CASE 377: (Continued Case) Under terms of Order R-172 the Oil Conservation Commission requested that Benson & Montin appear to show cause why a 160-acre spacing pattern should not be instituted for Pictured Cliffs wells in the Gallegos Unit Area, San Juan County, to supersede the temporary 320-acre spacing earlier granted.

TRANSCRIPT OF HEARING
September 17, 1953

BEFORE: Honorable E. S. Walker, Land Commissioner
Honorable R. R. Spurrier, Secretary-Director, OCC

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

I HEREBY CERTIFY That the within transcript of proceedings before the Oil Conservation Commission is a true record of the same to the best of my knowledge, skill and ability.

DONE at Santa Fe, New Mexico, this 21st day of September 1953.

Virginia M. Chavez
Notary - Reporter

My Comm. Ex.:
August 8, 1956

CASE 377: (a continued case)

MR. SPURRIER: The next case on the docket is Case 377.

(Mr. Graham reads the advertisement)

(Witness sworn)

MR. REID: Mr. Oliver Seth, Mr. Bill Federici, Justin Reid with Seth and Montgomery, appearing for the respondent, Benson & Montin. I might at this time briefly state into the record the status of the case. At prior hearing on June 19, 1953, on the application of Benson & Montin, for 320-acre spacing in the Gallegos Canyon Unit Area and certain adjoining lands to the northwest, the Commission entered its order as a result of that hearing on July 24, 1952 authorizing 320-acre spacing in the area for a period of one year. At the end of one year, the Commission called up for hearing the case and after two postponements at the request of Benson & Montin in which to complete the gathering of their data, the matter now comes on for hearing. At the last hearing the Commission will recall, there was considerable testimony concerning the fact that the West Kutz field is a common source of supply and that it is a separate pool from the pools in the area particularly separate from the Fulcher-Kutz field. We don't intend at this hearing to put on any additional information or testimony concerning that fact. We would however, at this point like to refer the Commission to the testimony at the previous hearing which appears that pages 6 and 9 and pages - 6 to 9 that is and pages 38 to 40 in the

official transcript on the other hearing. In that connection it might be well at this time to officially bring in all of the testimony in the other hearing and inform the Commission that we don't intend to repeat any of the testimony that was given there. We will have new testimony and make comparison to that testimony which was given before. We feel that we have new testimony and data at this time based on the experience of the past year which will confirm the Commission's findings in the prior hearing to the effect - I might read that for the Commission that apparently one gas well to the Pictured Cliffs formation of the above lands will effectively, efficiently and economically drain an area of 320-acres, and that testimony indicated that drilling wells in a pattern of greater density is unnecessary and not to the best interests of conservation and could result in wasteful use of critical material. We feel that we can show that the case of 320-acre spacing is now definitely established and the Commission should now enter its Order for permanent 320-acre spacing in the area in place of the present temporary order. With those preliminary remarks, I would like to call Mr. Greer to the stand.

ALBERT R. GREER

having been first duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. REID:

Q Will you state your name and position, please?

A Albert R. Greer.

Q And your Position?

A Field Superintendent for Benson & Montin, for the San Juan Basin operations.

Q You are the same Mr. Greer who testified at the prior hearing in this case on June 19, 1952?

A I am.

Q Can Mr. Greer's qualifications be established in that manner?

MR. SPURRIER: He is qualified.

MR. REID: These pamphlets containing the exhibits in this case we intend to introduce in evidence and in order to save time before the Commission, I thought that we might go ahead and identify all of the exhibits and bring out the testimony and then at the end offer them in evidence at one time without doing it as each exhibit comes up. Is that alright with the Commission.

MR. KELLAHIN: Jason Kellahin for Brookhaven Oil Company. We would like to have a copy of the exhibits and other forms available.

MR. REID: Incidentally, we have need for the return of two of those. We will file one for the record however, if that's alright with the Commission.

MR. REID: The large Exhibit on the board is labeled Exhibit A-1 and is a reproduction of Exhibit A as appearing in the pamphlet of exhibits.

(Examination continued)

Q. Mr. Greer, referring to Exhibit A, would you please identify that for the Commission and describe what it shows.

A. Exhibit A is a general information map which shows the position of the Gallegos Canyon Unit Area in relation to the adjoining fields. The Fulcher-Kutz field is colored in brown, the West Kutz field, which is outside the unit boundaries is colored in green. The Gallegos Canyon Unit is colored in yellow and the area covered by this application are the areas colored in yellow, blue and red. Now, this exhibit is almost identical with Exhibit #1 at our last hearing with the exception that the fields have been extended with additional drilling and the unit area has been enlarged to include approximately twenty two hundredths acres on the south boundary. These additional sections are Sections 35 and 36 in Township 28 North, Range 4 West; the S/2 of Section 31 in 28 North, 11 West; All of Section 4 in 27 North, 12 West; and the NE/4 of Section 5 in 27 North, 12 West.

Q. You refer to the descriptions in this section and this section and this section (indicating on map).

A. That is correct.

Q. Would you describe, please, the location of 160-acre spacing area and the 320-acre spacing area.

A. The area colored in green which is part of the West Kutz field outside of the unit is based on 160-acres. The areas colored in

yellow and blue are now spaced on 320-acres with the exception of the offsetting row of sections on the southern boundary of the units which have been drilled very nearly to 160-acre spacing. We therefore, have in effect a buffer zone of 160-acre wells on the south boundary of the unit which makes 160-acre spacing in the West Kutz field. These sections are identified by the wells with the red circles and the green circles on the south boundaries.

Q. Would you state, please, to the Commission the distance between the nearest well owned by other than committed working interest owners to the line of the Buffer zone well?

A. The two tracts colored in red show tracts in which wells have been drilled and are progressive Pictured Cliffs wells which are owned by other operators than Gallegos Canyon Unit working interest owners. Now, the nearest of these wells which were necessarily drilled on 320-acre spacing because of the Commission's order lies about 5 miles from the nearest 160-acre spaced well which is inside of the Gallegos Canyon Unit. In other words, these people who have drilled wells on 320-acre spacing cannot be required to meet 160-acre offsets such as the unit has done on the south. Now, I would like to point out that the unit is operated as a single lease and as such that permits us to meet 160-acre offsets on our south boundary and have the same ownership, the same royalty interests throughout the entire unit under 320-acre spacing as wells which were drilled under 160-acre spacing.

There is, therefore no difference in payment to royalty owners or to working interest owners who own wells in the northern part of the unit as compared to the wells on the south boundary.

Q. How many participating areas are there in the unit?

A. There is only one participating area. This participating area covers about 24,000 acres.

Q. Mr. Greer, how many wells have been drilled in the area since the time of the last hearing?

A. We've drilled 42 additional wells since the last hearing which lie in the present boundary of the Gallegos Canyon Unit.

Q. How many were drilled at that time, at the time of the last hearing?

A. At the time of the last hearing, we had six wells on which we had information.

Q. Have there been additional wells drilled outside of the unit area?

A. In the area spaced for 320-acre there have been two additional dry holes drilled in the area covered in blue, and one of the tracts colored in red presently #1 Phillips has been completed in the past year.

Q. Have you had any occasion to make any tests to determine the thickness of the pay section in the Pictured Cliffs formation on the wells drilled in the Gallegos Canyon Unit Area?

A. We have maintained very careful information in the drilling completion of the wells which enables us to determine reserves and project producing capacities of the wells.

Q. We turn now to Exhibit B (a), B (b) and B (c) in the pamphlet of exhibits. Would you identify those for the Commission and explain what they represent?

A. Exhibit B (a), B (b) and B (c) are drilling history records which are taken directly from our individual well records. These particular exhibits show the manner in which we drill the pay section with cable tool equipment and point out the fact that we have made a policy of drilling just a few feet into the pay section and take the measurement of the gas volume and then drill another few feet and continue on until we have drilled the entire productive section. This enables us to determine the interval during which we obtain an increase in gas flows which shows us what part of the sand is productive.

Now, I would like to point out on Exhibit (b (a) one of the methods we use in determining or limiting necessary section. In this particular well, the top of the Pictured Cliffs sand was at 1377 feet, the casing at 1381 feet. Now, on August 7th at 2 a.m. we were into the sand two feet. We had 118,000 feet of gas per day, took a four hour bailing test and showed no water, then we continued this drilling throughout the pay section and I would like to point out again that at 2 p.m., on the same day at a total depth of 1405 another bailing

test showed no water and the flowing of gas was increased to 670,000. Then again we took a four hour bailing test on August 8, which was completed at 3 a.m. and it showed four gallons of salt water per hour. Now, we know that we ran out of pay section between the depths of those two bailing tests for water. According to our increase in gas flow rates we estimated that point to be around 1412 to 15 so we plugged back the hydromite, shot the well and cleaned it out.

On August 10th at midnight, the final gauge shown on this particular sheet, the well was flowing a million two hundred seventy five thousand feet of gas a day and no water. Now the important thing that this record shows is that the water we picked up on the bailing test definitely came from the bottom of the hole. It could not have been coming from around the shoe or around the casing because if it had the plugging back of the bottom of the hole would not have shut the water off. We therefore had a limited sand thickness which, in this particular well No. 32, we estimate it to be 33 feet from the top of the producing sands to the water content. Now, this is important in that we all know all the awkwardness in the area and are familiar with the fact that we have about a hundred to a hundred and twenty feet of Pictured Cliffs sand throughout the entire area. This shows that the actual productive section is limited to sometimes as little as twenty or twenty-five feet of sand capable of producing gas.

Q. These exhibits then show the method by which you determine segments of the pay sections in three wells and in the other wells that you drilled in the area?

A. That is oorrect. We do not have exhibits of all the wells because they were all drilled in the same manner and we've obtained the same information very carefully as we drilled each well.

Q. According to Exhibit 3 in the pamphlet of Exhibits, would you describe that to the Commission and state what it shows.

A. Exhibit 3 shows the summary of the pay thickness in each of the wells drilled within the unit, and this pay thickness was determined in approximately the same manner as is shown on the preceding exhibits B (a), (b) and (c). This shows for the total of 48 wells now in the unit that the pay sections from the top of the productive sand to the base of the last gas increase is 42.7 feet. I would like to compare that with the sand thickness which we reported at the last hearing as an average of the initial six wells which was 40.5 feet. The difference is quite small and in addition this figure, 42.7, represents the gross interval, we found in a number of the wells streaks of sand which were non-productive. We therefore believe that the overall average net productive thickness of the sand in the unit area is still in the order of 40.5 feet.

MR. REID: For the convenience of the Commission, I might state at this time that the testimony on this question in prior hearing relates to Exhibits 5, 6 and 7 in that hearing and appears on Transcript pages 15 through 21.

Q. Mr. Greer, with reference to Exhibit D, would you describe that to the Commission and state what it shows.

A. Exhibit D is a core analysis report covering Gallegos Canyon Unit Wells No. 27, 35, 41. This is additional core information which we have obtained in the past year and is particularly significant with respect to Well No. 35. In Well No. 35, we made a special effort to obtain additional information relative to the connate water content of the pay sand. Our previous core information was very accurate with respect to porosity and showed to be quite uniform throughout the entire area. Those cores however were taken with a rotary rig using water base baked mud as a drilling fluid. The connate water content was therefore somewhat in question from the core analysees themselves. Therefore, in order to support that information we determined the connate water content by two additional methods which we presented at the last hearing. These other methods were datas on the electric log and the separate capillary pressure made.

Now, in addition at this time, we have cored Well No. 35 with oil and have what we feel is very excellent information on connate water content and is not limited by any calculations or estimates on our part. This information obtained from coring well No. 35 with oil shows that the connate water content is very nearly 50% of the total pore space which is the figure that we used at the last hearing. We therefore have confirmed this particular reservoir characteristic as being the same as

we had last year. Now, I should point out in connection with this exhibit that this well was cored with cable tools and we had difficulty in obtaining a 100% recovery, in fact, we just obtained little pieces of the core and ordinarily we recovered the hardest parts of the sand. We have, however, over a dozen samples of sand which shows the same characteristics, the same hard porosity that we found in each of the wells cored with rotary tools in which we had 100% recovery. The averages of the chronic water content for these particular samples is very nearly 50%.

Q. Moving on to Exhibit "E" in the pamphlet, would you identify that to the Commission and state what it shows.

A. Exhibit "E" is a summary of reservoir characteristics and recoverable reserves for the Gallegos Canyon Unit Pictured Cliffs formation which has been determined from information derived from all the wells completed to date. This information shown on this Exhibit is almost identical with that shown on Exhibits 4, 5, 8 and 9 at the last hearing. I'd like to point out again that the volume of gas in place is about 137 MCF per acre foot. Volume of gas recoverable to a hundred and fifty pounds reservoir abandonment pressure is 95.5 MCF per acre foot and volume of gas recoverable to 250 pound operating line pressure is 65.2 MCF per acre foot. In the corresponding reserves and volume of gas based upon the 40.5 feet of sand which we have found to be an average throughout the unit is for gas in place 5,550,000 cubic feet gas recoverable - that's per acre - to 150 pounds reservoir pressure

3,870,000 cubic feet per acre and gas recoverable to 250 pounds line pressure, 2,640,000 cubic feet per acre.

Q. You mean to testify then, Mr. Greer, that based on the additional and new information obtained over the past year, that the reservoir characteristics as set forth at the last hearing are essentially the same.

A. That is correct. Our initial six wells were scattered pretty well over the unit, and as such we felt that the average characteristics of those wells would be representative of reservoir conditions throughout the unit. The drilling now of 42 additional wells confirm our original estimates of reservoir characteristics.

Q. Mr. Greer, have you obtained any additional production figures on the wells in the southeastern part of the West Kutz field since the time of the last hearing?

A. Yes, I have. At the time of the last hearing, the West Kutz field for the most part was a relatively new field and we had very little production data covering wells which were producing as of that time.

Q. These figures are in the Commission files, is that correct?

A. That is correct.

Q. Would you refer now to Exhibit "F" (a) and describe and explain that to the Commission?

A. Exhibit "F" (a) is a production history record covering 6 wells in the West Kutz field which was drilled on a 160-acre spacing, and which well has an initial productivity into the line of about 550,000 cubic

feet per well per day. These are six adjoining wells and were picked as being wells comparable to wells within the Gallegos Canyon Unit, which wells within the unit have an initial productivity of approximately 550,000 cubic feet per well per day into the pipeline.

Q. That is the reason why these particular 6 wells are being compared or being studied in connection with the spacing question in the northern portion?

A. Yes, we wanted to compare the production rate of wells drilled on 160-acre spacing with the calculated production rate which we presented in one of our exhibits last year and which we believe will be to prove production characteristics of wells drilled on 160-acre spacing. Now, in order to determine a reasonably accurate production record covering this condition, it is necessary to have a number of wells such as six that we have here which are adjoining wells and which have offset wells drilled to them so that they are not affected unduly by wells that have not been drilled. Of these particular six wells fits all requirements that are necessary to determine a reasonably accurate production record which will be characteristic of wells drilled on 160-acre spacing.

Q. Referring now to Exhibit "F" (b) in the pamphlet which on the black board is Exhibit "F" (1). I might say just preliminary that the large exhibit on the board is not an exact duplicate of the exhibit in the pamphlet however, it does show the same information except some of the lettering was left off for simplicity's sake. Would you describe Exhibit

"f" (b) and explain to the Commission what it shows?

A. Exhibit "F" (b) is an exact reproduction of our Exhibit No. 11 which was presented at the last hearing. Superimposed on this exhibit is a line in red which shows the first sixteen months production history of six adjoining wells in the West Kutz field which had initial production rate into the pipeline of approximately 550,000 cubic feet per well per day.

Now, on Exhibit "F" (l) the black curved line represents the calculated production rate for an average well in the Gallegos Canyon Unit if it were drilled on 160-acre spacing. The red line is the actual production history of these six wells which are outside the unit and are on 160-acre spacing. Now, although our reservoir characteristics were determined for wells within the unit, these other wells, whose production is represented by the red line or within the common source of supply has relatively the same initial reservoir pressure and comparatively the same initial productivity. It can be seen from these exhibits that the actual production rate of the well very closely follows the calculated production rate which we determine from our reservoir characteristics.

Now, this Exhibit 11 was prepared last year prior to the time that those wells had commenced or prior to the time that those wells had two or three months of production. Now, I should point out that initially the first two or three months' production shown by the red line was that conditions into the pipeline, a line pressure approximating 220 to 240 pounds. Then where the red line drops below the black line

showing a lower rate of production and would be calculated, the line pressure was actually in excess of 250 pounds. The overall average however for an average line pressure of 250 pounds is very nearly within the computed rate. Now, inasmuch as the production records show that the wells are following the calculated production rates we can assume then that the accumulated production over a period of years will be the same as we also calculated last year and this indicates that the well with 160-acre spacing in the West Kutz Gallegos Canyon field we could anticipate a recovery of only twenty-two or twenty-three thousand dollars in a period of ten years from wells drilled on 160-acre spacing.

Now, it costs in the order of $17,000 to $18,000 to drill each well and over a period of ten years we will probably have $3,000.00 operating expense which is about $20,000.00 And, this does not cover the initial leasehold cost. It is therefore quite clear that it is not economically feasible to drill wells on 160-acre spacing in anticipation of this return on our investment. That return is computed on the basis of 7 1/3 cents per MCF.

Q. Mr. Greer, have you made an interference test on any of the wells in the Gallegos Canyon Unit since the last year?

A. We have made a number of intereference tests and in fact we continued one interference test which was started and reported at the last hearing and then we have conducted four additional interference tests.

Q. Referring now to Exhibit "G" (a), (b), (c) and (d) in the pamphlet of exhibits, would you describe those generally and explain to the Commission general y what they show.

A. Exhibit "G" (a), "G" (b), "G" (c) and "G" (d) are tabulated data showing the area for Interference Test No. 1, it tabulates the producing wells within the test area, describes the exact location of the shut-in well within the test area and also lists the distances from the shut-in well or the test well to the nearest producing well. There is a tabulation of the pressures as measured on the shut-in well and explanatory notes.

Q. Referring now to Exhibit "G" (e) and "G" (f), would you explain Exhibits "G" (e) and "G" (f)? Excuse me, Mr. Greer "G" (f) on the board the large exhibit, is not a precise reproduction of "G" (f) in the pamphlet.

