic pressures which we attribute to very poor permeability, permeability also being the governing factor in the important characteristics of other wells drilled both within the corridor and the other pools adjacent to the corridor.

We also make continuing studies, as best we can, of the isopachus, based on various means of logging. Of those wells which have logs available, we pick net effective pay, then, based on that information we make isopachus maps, that being the maps of equal net effective pay thickness. That type of study also indicates the corridors that we have found to exist, because of pressure differential between the fields and because of the fact that in the corridors there are wells that were dry, or which produced such small volumes of gas that they could not be made commercial producers.

Q Do you have any other statement or recommendation to the Commission with reference to the pool delineations?

A I would say that the condition discussed as separating the Fulcher-Kutz Pool from the Aztec and South Blanco Pools also exist between the Fulcher-Kutz and the West Kutz Pool to the southwest. There is good indication of separation in all areas except in the vicinity of the southern border of Township 27, Range 10 West.

Q 27 North, Range 10 West?

A 27 North, Range 10 West where we have wells in offset quarter

sections. These wells have very poor producing characteristics. It is indicated both by pressures and by the producing characteristics that it is an area of very low permeability. While definite separation is not indicated by dry holes in that particular area, we believe that because of the low permeability conditions, that effective separation exists, and for proration purposes these fields should not be cored to be connected at that point.

Q Does that cover in brief your studies and conclusions in reference to pool delineation?

A I believe that it does.

Q I suppose you could come back and sit down, or do you prefer to stay there?

A Let me carry on a little further. The boundaries which El Paso Natural Gas are recommending for most of the pools are comparable to the boundaries presently recognized by the Commission. By looking at the map you will notice in many instances we have not gone as far towards the extremities of the pools as the Commission has presently recognized as being within the pool boundaries.

We have limited our pool to the presently developed area. The only major difference being that portion of the presently designated Fulcher-Kutz Field, which we feel should be designated South Blanco.

Q What studies does the company continue and have been made under your general direction with reference to recoverable reserves in the Aztec, South Blanco and Fulcher-Kutz Fields or Pools?

A In an effort to be able to supply to the Federal Power Commission reserve and deliverability studies of other wells under

contract which El Paso owns in these Pictured Cliff Pools, we make continuing studies in an effort to know what the reserves are.

Q What is the number of wells and how many does El Paso own, and what information do you have as to each of these pools in turn?

A For the Aztec Pool, as of August 1, 1954, there were a total of 100 wells. El Paso owns 51 of these wells. Our records show that we were connected to 99 of the 100, the Southern Union Gas Company being connected to the other well.

Q At that point, is that with reference to the pools as you presently recommend that they be delineated, or with reference to the pools as presently delineated by the Commission?

A It is with reference to the pools that I recommend.

Q The data which you give reflects your recommended pools as you recommend them today?

A Yes, sir, that is correct.

Q Will you pass to the other two pools?

A As of August 1, 1954, in the South Blanco-Pictured Cliffs Pool there were 159 wells. 52 of these wells were owned by El Paso, a total of 104 were connected to El Paso, 52 were connected to Southern Union Gas, and we showed three to be unconnected as of that time. In the Fulcher-Kutz - Pictured Cliff Pool, as of August 1, 1954 there were 270 wells, El Paso had full interest in 53, partial interest in one well, total wells connected to El Paso, 74; total connected to Southern Union Gas, 190, unconnected, six.

Q As to each pool, have you made studies to attempt to determine the net effective thickness of pay in the Pictured Cliffs sand?

A Yes, sir, for every well that we have a log we have attempted to pick the net effective pay.

Q Approximately how many wells in each pool do you have logs on?

A In the Fulcher-Kutz Pool we had 79 logs. In the Aztec Pool we had 40 logs, in the South Blanco Pool we had 101 logs.

Q Did you also attempt to correlate the logs with such cores as you had available for analysis?

A Yes, sir, we set up a basis for picking the net effective pay. In setting up this basis we used the core analyses available and used the micro-log available, which we were very fortunate in having in this pool and which we consider very good in picking pay. We also used the drillers' logs as well as the indications on the electric logs themselves, to set up a basis for picking net effective pay. From this basis we picked net effective pay on all wells for which we had logs.

Q Did you consider all the information which you had available and could gather on these various wells?

A I did.

Q Did you reach a conclusion as to the net effective pay on each of the wells for which logs were available?

A Every well that had a log with which any net effective pay, or pay indication was distinguishable was studied.

Q Did you take these studies and correlate the studies, your studies of net effective pay with the initial potentials of these same wells?

A We have done so.

Q Referring first to the Aztec Pool, have you charted a graph which I will ask you to identify as El Paso Natural Gas Company's Exhibit No. 3?

(Marked El Paso Natural Gas Company's Exhibit No. 3, for identification.)

MR. SELINGER: I wonder if those of us may have a copy?

MR. HOWELL: Certainly, as many as available.

A If we fail to have enough copies, I will be glad to furnish them.

Q Will you state breifly the rules of your studies as reflected on your chart, which is Exhibit No. 3?

A Yes, sir, I will. First, indicating what has been done to gather the data shown here, we have taken the initial potential of each well having net effective pay within ten foot intervals. We have plotted the average initial potential of those wells against the average thickness of that interval. So that, as shown on El Paso's Exhibit Number 3, for the zero to 10 foot interval we have three wells with an average thickness of five foot, and average initial potential of 186 MCF. For the ten to 20 foot interval we had nine wells with an average initial potential of 297MCF; for the 20 to 30 foot interval we had 12 wells with 958 MCF average initial potential. For the 30 to 40 foot isopachus interval we had 13 wells with average intitial potential of 1,150,000 cubic feet. For the 40 to 50 foot interval we had two wells with average initial potential of 1,1 MCF. For the interval 50 to 60 foot, we had one well which had initial potential of 2,399 MCF.

Q With reference to the Aztec Pool, did you reach any conclus-

ion as to relationship between deliverability or initial potential on the one hand and recoverable reserves on the other?

A This graph indicates almost a straight line relationship between net effective pay and the initial potentials of the wells. We have used initial potential here because we do not have deliverability of all wells as of a common time. To be able to relate the characteristics of a well to the characteristics of another well, or to initial reserve, you must have the conditions all as of a common time.

Q Is that the time of the initial potential test the only time that you have been able to select as a common time when this information would be available?

A That is correct.

Q That is, the deliverability tests on some wells are made after several months production or several years production?

A That is correct, they vary accordingly.

Q What study did you make with reference to the comparison between actual deliverability as reflected by producing records and the initial potentials?

A We find that there is a very good relationship between what we would estimate would be the initial deliverability of the well and the initial potential of the well, not volumewise but percentagewise.

Q What is that percentage figure, as to the Aztec Pool?

A For the Aztec Pool we have found the percentage to be 14 percent.

Q Is that the deliverability of an average well in the Aztec Pool, as shown by actual production represents 14 percent of the

wells Initial Potential?

A That is an average. We do find there are instances where it varies to one side or the other of that 14 percent.

Q In connection with the Aztec Pool did you make any studies to determine the number of wells which were unable to deliver as much as 100,000 cubic feet of gas a day?

A Yes, sir, we have.

Q How many wells are there in that category?

A We found that both known deliverabilities, and I will refer to those deliverabilities which are acquired as a result of these commission required tests, the calculated deliverabilities and estimated deliverabilities which were arrived at by determining the percentage relationship of deliverability with the initial potentials of the wells in various initial potential ranges, and taking that percent and multiplying times the initial potentail of the wells for which we had no deliverabilities, then adding those indicated or estimated deliverabilities to those that we had known deliverabilities tests less than 100, we came up with 49 wells with deliverabilities less than 100 MCF per day, 49 of the total wells in the pool.

Q What is the actual experience in operating when leaving a well floating on the line and open, [illegible] against operating conditions as they exist? Is the well's actual deliverability under field conditions more or less as the theoretical deliverability or calculated deliverability?

A Ordinarily it will be less. I say ordinarily because in some instances, due to the pressure at which the deliverability is taken it may result in a calculation of a deliverability which is lower than the actual deliverability being experienced into the

line, but that is not ordinarily the case.

Q From the experience of the company in operating in this area, would you expect that in addition to the 49 wells with deliverability of less than 100,000 per day there may be other wells which, under actual field conditions, will not be able to make 100,000 per day average?

A Yes, I would expect it to be a considerable number more that could not, under actual field producing conditions, produce as much as 100 MCF per day.

Q In order to save time, I think I will hold a portion of the testimony back until we have put in the basis as to each pool. May I ask this, have you reached a conclusion as to each of these pools, as to the proper basis for prescribing an allocation formula?

A Yes, sir, I have.

Q Is that basis the same on each of the pools?

A It is.

MR. HOWELL: We will come back to that after we have put in the facts as to the other pools. Let us refer now to the Fulcher-Kutz.

(Marked El Paso Natural Gas Company's Exhibit No. 4, for identification.)

Q I will ask if you have prepared a chart showing the averages of the wells from which you had computed net pay thickness?

A Yes, sir, we have.

Q Will you mark that as El Paso Natural Gas Exhibit No. 4?

A Yes, sir.

Q And referring to Exhibit No. 4, state what the chart shows?

A It shows that for the zero to ten foot isopachus interval

there were two wells with an average initial potential of 82 MCF per day; for the 10 to 20 isopachus interval, 13 wells with an average initial potential of 366 MCF per day; 20 to 30 isopachus interval, 40 wells with an average of 950 MCF per day; 30 to 40 foot isopachus interval, 14 wells with an average initial potential of 1,176 MCF per day; 40 to 50 isopachus interval, sever wells with an average initial potential of 1,813 MCF per day, and for the 50 to 60 isopachus interval, three wells with an average initial potential of 2,781 MCF per day.

Q Does that chart reflect this information as to all wells for which you had it available, or could compute the sand thickness?

A Yes, sir.

Q What is your conclusion with reference to the result of this study as to a relationship between the initial potential and the recoverable reserves in the Fulcher-Kutz Pool?

A Here we have indicated an almost straight line relationship between net effective pay and the initial potential of the well. While net effective pay is only one of the factors entering into the reserve calculation, it is my opinion that, due to the close almost straight line relationship that we have, that the other factors entering into the reserve calculations, though varying within the well, bore of the well, are not the most influential factors in determining reserves. I believe that the net effective pay is picked and indicated here as the most detentive factor. For that reason I believe that the relationship here also holds for the reserve which can be calculated under these conditions.

Q Is that statement which you have just made also true as

to the Aztec and to the South Blanco Pools?

A Yes, that is right.

Q What study did you make to determine the relationship between the initial potential and the deliverability of wells in the Fulcher-Kutz Pool?

A Similarly, as I attempted to explain awhile ago, we knew deliverabilities of some of the wells and we estimated deliverabilities for those wells that we did not have deliverability tests on. We find that for the 53 wells that had deliverability tests, that a 13 percent relationship between initial deliverability and potential should be proper.

Q That is between deliverability and initial potential?

A Yes, sir.

Q What studies did you make to determine if there were any new wells in the field that could not produce as much as 100,000 cubic feet per day, but had a deliverability of less than that?

A In leading up to the answer, in my last answer I indicated we had taken deliverability tests of the wells and estimated those for which we had not. I was leading up to the answer to the question which he just asked, of what number of the wells do we consider have deliverabilities of less than 100,000. We find that at least 130 wells of the 270 wells in the pool, or 48.5 percent can be expected to have calculated deliverabilities of less than 100 MCF per day.

Q I think the record is straight on that, but as I understand your testimony now, your percentage figure of deliverability is based upon actual deliverability tests and not estimate?

A That is correct.

Q It is your estimate of the number of wells in the field, with a deliverability of less than 100,000 that is based upon the actual deliverability where tested and the estimated where you do not have an actual deliverability test?

A That is correct.

Q Before I pass the Fulcher-Kutz Field, is there anything else you would like to put in the record with reference to your studies of this particular field?

A Here again, as we indicated in the Aztec Pool, I think there will be considerably more wells than indicated by the percent stated, which will, under actual producing practices, have deliverabilities to existing gas transportation facilities of less than 100 MCF per day.

Q Is there anything else with reference to the Fulcher-Kutz Field?

A I believe not.

Q Did you make a similar plat, with reference to the South-Blanco-Pictured Cliff Pool, as to the wells upon which you had estimates of net sand thickness?

MR. HOWELL: Mark Exhibit 5.

Q I asked if you made a similar study and graph for the South Blanco Pool?

A Yes, I have.

MR. HOWELL: Would you mark that?

(Marked El Paso Natural Gas Company's Exhibit No. 5, for identification.)

Q Referring to El Paso Natural Gas Company's Exhibit No. 5, please state to the Commission what the chart shows as to that study.

A For the zero to ten foot isopachus interval, we had two wells with an average initial potential of 104 MCF per day; for the 10 to 20 foot isopachus interval we had 15 wells with 515 MCF per day average initial potential. For the 20 to 30 foot isopachus interval we had 39 wells with an average initial potential of 1,081 MCF per day; for the 30 to 40 foot isopachus interval we had 37 wells with an average initial potential of 1,919 MCF per day; for the 40 to 50 foot isopachus interval we had seven wells with an average initial potential of 2,396 MCF per day and for the 50 to 60 foot isopachus interval, one well with an initial potential of 18,025 MCF per day.

Q What conclusion do you draw from these studies as to the relationship of sand thickness in this field and initial potential?

A I have drawn the conclusion that there is almost a straight line relationship between increase in the net effective pay and the initial potential of the wells.

Q Referring now to all three of the pools which you have testified to today, what conclusions have you reached as to the proper method of allocating to each owner, or operator of a well, a fair share of the recoverable reserves underlying that acreage?

A First, I believe that proper proration should be based on permitting each individual operator to obtain his recoverable reserves underlying his tract. I think that we have been able to show that the producing ability of the well, as shown by the calculated deliverability, reflects reserves underlying, recoverable reserves underlying each individual tract. The deliverability so calculated, is based upon, and influenced by the various factors which enter

into the reserve calculation, other than acreage. Consequently its use is a good comparison of reserves remaining recoverable to one well as compared to the reserves recoverable to another well. I recommend for an allocation formula in each of these pools, 100 percent acres times deliverability. The deliverability being that calculated deliverability required by the Commission.

Q What would you do in the instances in which a deliverability test has not been completed and you don't have that as to a particular well?

A I would recommend that pemding the completion of the deliverability test that the Commission estimate the well's deliverability, as a percentage of its initial potential and allocate gas to that well, based on that estimated deliverability. At such time as the actual deliverability test has been completed, then I would recommend that the allowables assigned the well be adjusted in accordance with the actual tested deliverability.

Q I believe we omitted to have you testify as to the percentage of initial potential which your studies of deliverability in the South Blanco Pool showed to exist.

A That is correct, we have not done so.

Q Would you please state what you found as to that percentage?

A I found a percentage relationship of 19.2 percent between deliverability and initial potential for the wells in the South Blanco Pool.

Q Also, I believe we omitted to have you testify as to the number of wells in the South Blanco Pool which are capable of delivering less than 100,000 cubic feet per day.

A We find that either known or estimated deliverabilities for wells, which show 63 of the total of 159 wells in the South Blanco Pool, having calculated deliverabilities of less than 100 MCF per day.

Q With reference to all three pools, Mr. Woodruff, what would be your recommendation as to the proper method of handling these wells with the low deliverabilities, giving each of these wells the maximum opportunity for the operator and owner to recover his investment?

A I believe that in each of these pools, a well having a deliverability into existing pipeline facilities of 100 MCF or less, should be placed in a marginal category and be permitted to produce each day its capacity into existing pipeline facilities so as to give it a maximum opportunity to be a commercial well.

Q What would you do with the wells which have a theoretical deliverability, but under practical field operations are unable to make the allowable that might be allocated to them?

A My marginal well classification would be determined by the wells actual producing ability into existing gas transportation facilities, so that if its allowable, calculated by use of the deliverability as determined by the Commission required test, resulted in allocation of gas in excess of its actual producing ability, it should be placed in a marginal category and its allowable placed as its producing capacity.

Q What would you do with any well, which, although capable of producing in excess of 100,000, is unable to make its allowable? Would you place that in the same category?

A Yes, sir, I think that it properly should be in a marginal

category, and I have indicated in the rules to be recommended to the Commission two marginal categories for wells, and manners for handling such wells.

Q Have you prepared some proposed rules and regulations for use in each of these Pictured Cliff Pools?

A Yes, sir, I have.

MR. HOWELL: Will you mark one copy as El Paso Natural Gas Exhibit 6?

(Marked El Paso Natural Gas Company's Exhibit No. 6, for identification.)

Q Will you state to the Commission, referring to Exhibit 6, will you state what, in general, these rules propose?

A Yes, sir. These rules are similar to the rules recommended by El Paso and others, for use in other pools considered in the San Juan Basin, as well as the rules presently used in other pools presently being prorated in New Mexico, so that many of the provisions are more or less what have been standardized, as of this time. The important features that I think should be pointed out would be of the proposed Rule 9 on Page 4.

Q Rule 9 on Page 4?

A Yes, sir. Starting at the end of the first line on Page 4, "The total allowable to be allocated to said pool for each proration period and each month shall be equal to the sum of the purchaser's nominations, with any adjustment which the Commission may make. The Commission first shall determine and classify the marginal wells in said pool. A well in either of the following categories shall be classified as marginal, Class A, any well whose producing capacity into existing gas transportation facilities is less

than 100 MCF per day. Such a well shall be permitted to produce all its producing capacity into existing gas transportation facilities. Class B, any well which the Commission finds has an actual producing capacity less than its assigned allowable. Such a well shall be permitted to produce all its producing capacity into existing gas transportation facilities, restricted only by the allowable it would have been assigned under application of the proration formula. A well classified in either of the marginal categories shall accrue neither under-production nor over-production."

Q Will you explain your reason for adding that to the rule?

A In order that the total field demand may be allocated in such manner that it may be produced. Excess allowable should not be allocated to wells which are incapable of producing it.

Q If you allocate allowables to wells that aren't producing it, is it then possible to meet market demand?

A No, sir.

Q Does this provision as to the marginal wells furnish a practical means of allowing the wells to produce all it can make and still not disrupt the purchasers demands by accumulating under-production?

A It does.

Q Without reading this, suppose you just state then your recommendation as to the manner in which the allowable for a pool would be allocated among wells in that pool?

A I believe, possibly, Mr. Howell, in order that it may be best understood, that the next paragraph should be read.

Q All right.

A "The allocation of said pool shall be divided and allocated among the wells appearing on each proration schedule in the following manner: (1) the sum of the allowables for all marginal wells and of wells found by the Commission to have an actual producing capacity less than the assigned allowable shall be subtracted from the total pool allowable, (2) a tentative allocation to the non-marginal wells shall be made by dividing the remaining pool allowable among the remaining wells in said pool in the proportion that the product of each well's calculated deliverability multiplied by the acreage attributable to that well bears to the sum of such product for all such remaining wells to be prorated, (3) when the tentative allowable received by a well is in excess of its known producing ability, that well shall be classified as a limited well and shall have its allowable limited to its producing ability for the period of time covered by that proration schedule, (4) the allowable for the pool remaining after subtracting the sum of the limited allowables of all limited wells shall be reallocated to the remaining wells by application of the same formula, and (5) if such reallocation shall result in placing any other well within the limited classification, the allowable for the pool remaining after subtracting the limited allowables of all such additional limited wells shall be allocated among the remaining wells by application of the same formula until no well has received an allowable in excess of its known producing ability."

Q In your opinion, would the application of these proration rules which you have suggested, result in each owner receiving an allocation that corresponded to his recoverable reserves under his acreage?

A I believe that within reason it would do so.

MR. HOWELL: We offer Exhibits 1 through 6 in evidence.

MR. MACEY: Is there objection to the introduction of the exhibits in this case by El Paso Natural? If not they will be received in evidence.

Q Is there any further statement, Mr. Woodruff, that you would care to make on this that I may have overlooked in directing questions to you?

A I can think of nothing else at this time, Mr. Howell.

MR. HOWELL: That is all we have.

MR. MACEY: We will take a short recess.

(Recess.)

MR. MACEY: We will come to order. Are there any questions of the witness?

MR. GREINER: I have a few.

MR. MACEY: Mr. Greiner.

MR. GREINER: A. S. Greiner, Southern Union Gas Company.

CROSS EXAMINATION

By MR. GREINER:

Q Mr. Woodruff, do your rules, as recommended to the Commission in your Exhibit 6, I believe it was, make any provision as to the status of wells which were drilled on unorthodox spacing units? That is to say, drilling units of less than 160 acres at a time prior to the day when 160-acre spacing was first put into effect by Commission Order in this area?

A I made no specific reference to that, Mr. Greiner. I believe that the rules will provide, by their very nature, that those wells would get an allowable based on, in this instance, the acreage attributable to them.

Q I appreciate that aspect of it, Mr. Woodruff. What I was thinking of was not how much acreage was to be attributed to such a well, but whether or not new applications to the Commission was going to be necessary under your rules, in order to validate their position at the present time?

A I think, certainly, that if it is not clearly stated in here that it should be set out in such rules that wells drilled prior to the institution of these rules should not be required to come in and hold special pool hearings, in order to validate the tract upon which they were drilled, under rules prior to the institution of these rules.

Q In other words, in drawing up your rules, your proposed rules, whether or not it is so provided, you did not intend to recommend to the Commission that individual hearings, such as we often hear in this room, be necessarily held in order to get them into good standing under your rules, is that correct?

A That is correct.

Q Referring to your Exhibits 3, 4 and 5, I believe you testified that your studies indicated, and these charts presented, what you termed an almost straight line relationship between the initial potential of the wells under study and the recoverable reserves underlying such well tracts, is that correct?

A Yes, sir.

Q That is, to say, initial recoverable reserves not present today?

A That is correct, and your statement is generally correct.

Q Wasn't your phrase an almost direct relationship?

A Yes, between the net effective pay and the initial potential of the well, which I then went on to explain caused the relationship to be almost the same for reserves.

Q In other words, this is matching net sand thickness against initial potential, original initial potential?

A That is correct.

Q On these three exhibits, are all the circles indicating the averages of your well groups exactly on the straight lines which you have drawn?

A No, sir.

Q There is deviation in the case of practically every one of those circles, is there not, Mr. Woodruff?

A In many instances, yes, it could be somewhat due to the choice of the place to draw the line. However it very closely approximates the straight-line relationship.

Q There are more points off than there are on, are there not, on each of them?

A That is correct.

Q What, in your opinion, causes these deviations?

A There may be varying factors causing it, Mr. Greiner. Certainly it could be the other factors entering into the reserve calculation, other than the net effective pay.

Q You have not made studies, I gather, as to variance or consistency within the three fields here under consideration, as to these other factors?

A No, sir, I believe it would be impossible to do that.

Q Referring to your Exhibit 1, the isopotential map of the three pools, does that map indicate that for each of the 160-acre units surrounding each of the presently drilled wells that there is an equal initial potential, probable initial potential assigned to that acreage? That is to say, is it set up in 160-acre blocks or do the iso-potential lines that you have drawn cut through 160-acre drilling tracts?

A I am sure there are instances where it cuts through.

Q In your opinion, in these 160-acre drilling tracts, is the sand thickness of each identical throughout?

A I doubt that it is.

Q In other words, assuming that there is some relationship between initial potential and sand thickness, what you are able to show is merely a relationship between initial potential and sand

thickness at or in the very close vicinity to the well bore, is that correct?

A That is correct, being the only information that we know of the tract assigned to that well.

Q So, it does not give us any information as to the outlying areas of the 160-acre tract away from the well-bore?

A No, sir, it does not.

Q Are you sufficiently familiar with this area to know whether any of these wells are shot, or have been shot after they have first been brought in, in an effort to increase their initial potential?

A I believe in almost every instance there has been some method of stimulation used on the wells completed in these pools.

Q Have these stimulatory efforts been successful?

A To varying degrees, yes.

Q In other words, some have been more successful than others, in some wells they have worked better than others?

A That is correct.

Q Both on an absolute basis and a relative basis, that is to say, relative to what the initial potential had been before shooting and treating?

A I hesitate, because of not knowing exactly what your question means.

Q What I was getting at, say, a well which before shooting would have had an initial potential of 100,000 a day, it might be increased to as much as 500,000. Would that be within the range, and yet we might have had another which had an initial potential of 400,000 a day and it was increased to 1,000,000. In that case,

the absolute difference on the one hand was 400,000 and the other 600,000, so, if there was an absolute difference, and yet the relative difference between the two is quite different, in the opposite direction. That is to say, the one had been increased by some four times and the other by some two times, I believe. I have forgotten the exact figure I used. Is that correct?

A That is correct.

Q Did this increase, . initial potential increase recoverable reserves underlying the tract?

A It is my opinion that it did increase the recoverable reserves underlying this tract, that being those reserves recoverable within the time that we will have demand for the gas from these pools.

Q What is that period of time?

A I cannot express in years the period of time, but we must be able to supply the market demand, else we do not keep the market demand.

Q If a second well had been drilled on this 160-acre tract, having, we will assume, the same initial potential of the first, would that have resulted in this tract having twice the recoverable reserve that it had when only one well was there?

A Was your question, if an additional well was drilled on the same tract?

Q Suppose we get a 500,000 MCF well, or cubit foot well on 160-acre tract. We then come in and drill another one right beside it or a short distance away, and it comes in with an equal initial potential, would we, by the drilling of the second well, have doubled the recoverable reserves underlying the 160-acre tract?

A No, we wouldn't.

Q Does not that, then, tend to indicate that something other than purely initial potentials or the related factor of deliverability which grows out of much the same factor as initial potential, does that not indicate that something else needs to be considered, merely than the initial potential or the deliverabilities of the wells?

A Yes, sir, it does.

Q Would acreage as an additional element in an additive type formula? I am not asking you now with respect to any particular percentage of acreage, but would the presence of an acreage factor tend to bring the data based purely on deliverability more nearly into line with probable total recoverable reserves than if we had left it purely on a deliverability basis?

A I doubt that it would, Mr. Greiner. You fail to consider I believe, in your questions of me, that deliverability alone is not what is used in the allocation formula. I said, deliverability related between the well's recoverable to one well and the reserve recoverable to one well and the reserve recoverable to another well. I have also included as a multiplying factor the acreage attributable to that well. Under initial conditions you may drill a well on each acre and get the same initial potential. But after the well had produced, we find that its initial potential, or as these wells produced we would find that the initial potential of those wells depleted much faster than the initial potential would have depleted had there been only one well on that tract.

Q You, I think, are placing too much emphasis on my last

question. What I was basing that on was rather the fact that we have here admitted variances in sand thickness and presumably also in the other factors affecting deliverability within 160-acre drilling units and, therefore, is it not reasonable to suppose that some sort of an averaging factor might well be worthwhile, since on the average these tracts will probably tend to approach the normal in their outlying areas rather than deviating more widely from it?

A I do not believe that such an averaging factor would be appropriate, Mr. Greiner.

Q As far as you are willing to go is, then, I gather, that you are not prepared to state that deliverability is the perfect test, but you don't think we can improve on it by adding any acreage factor alone, is that correct, as opposed to merely a multiplier?

A I believe that essentially states my belief.

MR. GREINER: Thank you, Mr. Woodruff.

MR. MACEY: Any further questions of the witness?

MR. SELINGER: Mr. George Selinger. I would like to ask a few questions.

By MR. SELINGER:

Q One question with respect to Exhibit 6, which is your proposed rules, will you get that before you?

A Yes, sir.

Q On Rule 2 you provide for a drilling unit of 160 acres and in Rule 7 for allocation, you provide for a 320 acre unit. Would you kindly explain to me and the Commission and anybody else, is it your intention to provide a drilling unit of 160 acres and an allocation unit of 320 acres?

A It is my intention to permit the drilling of wells on tracts

as small as 160 acres. But --

Q (Interrupting) And by your Rule 7 you will require such units of less than 320 acres to have to come in and have a hearing and get an exemption, one way or the other?

A I do not believe that the rule so provides. It was my intent in writing the rule, to permit a well to assign up to 320 acres, or a proration unit, but to prevent the drilling of wells on tracts less than 160 acres.

Q It is your intention then to require 160 acres for drilling a well, but before you can get an allocation formula and an allowable under any allocation under 160 acres you would have to get an exception?

MR. HOWELL: I don't think the question is anything but argumentative. In Lea County you have established a proration unit of 640 acres. You have permission to drill on 160 acres without the necessity of coming in for a special hearing, and there is no more reason to believe that in the San Juan with an allocation unit of 320 acres and a drilling unit of 160, you would have to ask for special hearings than exists in Lea County. I think that is the intention that the rules are intended to prescribe.

MR. SELINGER: You are in error in the 160 acres in Southeast New Mexico, we do not have to get an exception at all.

MR. HOWELL: That is correct, unless it is an unorthodox unit. Where this rule says 320 it says 340 prescribed, and that analogy in the Lea County rules is the same, that there is no necessity under these rules for having a special hearing or getting an unorthodox location to drill on 160.

MR. SELINGER: I submit to the Commission that the rules,

as proposed, permits 160 acre drilling unit, Rule 7 requires 320 acres, or an exception for any unit less than that. I was merely trying to find out from the witness whether he intended that. He said he does. That is the end of that. We don't have to argue it any further. I just wish to point that out to the Commission.

Q Now, Mr. Greiner questioned you with respect to your curves, your Exhibits 3, 4 and 5. Do you have them before you?

A Yes, I have them before me.

Q Will you look on your Exhibit 4 and 5, and will you tell the Commission where your starting point is for your curve? Exhibit 4, for example, where do you start your curve?

A Exhibit 4 refers to -- which pool, the Fulcher-Kutz?

Q Your point of origin is what I am inquiring about, as to your acreage. Where does that start on your acreage?

A On the particular interpretation of proper curve here it would start somewhere in the vicinity of, I would say, three. Did you say acreage?

Q Yes, your thickness?

A Net effective pay would be somewhere in the vicinity of three feet.

Q If you had a well with three feet of net effective pay, would it have a potential?

A It very well would be possible, Mr. Selinger. The curve more properly could have been drawn having the line originate at zero thickness and zero initial potential.

Q Mr. Woodruff, is that the customary way of starting the point of origin of these curves with zero net effective pay and zero potential?

A I know of no customary way of doing it. We interpreted the appropriate lines to draw through these points and they fell as you see them indicated on these curves.

Q Also, with respect to 5, where does that point of origin of that curve show up on your average thickness?

A I believe it would be right at zero thickness and zero initial potential.

Q Your Exhibit 5, the South Blanco -- No, that is Aztec, I am talking about South Blanco. Where is your point of origin of that curve?

A It would be in the vicinity of four feet.

Q Would that four feet of net effective pay have a zero potential?

A I do not know.

Q Would it have it on your curve?

A Yes, it would indicate that such a well having four foot net effective pay would have zero potential.

Q From your study of the field, would you say that there are such wells in the South Blanco-Pictured Cliffs that have four feet of net effective pay with zero potential?

A I would not believe that there are any wells completed, I started to say commercial wells, with only that amount of net effective pay. I question whether these wells that were completed, which are represented by that point, the two wells having an average of 104 MCF per day would be commercial, in my way of thinking.

Q But, you show on Exhibit 5, which is the South Blanco, two wells with five feet of net effective pay that does not follow your

original three hour average potential of zero, is that correct? The would have a capacity of one hundred some odd thousand cubic feet, is that correct?

A I don't believe your statement is correct.

Q You stated with respect to these three --

A (Interrupting) Excuse me, Mr. Selinger. I do not believe your statement is a correct indication of what I said. I am not sure whether what you stated was correct or not.

Q Well, Mr. Woodruff, you are the expert. You drew up these curves, and we will let the record show whether they are drawn up correctly or not. We will let it go at that. Now, the interval from these Exhibits 3, 4 and 5, take, for example, Exhibit 3 to start with, that is your Aztec. On that Exhibit you show five feet net effective pay as having a potential of 160,000 cubic feet, is that correct?

A My figure reflects 186,000 cubic feet for the three wells, with thickness between the zero and 10 isopachus intervals.

Q 186, you say?

A Right.

Q What does the 15 foot show the potential to be?

A 297 MCF.

Q That is a difference of 111,000 cubic feet, is that correct?

A Yes, sir.

Q What does your 25 foot interval show?

A It shows an average initial potential of 958 MCF.

Q The difference between 958 and 297 is how much of a difference?

A I subtracted it to be 661.

Q Without going through all these ten foot intervals, would you tell this Commission whether or not the difference in the open-flow potential capacities of the various classifications, for 5, 15, 25, 35, 45, 55 have the same difference in potential, or do they vary?

A The vary.

Q Do they vary considerably?

A What do you mean by considerably?

Q Do they vary as much as a million cubic feet in a potential, from one classification to the next? Take your 45 foot interval, for example, what do you show the openflow potential on that 45 net feet of pay?

A 1,115 MCF.

Q 1,115?

A Yes.

Q What is your 25?

A 2,399 MCF.

Q What is the difference between the two potentials?

A 1,284.

Q A million two hundred eighty four thousand?

A Eighty four.

Q All right, what is the figure, the difference between two million, three hundred ninety-nine, and one million one hundred fifteen?

A 1,284 MCF.

Q That is the difference in potential on that ten feet?

A That is right.

Q Do you have that much of a difference in any other of the average pay thicknesses?

A I do not believe that we do.

Q How do you account for that variation in potential, as compared to each ten foot interval on your net effective pay?

A As previously testified to, I attribute that to probably be caused by the influence of the other factors entering into the reserve calculation.

Q What other factors influence that? Which is the greatest factor that is known in the common allocation factors of any formula?

A What do you mean by that?

Q Well, in a gas allocation formula, what factors do you take into consideration?

A Well, properly, or ideally you should allocate the gas with relation to recoverable reserves.

Q I am talking about an allocation formula, what factors do you consider in an allocation formula?

A The factors which you believe will best result in allocation to each individual well, the reserves recoverable under the tract assigned that well.

Q You take into consideration the acreage in the formula?

A Yes.

Q You take into consdieration the net effective feet of pay?

A Yes, sir.

Q Do you take into consideration the potential?

A No, sir.

Q Do you take into consideration pressure?

A Yes, sir.

Q How do you take into consideration the pressure in your formula here?

A The deliverabilities calculated for the various wells, or for a well, will vary as that well's pressure varies. Consequently, pressure is considered in this allocation formula.

Q In order to take your deliverability and make your calculations, you must take your pressure, is that correct?

A In calculating your deliverability you must use pressure.

Q Among the other things under the statute which the Commission is required to look into besides waste and recoverable reserves is the minimization of drainage. How have you taken into consideration such minimization?

A I believe that any formula, that as nearly as possible allocates to each well its recoverable reserves will come nearest to preventing drainage between tracts that are not compensated by compensatory drainage.

Q In making your study on these three fields, I believe the actual deliverabilities were taken on, approximately, a third of the wells in each of the groups?

A In the Aztec Field there was 51 percent, in the Fulcher-Kutz there were only about 20 percent, in the South Blanco there were about 40 percent.

Q They vary from 20 to 51 percent, is that correct?

A I believe that is correct.

Q Your study included the logs of wells for which there was logs available, is that correct? A That is correct.

Q Can you tell us whether or not the operators in drilling these wells, penetrated all of the pay thicknesses of the formation?

A There may be some instances where the entire Pictured Cliffs Formation was not penetrated. I think in almost every instance you may expect that it went through the entire Mesa Verde Pay, such is my recollection.

Q Your recollection is that --

MR. HOWELL: The Pictured Cliffs, you mean --

Q The Pictured Cliffs. Your testimony was that the entire Pictured Cliffs was logged, penetrated by the wells and logged?

A For the most part of the wells, that is correct.

Q For the majority of the wells on your study?

A Yes.

Q I believe you said that the net effective pay is the most determining factor in ascertaining reserves, is that correct? I have that written down, I just want to be sure that is correct.

A I believe that to be correct in these pools.

Q Do you have the net effective pay of all of the wells in each of these three fields?

A No, sir, but I had the net effective pay for all of the wells,that and any other data, other than pressure, that may be determined.

Q In the Aztec there were 40 out of the hundred wells, is that correct?

A Yes, sir.

Q In the South Blanco there were 100 out of the 159?

A 101 out of 154 wells.

Q Out of 154 wells. In the Fulcher Kutz it was 79 out of 270?

A That is correct.

Q Now, aside from your logs and your deliverabilities, what other factor, of the factors we were talking about in an allocation formula, do you know on each and every unit in the field? Without any calculation or without any extrapolations what known factor do you have available to you, as the fields exist today?

A Initial potentials and initial pressures.

Q Do you have the acreage known also?

A Yes, sir.

Q How accurate are your initial potentials, by that I mean, were they full 24 hour tests or were they a shorter period and a calculated 24 hour potential?

A You are referring to initial potential test?

Q Yes.

A They were all three hour initial potential tests, taken in accordance with the rules and regulations of the Oil Conservation Commission.

Q Are they taken regularly or just initially?

A Just initially.

Q How old are the wells that are producing in each of these three fields, what is the discovery date of each of them, if you have them available?

A I do have that. The Aztec Pool was discovered in September, 1941, the South Blanco Pool was discovered in June, 1951, the Fulcher-Kutz Pool was discovered in two separate areas which are now considered as one, the Kutz-Canyon portion was discovered in November of 1927, the Fulcher Basin portion was discovered in April

of 1934.

Q Without going into too much detail of the previous questions and answers that we had on a previous hearing, I just want to roughly bring your mind backto that series of questions and answers with respect to the other pool in the Blanco Field. As an engineer, Mr. Woodruff, how do you best ascertain the reserves under each tract and under a field?

A I believe by the pressure decline method.

Q In order to --

A (Interrupting) May I elaborate on that to say, the pressure decline versus cumulative production method.

Q I will ask you whether or not you have had sufficient enough production in these three fields to make calculations, using that superior method?

A I do not believe so.

Q Why is that?

A Because the data is not available upon which such a computation can be made.

Q You mean you do not have the accumulated production?

A We do have accumulative production.

Q Why is it that you are unable to make such calculation?

A Because we do not have adequate pressure history to make such calculation.

Q Do you know the original pressure of each of the three reservoirs?

A We have a fair indication of what it was.

Q By the taking of the pressures today, can you ascertain

the decline from the original pressure of each well?

A Yes, sir.

Q Would you not be able to ascertain the reserve that way?

A Oh, I would question the accuracy of that, having only one point to determine such a reserve calculation on.

Q What do you have that is more accurate, from the information that you have available, now, to determine reserves?

A I consider that the deliverability tests that are taken, both as influenced by the pressure decline which has been experienced and the variations in pressures, due to variations in cumulative production for the various wells within a pool, as well as being influenced by the other factors used in reserve calculation. I consider that as a more appropriate means of relating reserves between wells at this time.

Q You mean them that in the Fulcher-Kutz, with only 20 percent of the wells' deliverability being ascertained, you say that is a more accurate method of determining the reserves and allocation formula which will give the proper reserves to each operator?

A I don't see that the percentage is a factor to determine it there. I think, and my estimate was based not on the relation of the 20 percent to the whole 100 percent, but to the 20 percent, the corresponding data known on that 20 percent. I think it gives a reasonable indication of relation between reserves and the instance which I have plotted here, initial potential.

Q You mean you are going to use the information you gained from 20 percent of the wells to average it for the entire 100 percent pf the wells?

A I am going to use the data accrued for each individual well to determine what that well's allowable should be.

Q If over two hundred wells' deliverabilities have not been ascertained, how are you going to determine its proper share of an allowable?

A By taking its deliverability?

Q Are we in a position to take those immediately?

A Yes, they are presently being taken.

Q How long does it take to take a deliverability test?

A Oh, --

Q (Interrupting) Under the rules prescribed by the Commission, I will confine it to that?

A I believe it takes five weeks.

Q And do you believe then that the Commission would be in a position to institute proration, based on the deliverability, where ever two hundred wells have to take the deliverability test before a proper relationship of reserve can be ascertained?

A I didn't understand your question.

Q I will put it this way. How long would it take the Commission to institute prorationing, by taking the deliverability of the remaining wells in the Fulcher-Kutz, how long will it take 270 wells?

A I believe the test period terminates at October 31st of this year, at which time it is expected that all tests will be completed.

Q So, then, under your recommendation, it would be probably the first of November before you could accurately have the deliverabilities of all the 270 wells in the Fulcher-Kutz?

A That is correct, or it probably will be that time before we have them. It is possible to accrue them prior to that time, but under the present schedule set out that probably will be the time at which they are all available.

Q Mr. Woodruff, you were present, were you not, at a previous hearing in which we recommended 100 percent acreage times pressure, on another pool in the Blanco Field, were you not?

A I was present when that was recommended for the Blanco-Mesa Verde Pool.

Q Will you tell this Commission why acreage times pressure cannot be used as an allocation formula for the Pictured Cliffs?

A I wouldn't say that it couldn't be used.

Q It could be used equally well as the deliverability?

A I do not believe so.

Q Why?

A Because I just got through trying to explain to you, Mr. Selinger, it includes only one of the factors entering into the reserve calculation where the deliverability includes not only one factor, but it also is influenced by the other factors entering into the reserve determination.

Q You mean then that your decline in pressure from your initial, known initial for each of the 3/ original pools and your pressures which you are going to take between now and October, that decline cannot be applied for an allocation formula?

A I don't see how you would apply a decline in pressure to an allocation formula.

Q Do you have the pressures at all times that deliverabilit-

ies were taken on?

A Yes, sir.

Q You have those points. How many points do some of the wells have on the pressure determination?

A One.

Q You mean that a well that was, no wells that have pressuee points of more than one point, is that what you are saying?

A They have one flowing and one shut-in pressure.

Q How many deliverability points do you have?

A One.

Q You say that the deliverability is far and superior than the pressure point?

A That is what I said.

Q Now, in answer to a question from Mr. Howell, you said that the market demand for the field could be fulfilled by your recommended 100 percent acreage times deliverability. Do you recall that?

A In such words, no. I do believe that the allocation formula recommended will more nearly permit the production of the demand expressed than any other of the allocation formulas that I am presently familiar with.

Q Will any other allocation formula fulfill the market demand for each of the respective pools?

A Conceivably all of them could fulfill the market demand. But, I consider that it will be fulfilled, you might say, with the greatest ease --

Q (Interrupting) Ease to who?

A Well, I will start out like this. You may start out with 100 percent acreage and we are speaking here of ease of determining the allocation to be assigned to each individual well, by application of an allocation formula so that the total market demand may be allocated where it can be produced.

Q Mr. Woodruff, I wasn't trying to embarass you, I was trying to determine whether you meant ease on the part of the pipeline purchasers, to get their amount of gas that they seek. That is what I mean?

A I think that it will be ease for both. I wasn't necessarily embarrassed, I was just trying to explain something.

Q I wasn't trying to trick you. I was trying to determine whose solicitation you were looking out for.

A I am looking for the reasonable means of allocating gas in these pools.

Q Is it easier to administer on 100 percent acreage than on 100 percent acreage times deliverability?

A No, sir.

Q You mean there is no more calculations than 100 percent deliverability?

A Did you not ask me whether or not there would be more ease --

Q (Interrupting) On the part of the State?

A (Continuing) -- on calculating on 100 percent acreage than on 100 percent acreage times deliverability? I say no, there will not be.

Q You mean taking the total number of wells and dividing it

into the allowable and then taking the deliverabilities' tests and exstropolating your percentage of potential, that doesn't put an additional burden on the State in administering gas proration?

A I believe we are discussing market demand among the wells in such a manner it can be fulfilled.

Q We are talking about ease of administration on the part of the State. You said it was just as easy one way or the other.

MR. HOWELL: Just a moment. What Mr. Woodruff stated, and we object to your question, what Mr. Woodruff stated was that in order, in the first place he stated that an allocation formula should be designed so that each operator could meet the market demand, the market demand should be met. He stated that it was easier in administering it, to administer a formula based on deliverability which he recommended than a formula based upon 100 percent acreage, which you asked the question about. I am sure that Mr. Woodruff would be happy to explain to the Commission, and you, in detail the reason he says that.

MR. SELINGER: I am not stopping him if he wishes to do that.

Q The only thing I want to get down is the ease. I want to know the ease for whom? We were progressing to ease on the part of the State in administering gas proration. That is the point we reached.

MR. HOWELL: That is correct.

A My statement now is going to be premised on the ease in calculating allowables for wells, so that the total field demand may be allocated in such a manner that it may be produced. If you allocate on 100 percent acreage basis and give each well on the same size

tract the same allowable you will find that many of the wells cannot produce the allowable assigned. You will then have to restrict those wells to the allowable which they are capable of producing, recalculating the allowable for the wells that are not in a marginal category. By marginal I mean the wells that were restricted to their producing ability, and in recalculating their allowable you assign the remaining total market demand, after having subtracted the allowables of the marginal wells.