A. Exhibit "G" (e), is a map of the general area on which is colored an area in yellow which we cons ider the area of this test and in which area we have listed producing wells, shut-in wells and other pertinent information. Now, the particular test well, which was shut-in and circled in red is the producing well at the time of the test is circled in green. Now, the other well locations are shown within the yellow area are wells that have been subsequently drilled or were shut-in at the time of the test.

Exhibit "G" (f), is a graph showing the major pressures of this particular well which was shut-in during the test. This was

Hancock #11 Hancock which lies just outside the unit boundary. At the last hearing we had made the pressures on this particular well and had determined that the well shut-in pressure had stabilized. This was determined by the measurements which are shown circled in red. We concluded upon this information at the time of the last hearing that this well had reached its maximum pressure, which showed that the well had been drained by its adjoining wells. We knew this because the original pressure in the area was in the order of 465 pounds whereas this well built up to only 446 1/2 pounds and stopped building up. This pressure difference of 18 to 20 pounds from the original pressure to the pressure found in this well when it reached its maximum indicates gas volume or is indicative of gas volume which has drained from the well. Now, subsequent to the hearing, the last hearing, we continued the same pressure on this particular well until such time as it was tied into the pipeline. The additional pressure measurements are shown by the circle in green, and these pressures show a definite decrease from the well's maximum pressure which shows that gas was continuing to be drained from this well tract while it was shut-in. I would like to point out that this was a recently completed well and had never produced into the pipeline at all. There had been no gas flowing from this well at the time of the last pressure measurement shown at the bottom of the graph.

C. What does the yellow area in Exhibit "G" (f) indicate?

A. On this particular test we used the dead weight gauge which was borrowed from El Paso Gas Company and the smallest weight implement for this particular gauge was one pound. In order to obtain closer readings, it was necessary to estimate the half pounds. The gauge was quite sensitive however and I was reasonably sure of my pressure measurements when I recorded them at 446 1/2 pounds, and was certain that the well had stabilized. There is a personal, or there is a possibility of personal error between different individuals, had the well been measured by some one other than myself of perhaps 1/2 pound. In other words we might say the limit of accuracy of the test was 1/2 pound on each pressure measurement. The area colored in yellow shows then the range of accuracy for the particular test and is quite apparent that the total logs in pressure is far in excess of the range of accuracy of this particular instance.

Q. What is the distance of the shut-in well to the nearest producing well?

A. The nearest producing well to this shut-in well was Danube #3 Thompson, a distance of 2,160 feet.

Q. What does that indicate with reference to the effective circular drainage area?

A. This indicates that the shortest drainage radius of any of the wells affecting this particular well is 2,160 feet and a circular drainage radius of 2,160 feet indicates an area of 336 acres which could effectively

be drained by wells in that area.

MR. REID: For the convenience of the commission I might state into the record that this testimony occurs in the previous hearing on Exhibit 10, Transcript pages 28 to 31.

(Examination Continued)

Q. Mr. Greer with reference to Exhibit "H" (a), and "H" (b) appearing in the pamphlet of exhibits, would you describe generally what those represent?

A. Exhibit "H" (a) and "H" (b) are tabulated data relative to Benson & Montin's interference test #2 which shows the area of the test, producing wells within the test area, the subject shut-in well and the pressure measurements on the shut-in wells.

Q. Referring now to Exhibit "H" (c) and "H" (d) which are large exhibits on the board, "H" (1) and "H" (2), would you identify those for the Commission and explain what they show?

A. Exhibit "H" (c) is a map of the general area colored in yellow, the area of the test and on which the subject shut-in well was colored in red and the producing wells within the area colored in green.

Exhibit "H" (d) is a graph showing measured shut-in pressures of the particular shut-in wells. This is a similar type interference test for Well No. 11 Hancock. The main difference in these two tests is that this particular shut-in well No. 18 Gallegos Canyon Unit was

shut-in for a number of months from July of 1952 to March of 1953 and during this time pressure measurements were obtained with Benson & Montin's dead weight tester which has a sensitivity of 1/10th of a pound.

Now, we were able to obtain this long interference test on this particular well for the reason that this was drilled within Indian land within the unit and the pipeline company had difficulty obtaining right-of-way clearance to tie the well in. That is the reason the well was shut-in for such a long time. We took advantage of this long shut-in period to determine if to make an interference test which would not cost our working interest partners any loss of production for shutting in a well which could be producing into the line. This well shows a similar type build-up. Perhaps we should explain the build-up. When we drill and complete wells in this area, and shut them in we find that it takes a considerable period of time for the well to reach a maximum shut-in pressure. These build-up pressures are represented by the red circle and for this particular well, it shows a period of approximately 40 days was required for the well for the gas in the vicinity of the well to equalize and level off pressure drop caused by the withdrawal of gas during completion of the well. Now, even though this was a small volume of gas compared to the total reserves of the well which was produced during the time the well was completed, it still took a period of 40 days to reach the maximum pressure. After reaching the maximum

pressure the pressure began to drop off as gas was produced from adjoining wells and part of which gas was low as reflected in this particular well. Now, that is a substantial pressure drop from 463 pounds to 457 pounds. That's a pressure drop of 6 pounds and was measured with an instrument with the sensitivity of 1/10th of a pound. We feel that this is a very accurate reflection of the pressure behavior under that particular test during the period.

Q. What was the distance between the shut-in well and the nearest producing well on this test?

A. The nearest producing well to this #18 Gallegos Canyon Unit was #6, a distance of 3,050 feet and again the circular drainage area is equivalent to a drainage radius of 3,050 feet would be 670-acres to a well. This indicates that wells in that vicinity are capable of draining gas in excess of 600 acres.

Q. Referring now to Exhibit "I" (a) and "I" (b) in the pamphlet of exhibits would you explain briefly to the Commission what those show?

A. Exhibits "I" (a) and "I" (b) show tabulated data relative to Benson & Montin's interference test No. 3 and show the area of the tests, the producing wells within the test area, shut-in wells within the test area, a distance from test wells to the producing wells and the tabulation of the shut-in pressure taken on this particular well.

Q. Referring to Exhibits "I" (c) and "I" (d) of which there are maps on the board, would you explain those exhibits to the Commission?

A. Exhibit "I" (c) is a map of the area on which colored in yellow is the area of the Interference Test. Circled in red is the subject shut-in well and circled in green are the producing wells. Also shown on this exhibit are the initial shut-in pressures of two wells which were in a straight line opposite each other and between which #13 Gallegos Canyon Unit well is located. On one of these wells, #17 Gallegos Unit which was producing during the time of the test, we had an excellent initial reservoir pressure - that was 468.1 pound. Now, on #4 Gallegos Canyon Unit, we had an initial shut-in pressure of 464 pounds. This well had only been shut-in a period of about twenty days and I believe that its shut-in pressure would probably have built up to 467 or 468 pounds had it been a well shut-in long enough to reach its maximum pressure.

Exhibit "I" (d) is a graph showing the shut-in pressures measured on particular test well #13 Gallegos Canyon Unit. It is significant that the maximum pressure to which this well built up was only 461 pounds although it lies directly between two other wells which have initial pressures of 464 pounds and 468 pounds. Actually this well built up to a pressure of about 7 pounds less than the virgin pressure in that area.

Referring to the wells in the other interference tests, this one showed a pressure decrease after reaching its maximum built up pressure and which reflects volume of gas to adjoining areas.

Q. What is the distance to the nearest producing well from the subject well in this case?

A. The nearest well to this test well was #4 Gallegos Canyon Unit, a distance of 3,750 feet. The corresponding drainage area - circular drainage area is equivalent to a drainage radius of 3,750 feet would be 1,020 acres per well, which wells in this area are capable of draining. Now, that's the mimimum - 1,020 acres per well.

Q. Turning now to Exhibit "J" (a), (b) and (c) in the pamphlet of exhibits, would you please identify those for the Commission?

A. Exhibit "J" (a), "J" (b) and "J" (c) show data relative to Interference Test No. 4 on which is set out the area of the test, producing wells within the test area, the shut-in wells within the test area and the pressure measurements on the subject test well #31 Gallegos Canyon Unit.

Q. Would you identify and explain, please, Exhibits "J" (d) and "J" (e), of which there are large reproductions on the board and Exhibit "J" (1) and "J" (2).

A. "J" (d) is a map of the general area on which is covered the area of the test in yellow. The subject shut-in well is circled in red and the producing wells are circled in green.

Exhibit "J" (e) shows a graph of the pressure measurements taken on this particular shut-in well #31 Gallegos Canyon Unit.

Q. What was the distance ---

A. I'd like to point out on this particular well we have made pressure withdrawals from the beginning of the test to the end of about 12 pounds which is a very substantial pressure withdrawal.

Q. What was the distance from the nearest producing well to the shut-in well in this case?

A. The nearest producing well was #11 Gallegos Canyon Unit, a distance of 2,120 feet which has an equivalent circular drainage area of 323 acres.

Q. Referring now to Exhibits "K" (a), "K" (b) and "K" (c) in the pamphlet of exhibits, also "K" (d), "K" (e) and "K" (f), would you identify those for the Commission, please.

A. Exhibit "K" (a) and "K" (b), these exhibits show tabulated data covering the area of the test which is Interference Test No. 5, producing wells within the test area, producing wells on the boundary of the test area, shut-in wells within the test area and pressure measurements on four of the test wells within this area.

Now, this Interference Test No. 5 is in my opinion, one of the most impressive interference tests that has been reported in the unit. Ordinarily in these interference tests we have one well shut-in and another producing well surrounding the test well. In this particular instance we have an area covering eight square miles within which there are only two producing well, three producing wells, which have production in excess, or production increase in excess of three or

four months. Nevertheless, even with this small amount of gas withdrawal from the eight square mile area, we still have interference between wells which have not been produced, with the producing wells and which show drainage over a wide area covering most of these eight square miles.

Now, on Exhibit "K" (g) is covered the area of the test in yellow, shut-in wells in red and the producing wells in green. Also shownare two wells from which we obtained the initial shut-in pressure in that area. These wells are #17 Gallegos Canyon Unit which had an initial pressure of 468.1 pounds and which lies on the eastern side of the test area. The western most well which is colored in green is Gallegos Canyon Unit #7 which had an initial shut-in pressure of 467.5 pounds.

The maximum pressure which the wells in between these two original wells reached slightly over 463 pounds. In other words, they trailed by about 4 pounds to reach the maximum shut-in pressure which the area originally exhibited.

Three of the wells, the three wells in the south part of the area which was shut-in reached pressure which was very nearly the same. Their pressures were within about one pound of each other at the conclusion of the test.

Well #33 is in what we call the fairway of the field in an area of slightly higher permeability and which received more rapid drainage influence than the other wells and it showed a lower maximum pressure and a more rapid pressure decrease.

Of particular significance in this test is Gallegos Canyon Unit #40 which was at a distance of 5,000 feet from the nearest producing well. This drainage radius of 5,000 feet is equivalent to a circular drainage area of 1800 acres per well, which wells in this area could affectively drain.

Q. Mr. Greer, have you made any computation of the initial rate of depletion on the wells drilled in the area?

A. Yes, I have.

Q. Will you please describe it and explain it to the Commission?

A. What we have seen from these interference tests that wells within the Gallegos Canyon Unit have an ability to drain areas up to 1800 acres per well. Now, in addition to having that ability to drain wide areas just as a practical matter, relative to spacing, it is necessary that the wells have a capacity to produce these reserves in a reasonable length of time. Now, the initial producing characteristics of wells within the unit in the case of productivity of about 500 barrels of cubic feet per well per day for about fifteen million cubic feet per month in the department. Now, as in compared to the reserve which are recoverable to a 250 pound pipeline pressure an average well in the unit has an initial productivity into the line which is equivalent to the depletion of about 70 acres per year. Now, an initial depletion rate of 70 acres per year is a very high capacity to produce when we are thinking of 160 acres and 320 acre spacing.

Q. What then Mr. Greer is the overall effect of the data which has been obtained since the last hearing on this question of 320 acre and 160 acre, in your opinion?

A. This additional data confirms the data presented at the last hearing and in addition whereas at the last hearing we had only one interference test which indicated the mimimum drainage area of about 300 acres per well we now have interference tests which show ability to drain areas up to 1800 acres per well.

Q. In your opinion have the characteristics of the reservoir been definitely established at this time or do you expect data later in the future would indicate some change.

A. Since the drilling of 42 additional wells as compared to an initial six wells confirms the data presented at the last hearing, we see no reason for any additional wells to influence the reservoir characteristics to any material extent.

Q. Were all the exhibits that appear in the pamphlet of exhibits prepared by you and the information therein obtained by you or under your direction?

A. Yes, they were.

Q. How about Exhibit "D" - the Core Laboratories Test?

A. That was prepared by a commercial Core Analyzing Service of Core Laboratories.

Q. An Exhibit "F" (a) is obtained from records of the Commission?

A. That is correct.

MR. REID: On that basis we offer the Pamphlet of Exhibits and offer the exhibits on the board and in the pamphlet in evidence at this time.

MR. SPURRIER: Is there objection to admission of this evidence? Without objection the exhibits will be admitted.

(Exhibits marked for identification)

(Five-minute Recess)

MR. SPURRIER: Mr. Reid-

MR. REID: If the Commission please, this completes our testimony on direct. I would like to briefly summarize to the Commission that on the evidence of the testimony that has been placed before the Commission this morning it seems clear that from an economic standpoing as well as from drainage standpoint, that one well per 320-acres is unquestionably the proper spacing pattern for this portion of the pool.

We feel that we have shown, together with the evidence presented to the Commission at the prior hearing, that the required denser spacing would not only be an economic burden, it would practically be unbearable by the unit, but in addition would result in waste, and would not be to the best interests of conservation. For that reason, we ask the Commission, at this time to enter its permanent order establishing 320-acre spacing for the area.

MR. KELLAHIN: Jason Kellahin, representing the Brookhaven

Oil Company, a protestant to the application of Benson & Montin for continuation of 320-acre spacing in the West Kutz in the Gallegos Canyon Unit.

CROSS EXAMINATION

BY: MR. KELLAHIN

Q. Mr. Greer, would you refer to Exhibit "A" about which you testified showing a map of the Gallegos Canyon Unit and adjacent areas in the West Kutz Pool. In connection with your testimony on that Exhibit, Mr. Greer, you referred to those wells shown in red on the Exhibit as the so-called buffer zone. Has that area been taken into the unit as yet?

A. Yes, sir. The expansion of the unit has been completed and will be effective as of July 1, of this year.

Q. It would be effective retroactive then?

A. We originally requested that it be retroactive to February 1st when we made our first application.

Q. Mr. Greer, do you know when those wells were drilled?

A. Yes, sir.

Q. Were they drilled subsequent to the approval of the Gallegos Canyon Unit? To refresh your memory, I believe the Gallegos Canyon Unit was approved in 1951, am I correct?

A. Yes, sir.

Q. And were those wells drilled subsequent to that time?

A. Yes, sir, all the wells were drilled subsequent to the approval of the unit.

Q. By whom were they drilled?

A. All the wells in the area colored in yellow were drilled by Benson & Montin with the exception of one well in the northwest quarter of the unit area which was completed as a dry hole on lands which are not unitized.

Q. Now, when you say all the wells drilled in the zone colored yellow, you are including those wells within the so-called buffer zone?

A. That is correct.

Q. And they were drilled by Benson & Montin?

A. That is correct.

Q. Was that part of the Unit, at that time?

A. No, part of the wells were part of the Unit and part of the wells were outside the unit.

Q. Would you tell the Commission which wells were outside the Unit at the time they were drilled by Benson & Montin?

A. Those are the wells on the tract which we described in the first part of the hearing as being just recently brought into the Unit. Do you want me to name the wells?

Q. Just name the sections in which they are located, please?

A. Sections 35, 36 in Township 28 North, 12 West. The S/2 of Section 31 in Township 28 North, 11 West. All of Section 4, Township

27 North, 12 West and the NE/4 of Section 5 in Township 27 North, Range 12 West.

Q. Now, Mr. Greer, if I told you that the Commission records show that only one well was spudded prior to the date of approval of the Unit Agreement, that well being Payne #7, which was spudded in on July 12, 1952, would that be correct, or do you know?

A. I don't believe I quite understand your question.

Q. Of the wells which were drilled in the sections which you referred to, if I told you that the Commission's records reflect that only one of those wells was spudded prior to approval of the Gallegos Canyon Unit, and all the rest subsequent to approval of the Gallegos Canyon Unit, would that be correct?

A. No, sir, it would not.

Q. What other well was spudded in prior to the approval of the Gallegos Canyon Unit?

A. There were no other wells spudded in. That well also was not spudded in prior to the approval.

Q. You say it was not?

A. No, sir, it was spudded about a year after the approval.

Q. Then all the wells were spudded after the approval of the Gallegos Canyon Unit?

A. That is correct.

Q. By Benson & Montin?

A. Yes, that is correct.

Q. Who was also the Unit Operator?

A. That's correct.

Q. Has drilling within this so-called buffer zone been completed? I am referring to those locations which are shown in green, those have not been drilled have they?

A. That is correct. The locations shown in green have not yet been drilled.

Q. Then you do not have the complete buffer zone according to your definition, is that correct?

A. That's right. It has not been completely drilled to a 160-acre spacing.

Q. Now, Mr. Greer, in your earlier testimony you testified that the Unit is operated as a single lease -

A. I'd like to refer to the two wells shown in green in the lower right hand part of the buffer zone and then the southernmost well shown in green in Section 4 - (let me point that out)

Q. Are you referring to these two? (indicating)

A. Yes, these two. They are located on the land which has recently been brought into the Unit. Now, during the time that we were negotiating to bring this land into the Unit, it was of course impossible to drill those locations inasmuch as we didn't know who would end up as being the working interest owners of those wells. We started our negotiations to bring this

land into the unit about two or three months after the last hearing, which was over a year ago. As of about December, we began to reach an agreement with our other working interest owners on bringing this land into the unit and in March were finally able to make a formal request to the USGS and the State Land Office to incorporate this land into the unit. So, during that period of approximately the beginning of the first of this year we were unable to drill any additional wells on that land that had not already been started. It will now be a question among the working interest owners of the unit as to when or if it is necessary to drill these wells, the locations of which are shown in green and in that connection, I would like to point out that the easternmost well circled in green which is in the SE/4 of Section 36 is offset to the south by very pool wells and there is a definite question as to whether that particular well might be a desirable location. In my own opinion, I believe the unit members will probably vote to drill the next well to it, which is the second well circled in green. Then, as to the other well, the southernmost well circled in green, that location is close to the edge of the field and there is no more reserves to be protected behind that well. There is therefore, a question as to whether it is necessary to drill that location and that again will be put up to the vote of the unit operators.

Then the remaining locations circled in green is at the

corner of the zone above the well (let me point that well out - indicating on map). In the NW/4 of Section 33. Since that is a diagonal section to the nearest offsetting 160-acre location there is also a question as to whether that well is actually needed to provide an offset well to those to the south. Therefore, in affect the offsetting 160-acre locations have already been pretty well met. In my own opinion I would judge that the working interest owners would think it necessary to drill only one additional well and that would be in the SW/4 of Section 36.

Q. As a matter of fact those two wells which are located in the S/2 of Section 31-28-11 are relatively pool wells, are they not?

A. They are smaller wells than the average.

Q. Now, you testified earlier, Mr. Greer that the Unit Area is operated as a single lease, so you can meet these 160 acre offset obligations?

A. That is correct.

Q. Did you meet them when Benson & Montin drilled these wells in the so-called buffer zone?

A. As of the time of our last hearing a little over a year ago, we had 6 wells completed within the unit. The well to the south of us was proceeding rapidly and we could see a boundary line of approximately 5 miles over which it was necessary to meet some kind of offset 160-acre locations. We had two choices which we discussed with our other working interest owners, at that time.

One was to try to incorporate the line which had just recently been brought into the unit and then drill on them, while the alternative was for Benson & Montin to drill the well on the regular 160-acre spacing pattern which was at that time in affect outside the unit and then bring the wells into the unit.

Now, knowing how long it takes to cross the enlargments of the unit which we have just pointed out, it has taken nearly nine months to being in these productive wells, we thought it would be almost impossible to get the other working interest owners to agree to bring the land in first and then drill the well. You see, at that time we had production within the unit. Therefore to enlarge the unit, to incorporate additional lands on which they were not producing wells, would mean that the working interest owners within the unit would be joining their productive lands with lands which did not have a producing well in it and that is a pretty difficult thing to get people to agree on.

Therefore it appeared that it would be necessary to drill a well outside the unit first to establish production and then bring the lands into the unit.

Q. Who made that determination, Mr. Greer?

A. We discussed that with a majority of the working interest owners about a year ago.

Q. That would consist of Benson & Montin and Stanolind?

A. We have -- No, sir.

Q. Were there other working interest owners consulted?

A. Yes, sir.

Q. Was Brookhaven Oil Company consulted?

A. I don't recall at this time. People who had less or around 1% interest I am not certain that we discussed it with them.

Q. You only discussed it with those who had a large working interest, is that correct?

A. I can't answer that exactly. I am sure that we discussed it with a majority.

Q. Well if you don't know, why just say so. Now, on your testimony, you testified that you had about 120 to 160 feet of Pictured Cliffs sand, is that correct?

A. No, I believe I said it was about 120 feet.

Q. But the productive pay was about 20 to 45 feet?

A. I said the productive pay section was as small, in some cases as 20 feet. The average is about 40 feet. The maximum I don't recall but it was around 60 to 65 feet.

Q. Is that fairly uniform throughout the pool?

A. Through the area that we have drilled in taking a reasonable area in such as two or 3 sections, I would say it is uniform. It is reasonably uniform. It varies some.

Q. But it is fairly uniform throughout the pool.

A. Reasonably, yes.

Q. Now, referring to Exhibit No. B, Mr. Greer, I believe the Core Analysis there shows a porosity of approximately 18%. Isn't it true that there are a number of wells there as high as 20%?

A. Well, as I recall from the average of the well where we had a very large number of samples which were analyzed by the special analyst. I believe that the average of each well was very nearly 18%. I don't believe ---Yes, I recall definitely that no well had an overall average porosity of 20% .

Q. And that is fairly uniform throughout the pool, as far as you know, is it?

A. It was amazingly uniform in the wells we cored.

Q. And it's in an area of relatively low permeability, isn't it?

A. That is true.

Q. Now, in reference to your Exhibit No. "E", Mr. Greer, you show a final abandonment pressure of 150#. Is that what you anticipate in that pool, in its development?

A. Yes, sir.

Q. What line of pressure are you meeting now?

A. The average over the last year has been approximately 250#.

Q. You mean then that you would abandon the well at 150# pressure, a 13 to 14 hundred foot well, is that your testimony?

A. Yes, sir.

Q. You would not apply vacuum or make any other effort to produce?

A. No, sir. By the time the pressure has reached 150# the productivity of the well would be so low that it would not be economically feasible in any stretch of the imagination to put a vacuum on the formation.

Q. You have a marketing contract with El Paso Natural Gas, do you not?

A. That is true.

Q. What is the pressure on that?

A. The --

Q. Is it less than 150#?

A. The El Paso Gas Company in their contract agreed to, at some time or another, lower the line pressure at 50# psi. They do not say at what time they will do that. Now, I would like to point out that there is a question as to whether we can operate the well at a 50# line pressure. All of the wells produce some water and in order for the wells to stay on production, it is necessary to get that water out of the hole. Now, we do that at this time by periodically flowing this water out of the hole through a string of tubing. It takes a certain amount of pressure to make the well

flow that water out of the hole. The least pressure which we have used so far is about 150# and we are beginning to find difficulty in getting the water out of the hole at that pressure.

Q. But you know of your own knowledge that these have been produced at a lower pressure than that?

A. Not --

Q. In other areas?

A. Not with characteristics of this field.

Q. The characteristics of this field would make the difference?

A. Oh, yes, sir, - I'd like to continue - In addition to the trouble of lifting water out of the hold which may require line pressure in excess of 50#, even if we could produce the well with an operating line pressure of 50#, it takes a differential pressure in the reservoir to the line pressure for the considerable amount to produce gas in any commercial quantities and when the reservoir pressure is around 150# that production rate even into a low line pressure of 50# would be quite low.

Q. Now, in reference to Exhibit "F", Mr. Greer, you refer to water coming in? Doesn't that help to maintain pressure of the pool?

A. Not in this particular field.

Q It doesn't?

A. This water as near as we can determine is more nearly the high practically immobile quality of water.

Q. You have no encroachment at all in the field?

A. We think, very little.

Q. Do you have some?

A. Normal. I might point out in that respect that any areas to the west of the unit and which is southwest of the area shown on Exhibit "A", wells have been drilled to the Pictured Cliffs sand which apparently carry 100% water. It, therefore appears that the sand is water bearing to the southwest and it is at a higher elevation than the gas productive zone within the unit. Now this can only be true with water being above or at a higher structural level than we produce gas. This situation can only exist by having the same type or relatively impermeable sand between our gas productive areas and the water bearing areas. We have found on one particular well, Southern Union #1 Robinson, a shutin pressure of, I believe around 100# less than the pressure we have within the unit. This tends to confirm that there is a permeability block between the gas productive areas within the unit and water productive areas to the southwest which would prevent water encroachment from that direction.

Q. Have you found that same experience to the north - the northwest?

A. The two dry holes that have been drilled to the northwest, we have encountered only small amounts of water.

Q. They did encounter some water?

A. Yes, sir, they encountered some water.

Q. Now in reference to your Exhibit "F", Mr. Greer, I believe you show the production rates on those wells. Does not that depend on the pipeline pressure?

A. Pardon me. I pointed that out when we reviewed that Exhibit.

Q. You also mentioned that there would be an increase in price to ten cents, did you not?

A. We hope that we will get an increase in price, of course --

Q. Does that go in the end of this year?

A. The contracts which concern the increase in the price of gas does not definitely mean that we will get an increase in the price. We hope to get it within or possibly the next year.

Q. That would make an increase in your total recovery in the event that you got it?

A. It would increase the return covering whatever volume of gas is left as of the time the price of the gas is increased. Now, how that will affect the area, for instance, we have designated on Exhibits "F" to "G", it is apparent that these wells have already produced a very substantial part of their reserves and by this time next year if the price of gas is increased the overall return will not be increased by the set ratio of ten cents. It will be increased some.

Q. You don't know what the increase will be, is that true?

A. You mean the overall return? That would depend on when the wells are drilled. Of course if we wait until next year or the year after to drill a well then the price would be effective throughout the entire time we are producing.

Q. You said a price of 22,000 to 23,000 -- no, pardon me, the cost to drill about $20,000.00 per well not excluding price of the lease is that correct?

A. That price or cost of $20,000.00 includes about $3,000.00 operating cost over a period of ten years.

Q. In other words about $17,000.00, plus the operating cost?

A. Yes, sir.

Q. Now in reference to the other exhibits, we will try to lump them all in order to save time. If you have any questions that you don't understand please say so. You show original bottom-hole pressure, working pressure, so-called on several of those wells, what was that?

A. I believe 468# to be very close to the working pressure of the area.

Q. 464 pounds?

A. 468, I believe is more nearly correct.

Q. You think that would apply to the whole area?

A. It would be very close - it may vary two or three pounds.

Q. Do you know what the initial pressure of the pool was?

A. Of the pool?

Q. Yes, sir.

A. It would be very nearly the same.

Q. Of the present well drilled?

A. I don't recall the pressure recorded.

Q. Wasn't it about 480 pounds?

A. It may have been recorded as 480 pounds if taken with a dead weight tester. That I don't know whether it would be a reliable pressure, but I seriously doubt it.

Q. Is it your opinion then that 468 pounds was the virgin pressure from the entire pool?

A. That would be very close.

Q. Was the first development to the south of this area, that is south of the Unit?

A. That is correct. At the time we were -

Q. Now, in your initial test, your shut-in test, the well generally built up to about 446 pounds, is that correct? I believe you show 446 - 443?

A. At that particular time, one of them reached 461.

Q. And they showed a drop for the most part of 3 to 6 pounds - I believe one place it showed 12 pounds off the pressure. Isn't that correct?

A. That's right.

Q. What is the significance of that?

A. The significance of that is that the adjoining wells were draining gas from that particular tract.

Q. Now, in reference to your Exhibit "K", I believe you had nine wells producing and 6 wells shut in and unless I misunderstood your testimony it was to the effect that you were draining an area of approximately a mile - is that substantially what you testified?

A. Yes, but there's one thing about this I'd like to point out, what happened at that time which is interesting. The two northernmost wells shown on that exhibit which are wells Nos. 19 and 39 were over a mile and a half from the nearest producing

well which had been producing for a period in excess of three or four months and the interference had not quite reached that distance of a mile and a half, - in other words there is an element of time involved as far as interference and drainage are concerned.

Q. That is due to the low permeability of the formation, is it not?

A. The time that it takes for one well to interfere with another is dependent mainly on the permeability.

Q. Then you have a low permeability?

A. Yes, sir.

Q. What do you mean it took a long time - how long did it take?

A. For the wells that were close together - I believe the ones on approximately 160-acre spacing appear to take two to three weeks and for a well which is a mile and a half away, we say roughly four thousand acres per well, it looks like it will take about a year to pull interference to these.

Q. A year?

A. Yes. Of course that's very wide spacing we are talking about - four thousand acres.

Q. Over a period of the life of the pool, however, that is a relatively small time, isn't it? Two or three weeks? On a mile and a half?

A. I don't believe I've been though a mile and a half on

what we're talking about.

Q. The length of time it took to show interference on that well you referred to as being a mile and a half from the nearest producing well? Over a year?

A. That was about a year and a half - about a year.

Q. It took about a year?

A. Yes, sir.

Q. What do you estimate the life of this pool to be, Mr. Greer?

A. It depends entirely on the gas gathering companies, almost entirely.

Q. I understand that of course.

A. The way we are producing now we could reach economic limits in about 7 or 8 years. Now, in that time of course, at about seven or eight years we hope that the gas companies will lower their line pressure to where probably 12 to 15 years more would finally deplete the field.

Q. Are you referring to that 250 pound line pressure?

A. No - at the end of about 6 years they will either have to lower the line pressure to 250 pounds or else wewill have to abandon the well.

MR. SPURRIER: Mr. Kellahin, how much more do you have?

MR. KELLAHIN: Not very much - I can finish very shortly sir. (Cross Examination continued)

Q. It was your expressed point as I understood it - that

one well according to your information would drain possibly 1800 acres?

A. Yes, sir, it could. It could effectively drain and there again I'd like to point out that it would take longer to drill.

Q. That would be just something short of three square miles, wouldn't it?

A. Yes, sir.

Q. Now, in your opinion, has there been drainage to the south?

A. The wells offsetting the unit to the south were drilled and producing before our wells were and there is no doubt that drainage occurred as a result of those people drilling their wells before we did. We had quite a problem there with the five mile boundary to meet offset wells and although we drilled 42 wells this last year, it was impossible for us to proceed at the rate which would allow us to put all wells on production at the same time.

Q. In your opinion do you think there has been drainage to the south? Since you've been in operation of that unit, that is?

A. Yes, sir, there has been drainage caused by the wells that were drilled before ours were.

Q. But that was from operation of the well subsequent to yours, too - was it not?

A. The reason for any drainage that might have occurred from the Unit reveals that fact that the other wells were drilled before ours was.

Q. Except those that you drilled in the so-called buffer zone? Is that correct?

A. I am trying to remember the date of completion. As I recall, the offsetting well in the buffer zone and the wells in the buffer zone were drilled at very nearly the same time. There is very little difference.

Q. Mr. Greer, do you know of any pool that has been developed from the common source of supply on a non-unit spacing pattern in the absence of proration?

A. No, sir.

MR. KELLAHIN: Those are all the questions I have.

RECESS UNTIL 1:30 P.M.

MR. SPURRIER: The hearing will come to order, please. Mr. Reid.

MR. REID: If the Commission please, I have a very few brief questions on the direct.

DIRECT EXAMINATION

By: Mr. Reid

Q. Mr. Greer, concerning your testimony on direct and under cross examination about the projected production record of wells

on 160-acre spacing, what are some of the practical implications of that projected record?

A. This projected record was based on say 250 pounds operating line pressure and the amount of gas recoverable through this line pressure represents the amount of gas that we believe we will recover within the next eight to ten years. It is possible that sometimes down the line the pipeline company will lower the pressure and we will then receive additional income from our wells. However, they will not guarantee the day as to when they will lower the line pressure. We can look at the older field, the Fulcher Kutz field which has been in operation for twenty years and there are still wells in that field that have to produce against an average line pressure in excess of 200 pounds over the years.

We feel that we must base our economics on the cost of drilling a well and return of this cost over a period of the first eight or ten years. The additional recoveries that we make thereafter does not have a particular bearing on the payout time which we must certainly realize a return on our drilling investment which is surely within ten years.

Q. You feel that drilling on a 160-acre spacing pattern would not assure you of that payout during that time?

A. That is correct.

Q. Mr. Greer, referring again to this buffer zone - would you explain please, to the Commission just exactly what affect that buffer zone has on gas production on each side of it?

A. I would like to point out that this buffer zone prevents drainage from unitized lands to the area in the south.

As you saw in our Exhibit No. 5, it takes about a year for interference to reach a well which is a mile and a half from the nearest producing wells. This was shown with Wells Nos. 19 and 39 in our Interference Test No. 5. Now, the nearest well on 320-acre spacing was in the unit, to wells on 160-acre spacing outside the unit is about a mile and a half. I'll point that distance out on the map.

(Illustrating) From the nearest well upon 320-acre spacing on this road to 160-acre wells on the south is a distance of about a mile and a half. Now, if there were no wells in the buffer zone, - if there were no wells whatsoever, we then would anticipate interference and the commencement of drainage to the 160-acre spaced well in the south within about a period of about a year after production from the south has commenced. However, with two rows of wells drilled on 160-acre spacing, each well of which withdraws about as much if not more gas than the wells to the south, it is impossible for gas to migrate from the 320-acre spaced area to the 160-acre wells outside the Unit.

There will be cross drainage from the 320-acre spaced well to the first row of wells drilled on 160-acre spacing and a small amount of drainage from the first row of wells on 160-acre spacing to the second row of wells. Now, this does not cause any destruction of correlative rights or difference in payment of production -

for production to the royalty owners in the Unit, because the entire participating area is operated as one lease and it makes no difference to working interest owners or royalty owners as to which well the production comes from. It is all accounted for on the same percentage of interest.

Q. Does the low permeability of the area have any effect on this - is it the cause of it?

A. Yes. We might point out that in this particular field we are able to prevent migration from 320-acre spaced wells to 160-acre spaced wells by providing two rows of wells drilled on 160-acre spacing. Now, we do not recommend this for any field, we are recommending it for this particular field and it is possible in this field because of the low permeability the formation exhibits and which presents rapid equalization pressure over the area.

If pressures could be equalized rapidly as gas is withdrawn then there would be evidence of considerable migration. But these conditions do not exist. The two rows of wells drilled on 160-acre spacing very effectively prevent drainage.

RE-CROSS EXAMINATION

By: MR. KELLAHIN:

Q. Mr. Greer, in reference to your statement in regard to taking a year and a half to travel a mile, - is that correct - which exhibit were you referring to?

A. Exhibit "K" and the time is in the order of a year or possibly a year and a half and I do not propose to say that the gas minimum was a mile and a half in that year - it's just interference connections.

Q. How long did you run those interference tests?

A. The interference test itself was conducted from a period commencing in June through September of this year. To arrive at the period of a year for interference to reach wells Nos. 19 and 39, it is quite obvious from the fact that their initial pressures when they were potentialed in the month of August this year, were 467 pounds for No. 19 and 466 pounds for No. 39.

Now, these pressures are very close to the original pressure on the order of 467-468 pounds. At the end of one year then, interference, if any, has been exceptionally small.

Q. You did not take your interference tests over a longer period of three months, is that correct?

A. It was not necessary. Of course if the well had the same virgin pressure we do not need to conduct a test for a year to determine if the pressure has not dropped off.

Q. Are all of those wells set out in Exhibit "K"?

A. No, sir. Wells 19 and 39 do not show - they are not shut-in or were not shut-in long enough.

Q. Would you refer to Exhibit "K" (a), please? Now, does that Exhibit reflect interference on all of the wells?

A. Very definitely.

Q. And that is not over a period of a year and a half, is it?

A. No, sir. These wells were not as far removed as a mile and a half. Those distances were set out in Exhibit "K" (b). I think No. 33 was 3850 feet; No. 34, 3740 feet; No. 40, 5,000 feet; and No. 41, 3230 feet.