After reallocating your demand in that manner, you again have wells assigned allowables in excess of their producing ability. Similarly those wells are restricted to their producing ability. Their allowables are subtracted from the remaining market demand and then the market demand remaining after subtracting their allowables are distributed among the remaining non-marginal wells under the application of the allocation formula. After assigning allowables in that manner, those wells which have allowables in excess of their producing capacity will have their allowables restricted to their producing capacity and the whole procedure will be gone through again.

It is almost a never ending procedure in trying to get all wells that have, it is almost a non-ending procedure in trying to assign allowables to wells in the proportion that they can produce and not have allowables assigned to them in excess of their producing deliverability. The nearer you get to the 100 percent acreage, the more acute is the difficulty in assigning the allowable without having to have the reallocation many times. The allocation formula is, the greater ease will be in the 100 percent allocation formula. The greater ease that you will have in assigning

the allowables, because by utilizing deliverability, you start off assigning wells allowables more nearly capable of what they are producing, particularly in these Pictured Cliff Pools that we have under discussion. I think that any formula that you institute, after going through all of these steps that you would have to go through to get the allowable assigned to wells that couldn't produce it would end up very nearly with assignment of allowables of the nature you would have by initially having an allocation formula of 100 percent acreage times deliverability.

Q Are you through?

A I believe so.

Q Will you turn to your Rule 9? Do you not do the same procedure in your Rule 9?

A Well, I am sure that you do.

Q Let me ask you this, with respect to your 100 percent acreage, under such a formula you do not have two different types or classes of marginal, you just have one, and that is all wells unable to make their assigned allowable are considered not top allowable wells, is that correct?

A No. I believe that under any type of allowable you would have both categories of marginal wells.

Q Do you have that now in your gas wells that are now prorated in New Mexico? Do you have any marginal wells?

A Yes, sir.

Q Set up for gas?

A Yes, sir.

Q Which field?

A I believe you will find that to be the case in all of the

prorated fields of Southeast Lea County.

Q Is it not more correct to say that they are either top allowable wells or not top allowable wells?

A If you desire to express it that way.

Q That sort of formula, you have only two types of wells. Under your formula you have three types, the top allowable wells, the Class A marginal wells and the Class B marginal wells, is that correct?

A Yes, sir, that is correct.

Q Now, you stated on direct examination that in the Aztec Pool there were 49 wells out of the hundred who have a deliverability of less than 100,000 cubic feet, is that correct?

A Yes, sir.

Q Under any allocation formula those 49 wells are just out ofthe picture as far as proration is concerned, isn't that correct?

A No, sir.

Q Why not?

A Because they may receive an allowable by application of an allocation formula which would be less than 100 MCF per day.

Q You mean you are not classifying wells with a deliverability of 100,000 cubic feet or less, as a marginal well?

A I am classifying it as a marginal well, prior to any application of an allocation formula. That is the difference between the rules proposed here and the rules proposed elsewhere. We have that large group of wells which I classify as marginal, which I think should not have their allowables restricted because of variation in market demand.

Q It would be the 49 wells of the 100 in the Aztec, is that correct?

A Yes, sir.

Q Now, 100 percent acreage, they wouldn't be prorated wether, would they?

A Sure they would be prorated, initially.

Q You mean that the market demand of the Fulcher-Kutz is less than 100 times 100,000 cubic feet?

A Did you say Fulcher-Kutz? We were talking about Aztec, and I will be glad to answer your question as regards either one.

Q We will look at Aztec. There are 130 wells of the 270 that have a deliverability of less than 100,000 cubic feet, is that correct?

A No, sir. Let me answer your question, the question on the Aztec Pool.

Q I was correct in the first place, there were 49 of the 100 wells in the Aztec that have deliverability of less than 100,000?

A That is correct.

Q Where did you get this 100,000 figure?

A I thought that figure was a reasonable limit below which you would not restrict a well's allowable.

Q Would you recommend to this Commission that the 100,000 cubic feet be a minimum for gas wells in these three fields, in the Pictured Cliff, under any allocation formula?

A I would recommend that any well with a producing ability in to existing gas transportation facilities of 100 MCF or less, be placed in a marginal category and be permitted to produce at its producing

capacity.

Q Let's start with that basis then. The 49 of the 100 wells in the Aztec Pool having a deliverability of less than 100,000 cubic feet, which you recommend be a minimum or marginal allowable, those wells would not be prorated under any allocation formula?

A They would be prorated under any allocation formula, initially until you found that their allocation was in excess of their producing ability. It could be done with 100 percent acreage times deliverability formula. I think it is reasonable to place those wells in a separate category, so that each time we calculate the allowable we won't have to run through those wells I classify as marginal. We can set them off to one side and not have to consider them every time.

Q In the Fulcher-Kutz, 63 of the 159 have a deliverability of less than 100,000 cubic feet. Is your answer the same with respect to the wells in that field, 63 of 159 in the Fulcher-Kutz? The South Blanco, I am sorry. The South Blanco has 130 wells of the 270, is that correct?

A The South Blanco Pool has 63 wells of the 159 with no estimated deliverability of less than 100 MCF.

Q Your answer would be the same with respect to those wells that you gave to the other?

A Yes, sir.

Q To get 130 of the 270 in Fulcher-Kutz, your answer would be the same there, too?

A Yes, sir.

MR. SELINGER: That is all.

MR. MACEY: Any further questions of the witness? Mr.

Stanley.

MR. STANLEY: You touched upon a subject which will be very important and will be kicked around, I think, not only in the San Juan Basin, but also in Lea County. I believe that if you refer to the record, you have stated that shooting a well, or any type of stimulation increases the reserves. Is that true?

A I consider that in most instances stimulation increases the recoverable reserves to a well.

By MR. GRENIER:

Q Before the well was drilled at all Mr. Woodruff, were there any recoverable reserves under that tract?

A No, sir.

Q Your concept of recoverable reserves is only what will come out of the well and has nothing to do with what is under there in the first place, is that correct?

A Well, certainly it considers at first you had gas in place which would be recoverable if you completed a well there, without completing a well certainly you would have no recoverable reserves.

BY MR. SMITH:

Q Isn't it also true that after a well has been stimulated that it has a tendancy to buck the line pressures and thus produce a greater volume of gas for a longer period of time before abandonment than a well that has not been stimulated?

A I believe that is correct.

Q From that standpoint also, you get gas that will not be recovered by the well, will not be abandoned as quickly?

A That is correct.

MR. KELLAHIN: Jason Kellahin, representing Lowry Oil Company.

Q Mr. Woodruff, there are some wells of rather high initial potential in the South Blanco Pool, are there not?

A Yes, sir.

Q Do you know what the top three might be?

A I do not have that information ready, available to me. I could get it for you.

Q Would you agree there are some wells with eight million feet or thereabouts?

A Yes, sir.

Q They are averaged in there?

A Yes.

Q Do you know what the sand thickness on those wells is?

A I answered without thinking. I can't say positively whether those wells are included or not and they would not have been included until there had been a log on that well. I am not prepared to state at this time which wells we had logs on and which were considered. I mean I am -- I do not have the information before me here.

Q Your Exhibit Number Five, the highest you showed was approximately two million?

A I show as an average for seven wells within the isopachus interval 40 to 50 feet, 2,396 MCF.

Q Those wells don't appear on your exhibit except as an average on wells which are possibly tremendously low initial potential, is that correct?

A This figure on this graph, Exhibit Five of El Paso, reflects the average initial potential of the seven wells.

Q That is designed to show the relationship between the

initial potential and the net pay thickness, is that not correct?

A Yes, sir.

Q Is that the purpose of the Exhibit?

A It is the purpose.

Q Under your allocation formula you don't average, do you? In other words, a well of high deliverability would have a high allowable than wells of low deliverability would have, is that not correct?

A Well, the deliverability, I believe would be commensurate with the net effective pay and the other factors entering into the reserve calculations.

Q If your wells of high potential were included, say for example, there are included in the seven wells that you have here where is your relationship between the pay thickness and the deliverability?

A Well, first, Mr. Kellahin, I did not say that they were in there, being unable to tell you which individual wells.

Q You are not certain they are?

A I can't say now what the net effective pay for the wells which are referred to as having high deliverabilities in the vicinity of eight million cubic feet would have in net effective pay.

Q But assuming that you did include it in here, you don't know as I understand it, whether you did or didn't, but assuming that you did, is there any relationship between your allowable you are going to grant those wells and the allowables which are going to be granted the wells of low deliverability in the same pay thickness? Where is the relationship between reserve?

A You are attempting to relate reserves to the single factor which I have used here. There may be other factors entering into the reserve calculation.

Q That is the only factor that is used here?

A That is the only factor used here.

Q You do admit that these wells are in existence, whether they are on this chart or are used or not?

A Yes, sir.

Q That situation would exist?

A What situation?

Q The situation of the high potential wells getting a high allowable under your proposed formula and low potential wells getting a low allowable?

A Yes.

Q Regardless of pay thickness?

A No, I wouldn't say that is true.

Q You wouldn't say that is true?

A No, sir.

Q You don't know the pay thickness of those wells, is that the reason for your answer?

A I do not know the pay thickness of those wells. I do not have it here available before me. Were the net effective pay not in proportion, had the well been included in there, that would not necessarily mean that the reserves underlying that well was not greater in comparison than the reserves underlying a well with lower deliverability.

Q Are you familiar with those wells?

A I am generally familiar with them.

Q Do you know of any indication of any fracture?

A No, sir, I do not.

Q You don't know?

A No, sir.

Q If there were fracturing then would that alter your estimate as to the reserves underlying that well, based on deliverability or initial potential?

A I think we would have to know the nature and extent of the fractures to be able to answer that question properly.

Q But if such a situation existed, wouldn't it be proper to use some other factor to equalize it?

A Not necessarily.

Q Now, in connection with your proposed rules, Mr. Woodruff, I believe Rule Nine, in defining your allocation formula, I believe you arrive at Class A and Class B wells, one being marginal and the other limited, that is the general statement of it, is it not?

A No, both Class A and Class B would be called marginal.

Q You arrived at that definition, you determined what constitutes a marginal well by the ability to produce into an existing facility, is that correct?

A Yes, sir.

Q Does that take into consideration, Mr. Woodruff, the fact that more than one pipeline is operating in a given pool at different pressures?

A No, sir.

Q That would result in an inequity, or a double standard then, would it not, in defining what constitutes marginal wells

and thereby giving it a marginal allowable?

A I think the standard would still be the same, however, for one pipeline company you might have a different condition prevailing as from another. As far as the definition, --

Q (Interrupting) As far as the definition is concerned, I agree with you, but as far as the practical application of that definition, would it not result in a double standard within a single common source of supply?

A It could result in wells which could produce into one pipeline being unable to produce into another pipeline which had higher pressure. If that is what you have reference to. However, in my opinion, in setting up rules, the Commission must set up rules which are not based on the pipeline pressure of one pipeline company or the pipeline pressure of another pipeline company, and must prorate the gas among the wells. Then it is up to the pipeline company itself to operate its system in such a manner that it can obtain the gas allocated to it for its wells.

Q Wouldn't that result in two wells of the same producing capacity, one connected to one pipeline and one to another producing unequal amounts and being allocated unequal amounts under your rule?

A Well, yes, it could. However, the ability of the pipeline company to meet its market demand, or a pipeline company would be able to meet its market demand only by operating its pipeline in such a manner that it can obtain the gas allocated to its wells, otherwise that gas which it cannot produce because of existing pipeline pressures will be reallocated to the well that can produce it and the operator then would suffer --

Q (Interrupting) You have no provision on your marginal wells for allocating under-production or overproduction?

A Well, the marginal wells are neither capable of making up overproduction or -- well, they are not capable of making up under-production because they are assigned an allowable equal to their producing ability.

Q Their producing ability measured by the pipeline into which they are producing?

A That is correct.

Q That is an additional factor which makes an unequal situation.

A I believe that you are correct, there is an unequal situation there.

Q Mr. Woodruff, I would like to go back to the Exhibit Five again and ask you one further question. In your -- just take that seven wells, that 45 pay thickness, do you know whether you included in there the wells with eight million cubic feet potential, or wells with four million cubic feet potential?

A I cannot say which wells were included in there.

Q You don't know what --

A (Interrupting) I do not.

Q If your figures reflect it, Mr. Woodruff, that you did include eight million, four million cubic foot wells, then in that event two wells of the same pay thickness, one would get twice the allowable as the other under your formula, would it not?

A I believe that is correct.

Q Didn't you say that your reserves were based essentially on the net pay thickness?

A I think that reserves are based on all of the factors entering into reserve compilations.

Q What other factors?

A Pressure, porosity, interstitual water.

Q You haven't considered that in your formula?

A No, sir.

Q Don't you propose deliverability as the sole factor?

A Yes. I started to answer no, which would have been improper in that deliverability is influenced by those other factors entering into the reserve calculation.

Q But if you just take your deliverabilities with the same net pay thickness and the situation that I outlined, and eight million cubic foot well and four million cubic foot well, one well is going to get twice the same allowable as the other, although they have the same pay thickness?

A They would under that example, but that does not mean that they would necessarily have the same reserve.

Q You don't know whether you included such wells or not, do you?

A I believe my answer was no.

Q You do know that such condition does exist, don't you?

A I believe my answer to that was also no.

MR. KELLAHIN: Thank you.

MR. MACEY: Are there any further questions of the witness? Mr. Utz.

MR. UTZ: I have a question of Mr. Woodruff.

By MR. UTZ:

Q Referring to your Exhibit Two, which is your recommendation

for nomenclature, I notice in the area of 26 North, 9 West, Sections 13, 14, 15, extending almost parallel down to 25 North, 6 West, in the vicinity of Section 5, you have some wells on your map which are producing wells, some of which I know are producing into a pipeline. What do you propose to do with those?

A Those are the wells which are found on El Paso's Exhibit No. 2; those are the recommended limits of the Fulcher-Kutz and South Blanco Pools. We have not included any of those wells in any of the presently designated pools because they have not proven to be in any one pool by production. We have our thoughts as to which pool the majority of the wells should be in. It was our thought in leaving those wells out that they should not be prorated until such time as additional development had definitely indicated which pool they should be included into. Leaving those wells out, I see that no inequity will exist because at such time as they are definitely proven to be in one of the presently designated pools, they can then be allocated and prorated as being in that pool.

Q You are actually recommending no proration until the pool is established?

A That is correct.

Q Did you believe that when a well is producing that it should be in an established pool?

A I do not know that that is necessary, Mr. Utz. If we desired to put them in an established pool, we might call this South Fulcher-Kutz or something, because they are not now close enough to that pool to be definitely known to be in the Fulcher-Kutz Pool.

Q I take it that you would recommend leaving them out rather than to establish a temporary pool until such time as they are proven in one trend or another?

A That would be my recommendation. I think that no injury or inequities would exist because of that.

MR. UTZ: That is all I have.

MR. MACEY: Anyone else? If there are no further questions, the witness may be excused.

MR. SELINGER: On behalf of Skelly Oil Company, we wish to state to the Commission that we feel that it should continue its time-honored practice of prorating oil and gas, or both, on the basis of unit allowables. However, if the Commission desires to deviate in such a historical and satisfactory practice, it favors an allocation formula of acreage times pressure and the suggestion that all the rules put forth by El Paso as Exhibit 6 is satisfactory, except Rule 9 on page three, and in substitution thereof, we wish to put into the record an amended Rule 9 as Skelly's Exhibit 1, and I might say for Mr. Howell's benefit, and for Mr. Grenier and the others who were present at the Blanco Mesaverde, it is the same rule that we advocated as Section 4 of our proposed rules. We merely changed the pool name from Mesaverde to Pictured Cliffs.

MR. MACEY: Are you sure that you are talking about Rule 9 as proposed by El Paso?

MR. SELINGER: Page 3, Page 4, Rule 9, and we have put it on three-quarters of a page.

MR. MACY: You subscribe to the provisions of Rule 7-A?

MR. SELINGER: We have no objections if they desire to have one hundred percent, or half a three hundred twenty acre unit. We pointed out in our cross examination that we think it is rather unusual to have a drilling permit for a unit of 160 acres and allocation formula of 320 acres. We think that is rather unusual, but we are perfectly agreeable to going along on an allocation formula of 320 acres. We think that is rather unusual, but we are perfectly agreeable to going along on an allocation formula like that if the Commission desires to adopt a 320 acre allocation formula. We think the better practice would be to have Rule 2 and Rule 7 coincide. We have no objections particularly. Our only objection goes to Rule 9 of the proposed rule.

MR. MACEY: We will adjourn until 9 o'clock tomorrow morning.

MORNING SESSION
THURSDAY, AUGUST 19, 1954.

MR. MACEY: Meeting come to order, please. Before we begin today's proceedings, yesterday afternoon, Mr. Woodruff had a map similar to the one on the board there -- off the record.

(OFF THE RECORD)

MR. MACEY: Mr. Grenier, do you have some testimony?

MR. GRENIER: Yes, we do. Mr. Weiderkehr.

MR. MACEY: Mr. Walker, swear Mr. Weiderkehr, please.

MR. WALKER: Is that the only witness you have?

MR. GRENIER: Yes, sir.

A. M. W E I D E R K E H R

the witness, having been first duly sworn, testified as follows:

DIRECT EXAMINATION

By: MR. GRENIER:

Q please state your name for the record?

A A. M. Weiderkehr.

Q By whom are you employed?

A Southern Union Gas Company.

Q In what capacity?

A Manager of the Exploration Department.

Q Have you testified on previous accasions before this Commission?

A I have.

MR. GRENIER: Are this witness's qualifications acceptable to the Commission?

MR. MACEY: They are.

Q Mr. Weiderkehr, what is the interest of Southern Union Gas Company in the Pictured Cliffs Field which is the subject matter of this hearing?

A Well, in the Fulcher-Kutz Field, Southern Union has no wells. We are connected to quite a number of wells, and three of our partially owned subsidiaties, Angle Peak, Congress and Summitt have 20 wells in the field. In the Aztec Pictured Cliffs Field, Southern Union has a few wells and other wells we have contracted for gas, even though at the present time, that gas is going to El Paso. I think Southern Union is taking gas from only two wells in the Aztec-Pictured Cliffs Field. In the South Blanco Field, Souther Union has only some partial interest wells but we are connected to quite a number of wells as a gatherer and transporter of gas.

Q Now, referring to the first, to the Fulcher-Kutz Field, you mentioned that Southern Union had three subsidiary companies which owned and operated some wells there. Can you give us some indication as to approximately how long those wells have been producing, when did production begin from them?

A As was indicated yesterday, the field was discovered in 1928 and some of these wells were drilled from 1928 on up to date.

Q Now, that drilling then was done at a time prior to the initiation of the present 160 acre spacing rule, is that correct?

A It is.

Q Have you made any study of whether or not all of these early drilled wells are in fact located on 160 acre units or have 160 acres attributable to them?

A I have made such a study and there are quite a number of wells drilled many years, some of them on as little as 40 acres when that was the spacing pattern generally accepted. There are other wells that were drilled haphazardly through the section and it would be impossible to set out a 160 acre drilling pattern for those wells. Then there are quite a number of pool units comprising 160 acres but also comprising various parts of a section, not necessarily one of the quarters.

Q Have you reduced your findings to map form?

A Yes, I have.

Q Has that Exhibit been marked Southern Union Exhibit No. 1?

A Yes, it has.

Q Will you place it on the board there behind you so that the Commission may see it?

A I don't think anybody can see it, it is so small.

Q Now, what area is covered by this map, Mr. Weiderkehr?

A The area covered by this-- well, actually, the area we are primarily concerned with, Township 28, 29 and 30 North, Ranges 11 and 12 West. This area is what was known as the Old Kutz Canyon and Fulcher Basin Field, initially. Wells in this area were drilled starting back in 1928 on up through the 1930's and a few wells have been drilled in recent years. Wells that were drilled since the initiation of 160 acre spacing units were possibly set out on a quarter section. But due to the fact that many

years ago, there was no spacing pattern, there was considerable amount of fee acreage involved. We have quite a number of wells that are drilled either on 40 acres or 80 acres or in instances, 160 acres; but these 160 acre units do not conform to the normal quarter section. I would like--

Q (Interrupting) have these, either undersized drilling units or unorthodoxly located drilling units been indicated on the map?

A Yes, they have.

Q How?

A Well, actually Southern Union subsidiary companies were placed on here, outlined in red and colored in red and then to facilitate this hearing and since we are taking gas from wells connected to Aztec Oil and Gas outlined in orange, the unorthodox units being produced from wells owned by Aztec Oil and Gas Company.

Q Were those wells formerly owned by Southern Union Gas Company?

A Most of these wells were at one time, a lot of them were drilled while Southern Union, while Aztec was a wholly owned subsidiary of Southern Union. As a matter of fact, I think half of them were drilled in that category.

Q Or prior to the time Aztec Oil and Gas Company was formed?

A Right.

Q Now, you were here yesterday, I believe, when El Paso Natural Gas Company presented a suggested set of rules and regulations for these gas pools?

A Yes.

Q Do you recall their Exhibit 6 and the provisions there for 160 acre spacing?

A Yes.

Q Would you feel it appropriate or necessary in the interest of conservation of oil and gas in this state and the prevention of waste that new hearings be held, as possibly contemplated by these El Paso suggested rules, in order to validate these old unorthodox drilling units?

A I think that that would be a waste of both the Commission's time and the operator's time since in those instances these units have been formed and are already pooled and it would be quite a problem to dissolve the pooling units that are already formed and approved and recreate new units in wells drilled back in the 1920's and 1930's.

Q Now, assume a proration unit as suggested by El Paso of 320 acres, would one of these 80 acre drilling units, for example, receive a full allowable if there is any acreage factor in the formula adopted?

A No, I do not, would not recommend that these units be given an allowable in excess of the normal allowable that would be calculated under the formula, I don't advocate giving a 40 acre tract on allowable equal to that granted to an 160 acre tract, but I do feel though we should not have to come back before this Commission and ask for exceptions on each of these individual tracts. I think under the circumstances this Commission should approve the units already formed prior to the present anticipated order and let us go ahead and produce those wells, using what acreage is at-

tributable to them or any acreage in the future that might be added to it.

Q You are then suggesting what has been referred to as a "grandfather" clause validation, is that correct?

A That is correct.

Q Now, you were also here yesterday, were you not, when the witness for El Paso Natural Gas Company was recommending a formula based on 100 percent acreage times deliverability?

A Yes, I was.

Q Have you made any studies of these three fields in an effort to inform yourself as to their producing characteristics and to enable you to express an opinion, informed opinion as to the proper allocation formula that you would recommend in these fields?

A I have studied the deliverability characteristics of the wells and I would recommend a formula as has been stated before, I don't know what is entirely correct, I doubt if anybody else does, I have my ideas as to what would be an approach to a good allocation formula for these fields.