Now, if you recall the distance between Wells 19 and 39 was about a mile and a half from the nearest producing well which had been on production for three or four months, or in excess of 3 or 4 months. On this exhibit we show the nearest producing well which is No. 19 - Gallegos Canyon Unit No. 20, which did not go on production until April of this year and had not been producing long enough to affect the well.

Q. How about Well No. 40, was there interference?

A. Yes, sir.

Q. Did anyone make an estimate for you on your reserves?

A. No, sir. I did my own calculating.

Q. Have you ever secured more than an evaluatinn survey?

A. I haven't, my Company may have.

Q. You don't know abnut that, is that true?

A. No, sir, I don't.

Q. You say it is impossible for any drahage to take place? That is to the south. Is that based entirely on your idea of the low permeability going down?

A. That is partly what prevents the drainage.

MR. KELLAHIN: That's all.

MR. SPURRIER: Does anyone else have a question of the witness? If not, the witness may be excused. Mr. Kellahin, do you have a witness?

MR. KELLAHIN: Yes, sir.

THOMAS B. SCOTT, JR.,

having been duly sworn, testified as follows:

DIRECT EXAMINATION

By MR. KELLAHIN:

Q. Will you state your name?

A. Thomas B. Scott, Jr.

Q. Are you connected with the oil business, Mr. Scott?

A. I am President of Brookhaven Oil Company.

Q. Are you the protestant in this case?

A. Yes, sir.

Q. Mr. Scott, does the Brookhaven Oil Company have any interest in the Gallegos Canyon Unit?

A. Yes, sir, approximately a little over 1% - 240 acres.

Q. What type of lease is this?

A. State Lease.

Q. How long have you been in the oil business?

A. Since 1919.

Q. Have you had any special training or preparation for that business?

A. During practically all of my business life.

Q. Have you worked actively in the production end of the oil business?

A. Yes, sir.

Q. Would you describe please - you have not testified before this Commission before, have you?

A. No, sir, I haven't.

Q. Would you described please, to the Commission, your experience?

A. In 1919 I worked as a Junior Engineer for two years for the Empire Gas and Fuel Company. After that I went with the Standard of New Jersey and for seventeen years various subsidiaries, worked in the producing end of the pipeline in the field and in the various offices.

Q. Now, in connection with this Case No. 377, Mr. Scott have you prepared any statement you would like to present to the Commission at this time?

A. Yes, sir, I have.

MR. KELLAHIN: Would the Commission care to have that read or will they read it?

MR. SPURRIER: It should be read now.

MR. KELLAHIN: Yes, sir. Will you read that Mr. Scott?

MR. SCOTT: Case 377. Order R-172. The West Kutz Canyon Pool is a common source of gas supply in the Pictured Cliffs formation and covers an area of approximately 42,000 acres. Approximately the north half is operated in the Gallegos Canyon Unit by Benson-Montin and the south half in smaller tracts by a

number of individual operators. There are no known underground barriers which would question the common source of supply, throughout the entire pool or which would stop drainage from one end of the pool to the other. We understand that the pipeline of the El Paso Natural Gas Company is the outlet for gas produced from the northern half well in the Gallegos Canyon Unit and the pipeline of the Southern Union Gas Company is the outlet for gas produced from the southern half well. The conservation laws of this and other states recognize uniform spacing as the timely requisite for conservation and the protection of correlative rights. Uniform spacing promotes conservation because it results in the best drainage. I would like to repeat that, if I may - Uniform spacing promotes conservation because it results in the best drainage.

Uniform spacing protects correlative rights of the individual owners because it gives each owner mutual and similar conditions for production. Additionally State Conservation Commissions, including New Mexico's, where there is an excess of supply over demand add to the uniform spacing orders and engineering formula so as to compensate for the varying capacities of the well.

Despite the necessity and requirement of uniform spacing there are a few isolated cases where exceptions are made so that the lease owner may drill and produce on an odd size piece of land. Ordinarily a well is permitted to be drilled on an odd

sized piece of land but its capacity to produce is prorated in accordance with the size of that particular piece of land, to the uniform pattern and the capacity to produce.

In the case at hand, the Oil Conservation Commission of the State of New Mexico has universally ordered a pattern of one well to 160 acres which wells are drilled to the Pictured Cliffs formation, the only exception being in a very few cases, as mentioned above on an odd size piece, less than 160 acres and in the northern half of the West Kutz Canyon Pool where the Gallegos Canyon Unit operated by Benson & Montin has been allowed for the last year to drill on 320 acre spacing.

The South half of this same Pictured Cliffs Pool and the common source of supply is drilled and being produced as in other places in the San Juan Basin, New Mexico on 160-acre spacing. As mentioned above the West Kutz canyon pool has as its common source of supply in the Pictured Cliffs formation and consists of approximately 42,000 acres. The productive area in the north half of the pool is estimated to be approximately 23,000 acres. The south half of the pool consisting of approximately 19,000 acres is actually producing.

Except for border wells within the unit and the individual operators, your Commission has submitted 320-acre spacing in the north half of the pool and 160-acre spacigg in the south half without including in the order any stipulation to prorating the production of wells drilled on 160-acre spacing. We have made

an informal study which is available to the Commission. A summary of this informal study consists of the following:

EXHIBIT NO. 1

Right here I apologize to the Commission that these exhibits are not as attractively done up as the ones presented by Benson & Montin but, we were a little hurried and inasmuch as I helped pay for the Benson & Montin Exhibits I can't feel so badly about it.

We have listed on Exhibit 1 the production figures which we have been able to gather by wells and by areas.

MR. KELLAHIN: Mr. Scott, did you prepare these exhibits or were they prepared under your supervision and direction?

A. Yes, sir.

Q. And do they show the source of the figures you have used?

A. Yes, sir. This first Exhibit came from the New Mexico Engineering Committee and the San Juan Basin Operators Committee. A good deal of the data came from Benson & Montin.

MR. SCOTT: The figures will show that to date the production from the south half of the West Kutz Canyon Pool is more than three times the production from the north half of the pool, that's the Gallegos Canyon Unit.

As from the beginning through June, 1953, it shows that there are approximately four and a half times as many wells in the South half of the West Kutz Canyon Pool as there are in the north half, Gallegos Canyon Unit, as of June 30, 1953.

It also shows that the number of acres for producing wells is approximately 200 acres per well in the south half of the Pool and approximately 1100 acres per well in the north half of the Pool, the Gallegos Canyon Unit, as of June 30, 1953.

In other words, there is five times the acreage per well in the Gallegos Canyon as there is in the south half of the pool.

I could take time to go into details and if there are any questions, of course I will be very glad to answer them.

MR. KELLAHIN: An explanation of these figures is attached to the Exhibits, Mr. Scott?

A. Yes, sir.

Q. Does that complete your comments on Exhibit No. 1?

A. Yes, sir.

Q. Referring to Exhibit No. 2, will you explain to the Commission what that is, please?

A. Exhibit No. 2 is a chart showing the decline in pressure of individual wells from the initial bottom hole pressure to the shut-in pressures taken in September, 1953. The dots on the lines in red are the wells outside of the unit. The black dots on the lines are those within the unit.

Q. In reference to that Exhibit, Mr. Scott, what does that show the initial bottom hole pressure to be - the virgin pressure of the pool?

A. I have three wells that were up to 478.

Q. And what was the source of those figures?

A. The source of those figures, I am not quite sure - I know they are either the Oil Conservation Commission's figures or Benson & Montin's. You will not e that for the older wells - now, we'll take outside of the Pool that the pattern is rather uniform and the decline in pressure is lower than the decline in pressure for those wells in the Unit. The black figures being those wells within the unit. This is a chart (indicating) of times against pressure. It does not take into account the amount of gas that has been produced from the well. We take that up in the next step.

Q. What is the significance of that more rapid decline as shown by the black lines, that is those wells within the unit?

A. Well, in my opinion, it shows that the wells in the Unit are being drained faster or being overproduced.

Q. Now, referring to Exhibit No. 3, Mr. Scott, will you explain that to the Commission?

A. Exhibit No. 3 is a tabulation showing the decline in pressure per million of cubic feet of production from the initial bottom hole pressure to the shut-in pressures of September, 1953. This shows that generally speaking the decline in pressures per million cubic feet of gas produced is greater for the unit and the border than for the south end of the pool. This means that the gas is escaping to the south end of the pool or that the wells

are being produced so hard that it is waste. I am inclined to believe that both the escape of gas to the south end of the pool is taking place, as well as waste.

Q. Are those the same figures basically as are shown graphically by Exhibit 2?

A. Yes, except that this is per million cubic feet of gas produced while the other was only or mostly on a period of time. On the first sheet are the wells in the unit and running down the right hand column you will see that the decline in pressure, per million cubic feet of gas produced, the first figure is 72/100ths of a pound, 21/12ths, 71/100ths, 98/100ths, 25/100ths, 50, 39, 36, 63 and 41. Now turning to the second sheet, the first three wells are at the south end of the pool; in other words around 43, 42 and 35/100ths of a pound per million cubic feet of gas produced.

Now, we get into the border wells, those are the Benson-Montin's Paye, Foust, Lilly and two more Paynes.

Q. Are those the wells that are included in this so-called buffer zone?

A. Yes, sir. You will notice that the decline in pressure per million cubic feet of gas produced is exceptionally high. That is perfectly logical, because that is the transition line between the unit and the low pressures in the south end of the pool.

Q. Referring to Exhibit No. 4, Mr. Scott, would you explain that to the Commission?

A. That Exhibit which is No. IV are contours on top of the Pictured Cliffs formation sub-surface sea level basis and we

merely present that. I guess everybody has a similar map to show that as far as we know there is no barrier to the common source.

The B map is a Contour of initial potentials. Please note the lack of unit protection on the south border where the potentials are the highest, and I speak particularly in that mile area, the south border of Section 34, 29 North, 12 West and the north border of Section 3, let me correct that - that should be 28 North, 12 West and the north border of Section 3 27 North, 12 West. That is in a high potential area and there is no buffer zone there except the four wells in Section 34.

Map No. 3 is a Contour Map on the shut-in pressures recently taken by Benson & Montin. You will note that the high bottom hole pressures and shut-in pressures are practically all in the unit. There is a definite decline in pressure on the border between the unit and the southern producers and that extends way down until the very southeast corner when the pressures start to build up once more. With the difference in pressure, I don't see how drainage could be avoided between the units, in the south end of the pool.

You will see from these Exhibits that the individual operations in the south half of the pool could not fail to drain gas from the north end and I believe the operators of the Unit, have drilled a line of wells on 160-acre spacing within the Unit on the south border evidencing this contention - in other words they need protection. We also note that adjoining the unit on

the south border, the operators on their own properties have drilled their own wells on 160-acre spacing. In other words, 160-acre spacing is needed in the north half of the Kutz-Canyon Pictured Cliffs pool to equalize the drainage from the south end. It is true that in the most recent wells so far the productivity per well in the unit drilled on 320-acre spacing and in virgin territory is somewhat higher than the productivity of the older wells outside the unit drilled on 160-acre spacing. Nevertheless, this productivity per well will equalize if all wells in the pool are produced to capacity.

As I understand it, the interference tests that have been made by Benson & Montin consist of blowing down a well and shutting it in over a period of time while the surrounding or nearby wells are producing. We fail to see what, if anything, this proves except that there can be drainage.

As to the engineering features of common sources of gas supply, we mention the following:

1. A common source of gas supply at the beginning of production has a certain volume of gas content and a certain bottom hole pressure. The decline of each, as gas is produced, is directly proportional to the other. In other words, if a certain pool starts with reserves of 1 million MCF and a bottom hole pressure of 1000 pounds per square inch, and 500,000 MCF or one-half the gas produced, the bottom hole pressure will also decline one half to 500 pounds per square inch. Therefore, if one portion of a pool has produced and/or is producing greater volumes of gas

than another portion, the bottom hole pressure of the area of greater production declines more than the area of lesser production. Therefore, the bottom hole pressures in the south half of the West Kutz Canyon Pool are generally lower and have generally declined more than those in the north half of the Gallegos Canyon Unit, thus drainage of gas is taking place from the north half to the south half. The pressures in the common source of gas supply must inevitably equalize. What differentials in pressures there is may be determined at any time by the Commission or by the operators. The evidence of equalization of pressure is exemplified in the West Kutz Canyon Pool and any other common source of supply that might be chosen as an example. Until such time as there is equalization of pressures throughout the pool, there will be drainage from the higher pressure areas to the lower pressure area.

The West Kutz Canyon Pool, and as a matter of fact all other Pictured Cliffs pools as far as we know in the San Juan Basin, New Mexico have subnormal pressures. The Pictured Cliffs formation in the West Kutz Canyon Pool has low permeability, good porosity, approximately 20% or 18%, and excellent thickness from approximately 20 to 100 feet. As mentioned above, there is no known barrier to drainage within the common source of supply. It is a fact that gas as compared with oil, flows more easily through a formation, thus it drains more easily than oil from the high pressure area to the low pressure area.

As to the economics of the situation, the recovery or commercial reserves of gas from the West Kutz Canyon Pool is estimated by competent engineers and geologists from 4,000 to 7,000 MCF per acre, and I might remark that Paul Umbach, Consulting Geologist, estimated 7,500.

In the following example we have used the conservative figures of 5,000 MCF per acre net (7/8ths)to the operator. If we have a recovery of 5,000 MCF on 320 acres, we will recover 1,600,000 MCF; gas sold at 10 per thousand gives you $160,000.00; the cost of the first well on this spacing is $19,000.00; total $141,000.00 plus the cost to produce of a quarter of a cent per thousand - $4,000.00; I made a mistake there - the gas sold at ten cents gives you a revenue of $160,000.00 less the cost of the first well of $19,000.00, gives you a figure of $141,000.00, less the cost to produce at a quarter of a cent per thousand, $4,000.00, gives you a net of $137,000.00. If you would drill a second well, making the spacing 160 acres you would have to add expense of $20,000.00 giving you a net recovery of $117,000.00.

From the computation you will see that if an additional well is drilled on a 320 acre lease to make 160 acre spacing, the net income after all charges will be $117,000.00. The total charges to drill and produce the second location will be approximately $20,000.00. Therefore, to pay for this $20,000.00, an additional recovery of the net 7/8ths gas is 200,000 MCF. In other words,

an additional recovery of 12½% would pay for the second well. Generally two wells, if drilled on 160 acre spacing, will recover at least 12½% additional gas to one well drilled on 320 acre spacing. From our experience, it is our belief that the increase in recovery from two wells being drilled may be as high as 20 to 40%. In other words there is no doubt that there is an increase in gas recoveries when the number of wells drilled is increased. The more wells that are drilled, the more will be the increase in recovery. Therefore, the restriction of the number of wells to be drilled is an economic factor only. It restricts the ultimate recovery.

From the above you will see that the drilling of wells on 160 acre spacing allows the operator sufficient profit and therefore there is no economic restriction to such 160 acre spacing.

Brookhaven Oil Company owns 1.03% interest in the Gallegos Canyon Unit, that, they own 240 acres of New Mexico State leases within the producing area. As a matter of fact, Brookhaven's ownership is in the only state sections that produce from the West Kutz Canyon Pool. Basing the total recovery from this acreage at 5,000 MCF per acre, a loss by drainage to the south end of the pool of 10% means a loss of $12,000.00. A loss by drainage of 20% to the south end of the pool means a loss of $24,000.00 over the life of production.

It is recommended that Order No. R-172 in Case 377, dated June 1952, be rescinded because The West Kutz Canyon Pool is a

common source of supply and initially had the same bottom hole pressure. The decline in pressure per million feet of gas produced is directly proportioned. A great many more wells and a great deal more gas has been produced from the south end of the pool than from the north end. The present pressure in the south end of the Pool are less than in the north end of the Pool, therefore there is drainage of gas from the north end of the Pool to the south end of the Pool. Drilling wells on 160-acre spacing is economical. The gathering systems of the El Paso Natural taking gas, generally speaking, from the north end of the Pool and Southern Union gathering system taking gas from the south end of the Pool are, as I understand, in the future going to coordinate their takings. Whether or not this will be on a well basis or pressure basis remains to be seen.

The primary requisite of proration and conservation and the protection of correlative rights is that one common source of supply must be drilled on the same spacing pattern. If, in addition to that, the Commission sees fit to prorate the wells by formula based on capacity, that is an additional matter but the spacing of wells must remain the same in a common source of supply.

Q. Now, Mr. Scott, referring to testimony which was given this morning, were you ever consulted by Benson & Montin, or any one representing them in regard to the drilling of Benson & Montin's wells in the so-called buffer zone? That is wells shown in red on the map here?

A. They belong to Benson & Montin alone. They were not in the Unit.

Q. Were you consulted in regard to the drilling of those wells with the idea that they were to be brought into the Unit after completion?

A. No, sir.

Q. Were those wells produced after they were drilled? Prior to being brought into the Unit?

A. Yes, sir.

Q. For some length of time, sir?

A. Since initial production, right on to today.

Q. Do you known whether they are in the Unit now or not?

A. I do not. They were attempting to bring them into the Unit and I believe the U. S. Geological Survey still had to give its approval.

Q. And you don't know whether that approval has been given or not yet?

A. I haven't heard of it. I don't deny what Mr. Greer said.

Q. Now, you testified as to reserves, did you have your own reserves evaluated?

A. Yes, sir.

Q. And was that figure you quoted Mr. Umbach's?

A. Yes, sir.

Q. In your opinion, have Benson & Montin taken proper steps to protect the unit area against drainage in conformity with the

Unit Agreement?

A. I wouldn't have done it that way.

Q. Do you know of any pool or common source of supply which has been developed on a non-unit form of spacing pattern without proration?

A. No, sir.

MR. KELLAHIN: That is all.

CROSS EXAMINATION

By: JUSTIN REID

Q. Your primary contention then in the case is over the question of drainage, is that correct?

A. That's right.

Q. You testified that you would not have undertaken to prevent drainage in the way that Benson & Montin have done? What is your idea what should be done to prevent drainage?

A. I would drill many more 160-acre spaced wells on the south end and particularly in the higher porosity and permeability area.

Q. Then your position is essentially that you would like to see more 160-acre spaced wells in the north half?

A. Yes, sir and to produce more.

MR. SPURRIER: Does any one else have a question of the witness?