Q Based on the studies which you have made-- will you describe those studies a little bit more fully to us, you say you studied the deliverability, what have you done?

A I have taken the deliverability test information that was available and applied that information on the map and have studied logs of a good number of the wells and have come to the conclusion that in general, there is a relationship in these Pictured Cliffs Fields between net sand and deliverability or initial potential.

I did not find that that was necessarily a straight line function. I am of the opinion though that it is more nearly a straight line function than we find in the Mesaverde Pool, for instance, and would recommend the Commission adop a proration formula of 25 percent acreage plus 75 percent acreage times deliverability. I think that in particularly in your old, in your Fulcher-Kutz Field and Aztec-Pickured Cliffs Field that that formula would be equitable.

Q Do you feel that that formula can be proved with mathematical exactness as being the one applicable to these fields?

A No, I do not.

Q Your basis of recommending it then, is what?

A A study of the actually character, producing characteristic of the wells, what I would consider net sand of the various wells in their relationship.

Q In other words, it comes about as close as you have been able to get to what seems like proper, is that correct?

A That is right, it is a personal opinion.

Q Now, would you suggest any minimum allowable of the type recommended by El Paso Natural Gas yesterday?

A Yes, I think that wells completed in these fields should have a minimum allowable, in order that they might try to pay out in a reasonable period of time. I would suggest that in the Pictured Cliffs Field that a minimum allowable of 150,000 a day be assigned. At the going price, at the present time, for completeing wells in these fields that would give a pay out of between five and six years.

Q Now, that is, that would mean that any well having a deliver-

ability of less than 150 MCF per day be permitted to produce into the line everything it could?

A Up to its capacity, yes.

Q It would not be assigned an allowable of 150 MCF, if that were in fact greater than its actual deliverability?

A No, it would not.

Q Do you have any other comments or recommendations to make to the Commission regarding proration techniques or formulas which, in your opinion, are necessary or should be adopted in these areas?

A I would like to recommend to the Commission that they give due consideration to the pool delineations as set out by Mr. Woodruff in his Exhibit. I agree with him that it is practically impossible to divide the Aztec-Pictured Cliffs and other Blanco-Pictured Cliffs pools at the present time. Our pressure history shows there should be a division in there and I suggest they take the division as he has set out, use it for the present time and when more developments along that dividing line take place, possibly a new field boundary should be set out.

Also,in reference the pool delineation, I feel that the area in question yesterday which encompasses Township 26 North, Ranges 8, 9 and 10 West, where there has been considerable amount of development recently that we have no justification of putting that area in any pool at the present time. The Commission would have two alternatives; if they deem it necessary to prorate that field, it should be set up as an independent field, temporarily, I do believe the future development will show it ties to one of the other fields and I suspect it will tie into the Fulcher-Kutz Field. We

know the general trend in this San Juan Basin is a northwest-southeast trend, and from the development of this area, I say the chances are pretty high it will eventually tie into the Fulcher-Kutz. At the present time, we have no justification for tieing those two pools together.

Q Now, also yesterday, we heard a statement by Counsel for Skelly Oil Company, in which he reiterated his recommendation made in the Blance Mesaverde hearing for the formula based on 100 percent on pressure times acreage. In your opinion, would such a formula as that provide a proper allocation basis for gas in these fields?

A I think that a formula such as that would be out of the question, in that to make that formula work, we would have to have approximate stabilized pressures. We found in years of running shut-in pressures that it is necessary oftentimes to shut these wells in for as much as six to eight weeks and sometimes longer, to reach a stabilized pressure. Pressure actually has nothing to do with sand thickness, it is one of the factors in reserve calculations but it is not the major factor. Pressure is taken into consideration in deliverability and, personally, I do not think a pressure times acreage factor would be a wise allocation formula for this field.

Q Do you have anything further that you would like to state to the Commission?

A I believe not.

MR. MACEY: Did you offer your Exhibit?

MR. GRENIER: We would like to offer Southern Union's

Exhibit No. 1, in evidence.

MR. MACEY: Without objections, it will be received. Any questions of the witness?

By Mr. MACEY:

Q In connection with your minimum allowable that you recommended, do you feel that the minimum allowable will promote the development in so-called marginal areas that if you didn't have the minimum allowable, you might not get that development?

A I feel this, that is quite likely that would happen, Any operator who does not anticipate sufficiant allowable of land to pay out a well is not likely to go in and spend his money to drill such a well. I feel in setting a minimum allowable, we will see development in areas that possibly would not be developed under a formula that gave no minimum allowable.

Q Then, I take it that you feel that the combination of your recommended formula of 75 percent acreage times deliverability and 25 percent acreage, plus 25 percent acreage together with your minimum allowable will protect the correlative rights of every one in the field, in these fields?

A I think it will do as good a job as any formula we might have. We are going to have exceptions to any rule. There are a few exceptions pointed out yesterday in the South Blanco Pool, where you have extremely high productive capacity wells. Those are few and far between and, personally, I don't know how you can get away from that, under any formula. Overall, I would say 90 percent of the wells would be protected by the formula we have recommended.

Q Did you, I may have missed this in your, in the questioning, did you recommend that a 320 acre proration unit be established?

A We made no such recommendation. I do feel that if an operator thinks he can drain 320 acres and that if he believes he would be spending money unnecessarily to develop on 160 acres, that should be his perrogative. I would say that in certain areas very definitely one Pictured Cliffs well can drain the 160 acres and will go one step further and suggest any time 320 acres was to be assigned to a Pictured Cliffs well, that should be after notice and hearing, since it would be conceivable that a part of that 320 acres might not be productive. I think the normal unit allowable should be 160 acres but under, after notice and hearing that 320 acres should be allowed, if the area can be proved to be productive.

Q And if the well can drain --

A Yes, and I think that can be shown probably by its producing capacity. Now, Interfield wells, I think, wells with lines wholly within a pool, and not being on the edge of the field, I think those wells could be granted a 320 acre spacing unit automatically. But I do feel any time you get on the edge of a field and start allowing 320 acre spacing, that some hearing should be held on it.

By MR. SMITH:

Q Mr. Weiderkehr, don't you think that if the Commission sets the field limits, that as long as the Commission has made that determination that it would be possible to have a 320 proration

unit anywhere within the field limits as so delineated?

A I don't agree. Quite often the field limits in the past have encompassed an area that now seems not to be productive. They have a policy, I think now existing, to extending the field boundary out a mile and in a lot of places here a mile is too far.

Q Would it be possible for the Commission to provide the rules would provide within a mile of the boundary of the particular field and delineate the field, what the know production would be?

A That could be done, if the well was placed in the center of a 320 acre drilling tract, I believe this would be a logical way of handling it.

MR. KELLAHIN: Jason Kellahin representing Lowry Oil Company.

By MR. KELLAHIN:

Q Mr. Weiderkehr, in connection with the recommendation on the proration unit, have you made any study as to what well will drain 320 acres in the pools that are involved in this case?

A I feel that from the information I have studied in certain areas of these pools, that is true in your West Kutz Field, it has been definitely proved one well will drain 320, I think it is true also in the old area of the Fulcher-Kutz Pool, down the so-called fairway. I have not made such a study in the South Blanco Field; our interest there has been strictly as a purchaser.

Q Do you have any ideas as to whether there are areas within the South Blanco, which one well would not drain 320?

A I am certain there are areas on the rim of the southern

part of the South Blanco, or should I say Southeastern and Southwestern part of South Blanco, which one well would not drain 320.

Q You could not recommend the 320 unit proration rule?

A Not at all.

Q You recommend 160 acres?

A I think 160 is satisfactory, I think if an operator can prove within reasonable limits he can drain 320, he should be allowed to produce it. I don't subscribe to the drilling of unneccessary wells and spending unnecessary amounts of money.

Q As a matter of fact, most of the area has been drilled on a 160 acre pattern?

A That is correct, I think those should be exceptions.

By MR. SMITH:

Q Would you have any objection, Mr. Weiderkehr, to allowing an operator to take 320 proration unit by the waiver method rather than having a formal hearing and necessity of putting on testimony?

A No.

Q Waivers from offsetting operations?

A On the assumption, if there were objections there would be--

Q (Interrupting) Notice and hearing?

A Notice and hearing, right.

MR. MACEY: Anyone else?

MR. DAVIS: With the Commission's approval, I would like to introduce some testimony on behalf of Aztec, through Mr. Weiderkehr.

(Marked Aztec Oil and Gas Company Exhibit 1 for identification.)

By MR. DAVIS:

Q Mr. Weiderkehr, I see that you have an exhibit marked Southern Union Gas Company Exhibit No. 1 on the board. Does that Exhibit indicate proration units or drilling units which Aztec Oil and Gas Company might be interested?

A Indicates so-called unorthodox units, yes.

Q How are those outlined on the exhibit, Mr. Weiderkehr?

A In orange.

Q Orange lines?

A Yes.

Q Now, may I call your attention to Aztec Exhibit 1, approximately 20 wells are listed on that Exhibit, are they not, Mr. Weiderkehr?

A That is correct.

Q In these particular cases, I notice that Aztec Oil and Gas Company has as joint operators on some of the drilling units L. G. Stearns, Summitt Oil Company, I believe those are the two other parties. Is it you understanding, do you have knowledge of the fact that pool or Communitization agreements have been executed between those parties and Aztec Oil and Gas Company or its predecessor?

A I have seen such agreements.

Q Do we have any particular or unusual drilling units, Mr. Weiderkehr, that we are asking for unorthodx locations there?

A We do.

Q Would you point those out to the Commission?

A I think, probably one of the most interesting ones is lo-

cated in 29 North, 11 West and encompasses a portion of Sections 17, 18, 19, 20. Aztec Oil and Gas Company's No. 2 McDaniel well, where McDaniel owned four 40 acre tracts of fee land right in the center of these four sections.

Q Would you describe those four quarters just for the Commission's record?

A That would be the Southwest, Southwest of Section 17, the Southeast, Southeast of Section 18, the Northeast, Northeast of Section 19, and the Northwast, Northwest of Section 20. This is fee land owned by one person. A well was drilled on it in the days when there were no spacing rules. And, of course, it has been produced all these years on an, actually a 160 acre drilling tract but not conforming to the present spacing regulations. It would be necessary in this particular tract to communitize with four other parties in order to form a normal drilling tract and, as a matter of fact, another well has been drilled in the same quarter section which is 19, the Northeast of 19, as the McDaniel Well.

There are other instances throughout this Exhibit showing either units of 160 acres that do not conform to the normal 160 acre quarter section patter, or 40 acre drilling units, 80 acre drilling units. In those instances these units could not have over this amount of acreage in them due to the fact there are quite a number of wells, as many as 6 or 7 wells within 160 acre, I mean within one section. It would be impossible to assign all those wells to 160 acres.

Q Mr. Weiderkehr, in your opinion, it would be impractical

to go back recommunitize and repool this acreage surrounding these wells to form orthodox proration units?

A I think it would be impractical and in quite a number of instances impossible, due to the way the wells are located.

Q Due to the fact you have existing Communitization agreements effecting those wells --

A (Interrupting) Yes.

Q (Continuing) --which have been in effect a number of years?

A They have been.

Q You have knowledge of the fact several of these wells are located on less than 160 acres and were drilled prior to any spacing regulations whatsoever by the Commission?

A That is correct.

Q In other words, the wells we are talking about have been drilled and produced for several years, in those instances?

A As much as 20 to 25 years.

Q Going back as for as 25 years?

A That is correct.

Q If the Commission did not permit the formation or the continuation of these unorthodox proration units, would it in affect prevent Aztec Oil and Gas Company to recover its just and equitable gas in this reservoir?

A In some instances, it might.

Q In most instances, if we had to reduce the proration unit to permit the acreage within the standard proration or orthodox unit of 160 acres, it would reduce the allowable from those wells to be practical to produce them; in all cases, they are unorthodox.

A Would you read the question?

Q Let me state it this way. If the Commission elected not to approve unorthodox, these unorthodox drilling units, would it not have the effect of reducing the allocation to each well to the extent that Aztec would be prevented from getting its share out of the reservoir?

A In some instances that is so.

Q Well--

A (Interrupting) In other words, on one of the 40 acres, that is an unorthodox unit, all you can get is 40 acres.

Q What I am getting at are those that have the 160 acres allowed to them?

A Right.

Q Do you have any other comments on this Exhibit Number 1?

A I don't think so.

MR. DAVIS: I think that is all.

MR. MACEY: Anyone have a question of the witness?

MR. DAVIS: I would like to introduce our Exhibit No. 1 in the record.

MR. MACEY: Any objections to the introduction of Aztec's Exhibit No. 1? Without objection it will be received. Mr. Weiderkehr, on the unorthodox proration units, are there any units in excess of 160 acres on that map?

A We have not set up any units in excess of that. In instances, Aztec has acreage in excess of 160 acres but usually that is, would form a peculiar shaped unit and I don't think there would be justification for most of those. We have not set up any-

thing in excess of 160, we have from 40 to 160 and some are in all manners and shapes of drilling tracts.

MR. MACEY: You don't have any pool development in excess of 160 acres?

A No Pictured Cliffs Wells, I do not recall any, I am sure we couldn't.

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

(Witness excused.)

MR. MACEY: Mr. Grenier, is that all your case?

MR. GRENIER: Yes, sir, that is all we have.

MR. MACEY: Any further testimony in this Case?

MR. TOWNSEND: Stanolind Oil and Gas Company desires to present some testimony.

MR. MACEY: Do you just have one witness?

MR. TOWNSEND: Just one witness. Mr. Hiltz.

R O B E R T G. H I L T Z

the witness, having been first duly sworn, testified as follows:

DIRECT EXAMINATION

By: MR. TOWNSEND:

Q Will you please state your name and employment for the Commission's record?

A My name is Robert G. Hiltz, and I am employed by the Stanolind Oil and Gas Company as petroleum engineer in their North Texas, New Mexico division in Fort Worth, Texas.

Q Have you previously testified before the Commission as a petroleum engineer?

A Yes, I have.

MR. TOWNSEND: Before going further, I would like to state that our testimony and recommendations will be limited to the Fulcher-Kutz pool only and we have nothing to present in connection with the other pools of which are the subject of This case.

Q For the record, Mr. Hiltz, what is the present spacing pattern in the Fulcher-Kutz Pool?

A The present spacing pattern is 160 acres, that was established by Commission Order Number 748, which was adopted initially on June 22, 1948.

Q Do you recommend or will you recommend to the Commission that this spacing pattern be changed?

A No, sir, I will not.

Q Do you intend to recommend to the Commission the establishment of a 320 acre proration unit?

A Yes, I will.

Q Have you made or caused to be made certain studies regarding the proration of gas from this field with particular reference to the size of the proration units?

A Yes. With what information is available, we have made such study.

Q Have these studies been made with the considerations in mind of Article 13-B of the Conservation Act as ammended which authorizes the Commission to establish proration units and sets forth the matters which they should consider in the establishment of those units?

A Yes, that is correct.

Q Have you data or information which will indicate the area in this field which can efficiantly and equitably be drained by one well?

A Yes. I should like to point out however--

MR. TOWNSEND: Have that marked as Stanolind's Exhibit No. 1.

(Marked Stanolind's Exhibit No. 1 for identification.)

A As has previously been brought out, the Fulcher-Kutz Field was discovered in 1927, that was actually the Kutz Canyon portion of the field and I believe the Fulcher Basin portion to the northwest was discovered in 1934. Development of the field has progressed sporadically since that time. Since the field was developed at such an early date, there is not a great deal of really good useful information available. However, bottom hole pressure information has been obtained over a period of years and I believe based on the information we do have that we can demonstrate that one well will drain at least 320 acres in this field.

The information we have shown on this map are the shut-in casing pressures as measured from the 1953 deliverability tests which were conducted under the jurisdiction of the Commission. We have shown the vaious ranges of those in colors. The legend is indicated on the right. The northwestern portion of the field has probably been developed for the longest period of time and that area of the field is depleted to a larger degree than the area to the southeast, a large portion of which has been developed in very recent years.

With the very early discovery and development and production

from the northwestern part of the field, it could be expected that if this were a common reservoir initially, that if the reservoir had good communication throughout, there would be some movement of gas in the reservoir from this portion of the reservoir to the northwest. Now, due to the fact that this neck area, --I would like to change that-- due to the fact the northwestern part of the field is rather narrow, it would also be expected that the rate of migration would not be too severe but it should give us some evidence of migration as reflected by these pressures. Now, the pressures, I am referring to would be pressures measured initally on new wells as they were drilled. And I would like to, at this time, just point out pressures which were measured on new wells and compare them to what we believe to be the initial reservoir pressure. I beleive that will demonstrate the fact that the area around these new wells had been drained to some degree prior to the time they completed. Based on information that we have, it is indicated that the initial reservoir pressure was probably on the order of 630 pounds, so with the drilling of new wells in this are--

Q (Interrupting) Which area?

A The Southwester, southeastern portion of the field. In the last few years, a great many wells have been drilled down there and inital pressures are available on a number of those wells. By comparing the inital pressures on these wells with the initial pressure of 630 pounds, we will see some evidence of drainage from that area, thus indicating the ability of a well to drain the 320 acres.

For the record, I would like to quote a few of those examples. In section 27 of Township 27, and Range 10 West, we have the El Paso Natural Gas Company's Frost Number 2 Well. The initial shut-in casing pressure on that well corrected to bottom hole pressure after 10 days shut in time was indicated to be 511 pounds this was 119 pounds below the estimated initial pressure of 630 pounds, thus indicating that the area in the vicinity of that well had been drained prior to its completion. A second example would be in Section 22, the El Paso Gordon Number 1, which is also in the southeast quarter at this location. That well was completed on December 31, 1951; a shut-in casing pressure, after 22 days, was 524 pounds and the bottom hole pressure corrected was 567 pounds, indicating this pressure was some 77 pounds below the initial pressure of 630 pounds. A third example is in Section 28, the El Paso Natural Gas Company's McAdams No, 2 in the northeast quarter. This well was completed in December of 1951; the shut-in casing pressure after six days was 500 pounds and the corrected bottom hole pressure was 532 pounds. The fourth example, is in Section 31, 28, 10 which was the Stanolind Oil and Gas Company Mattin Gas Unit D Number 1 in the northeast quarter. This well was completed on January 7, 1950, and after eight days shut-in the casing pressure was 489 pounds and the corrected bottom hole pressure was 521 pounds, indicating that the pressure was some 109 pounds below the inital pressure of 630 pounds. One more example, I should like to point out is Stanolind's Sullivan No. 1 in the northeast quarter of Section 11 in 27, 10. After 44 days shut-in time, upon initial completion in December of 1950, shut-in casing pressure was 533 pounds and corrected bottom hole pres-

sure was 567 pounds.

There are many more examples of this available. In my opinion, those data show that the area in the vicinity of those wells was being drained prior to their completion and in each case, of course, the nearest well to them was on an adjacent 160 acre tract such that the area had to be drained on an equivalent of 320 acre spacing pattern.

One other exhibit I should like to present are cross sections, the location of which I shall identify on this isopachus map which I would like to have marked Exhibit No. 2. I will later make--

Q This cross section shall be marked Exhibit No. 3 that you referred to.

A All right, I will refer to this isopachus map again later. I would like to point out here the trace of the two cross sections to which I now make reference cross sections AA prime and BB prime indicated running from the west to the east. The westeast cross section is indicated at the top of the Stanolind's Exhibit No. 2 and the northsouth cross section is indicated as AA prime. This cross section was made up from available logs in the field and it will be noted it is confined principally to the southeastern portion of the field. Our reason for doing that was there simply aren't any logs available, or none available to us at least in the Fulcher Basin portion of the field in the northwestern area of the trend. The objective in showing this is to simply indicate at this time that that Pictured Cliff Formation is readily identifiable from each one of these logs, can be correlated from well to well and the development of the section appears to be relatively

uniform throughout the area. Therefore, I believe it can be concluded from this information that the Pictured Cliff is one continuous development and that the field as we know it now is one common source of supply.

Q The Pictured Cliff formation is colored in orange on the cross section, is that right?

A That is right.

Q Then, your conclusion is that, from these studies, just what is it?

A Well, it is that this is a single common source of supply and that one well will drain at least 320 acres.

Q You have stated that this field has been developed on -- that the present spacing pattern is 160 acres. Have all the wells been drilled on that spacing pattern?

A No, I believe it was brought out by Mr. Weiderkehr, that the spacing pattern in the field is quite arratic, principally in the northwestern portion of the field, since the field was discovered prior to the adoption of specific field rules which controlled the spacing as it now exists on 160 acres.

Q If the spacing is 160 acres, how is it you are recommending 320 acre proration units?

A I believe that if one well will drain 320 acres in this pool, that is a proper size proration unit and that is the size unit which should be adopted by the Commission. Now admittedly a large portion of the field has been developed on 160 acres and a smaller portion of the field developed considerable less than 160. However there are still acreas to the south and east of the

field, as is now described, which are as yet undeveloped. And I believe, that if those areas which appear to have low reserves and low deliverability are to be properly exploited, then the operator should have some greater assurance he will get a greater, or at least a reasonable return on his investment. I feel if he has the prerogative of assigning 320 acres to the well he will drill, that will give his investment a reasonable return to his fair share of the reserves and give greater incentive to exploiting the lower reserve areas.

Q Will there be any significant difference in the ultimate recovery from this field if it is developed or if the units are set at 320 as distinguished from 160?

A I don't believe there will be any significant difference in the ultimate recovery, and in all probability there actually could be less recovery, if the field were developed on 160 acres due to the additional amount of gas wasted to the air as each new well is completed.

Q What is that approximate cost of drilling a well in this pool?

A The cost of wells drilled by Stanolind today based on the cost of 20 wells is approximately $20,000.

Q Where it would be possible to assigne 320 acres to a well for allocation purposes, do you think it would be sound from an economic standpoint to drill an additional well on that unit?

A No, I believe in most cases, it would constitute an economic loss, in fact, I should say all cases.

Q In concluding this feature then, your recommendation as to

the size of the proration unit, it should be 320 acres?

A Yes.

Q What other factors should be considered besides the size in proration of gas from this pool?

A The adoption of a proper allocation formula.

Q What fundamental principle should be kept in mind in adopting this, or accepting the formula?

A In adopting the allocation formula it is mandatory we attempt to reach complete equity in distributing the market demand among the wells producing in the field. That means, however, if would be necessary to allocate the recoverable reserves to each well in direct proportion to the recoverable reserves underlying the tract. As a practical matter, it is impossible to determine what the recoverable reserves are under each tract and the formula which you would have, to distribute it in that manner, would be unwieldy so as to make it completely unworkable. What we should strive to do is devise a formula which will in practical limits accomplish that objective.