MR. REID: Mr. Scott, just to carry that a little further - you, I understand, would not have the complete pool drilled completely to 160 acres but only part of the north half.

A. No, sir, I am not saying that I would drill all 160-acre spacing locations that looked as if they'd pay out. But I'd certainly start on the south end and keep drilling until we were sure the pressures------

Q. You stated in your statement here that you got 12½% additional gas within a 160-acre - I mean areas where you do not recommend 160-acre spacing, would you leave that 12½% in the ground?

A. I don't understand your question.

Q. You suggested that in the north part of the area, you would recommend drilling to 160-acre spacing and parts you would recommend drilling to 320. Then in your statement here you say that certainly two wells, if drilled on 160-acre spacing will recover at least 12½% additional gas to one well on 320, and you propose that the 12½% be left in the ground.

A. Well, I would not drill locations which I thought would be uneconomical but I'd drill all 160-acre locations that there were.

A. And if it turned out an uneconomical location, your 12½% -

A. Well -

Q. Will you explain to us where you get the figure 12½%?

A. It was in the Exhibit.

Q. Is this computation the extent of the situation where you go to 80-acre spaced wells?

A. It might, it would depend on the pool. I would not object to 320-acre spacing in this entire pool, if it were uniform. It might be found at a later date that the recoveries were going

to be more and you might even go to 80 acres. The primary requisite of all proration is uniform spacing.

MR. REID: If the Commission please, I find myself a little limited in questioning this witness. Could Mr. Greer ask one or two questions on this computation?

MR. SPURRIER: Certainly.

BY MR. GREER:

Q. We are interested in finding out where the 12½% figure comes from - whether when you drill parts of any well going from 320-acre spacing to 160-acre spacing you say you get 12½% for gas.

A. No, I said all you needed to get was 12½%. That's what I said.

Q. Do you believe that you actually will get 12½% more gas?

A. I'd say yes, sir. I believe we would get much more.

Q. You think that you'll get more than 12½% more gas from the section with four wells on it than you would with two wells on it?

A. Well, from the studies I have made on other pools, I haven't studied this one - in other pools.

Q. Then you have studied other pools on which it was 320-acres compared to 160-acres. Is that what you are referring to?

A. Well, it might have been 80 to 40 or 160 to 80 or something like that.

Q. I see - then we could expect another 12½% recovery by going from 160 acres to 80 acres, is that right? And another

12½% by going from 80 acres to 40 acres, is that right?

A. That's possible.

Q. And another 12½% by going from 40 acres to 20 acres?

A. That's possible.

Q. And an additional 12½% by going to 10 acres?

A. You can get it right down to one acre.

Q. I see. This figure of five million cubic feet per acre was not based - as an engineer you arrived at this five million cubic feet per acre the same as Mr. Umbach?

A. Yes. I --

MR. GREER: No further questions.

MR. SPURRIER: Are there any further questions of the witness?

MR. HILTZ: R. G. Hiltz for Stanolind. I'd like to know in Mr. Umbach's estimate which was used in Mr. Scott's calculations what was the source of data that he employed to make up this calculation?

MR. SCOTT: I don't know - I asked his opinion.

MR. HILTZ: Then you don't know whether the data employed by Mr. Umbach was identical to that which was available to Mr. Greer?

A. No, sir, I don't.

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

MR. KELLAHIN: If the Commission please, that completes our case in protest and I would like to point out in particular that

our case is based on the problem primarily of drainage and the failure of the unit operators to protect against this drainage within the unit area, The drainage of which we originally complained was drainage which was committed by the unit operator himself in drilling those wells marked in red on the map and which were discussed in Mr. Greer's testimony. They were drilled without any consultation with Mr. Scott as he so testified. They were produced and the initial production was taken from those wells by the unit operator for his own account and not for the unit and now he attempts to put them into the unit and I presume from the testimony, has done so. Despite this fact and we do contend that that was drainage from the unit - improper drainage, highly improper due to the fact that it was committed by the unit operator themselves without any compensation to a member of the unit even though he may be a small one. Mr. Greer in his testimony has admitted that there was drainage to the south and that was the reason for attempting to include this buffer zone in there to halt this drainage. By his own testimony he also shows that one well will drain approximately three square miles. So, the buffer zone, even though it may be effective for some purposes, the buffer zone at its best will hardly be adequate for granting continuation of the drainage to the closely drilled area south of the unit. Now the only protection which could be afforded is either to drill the unit on 160-acre pattern particularly in the area of high productivity or to prorate the wells throughout

the entire pool, and we submit that in all fairness to the members of the Unit, be they small or large, that protection should be afforded by this Commission and I believe that those persons who hold interest in this unit should be protected by the Commission by cancellation of the present 320-acre spacing order.

MR. REID: Mr. Greer would like to comment briefly on the exhibits introduced by Mr. Scott particularly those relating to the time pressure and volume pressure.

MR. GREER: I would like to refer first to Mr. Scott's Exhibit which shows the pressures throughout the pool and its contours and pressure contours on this map. In the first place, the current pressures which are shown here are the ones which are taken in connection with the current deliverability tests required by the State. These are seven (7) day shut-in pressures and we hope over a period of years to obtain information, the trend of which will be indicative of surface characteristics of the reservoir but, the engineering committee which prepared the manner in which the tests were to be conducted realize that there are certain limitations of these seven (7) day shut-in pressures. We know that they are not built up to a maximum and that they do not reflect the true pressure in that particular area. Now, we propose to use those pressures in certain calculations regarding productivity and over a period of years we believe that it will be helpful and beneficial to the Commission as well as to the operator. An example of this pressure which occurs around the well as it is produced is that initially in the first few months

of production, the pressure drops off rapidly if we take a seven (7) day shut-in pressure or one (1) day shut-in pressure, neither of which are representative of the two pressures of the reservoir.

As seen in our Exhibits, covering interference tests, it may take forty to fifty days for a well to build up its maximum pressure. I'd like to point out on this Exhibit how the pressure shown here may not be indicative of the actual pressure of the reservoir. There is a contour line near the Gallegos Canyon Unit No. 34 which shows a pressure between 400 pounds and 420 pounds. It is estimated the initial pressure to be about 405 pounds. As shown on our Exhibit K (h) the pre shut-in pressure of the reservoir at this location, No. 34, when measured on September 12, which is exactly the same day that the other pressures in the area were taken was 463.2 pounds. Mr. Scott's map is in error on that point by about 60 pounds. Now, the same thing will occur throughout this particular map, perhaps it has been 30 or 40 pounds in some areas but it cannot be interpreted directly.

Now, the other thing I'd like to call you on is this thing about doubling of spacing and getting 12½% more gas. Now, we have shown that the recoverable gas is approximately 70% of the total gas in place. Regardless of what engineer calculates the reserves, you will have to first arrive at the volume of gas in place and then the recovery factor and thereby come up with the

gas that is actually produced. For this particular area that factor will be around 70% or 75% which indicates that 30% of the gas will be left in the reservoir.

Now, according to Mr. Scott's increase of 12½% by doubling of spacing, if we go from 320 acres to 160 acres he gets 12½% more gas; by going from 160 acres to 80 acres he gets 25% more gas which now leaves only 5% of the gas in the reservoir. That would be equivalent to a pressure of about 25 pounds and, by going down to 40 acres he gets 44% more gas and he now has recovered more gas than there ever was in the field to begin with.

MR. KELLAHIN: Mr. Greer, do you have any other pressures than those shown in your exhibits? or any other tests made?

A. Well, we have quite a large amount of pressure data.

Q. That pressure data as supplied to Mr. Scott, was at his request, was it not?

A. That is correct.

Q. Isn't it true that you shut in all the wells in the entire pool for a period of a year?

A. That's true.

Q. You have to use the information that's available to prepare your exhibits, do you not?

A. Yes, sir. If you're going to make interpretations from your exhibits you need to have proper foundation. Mr. Scott made an interpretation without proper foundation.

MR. KELLAHIN: Mr. Scott used figures which were supplied by you?

A. That's right. I made no inference to Mr. Scott that

they were representative of the actual stabilized reservoir pressure. These are just the pressures that we take in connection with our deliverability tests and we hope they will give us valuable information over a period of years. Take this seven (7) day shut-in pressure and say that the stabilized pressure in that particular case is taken on the assumption that it is not valid.

Q. Mr. Greer, on the basis of the information that you have, do pressures tend to be higher within the unit or to the south of the unit or lower?

A. Naturally they're higher because you might say - commence drilling a year or two years after the other wells had started to produce.

MR. SPURRIER: Any one else have a comment in this case?

MR. TOWNSEND: Jim Townsend for Stanolind. I just want to read a brief statement into the record. Stanolind is the largest operator in the unit, owning something better than 31% and we are satisfied with the spacing as presently regulated. On the basis of data presented by Benson & Montin, we believe that it has conclusively demonstrated that development on 160-acre pattern is not economically attractive. In consideration of the indicated per acre reserve, it is our opinion that drilling on at lease 320-acre spacing is necessary in order to afford a reasonable return on our investment. The data contained in the considerable engineering testimony as presented by Mr. Greer

clearly indicates that one well will drain an area well in excess of 320-acres. This data shows conclusively that this field should be adequately drained on 320-acre spacing pattern. Such a spacing pattern will not result in underground waste and will actually preclude surface waste which will be occasioned by the drilling of unnecessary wells.

Further, we cannot feel that such development of 320-acre spacing will result in a violation of correlative rights. It can be said in conclusion possibly that the drilling of additional wells, if unnecessary, will result in the wells being diverted to exploration in other areas within the State.

MR. SPURRIER: Anyone else? Mr. Davis:

MR. DAVIS: Quilman Davis, representing Aztec Oil and Gas Company. Aztec Oil and Gas Company is a party to the Gallegos Canyon Unit Agreement and owns approximately 6% interest in the unit having acquired it from Southern Union Gas Company. The initial joinder in the unit and based upon information we have as to the drilling, the production data and the economics involved in the drilling in the Gallegos Canyon Unit, it is our opinion that 320-acres for wells in this unit is proper and necessary under the circumstances. We, therefore, urge the Commission to adopt an order authorizing and permitting 320-acre spacing.

MR. SPURRIER: Anyone else? If not, we will take the case under advisement and take a five minute recess.

Ex. 4/
Case 377

4

RESERVOIR TEMPERATURE SURVEYS - GALLEGOS CANYON AREA

WELL	TOTAL DEPTH	TEMPERATURE
Benson and Montin # 3 Gallegos Canyon Unit	1713	78° F.
" " " # 4 " " " "	1617	77° F.
" " " # 5 " " " "	1470	82° F.
" " " # 7 " " " "	1522	75° F.

SODIUM CHLORIDE CONTENT OF FORMATION WATER

WELL	NACL CONCENTRATION in ppm
Benson and Montin # 3 Gallegos Canyon Unit	66,000
" " " # 4 " " " "	65,000
" " " # 6 " " " "	68,000

CHLORIDE CONTENT OF FORMATION WATER

WELL	CHLORIDE CONCENTRATION ppm
Benson and Montin # 3 Gallegos Canyon Unit	33,700
" " " #4 " " " "	33,200
" " " # 6 " " " "	37,300

BEFORE THE
OIL CONSERVATION COMMISSION
STATE OF NEW MEXICO

CASE 372:

Under terms of Order R-172 the Commission requested that Benson & Montin appear at this hearing to show cause why a 160-acre spacing pattern should not be instituted for Pictured Cliff wells in the Gallegos Unit Area, San Juan County, New Mexico, to supersede the 320-acre spacing granted for a one-year period after original hearing.

TRANSCRIPT OF HEARING

June 16, 1953

BEFORE: Honorable Ed. L. Mechem, Governor
Honorable E. S. Walker, Land Commissioner
Honorable R. R. Spurrier, Director, OCC

STATE OF NEW MEXICO)
ss
COUNTY OF BERNALILLO)

I HEREBY CERTIFY That the within transcript of proceedings before the Oil Conservation Commission is a true record of the same to the best of my knowledge, skill, and ability.

DONE at Albuquerque, N. M., this 20th day of June, 1953.

E. E. Greeson
E. E. Greeson
Notary - Reporter

My Comm. Exp. August 4, 1956

NOTARY PUBLIC BERNALILLO COUNTY E. GREESON

COM. SPURRIER: We will move on to Case 377.

(Mr. Graham reads the advertisement.)

MR. REID: Justin Reid, appearing for Benson & Montin.

Benson & Montin would like to report to the Commission at this time that their development program as to this area is going ahead according to schedule; that the offset drilling on the southern edge of the area affected by this Order has been completed, with the exception of a small portion in the southeast corner. As to that Benson & Montin have arranged for including additional acreage in their unit, which has been drilled to 160 acres. And that an extension of the unit is now awaiting approval by the federal authorities. It should be forthcoming very shortly, if it has not been already approved.

In addition, their coring program for the area is not complete.

For these reasons they would like to request this case be continued until the August hearing.

COM. SPURRIER: Is there objection to counsel's motion? If not, we will continue the Case 377 to the regular August hearing.

The next case on the docket is Case 497.

------O-------

BEFORE THE
OIL CONSERVATION COMMISSION
STATE OF NEW MEXICO

CASE 377:

Under terms of Order R-172 the Commission requested that Benson & Montin appear at this hearing to show cause why a 160-acre spacing pattern should not be instituted for Pictured Cliff wells in the Gallegos Unit Area, San Juan County, New Mexico, to supersede the 320-acre spacing granted for a one-year period after original hearing.

TRANSCRIPT OF HEARING

June 16, 1953
Date

BEFORE: Honorable Ed. L. Mechem, Governor
Honorable E. S. Walker, Land Commissioner
Honorable R. R. Spurrier, Director, OCC

STATE OF NEW MEXICO)
ss
COUNTY OF BERNALILLO)

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E. E. Greeson
Notary - Reporter

My Comm. Exp.
August 4, 1956

NOTARY PUBLIC BERNALILLO COUNTY N. M. E. GREESON

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The next case on the docket is Case 497.

------O-------

BEFORE THE
OIL CONSERVATION COMMISSION
STATE OF NEW MEXICO

CASE 377: (Continuation.) Under the terms of Order R-172, the Oil Conservation Commission requested that Benson & Montin appear to show cause why a 160-acre spacing pattern should not be instituted for Pictured Cliffs wells in the Gallegos Unit Area, San Juan County, New Mexico to supersede the 320-acre spacing (temporary) granted for one year.

TRANSCRIPT OF HEARING

August 20, 1953

BEFORE: Honorable Ed. L. Mechem, Governor
Honorable E. S. Walker, Land Commissioner
Honorable R. R. Spurrier, Director, OCC

STATE OF NEW MEXICO)
) ss.
COUNTY OF LOS ALAMOS)

I hereby certify that the within transcript of proceedings before the Oil Conservation Commission is a true record of the same to the best of my knowledge, skill and ability.

TRANSCRIBED at Los Alamos, New Mexico this 21st day of August, 1953.

Audrey M. Henrickson
Notary Public

My Commission Expires September 22, 1953.

NEW MEXICO OIL CONSERVATION COMMISSION

Regular Hearing

9:00 a.m., August 20, 1953

MR. REED: Justin Reed, appearing for the Respondents, Benson and Montin. Benson and Montin appear today with a motion to continue this hearing for thirty days to the regular September hearing.

The Commission may recall that when this case was originally set two months ago, we asked for a sixty day extension at that time stating to the Commission that the reason that it was necessary was that certain coring tests which were then being conducted in the area had not been finally completed and in addition, the approval of the United States Geodetical Survey and the Department of the Interior.

On the inclusion of certain wells and acreage to the south of the unit area within the unit, these had not been finally approved. Since that time, efforts have gone ahead to accomplish those two things but we are not in a position to present information to the Commission at this time; because of difficulties encountered in this coring program and because it has been impossible to get final action from Washington on the inclusion of this additional acreage, it is impossible now to present to the Commission the full picture which Benson and Montin had hoped to present.

In addition, there are other reasons at this time why we ask for the continuance. There have been a series of interference tests being conducted on certain wells within the area. Four of these interference tests are completed. A fifth one is now in process

of being completed and will be completed before the September hearing. We feel that the information which these tests will show is of vital importance to the Commission in determining this matter.

Another point for the postponement is that the state testing to determine deliverability will be conducted at the end of this month and the information acquired from that testing would certainly be relevant to this hearing and would be important to have before the Commission.

In addition, our client intends to file application for a permanent 320-acre spacing order as distinguished from this order to show cause and would like to have the hearing on that application consolidated with the hearing on this order to show cause, and this application will be filed in time to be published for the September hearing.

For these reasons, Benson and Montin feel that it is necessary that the hearing be postponed until September in order that the Commission can have full facts before it in determining the question.

MR. SPURRIER: Is there anyone else to be heard?

MR. KELLAHIN: Jason Kellahin speaking for the Brookhaven Oil Company of Albuquerque who have acreage within the unit.

We wish to oppose the motion for continuance on the following grounds: In the first place, the order setting up the temporary 320 acre spacing was adopted in July, 1952. It was a temporary order and I think it is fair to assume that it was granted by the Commission with the view of allowing sufficient time to gather the information which counsel has just referred to as being available next month.

There has been already a continuance of this case from the June hearing to the present and while he says that the coring tests have not been completed, it seems to us that there has been ample time to have completed those during the past year and sixty days.

With reference to the land to be included to the south, it does not seem to us as material to the issue involved which is the merit of the 320-acre spacing in a portion of a pool.

The interference tests again, it seems to us, could have been made sometime ago and the operator has apparently been derelict in completing those tests.

The application for a permanent order, referred to, in regard to 320-acre spacing again I think it is fair to assume that that was the purpose of the temporary order in the first place to allow them to gather that information and they should be prepared at this time to present it.

MR. SMITH: J. K. Smith, Stanolind Oil and Gas Company.

We would like to join with Benson and Montin's application for continuance for one month and I think that with just a month's time, it will probably afford the Commission an opportunity to acquire more information based upon the statement made by Mr. Reed.

MR. SPURRIER: Benson and Montin's motion in this case, 377, will be granted and the case will be heard at the regular September hearing.

MR. KELLAHIN: If the Commission please, I would like to suggest that Benson and Montin will by then have had sufficient time

present bottom hole pressures on these wells, - - - or at least representative bottom hole pressures.

MR. REED: If the Commission please, the information that can be furnished is the regular shut-in pressure that will be obtained in this August test that the state will be making. Isn't that correct, Mr. Macey? Won't that be furnished?

MR. MACEY: Yes.

MR. REED: That information will be available at the Commission office, I understand.

MR. SPURRIER: The next case on the docket is Case 391.

BEFORE THE

OIL CONSERVATION COMMISSION

STATE OF NEW MEXICO

TRANSCRIPT OF PROCEEDINGS

CASES NO. 363 & 377

June 19, 1952

E. E. GREESON
ADA DEARNLEY
COURT REPORTERS
BOX 1303
PHONES 5-9422 AND 5-9546
ALBUQUERQUE, NEW MEXICO

BEFORE THE
OIL CONSERVATION COMMISSION
STATE OF NEW MEXICO
Santa Fe, New Mexico.
June 19, 1952.

IN THE MATTER OF:

Case 363: (NW Nomenclature) Consideration of Sub-section (c) of this case was postponed to June 19 upon request of Benson & Montin in order that additional data might be compiled regarding the West Kutz-Pictured Cliffs Pool.

Case 377: Benson & Montin's application for an order establishing uniform 320-acre spacing of gas wells drilled to the Pictured Cliffs formation of the Gallegos Unit Area and adjacent lands in Twps. 28 and 29 N, Rge. 12 and 13 W, San Juan County, New Mexico.

Cases No. 363 & 377 Consolidated

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TRANSCRIPT OF HEARING

MR. SPURRIER: Cases 363 and 377.

MR. REED: If the Commission please, Seth and Montgomery, Mr. Oliver Seth and Mr. Justin Reed appearing on behalf of Benson and Montin, the Applicant in Case 377.

I wanted to make a brief statement of the case to the Commission, since it does involve some possibility of misconception. First, the applicant is here concerned only with the lands embraced within the Gallegos Canyon Unit Area and lands adjacent

to it on the Northwest, which have been included in the application. The applicant doesn't intend, by this hearing, to effect or be effected by any other spacing determination in any other pool. Although certain references may be made to the Fulcher-Kutz Pool, these will be only for purposes of illustration and comparison. There is no intention to draw any support from, or to detract from, any determination that has been made for these other pools.

We feel that our case is one that is sufficiently strong to stand on its own feet and support 320-acre spacing for this portion of the common source of supply of gas wells in the Picture Cliffs Formation. First of all, we expect to be able to show that the lands covered by the application, together with the present West Kutz Pool which has recently been established, embrace a common source of supply of gas in the Pictured Cliffs formation and that this source of supply is a separate pool from the Fulcher-Kutz Pool. This actually removes any conflict between Case 377 and Case 363 C. However, in order to avoid any difficulty and any misconception, we have protested 363 C up to this point, because we felt it would be wisest, from the Commissions standpoint, to consider the cases together.

Second, we expect to show that there are compelling reasons for having 320-acre spacing in the portion of this common source of supply covered by the application. First, because one well will effectively and economically drain 320 acres, and second,

because any denser drilling would be economically unfeasible and would result in waste. Third, we hope to show that although the Southern portion of this common source of supply, and that is the present West Kutz Pool, has been developed on 160-acre spacing that it is convenient and practical to break the spacing in this common source of supply along the Southern line of the Gallegos Canyon Unit, and to have 320-acre spacing in the Northwestern portion of the Pool. We will show that in order to insure uniform spacing and to protect correlative rights, that the well should be located on the Southwest and Northeast quarters of the governmental sections, with only such exemptions as are necessary for existing wells and future wells on good cause shown and whatever offsets may be necessary.

I would like to call Mr. Greer now as a witness.

ALBERT R. GREER,

having been first duly sworn, testified as follows:

DIRECT EXAMINATION

By MR. REED:

Q State your name, please.

A Albert R. Greer.

Q Mr. Greer, would you state briefly your qualifications as an expert in this case?

A I was graduated from New Mexico School of Mines in 1943.

MR. SPURRIER: Mr. Greer, weren't you qualified before this Commission before?

A I have testified before.

MR. SPURRIER: His qualifications are accepted.

Q Have you had considerable experience in making reservoir engineering studies?

A Yes, I have. Part of my experience was spent with Anderson Prichard Oil Corporation, a period of about three years, two years of which I did almost exclusively reservoir engineering work.

Q What is your present position?

A At present, I am employed by Benson and Montin as Field Superintendent for their operations in the San Juan Basin.

Q Does Benson and Montin own acreage within the Gallegos Canyon Unit Area?

A Benson and Montin owns a substantial part of the acreage within the unit and a few thousand acres outside the unit.

Q That is covered by this application?

A Which is covered by this application.

Q They are the operators for the Gallegos Canyon Unit?

A Benson and Montin are the operators for the Gallegos Canyon unit.

Q Have you made a reservoir engineering study of this reservoir lying under the lands covered by the application?

A I have made a very careful and detailed study of this particular reservoir. In fact when we initially set up our program of exploration in this area, we went to great pains to

make it possible to obtain all reservoir information that was, that could practicably be obtained.

Q What was the purpose for doing that?

A Our initial purpose in wanting this unusually large amount of reservoir information was in order to support a pipe line into our area, which at that time we were quite concerned with, because the present demand for gas in the San Juan Basin did not exist and we were, or we felt that it would be necessary to support a rather large reserve in order to bring the pipe line into the unit.

Q Over what period of time has this study been made?

A The study itself commenced when we began drilling wells, in August of 1951.

Q Mr. Greer, have you prepared a paper showing the lands covered by the application and the present West Kutz Pool and the Fulcher Kutz Pool?

A I have.

(Exhibit No. 1 marked, for identification.)

Q I hand you Exhibit 1 in the Case and ask you if that is the map that you prepared?

A This is a map that I prepared covering the Gallegos Canyon Area and the adjoining fields.

Q Would you explain to the Commission what this map covers and what the colored designations are, Mr. Greer?

A I set out on this map the Kutz Canyon-Fulcher Basin Field approximately as defined by the Commissions present orders, also the West Kutz Field.

Q The Fulcher Kutz is colored in brown?

A The Fulcher Kutz is colored in brown. The West Kutz Field we have colored in green and is about as the Commissions orders now have it defined, plus two additional sections we have colored in to bring this area up to join the unit boundary. Then we have colored the Gallegos Canyon Unit Area in yellow and an area to the Northwest of the Gallegos Canyon Unit which is covered by this application is colored in blue.

Q The lands covered by the application are the lands designated in yellow and blue on the map?

A That is correct.

Q In your opinion, Mr. Greer, do the lands covered by this application embrace a common source of supply of gas in the Pictured Cliffs Formation with the lands in the West Kutz Field designated green?

A From my study of the area, I have determined that the area colored in green and in yellow and probably in blue cover one common source of supply.

Q In your opinion, is this common source of supply separate from that of the Fulcher Kutz Pool which is colored in brown?

A It is definitely a separate source of supply from the old original Kutz Canyon Basin Field.

Q What is the basis for that opinion?

A We have found, in the drilling of wells between the Gallegos Canyon Area and the Kutz Canyon-Fulcher Basin Area, that there exists a belt of low permeability sands which effectively separate these two pools. From core analysis and electric log information and productivity of the wells drilled within this belt, which we have cross hatched, we can definitely say that this zone contains sand that carries a high connate water content, a considerably lower permeability than in either Kutz Canyon or Fulcher Basin, and as such has effectively prevented the equalization of pressures between the two pools over these millions of years in which there has been adequate time for pressures to equalize.

Q If there had been communication, you mean?

A If the communication had been adequate it certainly, the two pools certainly would have had an equalized pressure when they were initially discovered.

Q There is no reason to expect that pressures will equalize in the next few years, then?

A We feel that if the pressure,- let me change that. We feel that if the communication has been so poor that pressures did not equalize within one hundred pounds over a period of millions of years, that the communication will still be so poor over the next 20 or 30 years that there will not be drainage between , or from, one pool to the other.

Q There are certain dry holes along the fringes of that low permeable sand?

A Yes, there are several dry holes that have been drilled which confirm our thinking in this respect. These wells are Potash No. 2 Pipkin in Section 35, 28 North, 11 West. Another well is Frontier No. 10 Bolack in Section 427 North, 11 West. Another is Benson-Montin No. 2 Gallegos Canyon Unit in Section 35, in 29 North, 12 West. Another is Birfros No. 1 Mattix in Section 24, 30 North and 13 West. Another is Western Natural No. 1 Bolack in Section 2 in 27 North and 11 West. Another is Wichinger No. 1 Crawford in Section 31 in 29 North and 11 West.

Each of these wells in which production was attempted by setting casing and ordinary completion methods, found very little, if any, gas, and if the wells were shot, they produced a substantial amount of water. The water, of course, being the high almost immobile interstitial water which we normally find in sands of extremely low permeability.

MR. REED: I would like to introduce Applicant's Exhibit No. 1 in evidence at this time.

MR. SPURRIER: Without objection it will be received.

(Applicant's Exhibit No. 1 received in evidence.)

Q Did you have something further on that?

A Yes, I have a little more information. In regard to the pressure data to which I referred, which establishes definitely that we have two different sources of supply, the initial

pressure in the Kutz Canyon-Fulcher Basin Field was on the order of 575 to 580 pounds. That pressure existed over a distance of about 15 miles in which the pressures were equalized within just a few pounds. We have found the same situation in Gallegos Canyon-West Kutz Area, in which over approximately the same distance of about 15 miles, pressures have equalized within just a few pounds or 465 to 468 pounds. The only variation from this pressure, which we have found in each of the wells, is that as we approach these belts of low permeability there appears to exist a sort of transition in which the pressure commences its increase across the impermeable barrier from one source of supply to the other. We feel that the same will probably be found true in the Southeast part of Kutz Canyon Field.

Q So there has been pressure equalization in the two pools from Northwest to Southeast, but no pressure equalization between the two pools from Southeast to Northwest, which is the shorter distance than the overall length?

A A pressure equalization of a few pounds, say, over a distance of 15 miles and yet a difference in pressure of 100 pounds or closer to 120 pounds over a distance of only one or two miles across this impermeable barrier.

Q Mr. Greer, to your knowledge, has there ever been any testimony presented to the Commission in any other case relating to the spacing of gas wells in the Pictured Cliffs formation in the lands covered by the application, either the West Kutz or

Gallegos Canyon Area?

A To my knowledge there has been no evidence presented in support of any spacing pattern in this common source of supply for which our application covers part.

Q How many gas wells have been drilled to the Pictured Cliffs Sands in this area?

A We have drilled 7 wells within the Gallegos Canyon Unit. In the West Kutz Field there has been approximately --

Q (Interrupting) I am referring only to the land covered by the application. Have there been any other companies that have drilled wells in that area?

A Bay Petroleum Company, Corporation has drilled a well in Section 26 in 19 North and 13 West.

Q Are those wells located as indicated in the application, which we have filed a copy of, which I show you?

A Yes, and there is one other well, Lot No. 1 Graham, one mile North of the Bay well, which I believe has been completed this last week.

Q What is the status of these wells as to their production?

A Three of the wells within the Gallegos Canyon Unit are producing. Two of the wells completed in the Pictured Cliffs are shut in, waiting on pipeline. Bay's well is shut in, waiting on pipeline, and Lot No. 1 Graham is either abandoned or temporarily abandoned in the Pictured Cliffs, I believe they are attempting to complete it in the Fruitland.

Q Of these wells how many have been cored?

A Of the seven wells which Benson and Montin drilled, in the Gallegos Canyon unit to the Pictured Cliffs Sand, five of them were cored. We had excellent recoveries on the whole and as a result we have an unusually large amount of core information covering the Gallegos Canyon Unit.

Q Could you state to the Commission which of the wells listed in the application were the ones that were cored?

A Benson and Montin Number 2, Gallegos Canyon Unit, Number 3, Number 4, Number 5, and Number 7.

Q Do you have any information as to whether the Bay or the Locke's well have been cored?

A Bay's well was cored. Locke's well was not cored.

Q What type of core analysis was made on the Benson and Montin wells?

A We had two types of core analyses made, both by Core Laboratories of Dallas. The analyses were run in their Farmington Laboratory and in their Worland, Wyoming Laboratory. In each well we took several samples and had what we commonly term, conventional core analyses prepared, and then from all the rest of the core we had special analyses run. I might explain the difference in the conventional analyses and special analyses.

Q Go ahead.

A In conventional analysis, a small sample is taken from the core and run, which small sample is on the order of two or

three inches, whereas, in special analysis the entire core section is analyzed, and of course, gives a better average figure for the characteristics of the core. We have found, and later confirmed with Core Laboratories, that in sands which have a high clay content, such as we have found in this area, that the conventional analyses tends to give an erroneously large porosity. In order to obtain an accurate figure for this porosity we have, therefore, had the special analyses run, which eliminates the error.

In our area the error approximates 4 to 5% of porosity difference. In other words, if the conventional analysis shows 25% porosity the true effective porosity is on the order of 20%.

(Marked Applicant's Exhibit No. 2, for identification.)

Q I hand you Applicant's Exhibit 2 and ask you to state to the Commission what that is?

A Exhibit 2 contains copies of all of the core analyses by the conventional and special analysis method, which were run by Core Laboratories, and which covers Gallegos Canyon Unit wells Nos. 2, 3, 4, 5 and 7.

MR. REED: I offer Exhibit 2 in evidence.

MR. SPURRIER: Without objection it will be received.

(Applicant's Exhibit No. 2 received in evidence.)

Q Has any other production research been run on the wells drilled by Benson and Montin?

A We had Core Laboratories make a special additional study covering characteristics of the Pictured Cliffs Sands, which information is in addition to the regular core analyses.

(Marked Applicant's Exhibit No. 3, for identification.)

Q I hand you Exhibit 3 and ask if that is the report of that additional production research?

A This is a copy of the production research tests made by Core Laboratories, for us, covering these particular wells.

Q What do those tests consist of?

A One of the tests which we were especially interested in was capillary pressure measurements. In order to give us a separate method of estimating the formation of water content in addition to the information shown by the cores, in the last few years work done with capillary pressure measurements of core samples have indicated that on the whole, excellent results can be obtained and that connate water content can be estimated rather closely from these capillary pressure tests.

In addition, we desired to have still another method of estimating the connate water content, so we had Core Laboratories run resistivities of the cores and analyses of the formation water. From the electrical resistivity of the core samples, the resistivity of the connate water and the characteristics shown by the electric logs, we have then a third method, whereby we can estimate the connate water content.

Core Laboratories determined these core resistivities and

water resistivities in order that we might make this calculation. In addition, they went into some detail to explain the conventional core analysis and special core analysis and the reasons why one method is more accurate than the other for the measurement of porosity, which is the special analysis, and also why the conventional analysis is more accurate for the measurement of permeability.

MR. REED: I offer Exhibit No. 3 in evidence.

MR. SPURRIER: Without objection it will be received.

(Applicant's Exhibit No. 3 received in evidence.)

Q Has any temperature and formation water analysis been made for any of the wells?

A For most of the wells we were able to obtain samples of formation water, which we had analyzed and also temperature surveys.

(Marked Applicant's Exhibit No. 4, for identification.)

Q I hand you Applicant's Exhibit 4 and ask you if that shows the results of those analyses?

A Exhibit 4 shows reservoir temperature in each of the wells and sodium chloride content of the formation water as determined by Core Laboratories, and also the chloride content of the formation water as determined by Core Laboratories.

MR. REED: I offer Applicant's Exhibit 4 in evidence.

MR. SPURRIER: Without objection it will be received.

(Applicant's Exhibit No. 4 received in evidence.)

Q Has any electrical log surveys been made on any of the wells?

A We ran electrical log surveys on four of the wells completed in the Pictured Cliffs Sands.

(Marked Applicant's Exhibit No. 5, for identification.)

Q I hand you Exhibit 5, and ask you if that is a copy of those logs?

A Exhibit 5 is a copy of electrical logs run through the Pictured Cliffs formation on Gallegos Canyon Unit Wells No. 3, 4, 5 and 7.

Q Would you explain to the Commission what the attached paper is on each of those logs?

A We have taken the information determined in the laboratory as to formation, resistivity of the core samples and the resistivity of the formation water and then from the electrical log we can determine the resistivity of the formation as measured in the well, and from these factors, we can estimate the connate water content.

This method of calculation was initially developed by Mr. Archie of the Shell Oil Company, and has received increasing acceptance over the last few years as an excellent method of estimating the connate water content where it is possible to obtain information as to the resistivity of the formation water

and resistivity of the formation itself. We have these figures from Core Laboratories analyses and, therefore, feel that we have reasonably accurate methods of estimating the connate water.

MR. REED: Offer Exhibit 5 -- Go ahead.

A (Interrupting) I would like to point out in particular Gallegos Canyon Unit No. 5, in which it is evidenced that there is a marked change in the resistivity characteristics between the upper and lower parts of the sand. In this particular well we found about 80 or 90 feet of Pictured Cliffs sand. All of this sand showed porosity and might have been interpreted to be productive. However, from this electrical log we can determine that the connate water contents in the upper part of the sand is only about 50%. We calculate 49.6%, whereas in the bottom of the sand the formation water content from our electrical log calculations would be approximately 81%, which is too high connate water content to allow commercial production. That section, if it produced anything, would probably produce just water. In the completion of this well, we plugged off this lower section, which is interpreted to be water production. A similar calculation was made for No. 7, showing the difference in connate water content of 34% in the upper part of the sand and 78.8 percent in the bottom part. Incidentally, on No. 7 it is quite apparent from this electrical log and the connate water content information that, although we had about 100 feet of Pictured Cliffs sand, only about 30 feet of it is gas productive.

I should point out one more thing, and that is, in running the electric logs we had micro-logs run which confirms the core analyses and confirms our other estimates of net pay thickness, as distinguished by the micro-log.

MR. REED: I would like to offer Exhibit 5 in evidence.

MR. SPURRIER: Without objection it will be received.

(Applicant's Exhibit No. 5 received in evidence.)

MR. SPURRIER: Let's take a five minute break.

(Recess)

MR. SPURRIER: You may proceed, Mr. Greer.

(Marked Applicant's Exhibit No. 6, for identification.)

Q I hand you Applicant's Exhibit 6. Would you state what that is, please?

A Exhibit No. 6 shows a comparison of electrical log data with a gas increase log of two wells which were drilled quite close together. This information gave us a method of confirming our calculations made by electrical log data.

Q How were these tests made?