Q Are you familiar with Section 12-C and Section 13-A of the Conservation Statute which sets forth the matters to be considered by the Commission in the proration of gas which would be included in consideration of a proposed formula?

A Yes, I have.

Q Have you taken the matters, which are set forth in these articles of the Statute, into consideration in the formula which you will recommend?

A Yes, I have.

Q Is there in your opinion, a relationship between the ability of a well to produce and the recoverable reserves?

A Yes, I believe there is such a relationship.

Q Well, then what are the factors that determine the recoverable reserves in a pool?

A Well, speaking from the viewpoint of calculating reserves by volumetric method, those factors are porosity, formation, thickness, the connate water saturation and the abandonment pressure.

Q Have you made or caused to be made certain studies which consider each of these factors?

A Yes, I have.

Q Taking first porosity.

A The wells drilled by Stanolind in the field, a number have been cored and based on core analyses from eight wells comprising approximately 375 feet of analyzed core, we found that the average porosity varies from approximately 12 to about 20 percent.

Q And how about thickness?

A Utilizing what information was available from logs which were run on completed wells in the field, we have prepared an isopachus which I would like to present to the Commission at this time.

Q This has been marked Stanolind's Exhibit No. 3, is that right?

A I believe it is Number 2.

Q Number 2, excuse me.

A I should like to explain what we have on this Exhibit.

Shown here, of course, is the Fulcher-Kutz Field, the green outline being the currently defined limits as set forth by the Commission. We had logs available to us on approximately, I believe 56 wells in the field. We had no logs available in the northwestern, or Fulcher Basin portion of the field.

In determining the thickness, which was utilized in preparing this isopachus, the thickness used was the top of the pay in the Pictured Cliffs; and then within our ability to pick it, we said that the lower limit of production would be its lowest point, at which resistivity would differ. Based on the experience of engineers in this area, when resistivity is dropped below that point, in all probability the water saturation is so high you couldn't expect commercial production. I put that in the record to make it clear what the basis was for making the thickness values, which are indicated on the map in black by each of the wells on which a log was available.

These data then were contoured as indicated on the map and the various ranges on 20 foot contour intervals are indicated in the colors as shown by the legend in the lower right hand corner.

One other comment, it is apparent generally there is a trend of increasing thickness of the Pictured Cliffs pay from the periphery toward the center, and the thickest section is in the center of the field.

Q What about the factor of connate water saturation, have you made a study in connection with that?

A Yes, capillary pressure tests were run in our laboratory

on four of the core analyses or rather core analyses from four wells, and the water saturation data,which has a function of permeability, have been plotted on the graph.

MR. TOWNSEND: I ask this graph be marked as Stanolind's Exhibit No. 4.

(Marked Stanolind's Exhibit No. 4 for identification.)

A This graph simply reflects laboratory analyses for capillary pressure information and statistical data obtained from the tests. It will be noted as the permeability decreases the connate water saturation increases logarithmically and, of course, with the decreasing permeability to the lower ranges, the connate water saturation does increase to the point where it is so high you couldn't expect to obtain commercial production or recoverable reserves from the low permeability section.

Q What are the ranges shown by this graph?

A For data available, we had permeability data as low as two-tenths of a millidarcy, at which point the connate water saturation indicated to be approximately 90 percent of the available pore space in the rock, that was the lower limit of permeability. The upper limit, which point, the connate water saturation indicated to be 40 to 50 percent of the available pore space.

To indicate more clearly how this affects the reserves to be found in the various areas, these connate water saturation data have been converted to terms of net effective pore space, which simply represents the available pore space to which can contain gas.

Q Have you had prepared a graph to show that conversion?

A Yes, we have.

MR. TOWNSEND: I will ask the Reporter to mark that Stanolind's Exhibit No.

(Marked Stanolind's Exhibit No. for identification.)

Q What does this graph show here?

A This graph simply shows that as the permeability increases the pore space available to contain gas increases logarithmically.

Q What is the range that is plotted on this graph?

A In the lower ranges of permeability at approximately four-tenths of a millidarcy, it is indicated that the net effective pore space available for containing gas is only about three percent of the bulk volume. In the upper range for, let us take point ten millidarcies of permeability, it is estimated that the net effective pore space in percent of the bulk volume would be approximately 12 percent. Overall that simply reflects that as development of the field proceeds into the areas of lower permeability, the available pore space to contain gas decreases logarithmically.

Q Have you made a study of the abandonment pressure of the various wells?

A Yes, it is a well known accepted fact that the recoverable reserves under a tract are functions of the abandonment pressure, and that the abandonment pressure in any area is the function of permeability. Therefore, it could be expected that as permeability decreases, the abandonment pressure in the area increases and hence the recoverable reserves would decrease. And to simply

illustrate that effect, we have prepared another graph which we would like to present at this time.

MR. TOWNSEND: Mark that Exhibit 6.

(Marked Stanolind's Exhibit No. 6 for identification.)

(RECESS)

Q Directing your attention to what has been marked as Stanolind's Exhibit No. 6, will you please identify and explain this graph?

A This graph has been prepared to illustrate the effect of, indirectly, permeability on the reservoir abandonment pressure of a well, and hence the recoverable reserves that might be attained from a well. The data have been prepared on information that was available from the Fulcher-Kutz Field and making certain assumptions.

What the curve shows is this; that if we assume that a well will be abandoned at a given producing rate, say, we feel it can not be economically produced below 550 MCF per day and at that rate the abandonment line pressure would be 50 pounds, then from this graph we can determine approximately what the abandonment pressure would be expected for a series of wells of varying current deliverability.

Now, the deliverabilities as shown on here are comparable to the range of deliverability which now exists in the field, and the equilibrium reservoir pressure which was employed in reservoir calculations is approximately equal to the average reservoir pressure at this time. Now, to show the effect of abandonment pressure on recoverable reserve, we could take the two different examples

utilizing the upper curve which is for an abandonment rate of 50 MCF per day. A well having a deliverability currently at a line pressure of 250 pounds, up, equal to 700 MCF per day, could expect to have an abandonment pressure of approximately 100 pounds. At the same time, a well currently having a deliverability of only 100 MCF per day against 250 pounds line pressure could be expected to have an abandonment pressure on the order of 150 pounds.

Now, that then reflects the effect of permeability or reservoir abandonment pressure on recoverable reserves from a well and indicates that as you develop or encounter lower permeability areas in a field, that the recovery will be less because of the higher abandonment pressure which will be encountered.

Q And the lower curve uses abandonment pressure of what?

A The lower curve uses the same general approach. It simply reflects a lower assumed abandonment rate, that rate being 25 MCF per day. It is simply for comparison purposes because some of the operators might feel that 50 MCF per day was a rather high abandonment rate and they might be able to produce their wells to a lower rate. But in each case, the relative effects are essentially the same.

Q And the present reservoir pressure which you used in this calculation is what, as shown on the graph?

A That pressure is 462 pounds.

Q Now, you have testified about these various factors that are to be taken into consideration in determining reserves, and you have talked about the variations in these factors. What is their cumulative effect upon recoverable reserves?

A Our observation has been that, as we pointed out on a previous Exhibit, that the thickness in general increases from the periphery of the field toward the center, So as far as thickness is concerned then, there would be a tendency for an increase in recoverable reserves from the periphery toward the center, we have learned the porosity range is approximately 11 or, I believe I said 12 to 20 percent. And there is just a general tendency, though it is not fixed, for the porosity also to increase from the periphery toward the center.

We have also seen that as permeability decreases, as you reach the lower permeability areas, that the connate water saturation will increase and hence the available void space to contain gas will decrease. We have also seen that as we enter the lower permeability areas, the abandonment pressure will also increase thereby decreasing reserves. Our experience has been that permeability definitely does decrease from the center toward the periphery. That is reflected principally in the ability of the wells to produce.

Therefore, generally, we could say there is a consistent relationship of increasing reserves from the periphery of the field toward the center, and the relative magnitude of reserves we might expect is probably on the order of 7 or 8 to one between wells in the field.

Q Returning now to the ability of the well to produce, what are the factors that determine that?

A The ability of a well to produce is a function of the permeability, the thickness and the pressure.

Q And directing your attention to the Exhibit which you prepared, what is the data that you have on each of these factors that you have mentioned?

A As far as the thickness is concerned, we illustrated on our Exhibit No. 2, that the thickness of the formation decreased from the center toward the periphery so, based on that factor it could be expected the ability of the well to produce would decrease as you move from the center toward the outer limit of the field. As far as the permeability is concerned, our observation has been that the permeability very definitely does decrease from the center toward the periphery. As a matter of fact, the limits of production are essentially defined by decreasing permeability to values below which you can obtain due to the fact the connate water saturation decreases to such a value there is too little void space to hold any commercial recoverable gas.

Q Is the ability of a well to produce reflected by any test made on the wells in this field?

A Yes, I believe tests have been conducted on each well in the field initially. These tests in general have been three hour pitot tube initial potential test, and initial potential on all wells, or all wells on which data were available have been plotted on this map,

MR. TOWNSEND: I ask this be marked as Stanolind's Exhibit No. 7.

(Marked Stanolind's Exhibit No. 7 for identification.)

A We have indicated in the lower right hand corner a legend

showing the ranges of initial potentials on the various wells. The contour interval is approximately 500 MCF per day, and the lowest potentials are indicated by white, which is the range of initial potential from zero to 500 MCF per day.

Now, we have utilized initial potentials to compare the relative ability of wells to produce in lieu of deliverability tests because taken under a set of circumstances which is more nearly common to all wells, that is in line with the thinking that has previously been expressed. I would like to point out there very definitely is a tendency for wells near the center of the fields to have the highest deliverability and the deliverability does decrease as you move into the low deliverability areas on the periphery of the field.

Q State the range of initial potentials as shown by your legend there.

A As shown on the legend, the actual range is from zero to 4,000. I believe that on the information we have on this map that the highest initial potential was 3880 MCF per day. I would like to point out however, the current range of deliverabilities is not on that order of magnitude.

Q What other tests have been conducted on the wells in this field?

A Last year the Commission issued an order which required or established annual deliverability tests, among other things, and the first test under that order was conducted last year. I believe data were available on approximately 210 wells last year.

Q Based on that test, what is the range of deliverability above one hundred thousand cubic feet per day?

A The range?

Q Yes.

A The range of deliverability indicated in that test for wells above 100 MCF per day was approximately seven to one with the highest wells having deliverabilities on the order of 700 MCF per day.

Q Will the allocation formula which you recommend take these variations that you have discussed in recoverable reserves and in the deliverability into consideration?

A Yes, they will. I think we have demonstrated the relative magnitude of the variations and shown that there is definitely a relationship between the two, because the variations occur in a common manner throughout the field, that is, it can be expected that recoverable reserves increase from the periphery toward the center and it is perfectly obvious the deliverabilities and initial potential's follow the pattern.

Q What is the formula which you recommend for this pool?

A Based on an analysis of this data, we have concluded the formula, 75 percent acreage times deliverability plus 25 percent acreage would be equitable.

Q Why did you chose 75 - 25?

A I believe that this is a very definite relationship between deliverability and reserves. However, it is not always consistent; there are anomalies, and in order to compensate for those deviations from a straight line trend, we felt there ought to be some modifying factor, and we believe the inclusion of an additive acreage factor will tend to compensate for those deviations

from a straight line relationship.

Q Do you have a recommendation for a minimum allowable?

A Yes, it would be my recommendation that any well with an ability to produce 100 MCF per day or less, be assigned an allowable of 100 MCF per day or their ability to produce.

Q Have you prepared a form of order which you will recommend to the Commission?

A Yes, we have.

MR. TOWNSEND: I ask one copy be marked as an Exhibit.

(Marked Stanolind's Exhibit No. 8 for identification.)

Q Without going into the, over each of these provisions, will you, let's go to the most important and significant provisions of your recommendation. First, as to Rule 1, which is the size of the proration units.

A It is our recommendation that the standard proration unit be 320 acres or a standard proration unit to comprise between 315 and 325 contiguous surface acres.

Q With reference to sub-paragraph B of Rule 1, I wihs you would go over each one of those to show that provision is made for the conditions as they presently exist in the field. Read, if you will, the first statement and then discuss each of the subdivisions.

Section B under Rule 1, relating to proration units contains these provisions:

One, that an operator may without notice and hearing drill and/or produce wells on a standard proration unit in conformance with applicable spacing rules for the Fulcher-Kutz (Pictured Cliffs)

Pool. In brief that means that while a standard proration unit would comprise 320 acres, an operator would be permitted to drill two wells on that standard proration unit in conformance with the existing spacing regulations, That gives the operator the prerogative of drilling one or two wells as he sees fit.

The second provision is that an operator without notice and hearing may drill or produce a well on a legal quarter section consisting of 158 to 162 acres in conformance with applicable spacing rules for the pool. That means if an operator only has 160 acres to which he could attribute to a well, he would be permitted to proceed with the drilling of a well on that 160. It also would mean that all wells now drilled on 160 acre tracts, on 160 acre spacing pattern could simply file a proration unit for that plot and produce it without inter-result or notice and hearing do establish an unorthodox proration unit.

The third, provision is, that an operator may without notice and hearing produce all wells existing as of the date of this order on a standard proration unit and, fourth, that an operator may without notice and hearing produce all wells existing as of the date of this order on less than a standard proration unit, provided there is insufficient acreage available to be attributed to the well or wells to form a standard proration unit. Our objective of writing that into the rules was to give proper recognition to the somewhat erratic spacing pattern we have had in the past, prior to adoption of specific field rules. I believe that provision will permit all operators, particularly in the northwestern portion of the field where they do not have sufficient

acreage to form a standard unit, or where acreage as has been outlined by Southern Union and Aztec has been pooled to form drilling units, those operators may, by filing a proration unit plot required by the rules, go right ahead with the production of the well without having to establish, after notice and hearing, his right to form an unothodox unit.

Q What is the provision made for each of these subdivisions?

Q The provision is that the allowable for each well, regardless of the amount of acreage that can be attributed to it, will be established in accordence with the allocation formula we have recommended. Our thought there is that in order to treat all operators equitably, they should have an allowable established in line with the acreage which can be attributed to the well.

Q What is the next significant provision besides the standard provisions that are usually included in such an order?

A Well, there are provisions in there for obtaining administative approval of unorthodox units as outlined in Paragraph C, and provided that in certain cases, if certain requirements are met that an operator may establish an unorthodox proration unit with administrative approval by furnishing waivers or furnishing the Commission proper notice, or rather proper information that notice has been given to all of set operators.

Q Rule 3 provides for the Nominations, is that correct?

A Yes, and I should like to point out there in answer to a question Mr. Grenier is going to ask me, I have no objection to altering that wording to make the filing of supplemental nominations, only in cases where some change is indicated to be necessary.

lity test conducted by the Commission or under their jurisdiction.

Q Isn't it a fact, Mr. Hiltz, that fluid in the well bore could likewise cause that differential between bottom hole pressure and shut-in casing pressure?

A Fluid in the well bore would affect calculations of bottom hole pressure corrected from surface measurements.

Q Do you have any data available based upon interference tests or otherwise which, other than these pressure calculations which you have introduced?

A There have been no interference tests conducted in this field, I feel the information reflected by the pressures accomplishes the same results.

Q You have no actual interference test in this Case?

A No, that is correct.

Q How long were these particular wells shut-in when these pressure tests were taken?

A I believe I read the shut in time on each one of the wells in the record, I shall be glad to go over them.

Q No, I overlooked them if it is in the record. I believe you also testified that there is a uniform sand development throughout this field? Wasn't that your testimony?

A No, I didn't testify as to the uniformity of the sand; I think I said that the Pictured Cliffs is readily identified on the electric logs and can be correlated from well to well.

Q But your testimony is not that the sand in any particular well maybe the same in an adjoining well?

A No, the Pictured Cliffs is heterogenous.

Q And it also includes your allocation formula that you have previously testified to?

A Yes, sir, and provisions related to the minimum allowable of 100 MCF per day.

Q Upon what do you base that minimum allowable?

A We feel that is a rate which will offer and which will afford an operator a reasonable payout on his investment in wells in this field and will actually aid in creating incentive to exploit the low pressure areas which might not ohterwise be deve--loped.

Q What do the remainder of the rules cover?

A Remainder, the balancing of the production and filing of necessary forms and reports.

Q Do you have anything further you want to add?

A No, sir, I do not.

MR. TOWNSEND: That is all we have.

MR. MACEY: Any questions of the witness?

MR WEBB: William G. Webb, representing Development, Incorporated, First State National Gas Company, Johnson Oil and Gas and New Mexico Western Oil and Gas Company.

CROSS EXAMINATION

By MR. WEBB:

Q Mr. Hiltz, I believe you testified that your data, I believe it was your first Exhibit was based principally on pressure data which you had secured, your company had secured from the Fulcher-Kutz Field?

A I believe that it reflects data from a 1953 deliverabi-

Q In other words, it may or may not be the same half mile away or a quarter of a mile away, isn't that correct?

A That is typical of these reservoirs in the Basin, that is correct.

Q In other words, in this Pictured Cliff's field in particular, isn't it true that you have pronounced thinning, shaling up and other variances in between, when you drill on 160 acres basis? I had better restate that.

A I wish you would.

Q Isn't it true that the wells which are presently existing in this field, most of which have been drilled on 160 acre basis, that there is a pronounced differential in the sand development between those wells?

A Oh, undoubtedly, there are variations in the development of the porosity and permeability in various areas of the field.

Q That would have something to do with the amount of recoverable reserves under each one of those 160 acres tracts, would it not?

A Yes, that is true, I believe we testified on that.

Q Based upon that then, what is, I have forgotten what your testimony was as to the basis upon which you thought that one well on 320 acres could drain that 320 acre tract as well as two wells, if you have this pronounced differential in sand development?

A I fail to see any real relationship between the ability of a well to drain the acreage and the manner in which that acreage is developed, as far as the rock characteristics are concerned.

Q My point is that, isn't it true that one well on 160 acre basis can more adequately drain those particular 160 acre tracts better than one well on 320 acres, when you might have interference? In other words, the sand is completely thinned out over that 320 acres and it picks up again down in the bottom part of another 160 acre tract?

A I don't believe that in this field that has any significant effect. I believe that there are variations in the development of the pay and I believe that one well can, without question, drain 320 acres, and I believe I testified in my opinion there would be no significant difference in the ultimate recovery in this field, if it were developed on 160 or 320.

Q And your basis of this opinion is solely on the pressure differential?

A I feel that that is good indication of the ability of the wells to drain an area greater than 160 and certainly at least 320.

Q You don't have any interference test such as you had in the West Kutz Field?

A Not, but I will say this, I believe that the character of development of the two fields is such that the information that we have in the West Kutz Field could reasonably be expected to be applicable to the Fulcher-Kutz Field.

MR. WEBB: That is all I have.

MR. MACEY: Any further questions of the witness? Mr. Hiltz, could you give me the wells that you cited as examples, I believe you had them on a yellow sheet of paper there?

A Yes, sir. The first one was El Paso Natural Gas Company Frost Number 2, Southeast quarter of 27, 27, 10. It was completed on February the 8, 1952 after 10 days shut-in time; the casing pressure was measured to be 479 pounds, and using a gas gradient from the surface to midpoint of the pay, the corrected bottom hole pressure was indicated to be 511 pounds. You want all of them?

MR. MACEY: Yes, please.

A The second example, I gave was the El Paso Natural Gas Company, Gordon No. 1 located in the southeast quarter Section 22, 27, 10, completed on December the 3, 1951, after being shut in 22 days, a shut in casing pressure was 524 pounds, the corrected bottom hole pressure was 557 pounds.

The third example was El Paso Natural Gas Company's McAdam's No. 2, in the northeast quarter section 28, 27, 10. It was completed on December 4, 1951, after being shut in 6 days, the casing pressure was 500 pounds. The corrected bottom hole pressure was 532 pounds.

Fourth example was Stanolind's Martin Gas Unit D No. 1, in the northeast quarter of Section 31, 28, 10, completed January 7, 1950, the shut-in casing pressure of 8 days was 489 pounds, the corrected bottom hole pressure was 521 pounds.

MR. MACEY: Pardon me a minute, was that, that was the Martin?

A Martin Gas unit D 1.

MR. MACEY: Is that in 38?

A 38, 21, 10, is what I have here. The fifth example I quoted was Stanolind's Sullivan No. 1 in the northeast quarter of

se

Section 11, 27, 10, was completed December 2, 1950, and after 44 days shut-in the casing pressure was measured at 533 pounds, the corrected bottom hole pressure was calculated to be 567.

MR. MACEY: What did you say was the original reservior pressure?

A We believe it was 630 pounds, I believe that one indication you might have of that on the discovery well, I believe that the shu-in casing pressure was initally measured to be 585 pounds and utilizing a gas gradient the corrected bottom hole pressure, there is calculated to be 625 pounds. That was measured in 1927.

MR. MACEY: Do you know whether Stanolind has or any other operator had completed any wells in the immediate area of the wells which you cited, which have either shut-in casing pressures or reservoir pressures in excess of say, 600 pounds?

A Surrounding wells?

MR. MACEY: Yes, sir.

A I have some data here which I could compare, Mr. Macey, and submit to you. It will take just a little bit of time to check the pressures I have. If you would prefer, I could attain any data you desire and submit it later or--

MR. MACEY: (Interrupting) I have got all the pressures written down here and some of them are in excess of 600 pounds. For example, your Gordon 1 B.

A Yes, that was.

MR.MACEY: In the northwest quarter of 24, 27, 10, reported a shut-in pressure of 631 pounds?

A Yes, that is correct, that is the information I show here. However, I would like to also point out on the other four additional wells surrounding that one, the pressures measured were as follows:

On Stanolind's Gordon C No. 2, the pressure was 505 pounds at that time. On Gordon C-1, it was 503, on Martin A-1, it was 465. Just a minute, I have given that incorrectly. I will have to correct each one of those. On Stanolind's Gordon B-2 the pressure was 505 pounds, on Stanolind's Gordon C-2, the pressure was 503 pounds on Stanolind's Gordon C-1, it was 465 and Stanolind's Martin A-1, it was 504. I cannot account for the anomalous pressure of 631 pounds. It is inconceivable the pressure could be in that range after that much production had been had from the reservoir.

MR. MACEY: Do you think that the--I don't have the shut-in times on your pressures, but don't you think there is a possibility some of these wells might not have built up to a static condition?

A That is correct, if does take a considerable amount of time for these wells to reach an equilibrium pressure and if those wells remain shut-in for sufficiently long period of time, the pressures would be slightly higher, but I doubt seriously that they would be significantly higher.

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

(Witness excused.)