A The well on the left hand side of the exhibit is Benson Montin No. 8, which was drilled through the Pictured Cliffs sand, and completed in the Dakato formation. We then drilled a well to the Pictured Cliffs Sand about 300 feet from No. 8. Those wells then are quite close together and we feel that the sand characteristics are probably nearly identical in one well as

compared to the other. We have shown by the green coloring the total thickness of the Pictured Cliffs Sand in this particular well, which is approximately 115 feet. The part of the sand that we calculated to be productive is colored in yellow. This we would determine from our electrical log analysis and just in general, I would like to point out that this well was drilled with clear water, and this water was on the Pictured Cliffs formation for several weeks, while the well was drilled all the way to the Dakato sand. For that reason, there has been some invasion of fresh water into the sand and has, therefore, influenced the exact amount of the resistivity of the formation. But in general the characteristics of the resistivity are quite different from the upper part of the sand, as compared with the lower part.

In confirming this calculation, when we drilled well No. 6, which is shown on the right hand side of this exhibit, we measured the increase in gas production as we drilled the sand. In order to do this we set pipe on top of the Pictured Cliffs sand, I say on top, it was about 5 feet into the sand, moved the rotary off and drilled a well in with cable tools. Every few feet we would shut down and measure the amount of gas. By the amount of increase as we penetrated the formation, we were able to tell how long we encountered productive sand. This distance is shown by the red coloring and it can be seen after about 30 feet of penetration below the pipe the gas quit increasing.

It happened at that particular point that one of the, because of difficulties with the rig, it was shut down for 40 hours. When we resumed drilling we made a bailing test to determine how much water had filled up in the hole at the end of the 40 hours, and we found the bailer perfectly dry. There was not a drop of water being produced when our total depth was about 1466. We drilled a few more feet and found no increase in gas production, and then, at about a depth of approximately 1475 to 80 we shut down for another 12 hour bailing test to be sure that we had not picked up any water, but at this point we found that the well had commenced to make water and we made a test at that time, in order to determine the amount, which as I recall was approximately 2 gallons an hour.

This we consider to be positive evidence that we had passed through the productive part of the sand. Just the fact that the gas failed to increase, of course, we might consider negative evidence, but the factthat we picked up water definitely confirms the fact that we had drilled through the gas pay and went into non-productive formation. Therefore, although there is 115 feet of Pictured Cliffs sand which is porous in this particular area, we are convinced that there is only about 40 feet of productive sand.

MR. REED: I offer Applicant's Exhibit No. 6 in evidence.

MR. SPURRIER: Without objection it will be received.

(Applicant's Exhibit No. 6 received in evidence.)

(Marked Applicant's Exhibit No. 7, for identification.)

Q I hand you Exhibit 7 and ask you to state what that is?

A Exhibit 7 is a similar type of gas increase log which was made for Well No. 1. We had initially proposed to core this well and have similar information on it, as our other wells as were cored, but the Farmington sand blew out at about 500 feet, and it was necessary to carry heavy mud, and because of that we gave up our plan to core the well and set pipe on top of the sand and drilled it in with cable tools, and in so doing, we were able to determine the rate of increase in gas production as we drilled this well.

Q What does that show in comparison to the other well that was drilled with cable tools?

A This shows that in this particulat well we had approximately 15 feet of productive sand below the casing and there was possibly four or five feet of sand above the shoe, which gives us about 20 feet of sand in this particular well. This was our first well in the area. It has been customary practice throughout both Kutz Canyon-Fulcher Basin and the West Kutz area, as it had been developed at that time to drill the entire section of Pictured Cliffs formation and shoot it in, completing the well. We followed this standard practice on this particular well, although we felt that the section which we could shoot, which would be from around ten feet below the pipe, would probably be the section that was not productive. We, therefore,

tested this well for two or three days after shot in order to see if the increase in gas production as a result of the shot would hold up. It did not. In our mind, in my mind this shows that the lower section, since it did not increase after the shot, is not gas productive. The only production that we can expect from this particular well must come from the upper 15 or 20 feet of sand, which was too close to the pipe to effectively shoot it.

MR. REED: I offer Exhibit No. 7 in evidence.

MR. SPURRIER: Without objection it will be received.

(Applicant's Exhibit No. 7 received in evidence.)

(Marked Applicant's Exhibit No. 8, for identification.)

Q I hand you Applicant's Exhibit 8 and ask you to state what that is?

A Exhibit 8 is a summary of our calculation of connate water content. As I indicated before, we estimated the connate water content from three separate and distinct methods. One of them was from a special core analysis, another was from electrical log data plus resistivity measurement of the sand and formation water, and the third method was by capillary pressure measurements.

We would like to point out that in estimating the connate water by special core analysis, that the total waters measured by Core Laboratories showed a content in excess of 60 percent. We felt that there was a possibility that in coring this particular

sand with its high shale content, that it might have picked up some filtrate from the drilling mud, which would give us a higher water content than actually existed in the formation. Core Laboratories has done a lot of work in estimating or in calculating the true formation water content from the total amount of water which they measure in their laboratories. This has been determined from quite a lot of experience, which they have had, with a number of sands in the past.

They have pointed out, however, that with shaley sands, that their method might not be as accurate as is ordinarily found for sands that are relatively clean. We have deviated a little from a conservative standpoint, which we think, engineers should be conservative in estimating the considerably lower connate water content than is indicated by the core analyses themselves.

We have estimated that by calculating how much the formation water in the cores was diluted as a result of the mud filtrate entering the core while the well was cored. As an example of how we calculated that, we know the formation water to have a chloride content on the order of 34,000 parts per million. This we determined by actually measuring some of the water produced from the wells. In analyzing the core, Core Laboratory ran chlorides for us throughout the section cored, from individual samples of the cores. The chloride content shown by their calculations was approximately 20,000 parts per

million on two of the wells, and around 28,000 parts per million on another of the wells. We, therefore, reduced the total water shown by the Core Lab. analysis by the ratio of 20,000 to 34,000 or, 28,000 to 34,000, whichever the case might be, in order to arrive at total water content within the core sample corrected for this filtration of water from our mud. We feel that gives a minimum water content that we can possibly estimate from the core analyses. The summary of that is about 50.3% as an average from four of the wells.

Our electric log data showed an average connate water content of 46.6%. The separate capillary pressure showed connate of 53.6. The average of these three is 50.1% connate water content. The overall averages all agree within a few percent. We feel that we have a very reasonable figure for connate water from these particular wells, as a result of this rather extensive research work we have done.

MR. REED: I offer Exhibit 8 in evidence.

MR. SPURRIER: Without objection it will be received.

MR. REED: Our next item is a general summary and conclusion of some of the reservoir characteristics. It would probably take sometime to present it completely. I wonder if it would be helpful to break now and meet earlier this afternoon.

MR. SPURRIER: We will recess until 1:30.

(NOON RECESS)

AFTERNOON SESSION

MR. SPURRIER: The meeting will come to order, please. Mr. Greer.

DIRECT EXAMINATION
(Continued)

By MR. REED:

Q You are the same Mr. Greer that testified this morning?

A Yes, sir.

Q Mr. Greer, as a result of the study that has been made in the data that has been compiled, concerning the reservoir under the lands involved in the application, what are your conclusions as to the porosity, permeability, connate water and thickness of the pay, and other reservoir characteristics?

A We have summarized most of the reservoir characteristics and have set them out on an Exhibit.

(Marked Applicant's Exhibit No. 9, for identification.)

Q I hand you Exhibit No. 9 and ask you to identify that, and just tell what it shows.

A Exhibit No. 9 shows certain reservoir characteristics which we found from our study of the pay thickness, the porosity, the permeability and the connate water content for the Pictured Cliffs formation in each of these wells that we cored.

Q What are your conclusions as to those characteristics?

A Four of the wells, on four of the wells we have what

we consider excellent information and from those four, we have drawn average values for the reservoir characteristics and those averages are, for net pay thickness-40½ feet, porosity - 18%, connate water - 50.1%. The average permeability was 5.9 millidarcys.

From this information we can determine the total volume of gas in place, per acre foot and also, the recoverable gas to an abandonment pressure we estimate to be 150 pounds. We have also estimated the reserves recoverable to an operating line pressure of 250 pounds. These figures are total gas in place, 137,000 cubic feet per acre foot. Recoverable to 150 pounds, 95.5000 cubic feet per acre foot, and recoverable to 250 pound line pressure, 65,000 cubic feet per acre foot.

Q What is the basis for your estimate of the abandonment pressure?

A We have two ways of making estimates of abandonment pressure. One is that as the reservoir pressure declines the wells productivity decline, and at some point, which we estimate to be around 150 pounds, the productivity of the wells will be so low as to be uneconomic to produce them.

The other factor determining abandonment pressure is that line pressure at which we can lift the water which accumulates in the bottom of the hole, through the tubing and so unload the well as to allow the gas to produce. Now, just what pressure it will take to lift the water through the tubing will vary a

little from one well to another. But it's going to be on an order of 50 to 100 pounds. Therefore, when we operate with a line pressure of, say, 50 pounds or 100 pounds, we may have to shut the well in, let the pressure build up before we can unload the water out of the well. When we reach a point as the pressure declines, that we can't lift the water out of the well, that will define our abandonment pressure.

Q Which you estimate now at 150 --

A (Interrupting) Which we estimate to be on the order of 150 pounds.

Q What is the basis for your figure of 250 pounds line pressure?

A That is approximately the line pressure at which the wells are now being operated. On our particular wells it has varied from around 225 pounds to about 250 pounds.

In the old Fulcher Basin Field, the area farther east from the compressor station, the line pressure has been on the order of 250 to 300 pounds for a period of approximately ten years. We presume at sometime the gas company will lower the line pressure, but we don't know when. In our area we also hope that the operating line pressure will be lowered in time, but we have no definite means of knowing when it will be lowered and, of course, the gas contracts that are written do not set out a definite time at which this pressure will be lowered. So, all that we can do is estimate our recoverable reserves at this time

on the basis of ten years, on the basis of 250 pounds operating line pressure. For that reason we consider 65,000 cubic feet per acre foot a reasonable figure at which to base the payout of the well.

I would like to go a little further with our reserve figuring that the line pressure will eventually be lowered to 150 pounds. We will ultimately recover about 95½ MCF per acre foot, which for 40½ feet of pay is about 3,850,000 cubic feet per acre. That is a, we feel, a quite reliable figure. We have behind it all of our reservoir work, our net pay thickness, porosity and connate water and reservoir pressure, which we can measure quite accurately, and we feel that that figure is more accurate than can ordinarily be obtained in gas fields.

Now, the productivity of the wells that we have now completed indicate a capacity to produce into the line of about 550,000 cubic feet per day, which is on the order of 16,000,000 cubic feet per month. Now, with the reserve of 3,850,000 cubic feet per acre and a productivity into the line of 16,600,000 cubic feet per month, our wells will produce into the line at a rate which will deplete about 4 3/10 acres per month of ultimately recoverable reserves, or about 52 acres per year. That is a, that indicates a relatively high capacity to produce as compared to reserves. That is a figure that we think is important. 52 acres a year initial deliverability into the line, when we talk about 160-acre spacing is almost ridiculous.

Q As the area is drilled up that rate of production will, of course, drop off it, will it not?

A That is true. The closer the spacing, the faster the pressure will drop off, and the faster the rate of production will accordingly drop off.

MR. SPURRIER: Mr. Greer, do you mean 52 acres per well?

A Yes, 52 acres per well, per year.

MR. REED: I would like to offer into evidence at this time, Exhibit No. 9.

MR. SPURRIER: Without objection it will be received.

(Applicant's Exhibit No. 9 received in evidence.)

Q From the study you have made, in your opinion, Mr. Greer, will one well on the acreage covered by the application efficiently and economically drain 320 acres of land over the gas supply in the Pictured Cliffs formation?

A From the work we have done in regard to drainage, we feel that one well will efficiently drain even more than 320 acres. We have work that evidences at least 640 acres efficient drainage per well.

Q Are there any examples in your production history that tend to support this conclusion?

A We have an example in regard to drainage which reflects a decline in pressure for a well drilled in an area after production had been started on offsetting wells.

(Marked Applicant's Exhibit No. 10, for identification.)

Q I hand you Exhibit 10 and ask you if that shows the well and the offset?

A Exhibit No. 10 is a plat of the area showing the unit in the West Kutz Field and colored in yellow on this exhibit is an area on which we have excellent reservoir pressure information, and in which four wells were drilled and completed last year and shut in pressure tests taken on those wells, and then they were tied into the line and commenced producing in January. Then in the month of May, the well indicated by the red circle, which is Hancock No. 11, Hancock in Section 3 and 27 North, 12 West was completed, this well shows a pressure which is approximately 20 pounds less than the initial pressures of the other wells, which were drilled before production was started in this area.

I would like to give you those exact figures. In Section 2, Danube No. 1, Harmon was completed in August of 1951 at initial shut in pressure of 466 pounds. Harmon No. 2 had an initial pressure of 461 pounds. Then in Section 3, Danube Thompson No. 3 had a shut in pressure of 463 pounds. Then in Section 34, in 28 North, 12 West, Benson and Montin No. 4, Gallegos Canyon Unit had initial pressure of 464 pounds. These four wells were drilled on three sides of the Hancock No. 11, and definitely established the initial reservoir pressure in that area.

They are all within one or two pounds of 465 pounds, with the exception of Harmon No. 2, which is off four pounds from that. Those shut in pressures were taken by representative of El Paso Natural Gas Company with a dead weight tester, were witnessed by a representative of the Conservation Commission and myself. The pressure on Hancock No. 11, I took it personally with a dead weight tester and, are as follows:

On May 26th, after shut in nine days, the well showed pressure of 444 pounds. This was a spring gauge 444 pounds.

On June 3rd, after shut in 17 days, it showed 443 pounds on my spring gauge. I assumed from that that the well had probably built up to a maximum and from that point on continued taking pressure tests with a dead weight tester.

On June 7th, after shut in 21 days, the pressure was 446½ pounds.

On June 8th, shut in 22 days, 446½ pounds.

June 11th, shut in 25 days, it was 446½ pounds.

That is a pressure decrease from virgin pressure of about 18 or 20 pounds. This definitely indicates that in the brief period of 4 or 5 months production from offset wells, that the gas under this particular tract had been efficiently drained, and in fact, something on the order of 6 or 7 percent of the reserves have already been produced out from under that tract before the well was completed. We feel that these are representative pressures for that particular well for two reasons. One is the well had a good initial productivity, over a million cubic

feet per day natural. After shot, shows a productivity on the order of 3,000,000 feet. A well with this capacity will ordinarily build up quite rapidly as long as there has not been a lot of production taken from the well. It was open only a short time after shot, approximately two or three days, and for a well of that capacity and under those conditions, we would anticipate a maximum pressure within four or five days. We feel this evidence is conclusive that the offsetting wells drained a distance, approximating, a half mile from each well, which is a total drainage area on the order of 600 acres per well.

MR. REED: We would like to offer Exhibit 10 in evidence.

MR. SPURRIER: Without objection it will be received.

(Applicant's Exhibit No. 10 received in evidence.)

(Marked Applicant's Exhibit No. 11, for identification.)

Q Mr. Greer, I hand you Exhibit 11 and ask you to identify that?

A Exhibit 11 shows the estimated future production rate and cumulative production expressed in terms of income, which we can anticipate from an average well drilled in the Gallegos Canyon Unit on 160-acre spacing. That calculation is based primarily on the information which we have developed in regard to reserves. The accuracy of that calculation will be directly proportional to the accuracy of our reserve estimates, and we feel that they are quite accurate.

Q What does the graph show?

A For one thing, it shows that with wells drilled so close together and with the capacity to produce, which is so high in comparison to the reserves, that the production rate will decline quite rapidly.

Q By so close together, you mean on 160-acre spacing?

A I mean on 160-acres. With an initial deliverability into the line of 5,060 cubic feet per day per well. We would anticipate that the production rate would be down to 3,000 cubic feet per day. At the end of five years it would be on the order of 50,000 cubic feet per day, approximately one-tenth the initial deliverability in the line. At the end of ten years the cumulative income for one well would be about 22 or 3 thousand. It costs approximately $17,000.00 per well to drill and complete wells in this area. We anticipate in operating cost a minimum of $25.00 per well per month, which is $300.00 a year or $3,000.00 in ten years. So, at the end of ten years we would have invested, in an average well, $17,000.00 building and development cost, $3,000.00 operating expenses, for a total of $20,000.00. This does not include the cost of the leases initially. It is quite definite that we cannot economically afford to drill wells under this type of spacing pattern.

I would like to point out that this calculation, that this type of calculation has been developed over a number of years subsequent to the initial back pressure testing, which was in-

augerated by the Bureau of Mines. It has become generally accepted by the industry as a method of projecting production histories of gas wells. We feel quite confident in our predicted production performance as set out on this graph.

I would like to add, that the total factors that we have used in constructing this graph are the reserves, which we have previously gone over, plus back pressure test information. Now, in taking back pressure tests on wells we have two experimental constants that have to be determined for the particular wells. One of them can be determined quite accurately by production into the line. The other constant has been determined over a number of years to be quite consistent for gas wells and varies from a factor of around five or six tenths, up to about one. The theoretical value for that factor would be very nearly one.

In our back pressure tests of wells in this area we have found that factor to be within approximately ten percent of one, and have used a factor of one in making our calculation. We anticipate that the production history will very closely parallel this rate as set out here. There is only one thing that could effect the shape of that production curve, and that would be, if the wells are drilled, say, in one end of the unit, only such that they could drain the entire unit for the distance of the mile or three or four miles, then this production curve would flatten out and the production rate would not drop off so fast. The reason being that the wells would be producing gas from

tracts outlying their own 160-acre units. That sort of thing has happened in the old Kutz-Canyon-Fulcher Basin thing in the past and has caused a great deal of misconception in the productivity of the Pictured Cliffs well.

MR. REED: I would like to offer Exhibit 11 in evidence.

MR. SPURRIER: Without objection it will be received.

(Applicant's Exhibit No. 11 received in evidence.)

Q Mr. Greer, is there any production history in the Fulcher Kutz Basin that does not have these wells that draw from other areas and which might support such a production curve as a matter of experience?

A There is only one area in the entire Fulcher Basin-Kutz Canyon Field that we feel wells have produced gas only from their individual tracts and have not received drainage from outlying areas.

(Marked Applicant's Exhibit No. 12, for identification.)