MR. MACEY: Do you have anything further, Mr. Townsend?

MR. TOWNSEND: I think not.

MR. MACEY: Have you offered your Exhibits?

MR. TOWNSEND: I want to offer Exhibits 1 through 8 into evidence.

MR. MACEY: Is there objection to the introduction of the Exhibits in evidence? Without objection they will be recieved. Does anyone have any further testimony in this Case? Anyone wish to make a statement.

MR. GRENIER: Let me preface what I am about to say, my statement that Southern Union Gas Company is by no means opposed to the institution of proration in the three fields where we are considering proration today. We do, however, very strongly feel that if any proration order is going to be entered, it must be one which will be a valid order and demonstrably a valid order, in the event anybody having an interest in the subject matter of the order desires to submit it to the Court attack.

Now, Section Two of the ct under which we are here operating defines waste. I am referring to the term as it is usually used and generally understood, and then goes on to include some other items which are also stated to be waste, and I point out to the Commission, particularly, the fact, Section 2-D of the Act relating to the non-ratable purchase or taking, relates only to the non-ratable purchase or taking of crude petroleum oil and not to such taking of gas. Sub-section 2-E, states the production in this State of natural gas from any well or pool in excess of the reasonable market demand from such sources for natural gas shall constitute waste, and goes on to define what reasonable market demand is. And we have had no showing in this case that there

has been production of gas in excess of that market demand.

We have seen, I think in the testimony here, some indications by inference at least, probably there is potential production in excess of that market demand at the present time, but not that there has been any actual production.

Passing over to other pertinent sections of the Act, Section 12 C, which is the one which sets up in large measure the standards to be applicable in the promulgation of gas proration orders start off, "Whenever, to prevent waste, the total allowable of natural gas, production of gas wells producing from any pool in the state is fixed by the Commission an amount less then the pool could produce if no restrictions were imposed, then the Commission shall allocate the production upon the basis specified in the section of this statute to conform to the standards therein contained."

Also, further standards are prescribed over in Section 13-A of the Act. Again, that is not a section of the Act which confers the authority, it is merely a section of the Act which imposes additional standards to be complied with in the issuance of an order.

Thinking back a month or two ago, to when we had the Blanco Mesaverde hearing here, it will be recalled that at that time the Commission staff put on some testimony indicating that there had been very definite drainage as between wells and in this case, also we have seen some testimony of that kind on the part of Mr. Hiltz, who by inference has indicated to us that in apportionately for the Blanco, I mean of the Fulcher-Kutz Field that

there has been a movement of gas away from the more recently developed areas to those which have been producing back over a period of 20 or 25 years.

Now, I would like, at this time, to make a motion that this case be continued for the receipt of additional testimony at a later date, either by the interested companies or by the Commission's staff tending to show the facts which are called for by the statute as the necessary basis for the establishment of a valid proration order.

Our interest in it as a pipeline company and that is how we are primarily interested in this field, is this: we have gas purchase contracts containing minimum take or pay provisions, if during any year or specified period of time, it is fixed by the contract, if we fail to take into our pipeline the requisite quantity of gas, we are nevertheless obligated to pay for the deficiency below the quantity that we did promise the seller that we would take.

Now, when a valid proration order comes into being, we are prevented by law in some cases by the operation of the formula from taking the full amount which we have contracted to take, and in those circumstances, we go back to the seller and say, we are very sorry, we are unable to take the amount we said we would but we are not obligated to pay you for the difference because we were prevented from taking the amount that we said we would by the supervening action of this Conservation Commission and we have merely been acting in conformity with their order, taken what the allowable was that was fixed for these wells.

Now, that is fine if the order is a valid order, but if it is not a valid order, and demonstrably a valid order, we are placed in a bad position. Either we are laying ourselves open to subsequent lawsuit by the seller, who says that is fine but you can't get out of your contract committment on the basis of an invalid order, and this is an invalid order, or we take the risk on theoother hand of taking more gas and saying, sorry, Mr. Commission, we have disobeyed your order because we think it is invalid and we just had to do this in order to protect ourselves. Certainly that is a very unpalatable alternative.

It is for these reasons and because I feel that there can be additional testimony, particularly in the other two fields, introduced, possibly tending to show waste and certainly tending to show a drainage and a need of, real need for protection of correlative right, I move this case be continued for introduction of additional testimony along those lines at some later date.

Parenthetically, and to explain why we have not attempted to introduce any such testimony at this time, these hearings, as the Commission knows, and I think all of us taking part in them, have been coming pretty thick and fast recently. Our company is perhaps not quite as liberally blessed with manpower as some of the others, and I hesitate, and knowing some of the other problems that we are faced with, even with the promise that we will have any testimony to put on. But that doesn't alter the fact that some is needed and called for. We will do the best we can to see if we can work something up, use our best efforts, but that is as far as I can state affirmatively at this time. I hope some of the

others who have very generously given of their time and effort will continue to do so along these lines.

MR. MACEY: Before we act on your motion, Mr. Grenier, I would like to know if anyone has a statement or comment to make along the line of Mr. Grenier's motion? I think he has raised a very valid point and I think probably we better consult with counsel before we make a ruling on the motion as to what to do with the case.

MR. GRENIER: Mr. Macey, might I add one more brief point. This same point to some extent also holds true of the West-Kutz Case 696. I know that we are not hearing that matter now, but it does seem to me that possibly if it is decided that the motion is well taken and is to be granted that the Commission might want to consider a reopening of that case, also, so as to provide us with a sound and proper basis for going ahead. Mr. Kellahin may feel he has adequate basis and may want to resist it as to the West-Kutz, and certainly we are better off there than we have been in the testimony on the Aztec and South Blanco areas here.

MR. KELLAHIN: I certainly would like to resist it on behalf of J. Hancock, Limited, in so far as the West-Kutz is concerned, that case was heard, and full apportunity was given everybody to offer anything they had to offer, and Mr. Grenier participated in that hearing and if he had anything further to add, he should have added it at that time or said so before the Case was closed.

MR. GRENIER: I agree, but this is something that hit me at a later date. Getting back to that one, I feel we have a strong-

er basis in that case for an order.

MR. KELLAHIN: I do too, and I think there is an adequate basis in the record for West Kutz Mr. Hancock, it was pointed out at noon time in the course of that hearing, was anxious to get an order entered. I feel that order will link in with these other pools and the effectiveness of it even though entered, will hinge on the prorating of gas in the San Juan Basin generally, There would be no particular merit in pressing for an order in the West-Kutz. If the case is reopened, it would just cause further delay in the entire matter and I resist for that reason.

MR. WALKER: Are you referring now to his present motion or the additional --

MR. KELLAHIN: He suggested reopening the West-Kutz, Mr. Walker, and I am resisting as to the West Kutz. As to the present three cases before the Commission, I am representing the Lowry Oil Company in these cases and as far as we are concerned, we have no objection to continuance along the lines Mr. Grenier suggested, and if it is to be done, I do have a statement to make for Lowry, but I will reserve it to the end of the hearing.

MR. MACEY: Anyone else have anything further?

MR. WEBB: On behalf of those company enumerated before, we would like to concur with Southern Union in their motion to continue this case, and in order not to take up too much time, I want to just by adoption, say the same thing he did and concur one hundred percent in his remarks on the market demand and the other factors he pointed out as to whether or not this would be a valid order if issued.

order if issued.

MR. MACEY: If there is anyone who would be in a position any of the companies who would be in a position to put on the testimony which Mr. Grenier outlined.

(Discussion off the record.)

MR. MACEY: The Commission will continue the case and we will give you the exact date, depending upon whether or not we can get this Hall on Wednesday the 15th, the regular hearing is the 16th and I think we probably ought to dispense with this Case on a separate day.

For the information of anyone who is interested, the Commission itself will attempt to put on the necessary information as pointed out by Mr. Grenier. I don't, personally don't think that there is any difference between the situation which exists in the Pictured Cliff Pools any more than there is in Blanco Mesaverde. I think waste was adequately proved in the Mesaverde Pool, and I think it can probably be proved in this instance in the Pictured Coiffs Pools. Now, I am referring to the three Pictured Cliff Pools in this case and not the West-Kutz.

If you will bear with us a little while, unless someone has anything else, we will continue the case and I will let you know what date it is in a few moments, and we will continue on to the next case. Anyone have anything further?

MR. KELLAHIN: I take it Mr. Macey, any statements to be made in regard to these three pools will then be made at the end of the hearing?

MR. MACEY: Yes, anyone have anything further? The case is continued until Wednesday, September 15th, 9:00 o'clock.

STATE OF NEW MEXICO)
) ss.
COUNTY OF BERNALILLO)

I, ADA DEARNLEY & MARIANNA MEIER, hereby certify that the foregoing and attached transcript of hearing in Case No. 729 before the Oil Conservation Commission, State of New Mexico, at Santa Fe, New Mexico, on September 18th & 19th, 1954, is a true and correct record of the same, to the best of our knowledge, skill and ability.

DATED AT ALBUQUERQUE, NEW MEXICO, this 13th day of September, 1954.

Marianna Meier
COURT REPORTER

Ada Dearnley
COURT REPORTER

BEFORE THE

Oil Conservation Commission

SANTA FE, NEW MEXICO

IN THE MATTER OF:

CASE NO. 729

TRANSCRIPT OF PROCEEDINGS

October 14, 1954

ADA DEARNLEY AND ASSOCIATES

COURT REPORTERS

ROOMS 105, 106, 107 EL CORTEZ BUILDING

TELEPHONE 7-9546

ALBUQUERQUE, NEW MEXICO

BEFORE THE
OIL CONSERVATION COMMISSION
STATE OF NEW MEXICO
Santa Fe, New Mexico

Special Hearing
October 14, 1954

REGISTER

Name	Representing	Address
A. M. Wiederkehr	Southern Union Gas	Dallas, Texas
H. L. Beckmann	Humble Oil & Refining	Midland, Texas
J. K. Smith	Stanolind Oil & Gas Co.	Ft.Worth,Texas
William G. Webb	Delhi Oil Corp., Three States Nat., Inc., Pabco Development, Inc., New Mexico Oil, Inc., Johnston Oil, Inc.	Dallas, Texas
S. V. Roberts	OCC	Aztec, N. M.
George V. Selinger	Skelly Oil Company	Tulsa, Okla.
Barton W. Ratliff	Skelly Oil Company	Tulsa, Okla.
Jason Kellahin	Lowry Oil Co.	Santa Fe, N.M.
Elvis A. Utz	NMOCC	Santa Fe, N.M.
P. T. McGrath	U.S.G.S.	Farmington,N.M.
J.M.Stricklin	El Paso Natural Gas	Farmington,N.M.
L. D. Galloway	El Paso Natural Gas	Farmington,N.M.
A. J. Dudenhoeffer	El Paso Natural Gas	Farmington,N.M.
Ben R. Howell	El Paso Natural Gas	El Paso, Texas
Dan Nutter	OCC	Santa Fe, N. M.
F. C. Barnes	Independent	Santa Fe, N. M.

ADA DEARNLEY & ASSOCIATES
STENOTYPE REPORTERS
ALBUQUERQUE, NEW MEXICO
TELEPHONE 3-6691

IN THE MATTER OF:

THE application of the Oil Conservation Commission upon its own motion to consider an order promulgating rules and regulations affecting and concerning the Fulcher Kutz-Pictured Cliffs Gas Pool, the Aztec-Pictured Cliffs Gas Pool and the South Blanco-Pictured Cliffs Gas Pool situated in San Juan and Rio Arriba Counties, New Mexico. CASE NO. 729

The matters to be considered in the above styled case will pertain to the gas pool delineation and definition, gas pro-ration, gas well spacing, gas well allowables, gas pro-ration units and related matters affecting and concerning the Fulcher Kutz-Pictured Cliffs Gas Pool, the Aztec-Pictured Cliffs Gas Pool, and the South Blanco-Pictured Cliffs Gas Pool in San Juan and Rio Arriba Counties.

BEFORE:

E. S. (Johnny) Walker, Commissioner
William B. Macey, Member and Secretary

TRANSCRIPT OF HEARING

COMMISSIONER WALKER: The hearing will come to order. The case on the docket this morning is Case 729.

MR. KITTS: I'd like to have both Mr. Arnold and Mr. Utz sworn, please. (Witnesses sworn.)

E. C. A R N O L D,

having first been duly sworn, testified as follows:

DIRECT EXAMINATION

By: MR. KITTS:

Q Will you state your name, please.

A E. C. Arnold.

Q And you are employed as a geologist by the Oil Conservation Commission, Mr. Arnold? A That is correct.

Q And where is your place of employment?

A District three office in Aztec, New Mexico.

Q You have testified previously before this Commission as a geologist, have you not? A I have.

Q Are the witness's qualifications acceptable to the Commission?

COMMISSIONER WALKER: Any one object to the witness's qualifications, if not, they will be accepted.

MR. KITTS: Mr. Arnold, have you made a study regarding the geology and gas production of the Fulcher-Kutz-Pictured Cliffs Pool, the Aztec-Pictured Cliffs Pool and the South Blanco-Pictured Cliffs Pool? A Yes, I have.

Q In this connection you have prepared, I believe, what has been marked Commission's Exhibit No. 1, a contour map of these pools, is that correct?

A Yes, that is correct.

Q Would you go to Exhibit 1 and explain what that portrays, the scale and data and so forth?

A Exhibit No. 1 is a map of the Pictured Cliffs Pool in the San Juan Basin, the contours on here are pressure contours, the interval being 100 pounds per square inch. All the available shut in pressure information which we had in the Commission's files was put on this map and contoured. These are all original initial shut in pressures, in other words, the pressure taken at the time the well was completed. Not all the pressures on this map correspond to the contours of the drawing. One reason for that is that they are areas in the old Fulcher Kutz Pool where recent completions show initial shut in pressures on the order of 150 pounds lower than the original shut in pressures

within those areas. That is probably due to the amount of gas which has been produced from that area over a period of the last 20 years.

Q What is the contour interval there, Mr. Arnold?

A The contour interval is 100 pounds per square inch.

Q Would you point out the contour intervals, I don't believe the people can see them?

A Yes, this is the 400 pound contour, 500 pound, 600 pound, 700 pound, 800 pound, 900 pound and 1,000, the highest pressure I found here is 1,039 pounds, the lowest is just under four hundred, 394. I have also disregarded some pressures for the reason that the length of time shut in did not correspond. In other words, some of the earlier wells were not shut in over a couple of days, 48 hours. Later it was changed to seven days, so I have also kept that in mind in contouring these pressures. Also, some have small wells so have low pressures because in my opinion they didn't have time to build up to their maximum pressures. What I have attempted to do is contour what I considered the original initial shut in pressures to be. The reason that I did that was to try to determine where the boundaries to the oil should properly be drawn. I have used that information along with log information on the margins, dry holes which have been drilled, to attempt to determine where the permeability barriers are between the various pools and have drawn the boundaries with that in mind.

Q Mr. Arnold, what do these variances in pressure indicate to you?

A They indicate just as I have said in various areas, what

I considered to be low permeability areas which is where the pool should be separated, there are variations within the same pools, however. In order to make a -- to draw conclusions you cannot use pressure alone, however, pressure does help in the determinations.

Q Well, on the basis of your study, Mr. Arnold, do you have any recommendations to make as to the pool boundaries or delineations?

A Yes, my recommendations for pool boundaries are shown by these lines on this map.

Q Which pool is that you are poing to now?

A This is the Fulcher Kutz Pool, this is the west Pictured Cliffs Pool (indicating), this is the Aztec Pictured-Cliffs Pool, this is the South Blanco-Pictured Cliffs Pool, this is a new pool which I recommend be called the Fulcher Kutz 269 pool, the northeast edge of the Fulcher Kutz Pool I have reduced the pool boundaries. I have done this from a combined study of pressure, dry holes which have been drilled along the edge of the Fulcher Kutz Pool which were originally in the Fulcher Kutz Pool which indicate that there is a permeability barrier lying in this area.

Q Indicate what area there, you say in this area.

A On the northeast edge of the Fulcher Kutz.

Q Northeast edge of Fulcher Kutz?

A We did when we reduced the Fulcher Kutz Pool in this area, it was necessary --

Q In the northeast area?

A -- to place several wells in the Aztec Area which had

originally been in the Fulcher Kutz Pool, the Aztec Pool was extended in this area.

Also, on the south end of the Fulcher Kutz, Fulcher Kutz boundary originally came almost across Township 27 north, range 9 west. Based on the study that I have made I think that the east portion of this township should more correctly go in South Blanco, as I have shown here. Also, the size of these wells and erratic pressures indicate that there is a permeability barrier probably in this area extending on through.

Q Well, delineate the area for the record.

A Through the central part of Township 27 north, 9 west, extending northwesterly between the boundaries as shown. One other change which is made is on the south side of the South Blanco Pool, originally these wells as shown here in Township 25 north, range 7 west, were included in the South Blanco Pool. On the basis of the study that I have made I believe now that there is a permeability barrier extending southeasterly across the south half of Township 26 north, range 7 west, which would separate these two pool.

Q The South Blanco and that new pool, is that right?

A And the new pools.

Q Which is --

A Which is Fulcher Kutz which I recommend be called Fulcher Kutz 257 Pictured Cliffs Pool. For the same reason I have established a new pool in these three townships which would be 25 north, 8 west, 26 north, 8 west, 26 north, 9 west, which I recommend be called the Fulcher Kutz 269 Pictured Cliffs Pool. The

reason that I recommend that these be called Fulcher Kutz Pools is because it appears that eventually this trend will extend across this area. However, there have not been eough wells drilled between the south end of Fulcher Kutz and the north end of the new pool to substantiate connecting with them at the present time. I have made no changes in the West Kutz Pictured Cliffs Pool boundaries except that I have made two small extensions which will be advertised for the next hearing.

Q West Kutz Pool is not included in the scope of this hearing? A No, that is right.

Q You have anything further you wish to say in regard to Exhibit No. 1, Mr. Arnold?

A One other thing, it also appeared possible that the Aztec Pictured-Cliffs Pool, the South Blanco-Pictured Cliffs Pool will eventually be connected in this area.

Q Which area is that?

A Which is the north end of Township 27 north, range 9 west, however, the two closest wells on those two pools are approximately 2-1/2 miles apart and the initial potentials are 196 MCF, 175 MCF, which indicates -- which doesn't indicate at the present time that the permeabilities will be very high in this area. Therefore, I think we should wait until further drilling has been done in sections five and six of 7 north, 9 west. I believe that is all I have to say about this.

Q You have also prepared, I believe, Mr. Arnold, what has been marked Commission's Exhibit No. 2.

A Oh, No. 2 is a description of the pools as indicated on

this map.

Q And it relates directly to Exhibit 1, does it not?

A That is right.

Q And this was also prepared by you?

A Yes, sir.

Q Now Mr. Arnold, you have also prepared what has been marked Commission's Exhibit No. 3, is that correct?

A Yes, sir.

Q Will you explain that exhibit, please?

A Exhibit No. 3 is a plat of an area in the Aztec-Pictured Cliffs Pool in township 30 north, ranges 10 and 11 west on which we have made a reserve and production study. Two cross-sections were constructed across this area using electric logs as indicated by the lines A-A' and B-B'. Exhibit No. 5 is a -- no four, first, is section A-A' which is a north to south cross-section across this area. B-B' is a west to east cross-section across this area.

Q Well, will you explain the -- how this exhibit was prepared and the data used?

A This exhibit was prepared for the purpose of determining net pay relationships between these five wells. Electric logs from the Commission's files were used. The method that I used in determining that pay was as follows: First I determined what the shale line was on each log, that is the portion of this self potential curve which is farthest to the right. I have determined that from a sample examination compared with logs running in the same hole -- in the same well. After determining the shale line on each well, I then took the values of maximum self potential

variations in the sandstone on each well. I averaged these values, took 50 per cent of that value and plotted it on each well log in the proper place. The assumption behind that was that the maximum variation in self potential represented the highest permeability, this represented the shale line, at a value of approximately 50 per cent of that value I assumed that the permeability would become questionable. This is based also upon some studies of core analysis value logs which I have made.

Q Mr. Arnold, at this point for the information of the Commission, the center well shown on Exhibit 4 and the center well shown in the Exhibit 5 are the same wells, are they not?

A That is correct, that is the well shown in the graph here, that is the El Paso No. 1 Kessler.

Q What is your reference line there, is that what you call it?

A The datum is sea level plus 4,000 feet and the horizontal scale is one foot equalled one-half mile. Using the method that I have just described I arrived at the following net pays on these wells: On the El Paso No. 1 Lloyd in the northwest of 24, 30, 11, 23 feet; the El Paso No. 1 Kessler, northeast of 24, 30 north, 11, west, 36 feet; the El Paso No. 3 Schumaker, in the southwest of 18, 30, 10 -- 30 north, 10 west, 28 feet; the El Paso No. 1 Murphy in the southeast of 24, 30 north, 11 west, 23 feet, and the Axtec Oil and Gas Company No. 49, southeast of 13, 30 north, 11 west, 35 feet.

Q Mr. Arnold, net pay is one of the factors used in determining recoverable reserves, isn't that correct?

A Yes, that is correct.

Q You have any further testimony you wish to give on Exhibits 3, 4, and 5 at this time?

A No, I don't believe so.

Q And these were -- each of these exhibits were prepared by you or under your direction?

A Yes, sir.

Q All right, Mr. Arnold, passing on to Exhibit No. 6, will you state to the Commission what that is?

A That exhibit is a plat of an area in the South Blanco-Pictured Cliffs Pool in township 26 north, range 7 west, upon which a similar study was made. Four wells were used in this area, those being in the same method of determining net pay was used as I have previously described on Exhibit Nos. 4 and 5.

Q You are now making reference to Exhibit No. 7, is that correct?

A That is right. Exhibit No. 7 is the cross-sections as indicated by the line A-A' on Exhibit No. 6. The net pays as I have arrived at them are as follows: King Locke Petroleum Company MKL 4-11, in the southwest section 7-26 north, 7 west; King Locke Petroleum Company MKL 6-13, northeast section 7-26 north, 7 west, 40 feet; King Locke Petroleum Company 1 MKL in the southwest of section 5-26 north, 7 west, 39 feet. Now this well --

Q Which well is that? A This log was taken from a Mesa Verde well which was a 200 feet offset.

Q Will you identify that for the record, where you said, ~~this well.~~

A The MKL number one is a 200 foot offset -- 200 offset to the MKL No. 2 which was the Pictured Cliff well which was used in our reserve determinations. I did not have a log on the No. 2 MKL, therefore, it was necessary to use the No. 1 MKL due to the fact that it was only 200 feet away I felt that it would fairly represent the pay for that quarter section.

The fourth well is the King Locke Petroleum Company MKL 4-15, northeast section 5-26 north, section 7 west, 30 feet.

Q Mr. Arnold, did you study any core data to determine porosity and connote water in any of these wells, that is the wells covered by Exhibit 4, 5, or 7?

A Yes, core data used in connection with Exhibits 4 and 5 in the Aztec Pictured Cliff Pool came from the El Paso Natural Gas No. 1 Forrest in the northwest quarter of section 35, 30 north, 11 west, 133 feet of total section was cored in this area. Only 24 feet in this particular well showed permeability of greater than zero zero. Therefore, I have used those 24 feet in arriving at an average porosity, an average connote water value to be used in our reserve study across the area as shown. The average porosity which I determined from this core analysis was 20.5 per cent, the average connote water value 43.7 per cent, the average permeability 1.05 millodorcies.

Q That is the only core analysis that you had available, is that correct?

A Yes, that is the only core analysis which I had available to study for that area.

Q All right, in the other area of the South Blanco-Pictured

Cliffs Pool area shown on Exhibits 6 and 7, did you have core analysis, a core analysis available there?

A Yes, I used the King Locke Petroleum Company No. 4-11 MKL, in the southwest section 7-26 north, 7 west, the total core in this well was 21 feet and 19 feet of this showed permeability. The average permeability for this 19 feet was 24.3 Md. The average porosity was 20.6 per cent. The average connote water 53.9 per cent. Those are the values which we have used for calculating reserves in the area as shown on Exhibit No. 6.

Q Is that the only core analysis that you had available for that area? A Yes.

Q And you applied that data on all the other wells covered by Exhibits 6 and 7, is that correct?

A That is right.

Q So that those factors being constant could not change the ratio between the net pay?

A No, they would not.

Q Do you have anything else you wish to say concerning Exhibits 6 or 7?

A No, I don't believe so.

Q Those exhibits were likewise prepared by you or under your direction, Mr. Arnold? A That is correct.

MR. KITTS: We offer in evidence Commission's Exhibits 1 through 7, inclusive.

COMMISSIONER WALKER: Any objection to the exhibits being admitted?

WITNESS: This is Exhibit No. 1, No. 2 was the pool description, this is No. 3, 4, 5, 6, and 7 (indicating).

COMMISSIONER WALKER: If there are no objections the exhibits will be admitted.

MR. KITTS: That is all I have of this witness.

COMMISSIONER WALKER: Any questions of the witness?

CROSS-EXAMINATION

By: MR. SELINGER:

Q Mr. Arnold, I want to call your attention back to Exhibit 1, which is your -- call your attention to Exhibit 1, which is your bottom hole pressure contour map.

A This is not a bottom hole, this is shut in well.

Q Oh, shut in well pressure contour on the 100 feet intervals, is that right, 100 pound intervals, from your study of the area based on pressures alone, you are able to ascertain that the division between the various pools outlined on this map, is that correct?

A No, I don't believe I testified to that exactly. I said that I used these pressure contours in conjunction with the logs to determine where these boundaries should go.

Q And your study has indicated then, from your pressure study, that the lines you have indicated surrounding the various pools are the boundaries and that would be your recommendation as to the Commission that the pools be defined as you have indicated on Exhibit 1, is that right?

A It is my recommendation that the pools be shown as outlined on the Exhibit No. 1, yes, that was not based altogether upon the pressure study.

Q But insofar as your Exhibit 1, that is based on a 100

pound pressure intervals?

A The contours on this map are, yes.

Q Well, how did you arrive at these heavy black lines surrounding each of the fields then?

A Well, in most cases by proven production. There was no problem where there was a wide non-productive area separating the two producing areas. The only place that you get into difficulty is where the two producing areas approach each other, that is where in some cases I have used pressure to help to determine where to draw these boundaries. In other words, in this area right here(indicating), rapid pressure built up across this township indicated to me that probably this was one reservoir and this was another reservoir.

Q You mean the Fulcher Kutz and the South Blanco were each two separate reservoirs when you say this pool and that pool, you are referring to the Fulcher Kutz and the South Blanco?

A That is right.

Q Now in answer to a question of counsel with respect to Exhibits 2, 3, 4, and 5, you stated that net pay was a factor in determining recoverable reserves, do you recall that answer that you gave him?

A Yes.

Q Normally which would have the higher pressure, a thick pay or a thin pay?

A I am not sure that pressure would be affected.

Q You say then that the pressure of a thin pay would be as equal as the pressure of a thick pay?

A I believe so, there are -- I think that the size of the well, the method that the pressure was taken, the length of time shut in all affect those pressures, all right. That is why it is almost impossible to use pressure alone but I think that if a small well is given the necessary time to build up the maximum pressure that it would probably equal the large well.

Q You mean a small well, what basis do you use a small well, in what way, as to pressure, as to pay thickness or as to --

A No.

Q -- or deliverability or as to overflow capacity, what do you mean a small well?

A As to open flow capacity which can also be related to deliverability.

Q Well, I will ask you again then, Mr. Arnold, a well with an extremely high open flow, would it likely be that the pay is thin in that sort of a well?

A No, it probably would not.

Q Most likely, all other factors being equal, the larger open flow well would normally have a larger pay thickness than a well with a smaller open flow generally, with all other factors being equal?

A I believe that the largest factors in determining the size of a well is the permeability, you do not necessarily have to have a thick pay section in order to have a high permeability in part of that section. In other words, I think it would be possible for a well to have an average total net pay thickness but to be a larger well because of the fact that one portion of that

net pay had substantially higher permeability.

Q Well, Mr. Arnold, do you give, as a geologist, do you give any effect to setting recoverable reserves to pressure at all?

A Yes, we do.

Q How much weight do you give as a geologist to pressures in determining recovery reserves?

A Well, I believe that --

Q Can you give us any relative amount in your consideration?

A I think that ordinarily reserves and pressure are directly related.

MR. SELINGER: That is all. Thank you.

COMMISSIONER WALKER: Any other questions of the witness?

CROSS-EXAMINATION

By: MR. WIEDERKEHR:

Q In response to Mr. Selinger's last question, you stated, I believe, that you thought pressure and reserves were directly related?

A That is what I stated, yes.

Q If pressure and reserves are directly related then, how would you consider sand thickness and reserves?

A They are each a factor which are used with other factors in determining reserves.

Q Well, don't you think that sand thickness would have more affect on your reserves than pressure in the field that we are talking about? In other words, is there not a greater variation in sand thickness through out the wells which we have under discussion than there is in pressure?

A Within specific pools, yes, I believe that is true.

Q So in the pools then that we are talking about this morning, then actually you'd have to say that the sand thickness of the various wells would have considerable more affect on the reserve of that well than the pressure?

A Yes, sir, at any rate for a local area such as for which this study was made.

MR. WIEDERKEHR: That is all. Thank you.

COMMISSIONER WALKER: Any other questions of the witness? If not, the witness may be excused.

(Witness excused.)

COMMISSIONER WALKER: Take a five minute recess.

(RECESS)

COMMISSIONER WALKER: The hearing will come to order. Mr. Kitts, will you call your next witness.

MR. KITTS: Call Mr. Utz.

E L V I S U T Z,

having been previously duly sworn, testified as follows:

DIRECT EXAMINATION

By: MR. KITTS:

Q Will you state your name, please.

A Elvis A. Utz.

Q Mr. Utz, you are employed as a gas engineer for the Oil Conservation Commission?

A That is correct.

Q You have testified previously before this Commission as a gas engineer?

A Yes, I have.

Q Are the witness's qualifications acceptable to the

Commission?

COMMISSIONER WALKER: Any objection to the witness's qualifications? If not, they will be accepted.

MR. KITTS: Mr. Utz, have you made a study of production and deliverability in the three gas pools under consideration in this case?

A Yes, I have and I made made the study of Fulcher Kutz, South Blanco and Aztec-Pictured Cliffs Pools of the San Juan Basin. This study includes every well in each of these three pools for which production was reported to the Oil Conservation Commission for a period from three to twelve months of the year 1953. In other words, wells with only one and two months reported production were not included in the study. The purpose of this study was to determine whether or not these wells had been produced rateably during the year 1953. This study was made by analyzing the production purchased by each pipeline company. The wells connected to each pipeline was grouped by companies and deliverability groups or according to the well's ability to produce and this analysis daily average production per well and daily average load factors per well were employed.

Further study was made for more local areas of these pools in which the ratio of recoverable reserves to production was used. A third phase of our analysis will show the effect of the 250 pound per square inch absolute deliverability pressure limit now ordered by New Mexico Oil Conservation Commission order R-333-A which pressure limit is used in the back pressure formula. The

back pressure formula being used to calculate a well's deliverability to a back pressure other than the back pressure at which the well was tested.

Q Have you finished your statement, Mr. Utz?

A Yes.

Q Mr. Utz, you have prepared certain exhibits in connection with the study, did you not, will you proceed first to Exhibit No. 8?

A Yes, I will.

Q And that was prepared by you, Mr. Utz?

A Yes, it was partially by me and under my supervision. The graphs shown are for three different pools, the Aztec-Pictured Cliffs, the South Blanco-Pictured Cliffs and the Fulcher Kutz-Pictured Cliffs. I will take up the Aztec Pictured Cliffs first.

Q Being Exhibit No. 8.

A Yes, this being Exhibit No. 8, the vertical scale on the graph is from five per cent to 100 per cent, this being the load factors in per cent, the same scale is shown on the right hand side of the graph. The center scale is average production in MCF per day per well. Across the horizontal scale on the left hand side of the graph we have letters of the alphabet from A. to G., each letter representing an operating company. On the right hand side of the graph or Exhibit 8, we have numbers from one to eight, each number representing deliverability group. In other words, group one is a deliverability group from zero to 100 MCF. Group two is from 101 MCF per day to 200 MCF and thus on up the scale to group eight being from 701 MCF to 800 MCF. Coming back to the left hand side of the graph, we have one side of this for

pipeline A, which is one purchasing pipeline in Aztec-Pictured Cliffs and pipeline B which is the other purchasing pipeline in Aztec-Pictured Cliffs, being rather difficult to analyze pipeline A since they only had one well. If I may say so, there wasn't a deliverability test made on the one well, so it is rather difficult to analyze the two pipelines in this particular pool. However, we do have enough information for pipeline B in order to show the picture.

Continuing with the left hand side of the graph, you will note the blue curve. This blue curve represents in percentage the producing load factor for each of the operating companies. I have chosen to call this the production load factor because it is arrived at by calculating or it is calculated from the monthly production for 1953 for each well which was reported to the Oil Conservation Commission. In other words, it expresses in percentage what the well did produce as compared to what it could have produced based on the highest productive month. To be possibly more explanatory, this was arrived at by dividing the annual production for each well by the highest month's production times the number of months that well was on the line.

The red curve expresses in percentage what I have chosen to call the deliverability load factor. These load factors were calculated on the basis of the 1953 deliverability tests on each well that was reported to the Commission or each well which was tested in 1953 as compared to the daily average production for each well which was tested in 1953. To show that possibly a little more clearly, I have used the red and the blue circles, the red

circles indicating the average daily well deliverability for the respective company, the blue circles indicating the daily average production for the average well for each of the companies, these red and blue circles being on the horizontal MCF per day scale or the vertical MCF per day scale. In other words, the red deliverability load factor curve shows a percentage relationship between the red and blue circles. The green curve shown at the bottom of the graph is the daily average production for each company based on every well reporting production for two or more months during the year 1953.

Q Daily average production per well?

A Daily average production per well in MCF. You will note that these curves vary considerably and they joggle up and down, they are not a smooth curve, not only the production load factor curve but the deliverability load factor curve and the daily average production curve. I will return to that shortly.

Over on the right hand side of the graph since we only had one pipeline which we could properly analyze we, therefore, only show curves for that one pipeline or pipeline B. The upper blue curve is the deliverability load factor vs. deliverability groups, the groups being shown by numbers at the bottom of the graph. These deliverability load factors were arrived at in the same manner previously explained except that the wells were grouped by deliverability groups rather than by operating companies. In other words, we wanted to determine how the deliverability load factors ran according to the ability of the well to produce. The bottom blue

curve on the right hand side of Exhibit 8 shows the daily average production for all wells which reported deliverability tests in 1953 vs. the deliverability groups.

Q What conclusions have you come to, if any, Mr. Utz?

A By analyzing the results of the study made regarding production load factors, deliverability load factor, daily average production, I have come to the conclusion that the production by companies as well as by deliverability groups was not rateable during 1953. Further, to explain why I don't think it was rateable or wasn't rateable, had the take been rateable according to some predetermined rateable take formula whether it had been straight acreage or 100 per cent deliverability or anything in between, these curves would not have been jagged such as they are. Had it been on a deliverability basis of some type, the deliverability load factor curve and the production curve should have been flat. In other words, the load factors for each well should have been nearly the same. Had it been on 100 per cent acreage basis, since the Aztec-Pictured Cliffs is developed on 160 acre spacing, the green curve would also have been relatively flat. The only deviation from being flat or horizontal would have been due to margin of wells, of course. In other words, giving other wells in the field a production that margin wells could not produce in order to meet allowables or the demand.

Going now to the right hand side of Exhibit 8, the deliverability load factor curve here would also have been flat indicating that each well had been produced at the same load factor had the pipeline companies considered the ability of the well to produce, as can plainly be seen, it is not flat, nor is it even a smooth

curve. Had these wells been produced according to their deliverability, this production curve would also have been a smooth curve. However, it would have been gradually sloping upward as the ability of the well to produce increased.

Further conclusion, as explained, I do not believe that the production from Aztec-Pictured Cliffs during the year 1953 was rateable in any sense of the word.

Q You have also prepared Exhibit 9 and 10, which we will consider together, relating to the South Blanco-Pictured Cliffs, is that correct?

A That is correct.

Q And you prepared those or supervised the preparation?

A They were prepared with my assistance, you see, Exhibit 9, which is the deliverability load factor and production study for the operating companies and the deliverability groups for South Blanco-Pictured Cliffs Pool is exactly the same as I just explained for Aztec-Pictured Cliffs, the only difference being the pool and the wells, of course, used. As previously explained the blue curve is the production load factor curve, arrived at as explained before. The red curve is the deliverability load factor curve arrived at as previously explained and likewise the red curve --

Q Green curve.

A Green curve, I am color blind this morning -- green curve is arrived at by using all wells reported, reporting production.

Exhibit 10 is the analysis of MCF per day against deliverability groups for all wells reporting production -- reporting

deliverability tests in this pool. The red curve being pipeline A and the blue curve being pipeline B.

Q Explain the dotted red lines and blue lines on both of those exhibits?

A Yes, the dotted portions of the curve indicates that there were no wells in that group or in between the solid line and the next change in curve. In other words, on Exhibit 9, there were no wells in groups six, seven and groups nine and ten, to indicate there were no wells in that group we dotted the curve -- dashed the curve, rather. However, on South Blanco-Pictured Cliffs, we had two pipelines purchasing from enough wells, enough companies that we could analyze the rateable take situation as not only within the pipeline, as between pipelines. As previously explained, if the take had been rateable these curves, deliverability curves -- deliverable and load factor curves and production load factor curves would have been relatively flat for each pipeline. The green curve or the producing daily average production per well curve would also have been relatively flat, whereas -- or over on the right hand side of Exhibit 9, the deliverability load factor curve for each company should have been, had they been produced according to the well's ability to produce, practically flat.

You will notice that there is considerable difference -- there is considerable jaggedness in the load factors, as well as the difference in the load factors between pipelines. This is also true on the left hand side of the chart, where we compared each operating company. The conclusion I come to from Exhibit 9, is the same that I arrived at for the Aztec-Pictured Cliffs or

Exhibit 5, the take was not rateable between companies, between deliverability groups, nor was it rateable between pipelines. The same conclusion is arrived at from Exhibit 10, however, I must admit that that shows a little more promise because the curves do coincide fairly well but had these wells been produced according to their ability to produce, this curve would have been a gradually increasing curve rather than a straight line.

Q Passing on now to Exhibits 11 and 12, Mr. Utz, those were likewise prepared by you or with your assistance and your direction, is that correct?

A That is correct, yes, sir.

Q And they relate to the Fulcher Kutz-Pictured Cliffs?

A That is correct, Exhibits 11 and 12 portray the results of the same type of study as made for Aztec-Pictured Cliffs and South Blanco-Pictured Cliffs except that they are for Fulcher Kutz-Pictured Cliffs. Again I doubt that it is necessary at this point to explain the graphs. I hope we are all familiar enough with them to realize what they show, so I will just go ahead with the conclusions.

The production load factor curve again being the blue curve and the red one again being the deliverability load factor, the green one the daily average production for all wells reporting for more than two months in 1953. As may be seen, these curves are extremely jagged. Therefore, I do not believe that the take from Fulcher Kutz within the pipeline or between pipelines A and B was rateable during 1953. The same conclusion is arrived at on the right hand side of Exhibit 11, where we show the deliverability

load factors vs. the deliverability groups. These curves also go all over the chart, the red curve being the deliverability load factor of pipeline A, the blue curve being the deliverability load factor for pipeline B.

On Exhibit 12, we again show the relationship between daily average production and deliverability groups for all wells reporting deliverabilities in 1953, the blue curve being pipeline B and the red curve being pipeline A. Again we see that the curve is anything but a smooth curve or gradually increasing curve as it would have been if the groups and wells had been produced according to their ability to produce.

Q Does that conclude your comments on that?

A I would like to point out that this increase --

Q Referring to Exhibit 8?

A In the production on Exhibit 8, the lower green curve, was not so much due to company E having a higher deliverability as shown here as it was that company E's deliverability load factor was higher. The reverse of that situation is true on Exhibit 11 for the Fulcher Kutz Area. The high point in the daily average production curve for company D is not as high as it should have been had the wells been taken more in accordance with their ability to produce. In other words, the load factor is lower. That is about all I have to say about these exhibits, I believe.

Q I believe, Mr. Utz, you have some preliminary testimony in regard to Exhibit No. 3, have you not previously testified on 3 and 6?

A Yes, that is correct. As previously explained by Mr.

Arnold, Exhibit 3 shows the plan of cross-section for a local area on Aztec-Pictured Cliffs Pool or cross-sections of plan A-A' and B-B'. You will note that the wells used in this cross-section are colored. A reserve was calculated for each drilling tract, in other words, a reserve is calculated for each well, based on the amount of acreage assigned to that well, not only with reserves calculated on the red squares but for the green squares. I believe Mr. Arnold took care of the core analysis that was used and explained the core analysis that was used in calculating reserves, recoverable reserves for these drilling tracts. This well is located here and was the closest known core of any value to the area. The results of this deliverability or reserve production study is shown on --

Q Exhibit 13.

A -- what I believe will be called Exhibit 13, the right hand chart on the opposite side of the room.

Referring now to Exhibit 6, as previously explained, this shows the cross-section across South Blanco-Pictured Cliffs Pool, the local area of that pool. The reserves were calculated from the nearest known core data for each of the four wells or in other words, reserves were calculated for each of the drilling facts shown in red and green. The results of that study, explained from Exhibit 6, are shown on what will be called Exhibit 14. Exhibit 13 shows graphically the 1953 production vs. recoverable reserves for a local area in Aztec-Pictured Cliffs Pool, the local area being that area shown on Exhibit 3. The upper wellheads or wellhead illustrations or portraits, as I might call them, shows

the daily average production for the Kessler No. 1 and each of its four offsets, the scale, the vertical scale being one inch to 100 MCF per day, daily average 1953 production. The production from the Kessler No. 1 being 660 MCF per day; the Nye No. 4 being 440 MCF per day, that is for the number of months on which production was reported, 1953; the Murphy No. 1 daily average production was 143 MCF per day; the Lloyd No. 1 was 102 MCF per day and the Schumaker No. 3 was 50 MCF per day.

The cubes shown just below the wellhead illustrations represent the reserves, calculated recoverable reserves for each of these drilling tracts, the scale being one cubic inch for each 25,000 MCF reserves at New Mexico standard conditions. The lower graph or perhaps I should more properly state the reserves calculated, the recoverable reserves calculated for Kessler No. 1 was 1,230,240 MCF for 160 acre tract. The reserves calculated for the Nye No. 4 was 1,196,000 MCF for the 160 acre tract. The reserves calculated for the Murphy No. 1 was 785,920 MCF for the 160 acre tract. The reserves calculated for the Lloyd No. 1 was 795,920 MCF for the 160 acre tract. The reserves calculated, recoverable reserves calculated for the Schumaker No. 3 was 941,850 MCF for the 157.5 acre tract.

The lower part of the chart shows by use of red bar graphs the percentage by which the production ratio exceeds the reserves ratio comparing the Kessler well to each of its offsets. To go further into that, comparing the Kessler well production with the Nye No. 4 production, we have a production ratio of 1.454 to one. Comparing the Kessler's reserves to the Nye No. 4 reserves, we

have a reserve ratio of 1.028 to one, the production ratio exceeding the reserves ratio by 41.4 per cent. Comparing the Kessler well to its offset, the Murphy No. 1, we have a production ratio of 4.475 to one and the reserves ratio of 1.565 to one, the production ratio exceeding the reserve ratio by 155.9 per cent. Comparing the Kessler well to the Floyd well, Floyd No. 1, the production ratio is 6.274 to one and the reserves ratio is 1.565 to one, the production ratio again exceeding the reserve ratio by 300.8 per cent.

Further comparing the Kessler well with its offset, the Schumaker No. 3, we have a production ratio of 12.306 to one and a reserve ratio of 1.306 to one, the production reserves exceeding the reserve ratio by 845 per cent.

Q Mr. Utz, what conclusions can you come to after analysis of Exhibit 13?

A The only conclusion I could come to, based on my calculated reserves, these reserves being calculated on the best available core information, the production being from -- reported production, is that if the well called the Kessler No. 1 is produced as it was in 1953, the drainage is almost certain to occur in early years.

Now turning to Exhibit 14, is the results of the 1953 production vs. recoverable reserves for the South Blanco-Pictured Cliffs Pool or for that local area in South Blanco-Pictured Cliffs Pool as shown on Exhibit No. 6, again the well head indicate in the same scale -- again the well head illustrations in the upper part of the graph show the daily average 1953 production in the vertical scale of one inch equals 100 MCF per day, the cubic blocks or cubes on the next, below the well heads being in the

same scale as Exhibit No. 13, being one cubic inch equalling 25,000 MCF reserves for each of the wells. The lower scale again being the percentage by which the production ratio exceeds the reserve ratio. Making the comparison between the 6-13 and its offsets, 6-13 produced 990 MCF per day for 1953, the MKL No. 2 produced 255 MCF per day, the production ratio between the 6-13 and the MKL being 3.96 to one. The calculated reserves for 6-13 was 1,592,640 MCF, comparing that reserve to the reserve for the MKL No. 2, which reserve was 1,552,800 MCF, we have a reserve ratio of 1.026 to one. The production ratio exceeds the reserve ratio by 285.9 per cent. In other words, that simply means that the 6-13 exceeded production by which it should have produced, judging from what the MKL produced by 285 per cent.

Comparing the 6-13 to the 4-11, we have a production ratio of 21.52, we have a reserve ratio for the same two wells of 2.659, the production ratio exceeding the reserve ratio by 790 per cent. Comparing the last offset to 6-13 or the MKL 4-15, which had a daily production of 42 MCF, the production ratio is 23.57, the reserve ratio is 1.134, the production ratio exceeding the reserve ratio by 1978 per cent. I don't believe that I gave the calculated reserves for the 4-11, I will give those now for the 4-11. The calculated reserves was 598,773 MCF, the calculated reserves for the 4-15 was 1,404,015 MCF.

The conclusion I arrive at, the only conclusion I can arrive at after analyzing Exhibit No. 14, is that if the 6-13 is allowed to produce for any length of time as it did produce in 1953, it is sure to drain some of the reserves out from under its offsets MKL No. 2, the MKL 4-11, and the MKL 4-15.

artistry.

Q I believe you also prepared what has been marked Commission's Exhibit No. 15, Mr. Utz, was this prepared by you or under your direction?

A Yes, this was prepared by me.

Q Explain that, please.

A Well, this is the third phase of our rateable data study as explained at the outset of my testimony, this exhibit being Exhibit 15, order R-333-A of the Oil Commission states that the

MCF. Using that same flow information, I used the by pressure formula and increased the seven day shut in pressure which also, of course, increased the deliverability, calculated deliverability of that well, which resulted in the blue curve as shown here, for shut in pressure from your 339 pounds seven day shut in up to 1,000 pounds seven day shut in pressure. As may be seen the deliverability increases as the shut in pressure increases. You will further note that using a straight 50 per cent of the seven day shut in pressure curve is a smooth progressively increasing curve up to 1,000 pounds. The red curve represents the results of using the 250 pound deliverability pressure limit. You will note that at 500 pounds shut in, 250 pounds being 50 per cent of 500 pounds shut in, the deliverability curve deviates from the smooth 50 per cent curve and farther, the higher the shut in pressure gets the farther apart the red and blue curves become.

The results of this deviation from the blue curve in percentage for different pressure is as follows: 550 pound shut in pressure the difference between the 250 pound limit and the straight 50 per cent deliverability pressure curve is 4.2 per cent. In other words, 250 pound limits calculates 4.2 per cent higher as 750 pounds seven day shut in pressure the 250 pound limit curve or the red curve exceeds the straight 50 per cent curve by 15.6 per cent at 900 pounds shut in pressure. The 250 pound limit curve exceeds the 50 per cent curve by 19-1/2 per cent and at 1,000 pounds the 250 pound limit exceeds the straight 50 per cent curve by 20.8 per cent.

Now I made this study because I felt that maybe the limitations

of deliverability pressure was not greater. After making the study I have come to the conclusion that it is not rateable. I, therefore, recommend that the Commission revise order R-333-A to say that a straight 50 per cent of the seven day shut in pressure be used as a deliverability pressure.

Q Mr. Utz, on the basis of your study of these three pools, you believe the potential productivity in each of these pools exceeds the reasonable market demand for gas?

A In other words, you are asking me, I believe, if I interpret your question correctly, as the deliverabilities of each of these three pools exceeds market --

Q No, the potential productivity.

A Yes, I am sure that it does.

Q And on the basis of your study, you believe, that proration is necessary in each of these pools?

A Yes, I believe that it is, in order to have rateable take among the various wells within the boundaries of each pool.

MR. KITTS: May it please the Commission, we offer in evidence Exhibits 8 through 15, inclusive.

COMMISSIONER WALKER: Any objection to the exhibits? If not, they will be admitted.

MR. KITTS: That is all I have of this witness.

COMMISSIONER WALKER: Any other questions of the witness?

CROSS-EXAMINATION

By: MR. GRANIER (Southern Union Gas Company):

Q Mr. Utz, I was a little bit lost occasionally in your testimony as between reserves and recoverable reserves. Were

these figures over here recoverable reserves as represented by the cubes in Exhibits 13 and 14 or were those recoverable reserves or were they reserves or just what were they?

A They -- all reserves spoken of in the testimony that I gave is considered by me to be recoverable reserves down to 100 pounds well head pressure.

Q In other words, your assumed abandonment pressure of 100 pounds --

A (Interrupting) Well head, yes, sir.

Q -- well head. Now in determining the recoverability of these reserves, have you given any consideration to the permeability of the structure underlying these wells insofar as that permeability might affect the wells ability to produce within an economically reasonable period of time?

A In making this study, I did not determine time as an element.

Q So that even if it took --

A (Interrupting) In other words, I used exactly what the wells produced in 1953 as compared to what the recoverable reserves were down to the 100 pounds well head regardless of how long it took to get those reserves out.

Q It made no difference whether it would take two years or 200?

A In other words, I assumed it is not up to me how the pipeline is going to operate its pipeline in order to recover those reserves.

Q So that by using the term recoverable reserves you are not using it or attempting to use it synonymously with economically

recoverable reserves?

A No.

Q Now turning --

A (Interrupting) I would like to point out, however, that the production from these smaller wells may be varied and undoubtedly can be varied to a certain extent by the way the pipeline operates. In other words, by lowering pipe pressures or by reworking the wells, if the operator so desires, and that is the reason, that is something I have no control over whatsoever and that is the reason that I did not include time as my recoverables reserve study did.

Q I was merely trying to find out what you'd said, not all that you hadn't said. Now turning, sir, to Exhibits Nos. 8, 9 and 11, on each of them there is, I believe, a green line along the bottom portion of it, is that right?

A You are referring to --

Q Yes, sir.

A -- the green line on the left hand side of it?

Q Does that represent average deliverabilities per well by operators, is that--

A (Interrupting) No, sir, the green line represents the daily average production for each company, what it actually did produce. In other words the companies --

Q (Interrupting) Daily average production per well by operators?

A That is right.

Q By producing companies?

A That is right, that is correct.

Q Now in drawing that line, did you give any effect to the

average deliverability of those wells so that if the average deliverability was high the position of the line for any operator would be higher or lower than it would have been otherwise?

A Drawing the green line, you are inquiring --

Q Yes. In other words, you didn't take into account in drawing the line, did you, what the deliverabilities of the wells were, you just said, this is the average per well per operator as it happens to come out?

A The green line represents only what the wells actually did produce, no regard was given to deliverability other than the higher deliverability wells produced some more.

Q Yes, naturally the higher deliverability wells -- well, I wouldn't say that. Well, now the only time that that line would be straight as between all the operators then would be if each well were producing exactly the same amount, is that correct, sir?

A That is right.

Q And if that were so the ratio of production per well to that well's deliverability would have a rather sizeable variance as between wells and between operators, would it not?

A It certainly would, it would be virtually straight acreage production.

Q Be virtually --- the mere fact that the line is jagged and goes up and does does not show that there is non-rateable taking as between wells of like deliverability, does it, leaving out the other lines, I appreciate that some of them might tend to show that but I am talking about the green ones only?

A Well, I think, Mr. Granier, that the mere fact -- well, I will answer your question this way: It need not show but it may

show that the load factors were different.

Q You just couldn't tell much about it though from that one study alone, you would have to take it in conjunction with others to arrive at conclusions respecting ratio of production to calculated deliverability?

A That is right, that is shown by the other curves.

MR. GRANIER: Thank you.

COMMISSIONER WALKER: Any other questions of the witness? If not, the witness may be excused.

(Witness excused.)

COMMISSIONER WALKER: Anyone have any statements to make regarding the -- or that you'd like to read into the record or make for the record?

MR. GRANIER: Will written statements be accepted?

COMMISSIONER WALKER: Will the 1st of November as far as time is concerned be sufficient for you to get your written opinions in? Any other comments, questions, etc.? If not, the Case 729 will be taken under advisement.

- - - - - - - - - - -

STATE OF NEW MEXICO)
) ss.
COUNTY OF BERNALILLO)

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

IN WITNESS WHEREOF I have affixed my hand and notarial seal this 18th day of October, 1954.

Margaret McCoskey
Notary Public-Court Reporter

My Commission expires:
August 15, 1956.

BEFORE THE

Oil Conservation Commission

SANTA FE, NEW MEXICO

IN THE MATTER OF:

CASE NO. 729

TRANSCRIPT OF PROCEEDINGS

ADA DEARNLEY AND ASSOCIATES

COURT REPORTERS

ROOMS 105, 106, 107 EL CORTEZ BUILDING

TELEPHONE 7-9546

ALBUQUERQUE, NEW MEXICO

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
June 16, 1954

IN THE MATTER OF:	
The application of the Oil Conservation Commission upon its own motion to consider an order promulgating rules and regulations affecting and concerning the Fulcher-Kutz-Pictured Cliffs Gas Pool, the Aztec-Pictured Cliffs Gas Pool, and South Blanco-Pictured Cliffs Gas Pool situated in San Juan and Rio Arriba Counties, New Mexico.	Case No. 729

BEFORE:
Honorable Edwin L. Mechem
Mr. E. S. (Johnny) Walker
Mr. R. R. Spurrier

TRANSCRIPT OF HEARING

MR. SPURRIER: Now, in Case 729, Mr. Macey I think was a recommendation following the note that you see at the beginning of this case.

MR. MACEY: In connection with Case 729, the advertisement in the case was for the 16th day of June and we fully intend to advertise the case to be heard the same time that the other cases regarding proration in the San Juan area, on the 21st of June. Therefore, I would like to move that the case be continued to June 21st, in order that we can obtain testimony at that time.

MR. SPURRIER: Is there objection to Mr. Macey's motion? If not we will recommend that the case be continued to June 21st.

(Recess.)

C E R T I F I C A T E

I, ADA DEARNLEY, do hereby certify that the above and foregoing transcript of proceedings before the Oil Conservation Commission on June 16, 1954, in Mabry Hall, Santa Fe, New Mexico, is a true and correct record to the best of my knowledge, skill and ability.

Dated at Albuquerque, New Mexico, this 19th day of June, 1954.

Ada Dearnley
Notary Public

My Commission Expires:
June 19, 1955.

BEFORE THE

OIL CONSERVATION COMMISSION

STATE OF NEW MEXICO

Santa Fe, New Mexico

* * * * *

TRANSCRIPT OF PROCEEDINGS

CASE NO. 729

Regular Hearing

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
June 16, 1954

IN THE MATTER OF:	
The application of the Oil Conservation Commission upon its own motion to consider an order promulgating rules and regulations affecting and concerning the Fulcher-Kutz-Pictured Cliffs Gas Pool, the Aztec-Pictured Cliffs Gas Pool, and South Blanco-Pictured Cliffs Gas Pool situated in San Juan and Rio Arriba Counties, New Mexico.	Case No. 729

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MR. SPURRIER: Is there objection to Mr. Macey's motion? If not we will recommend that the case be continued to June 21st.

(Recess.)

C E R T I F I C A T E

I, ADA DEARNLEY, do hereby certify that the above and foregoing transcript of proceedings before the Oil Conservation Commission on June 16, 1954, in Mabry Hall, Santa Fe, New Mexico, is a true and correct record to the best of my knowledge, skill and ability.

Dated at Albuquerque, New Mexico, this 19th day of June, 1954.

ada Dearnley
Notary Public

My Commission Expires:
June 19, 1955.

BEFORE THE

OIL CONSERVATION COMMISSION

STATE OF NEW MEXICO

Santa Fe, New Mexico

* * * * *

TRANSCRIPT OF PROCEEDINGS

CASE NO. _____

Regular Hearing

BEFORE THE

Oil Conservation Commission

SANTA FE, NEW MEXICO

IN THE MATTER OF:

CASE NO. 729 (June 22, 1954)

TRANSCRIPT OF PROCEEDINGS

ADA DEARNLEY AND ASSOCIATES
COURT REPORTERS
ROOMS 105, 106, 107 EL CORTEZ BUILDING
TELEPHONE 7-9546
ALBUQUERQUE, NEW MEXICO

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
June 22, 1954

IN THE MATTER OF: Case No. 729

The application of the Oil Conservation Commission upon its own motion to consider an order promulgating rules and regulations affecting and concerning the Fulcher-Kutz - Pictured Cliffs Gas Pool, the Aztec-Pictured Cliffs Gas Pool, and the South Blanco-Pictured Cliffs Gas Pool situated in San Juan and Rio Arriba Counties, New Mexico.

The matters to be considered in the above-styled case will pertain to gas pool delineation and definition, gas proration, gas well spacing, gas well allowables, gas proration units, and related matters, affecting and concerning the Fulcher-Kutz - Pictured Cliffs Gas Pool, the Aztec - Pictured Cliffs Gas Pool, and the South Blanco-Pictured Cliffs Gas Pool in San Juan and Rio Arriba Counties.

BEFORE:

Honorable Edwin L. Mechem
Mr. E. S. (Johnny) Walker
Mr. R. R. Spurrier

TRANSCRIPT OF HEARING

MR. SPURRIER: The meeting will come to order please. Mr. Reeves, I believe you were still on the stand. Does anyone have any further question of Mr. Reeves?

MR. MACEY: I want to ask him a question.

MR. LOCKE: I would like to call up Case 729 having to do with the proration of gas in the other fields and made a motion concerning it. I would predicate my motion on these facts. I am

advised that the ones are now prepared to go ahead with the hearing. I am further advised that the Commission itself is not at this time ready to go ahead with the hearing. In view of the deliverability, tests will not be completed until 8-31, that is August 31 of this year.

I now move that Case 729 be continued until the September meeting of the Commission.

MR. SPURRIER: Is there objection to Mr. Locks's motion on Case 729? Is there anyone who has testimony to present in Case 729? We will give you an answer on that after the first recess.

(Recess).

MR. SPURRIER: The meeting will come to order. Mr. Foster, before you continue may I make an announcement on Case No. 729 on which Mr. Locke moved for continuance. We will continue that case to the regular July hearing, which is July 15, 1954.

STATE OF NEW MEXICO)
: ss.
COUNTY OF BERNALILLO)

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

IN WITNESS WHEREOF I have affixed my hand and notarial seal this 12th day of **July**, 1954.

Ada Dearnley
Notary Public, Court Reporter

My Commission Expires:

June 19, 1955.

BEFORE THE

Oil Conservation Commission

SANTA FE, NEW MEXICO

IN THE MATTER OF:

CASE NO. 729 Regular Hearing

TRANSCRIPT OF PROCEEDINGS

ADA DEARNLEY AND ASSOCIATES
COURT REPORTERS
ROOMS 105, 106, 107 EL CORTEZ BUILDING
TELEPHONE 7-9546
ALBUQUERQUE, NEW MEXICO

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
July 15, 1954

IN THE MATTER OF:

Application of the Commission, upon its own motion to consider an order promulgating rules and regulations affecting and concerning the Fulcher-Kutz-Pictured Cliffs Gas Pool, the Aztex-Pictured Cliffs Gas Pool, and the South Blanco-Pictured Cliffs Gas Pool situated in San Juan and Rio Arriba Counties, New Mexico.

The matters to be considered in the above-styled case will pertain to gas-pool delineation and definition, gas proration, gas well spacing, gas well allowables, gas proration units, and related matters, affecting and concerning the Fulcher-Kutz - Pictured Cliffs Gas Pool, and the South Blanco-Pictured Cliffs Gas Pool in San Juan and Rio Arriba Counties.

Case No. 729

BEFORE:

MR. E. S. (Johnny) Walker
Mr. R. R. Spurrier

TRANSCRIPT OF HEARING

MR. SPURRIER: The next case on the docket is Case 729. Does anyone have testimony to present in 729?

MR. MACEY: Mr. Spurrier, on behalf of the Commission staff we feel that the case should be contined until the month of August. However, we feel that very careful study should be made in the meantime regarding the pool delineation of the gas pools that are listed in this case and we understand that there has already been quite a bit of work done by the industry, but it is not complete as yet. I feel sure that everyone will agree with me that the case

should be thoroughly studied before any evidence is presented to the Commission.

MR. SPURRIER: Is there objection to Mr. Macey's motion? If not we will continue the case to August 18th.

STATE OF NEW MEXICO)
: SS.
COUNTY OF BERNALILLO)

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

IN WITNESS WHEREOF I have affixed my hand and notarial seal this 17th day of July, 1954.

Ada Dearnley
Notary Public, Court Reporter

My Commission Expires:
June 19, 1955

BEFORE THE

Oil Conservation Commission

SANTA FE, NEW MEXICO

September 15, 1954

IN THE MATTER OF:
Special Hearing

CASE NO. 729 (Cont'd.)

TRANSCRIPT OF PROCEEDINGS

ADA DEARNLEY AND ASSOCIATES
COURT REPORTERS
ROOMS 105, 106, 107 EL CORTEZ BUILDING
TELEPHONE 7-9546
ALBUQUERQUE, NEW MEXICO

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
September 15, 1954

SPECIAL HEARING

IN THE MATTER OF:

Special continuation for presentation of testimony relating to gas-pool delineation and definition, gas proration units and related matters affecting and concerning the Fulcher-Kutz - Pictured Cliffs, Aztec-Pictured Cliffs and South Blanco-Pictured Cliffs Gas Pools in San Juan and Rio Arriba Counties, N. M.

Case No. 729
(Cont'd.)

BEFORE:

Honorable Edwin L. Mechem
Mr. E. S. (Johnny) Walker
Mr. William B. Macey

R E G I S T E R

Barton W. Ratliff	Skelly Oil Company	Tulsa, Oklahoma
H. L. Beckmann	Humble Oil & Refinery	Midland, Texas
A. A. Phillips	Humble Oil & Refining Co.	Albuquerque, N.M.
J. J. Smith	Stanolind Oil & Gas Co.	Ft. Worth, Texas
F. Norman Woodruff	El Paso Natural Gas	Houston, Texas
W. H. Van Hook	Magnolia Petroleum Co.	Lovington, N. M.
Keith L. Wernick	Pubco	Albuquerque, N.M.
Forrest G. Daniell	Pubco	Albuquerque,N.M.
P. T. McGrath	U. S. G. S.	Farmington,N.M.
Elvis A. Utz	N.M.O.C.C.	Santa Fe, N.M.

TRANSCRIPT OF HEARING

MR. MACEY: The meeting will come to order, please. The case on the docket this morning is Case 729, pertaining to the Fulcher-Kutz, Aztec-Pictured Cliffs and South Blanco-Pictured Cliffs Gas Pools.

MR. KITTS: The staff has not, Mr. Secretary, been able to prepare and complete its testimony on waste and non ratable take in the Pictured Cliff Pools. Therefore, we request that we be allowed to postpone our testimony until sometime during the month of October.

MR. MACEY: You are requesting a continuance to October?

MR. KITTS: To October.

MR. MACEY: Is there an objection to the continuance to sometime in October?

MR. KELLAHIN: I have no objection to the continuance, however, I understand the October hearing will be held in Hobbs. I would suggest that this not be put in with this, because some of us would have a considerable distance to travel and some of us would prefer to have it held in Santa Fe.

MR. MACEY: We realize that, and we saw the possibility of needing the continuance and have arranged to have this room for the 14th of October, which is a Thursday. In view of your statement, is there objection to the continuance of the case to October 14th? If not we will continue the case. Mr. Utz, in connection with that, do you think you will be ready on October 14th?

MR. UTZ: I think we will, Mr. Macey. I can't make a definite promise, but I believe we will be ready.

MR. MACEY: If no objection the case will be continued to October 14th. The hearing is adjourned.

(Whereupon Case 729 was continued to October 14, 1954.)

STATE OF NEW MEXICO)
: SS.
COUNTY OF BERNALILLO)

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

IN WITNESS WHEREOF I have affixed my hand and notarial seal this 23rd day of September, 1954.

Ada Dearnley
Notary Public, Court Reporter

My Commission Expires:
June 19, 1955

BEFORE THE

Oil Conservation Commission

SANTA FE, NEW MEXICO

IN THE MATTER OF:

CASE NO. 729 Regular Hearing

TRANSCRIPT OF PROCEEDINGS

ADA DEARNLEY AND ASSOCIATES
COURT REPORTERS
ROOMS 105, 106, 107 EL CORTEZ BUILDING
TELEPHONE 7-9546
ALBUQUERQUE, NEW MEXICO

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
July 15, 1954

IN THE MATTER OF:

Application of the Commission, upon its own motion to consider an order promulgating rules and regulations affecting and concerning the Fulcher-Kutz-Pictured Cliffs Gas Pool, the Aztex-Pictured Cliffs Gas Pool, and the South Blanco-Pictured Cliffs Gas Pool situated in San Juan and Rio Arriba Counties, New Mexico.

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Case No. 729

BEFORE:

MR. E. S. (Johnny) Walker
Mr. R. R. Spurrier

TRANSCRIPT OF HEARING

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Ada Dearnley
Notary Public, Court Reporter

My Commission Expires:
June 19, 1955

BEFORE THE

Oil Conservation Commission

SANTA FE, NEW MEXICO

September 15, 1954

IN THE MATTER OF:

Special Hearing

CASE NO. 729 (Cont'd.)

TRANSCRIPT OF PROCEEDINGS

ADA DEARNLEY AND ASSOCIATES

COURT REPORTERS

ROOMS 105, 106, 107 EL CORTEZ BUILDING

TELEPHONE 7-9546

ALBUQUERQUE, NEW MEXICO

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
September 15, 1954
SPECIAL HEARING

IN THE MATTER OF:

Special continuation for presentation of testimony relating to gas-pool delineation and definition, gas proration units and related matters affecting and concerning the Fulcher-Kutz - Pictured Cliffs, Aztec-Pictured Cliffs and South Blanco-Pictured Cliffs Gas Pools in San Juan and Rio Arriba Counties, N. M.

Case No. 729
(Cont'd.)

BEFORE:

Honorable Edwin L. Mechem
Mr. E. S. (Johnny) Walker
Mr. William B. Macey

R E G I S T E R

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J. J. Smith	Stanolind Oil & Gas Co.	Ft. Worth, Texas
F. Norman Woodruff	El Paso Natural Gas	Houston, Texas
W. H. Van Hook	Magnolia Petroleum Co.	Lovington, N. M.
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(Whereupon Case 729 was continued to October 14, 1954.)

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Notary Public, Court Reporter

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June 19, 1955