Q I hand you Exhibit 12 and ask if that shows where the wells are located?

A Exhibit 12 is another plat of this area on which, colored in yellow, is a small area covering a group of wells which have produced gas from under this one particular area, and probably have not drained gas from any other part of the field.

The way we know that to be true is from the development of the field. Initial development in the Kutz-Canyon-Fulcher Basin Field is in the approximate center of the field as it is now

defined. The production was gradually extended to the Southeast from the old Kutz Canyon Field and a discovery well, I believe around 1938, was drilled in the Fulcher Basin Field. From those two points, production was moved out by approximately offset locations in both directions, Northeast and Southwest. In the course of this development, one operator stepped out about two or three miles from nearest production and drilled a well, BMNS No. 1 Waggoner, in this area colored in yellow. That area was immediately drilled up and the area Southeast of it was in field at a rapid drilling rate, such that there was no possibility for this area colored in yellow to drain gas from the old field to the Southeast. Likewise, the limits of the field were determined from the Northwest, which prevented migration into that yellow area.

Now, the average density of development in this particular area, colored in yellow, would approximate 120 or 130 acres per well. There were six wells drilled on one section, two wells drilled on another half section, and then all of these wells had probably been draining part of the section that lies to the Southwest. There is an area that the wells had to produce the gas that underlaid their tracts only, and that is all the gas they could produce. In such a condition we can predict the production performance of wells and would anticipate a curve somewhat similar to the one we have calculated for Gallegos Canyon Unit.

Q You are referring there to Exhibit 11?

A Yes, it would be similar to our Exhibit 11.

MR. REED: I offer Exhibit 12 in evidence.

MR. SPURRIER: Without objection it will be received.

(Applicant's Exhibit No. 12 received in evidence.)

(Marked Applicant's Exhibits Nos. 13 and 14, for identification.)

Q I hand you Exhibit 13 and ask you to state what it shows?

A Exhibit 13 shows the production history of a discovery well in this area colored in yellow, which we have just described. I don't believe I identified that by section. Let's put that into the record. This area colored in yellow covers Section 29, part of Section 30, part of Section 31 and the North half of Section 32 in Township 30 North, Range 12 West, all in the Northwest part of the Fulcher Basin Field.

Exhibit 13 shows the production history of the discovery well in that area. As can be seen from this curve, the scales being the same as our Exhibit No. 11, there is a close similarity in production performance of this discovery well in what we calculate to be the production performance on 160-acre spacing in Gallegos Canyon there.

MR. REED: I offer Exhibit 13 in evidence.

MR. SPURRIER: Without objection it will be received.

(Applicant's Exhibit No. 13 received in evidence.)

Q I hand you Exhibit 14 and ask you to state what that is, please?

A Exhibit 14 shows the average production history of the nine wells in this particular area. We prepared this production history to be certain that the discovery well which we choose as an example, was not an unusual well and that its performance was not comparable to average performance of all the wells. It is apparent, by comparing the two curves, that they are quite similar.

MR. REED: I offer Exhibit 14 in evidence.

MR. SPURRIER: Without objection it will be received.

Q Mr. Greer, did you prepare any projected production history plat for the Gallegos Canyon Unit Area based on 320-acre spacing?

A I have.

(Marked Applicant's Exhibit No. 15, for identification.)

Q I hand you Exhibit 15 and ask you if that is such a plat?

A Exhibit 15 is a production history calculated by me, for 320-acre spacing in the Gallegos Canyon unit.

Q What does it show in comparison with --

A (Interrupting) It shows on 320 acres the rate of production decline will be considerably less and that the cumulative income will be proportionately greater. In this case, at the end of ten years we can anticipate income per well approximating

$41,000.00 or $42,000.00. Slightly more than twice the cost of drilling a well and is, in our opinion, the minimum profit which we can economically drill wells under.

MR. REED: I offer Exhibit 15 in evidence.

MR. SPURRIER: Without objection it will be received.

(Applicant's Exhibit No. 15 received in evidence.)

Q Have you made any comparison between the recoverable gas in place under the sub-lands and that in the Fulcher Kutz Pool?

A I have made a comparison.

(Marked Applicant's Exhibit No. 16, for identification.)

Q I hand you Exhibit 16 and ask you to state what that is?

A Exhibit 16 shows the difference of the comparitive difference in reserves in the West Kutz Gallegos Canyon Area as compared to the Kutz Canyon-Fulcher Basin area, as effected by this difference in reservoir pressure, to which we have previously referred, assuming all the other factors to be the same.

Q What is that difference and the conclusion that you draw from it, Mr. Greer?

A The point that I would like to make here is, that with this difference of 100 pounds or 120 pounds in reservoir pressure that there is a somewhat proportionately less amount of gas in place in the Gallegos Canyon Area than in Kutz Canyon and Fulcher Basin Area. Since we can measure the pressures quite

accurately, we can determine also quite accurately what this comparison is. It is dependent upon simple fundamental engineering facts and is quite accurate.

This shows that the recoverable gas to operating line pressure of 250 pounds is only 61% as much in the Gallegos Canyon Area as in Kutz Canyon-Fulcher Basin, simply because we have a lower initial reservoir pressure. To a final abandonment pressure we have approximately 7% as much recoverable gas for Gallegos Canyon as compared to Kutz Canyon. Now, that is assuming all other factors to be the same.

We have evidence from a previous hearing that the connate water content in Kutz Canyon-Fulcher Basin was estimated to be 20%. We have a reasonably accurate figure of 50% in Gallegos Canyon. That gives us a still lower volume of gas in place in Gallegos Canyon than in the initial field. Now connate water contents are more difficult to determine exactly. We don't know that it was exactly 20% in the old Kutz Canyon-Fulcher Basin Field. We feel it is reasonably close to 50% in our area, but under any method of comparison we definitely have considerably less gas in Gallegos Canyon area than in Kutz Canyon. We anticipate that to be, assuming the same thickness, the same porosity there would be less than half as much gas in Gallegos Canyon as in Kutz Canyon.

Just a word in regard to the other factors which we assumed to be the same. At this previous hearing the porosity in the

Kutz Canyon Area was set out as 20%, whereas we know our porosity to be about 18%, so, if anything we have a lower porosity. The sand thickness was estimated at 40 feet, which is quite close to what we estimate for our Area. So, just in general, there are roughly twice as much recoverable reserves under the same area in Kutz Canyon as under Gallegos Canyon.

MR. REED: I offer Exhibit 16 in evidence.

MR. SPURRIER: Without objection it will be received.

(Applicant's Exhibit No. 16 received in evidence.)

(Marked Applicant's Exhibit No. 17, for identification.)

Q I hand you Exhibit 17 and ask you what that is?

A Before we go into Exhibit 17 I think we might just point out the significance of that difference.

Q What is the conclusion you draw from that?

A Since there is half as much gas in Gallegos Canyon as in Kutz Canyon-Fulcher Basin Field, in order for us to recover the same volume of gas per well as is anticipated in Kutz Canyon we need twice as much acreage assigned to each well.

Q Will you go ahead with Exhibit 17?

A Exhibit 17 shows a cross section made from electrical logs of wells in the Gallegos Canyon Area. These wells are: Gallegos Canyon Unit No. 4, No. 5, and Bay Petroleum No. 1 Federal in Section 27, 29 North, 13 West, which directly offsets the unit on the Northwest.

From our work with electric logs we can predict rather accurately, or we can determine rather accurately, the net pay thickness in each of these wells. It is apparent from this cross section, that the thickness of net pay drops off markedly from the Southeast portion of the Gallegos Canyon Unit to the Northwest part of the unit and into the area Northwest of the unit, which is covered by this application and which we have colored in blue on Exhibit No. 1. In our calculation of economics, we have used 40 feet of net pay as an average throughout the unit. Unless things change considerably from what conditions now appear to be, in the blue area Northwest of the unit there will be much less than 40 feet of net pay, in fact, there will be something on the order of 20 feet. This is indicated by Bay's No. 1 Federal and was also indicated by the gas increase log on our Gallegos Canyon Unit No. 1, which is also in the Northwest area.

It is apparent then, from this cross section, that if 320-acre spacing is necessary, which we feel it definitely is within the unit, that it also is quite necessary in the blue area Northwest of the unit.

MR. REED: I offer Exhibit 17 in evidence.

MR. SPURRIER: Without objection it will be received.

(Applicant's Exhibit No. 17 received in evidence.)

Q Mr. Greer, have you made any estimate as to the waste

that would result from development of this acreage on a spacing pattern denser than one well for each 320 acres?

A I have.

Q What is the result? What is that estimate?

A In the drilling and completion of wells in this area, it is the practice to complete the wells with cable tools. The wells are open to the air blowing gas which is wasted for periods varying from a few days to as much as two weeks, depending on the amount of difficulty in completing the well. Some of these wells will produce, during that time, a considerable volume of gas. Some of them an average of more than a million feet a day, to as high as three and maybe four million feet per day. It is quite possible that on an average, six to ten million cubic feet of gas is wasted in each well, in drilling and completion of it.

This volume of gas which is wasted is, of course, twice as much where you have two wells on 320 acres, than if you just had one well. Six million cubic feet of gas, out of ultimate recovery on the order of six hundred million cubic feet, is approximately 1%. It can be as high as 2% of the total reserves are wasted to the air in the completion of the well, which gas would be saved if we drill the wells on 320-acre spacing.

Q Have you made any estimate of the quantity of critical materials that would be saved as a result of spacing on 320 acres?

A Just in our area alone we are setting up a program to develop, what we are now defining as a participating area which

covers approximately 20,000 acres, and in which we will drill on the order of 75 to 100 wells, depending on how many offsets we have to meet on the 180-acre spacing. We can save the drilling of something like 75 wells in our unit which will result in the saving of over 1,000 tons of steel, which is quite critical at this time.

Q Total area will be approximately twice that?

A Before the entire area, should production continue to the entire limits of the area as covered by this application, it would be approximately twice that or on the order of 2,000 tons of steel saved.

Q Mr. Greer, on what spacing pattern is the Southeast portion of this pool being developed?

A It has been developed on 160-acre spacing.

Q Are there any wells drilled in the Northwest portion, that is the part covered by the application on 160-acre spacing?

A Bay Petroleum Corporation has drilled one well on part of their land in this blue area. I understand that they own the rest of the land in that particular section and can, of course, assign whatever Commission orders, 160 or 320 acres, to that particular well.

Q There is no situation in those lands where there are four wells on a section however?

A No, there are, in fact, there are no other completed producing Pictured Cliff wells in the blue area or capable of

production from the Picture Cliffs.

Q Where, in your opinion, Mr. Greer, is the most convenient and practical point to begin 320-acre spacing in the pool?

A We can very practically change the spacing from 160 acres to 320 acres at the Southeast boundary of the unit.

Q Why is that?

A We are setting up a participating area which covers most, which covers approximately half of the entire unit in this one participating area, will be operated as a single lease. We can, therefore, meet 160-acre offsets on the South boundary of the unit and change the spacing there to 320 acres, and there will be no cross drainage between properties within the unit. There will be no destruction of correlative rights throughout the entire area covered by this application.

Q The unit extends completely across the pool at that point?

A Yes.

Q Is there some acreage within the Gallegos Canyon unit that has not been committed to it?

A There are certain small tracts.

Q Where are the tracts along the Southeastern boundary?

A There are none of the tracts that have been committed along the Southeastern boundary. The unit has been, the unit area has been entirely unitized for three miles North of the Southeastern boundary.

Q Mr. Greer, in order to insure uniform spacing in the area covered by the application, and to protect correlative rights, where would you recommend that the wells be located in each section on 320-acre spacing?

A We have drilled our wells with initial pattern of locating the wells in the Northeast and Southwest parts of the section.

Q Are all the wells, presently located in the area, drilled on that basis?

A No. Bay Petroleum well is located in the Southeast part of the section. However, we would like to be definite in this one point, that we would prefer to see the wells drilled in the Northeast and Southwest parts of the section. However, as long as there are only two wells drilled to a section in the blue area, we would have absolutely no objection to where they were located.

MR. REED: I would like, at this time, to take up a point that has come up since the filing of the application. And that is the point that there has been an application for approval of location of wells in the area covered by the application. I think they are all in the blue area or nearly all in the blue area, and although the Commission may well feel that it wants to take the case under advisement on the merits, we would like to request that, at this time, some expression be made that these pending applications for well locations be postponed,

pending the final disposition of this case. The applications are on the basis of 160-acre spacing up there.

I understand that Bay Petroleum has a statement that they would like to make at this time.

MR. MORAN: Martin Moran, attorney for the Bay Petroleum, and we wish to state that we are in accord with the petition here and the spacing pattern for the Gallegos Unit, and the blue area included outside the unit. However, the point that was brought up at the last, on the pending application for the other wells in the blue area. If they are approved prior to the spacing pattern on the unit in the blue area, we would like to reconsider our approval on the 320-acre pattern.

We don't think though that 160-acre spacing is going to be in accordance with good oil field practice, and the best interest of the industry in this development here and, therefore, we are in accord with the Benson-Montin petition here for this spacing pattern.

MR. REED: Do I understand that they, the Commission postpone giving approval as to these well locations?

MR. MORAN: Yes, I do, until they have decided on whether they are going to grant your petition.

MR. REED: Does the Texas Company have a statement?

MR. RAY: C. J. Ray, representing the Texas Company. Texas Company is participant in the Gallegos Canyon unit and we wish to support the application as presented by Benson and

Montin and wish to concur in their recommendation for spacing and well locations within this unit.

MR. REED: Stanolind?

MR. HILTZ: I am R. G. Hiltz with Stanolind Oil and Gas Company. I think that Stanolind is the large interest hold near Canyon unit and we would like to concur with Benson-Montin in their request for 320-acre spacing and location of wells within the unit.

We believe that the testimony that they have presented is based on sound engineering principal, and that the data they have utilized is a result of laboratory practices that give representative data on the characteristics of the formation, both of which are acceptable widely throughout the industry. As they have demonstrated there would be no significant difference in the ultimate recovery from the area covered by the application, we feel that, as a result, an adoption of 320-acre spacing in the area covered by the applicant will preclude unnecessary expenditures of capital, will be in the best interest of conservation in that it will permit recovery of the maximum amount of gas and will in a sense, prevent some waste, and it will probably protect correlative rights. Therefore, we would like to concur in their application.

MR. REED: I believe that concludes our direct presentation.

MR. GRAHAM: Why did you include the blue area?

A Mainly to make our application effective. There are

a few scattered tracts in the Northwest part of the unit which have not been unitized. We, therefore, do not have complete control of spacing within the unit. If the wells in the blue area are drilled on 160-acres, they would then offset some of the land, as not unitized, inside the unit boundaries and then those tracts, would, of course, would then have one well on 160 acres, and that would spread throughout the unit to the point that our application would be entirely defeated. We would not in effect, have 320-acre spacing. Well, as I pointed out before, if anything, there is considerably less gas in place in the blue area than under the unit and although we don't have any acreage in the blue area, well, we feel that we are definitely helping the operators who do have.

MR. GRAHAM: You contemplate sometime to include the blue area in the unit if they sign up?

A The unit plan provides for enlarging the unit, if, of course, it is agreeable to the people who own the land outside the unit and to the people inside the unit. In other words, wells drilled in the blue area could be brought into the unit, providing the operators wanted to join the unit and the operators in the unit wanted them to come in. That has to have, also, the approval of the United States Geological Survey, the Conservation Commission, and the State Land Office.

MR. GRAHAM: On the 160-acre spacing, what do you estimate the life of the unit to be in years?

A I would like to refer to Exhibit 11 on that. You will note on that Exhibit, that at the end of 7 years, I have shown the production rate and the cumulative production by dash lines rather than solid lines. Now, at that point at the end of 7 years, producing against 250 pound line pressure, the average production is on the order of 25,000 cubic feet per well per day. These wells produce something like two or three barrels, up to five or ten barrels of water a day. And from that depth and line pressures that we operate under, it takes something like two to three thousand cubic feet per barrel to lift that water out of the hole.

Now, that is reasonable gas lifting efficiency, and we feel that our equipment is in order in that respect. Nevertheless, it requires some volume of gas, from 15 to 25 thousand cubic feet per day in some wells, just to lift that water from the hole. When we have reached a production rate on the order of 25 or 30 thousand cubic feet per day, we will have about enough gas to lift the water out of the hole and we will not be able to sell any gas into the pipe line. Somewhere in that length of time, around 7 or 8 years, it would be uneconomical for us to operate wells in the unit.

MR. GRAHAM: You estimate it would be about double the time on 320?

A To get to exactly the same point, it would take exactly, that is to drop to a production rate of around 30,000 cubic feet

per day, it would take exactly twice as long. 14 years instead of 7 years. Now, you will recall that this calculation is dependent on the fact that all the wells would be drilled up rapidly, which we propose to do. If it takes us a year to drill the wells, then this average would be extended one more year, say to eight years rather than seven. At that point then, we would have to either abandon the wells or shut them in until the pipeline company lowered the line pressures.

MR. GRAHAM: Still, the thing that confused me, the blue area outside, with reference to your development program that you have submitted?

A Our participating area comes up, it joins the blue area in one or two spots, I believe. Yes, our participating area goes as far Northwest. We have omitted the two Northwest sections, that is Section 13 and 29 North and 13 West; and Section 23 and 29 North and 13 West. Then, Section 26, within the unit in that same Township joins the blue area and is inside the participating area. The only other place that the participating area touches is on the corner between Sections 14 and 24, but, of course, the participating area can be extended as production is developed. It could go all the way to the unit boundary.

MR. GRAHAM: There is some possibility then of drainage on your theory --

A (Interrupting) No, sir, if we have - You mean offset drainage?

MR. GRAHAM: Yes.

A No, sir. If we developed on a pattern of 320 acres inside the unit and they are developed on a pattern of 320 acres outside the unit, then we anticipate no offset drainage. Of course, if the blue area had 160-acre spacing, and our participating area had 320 acres, there would be offset drainage to the blue area from our unit.

MR. GRAHAM: You insist on including the blue area in such an order?

A Yes, sir, we feel that our application could easily be defeated if the blue area were not included.

MR. MORAN: We would like to have it included too, from the mathematics of the picture and the recovery of the gas from the wells there. We don't believe that 160-acre spacing on the blue area will be commercial.

MR. GRAHAM: We intended to think of these units as the thing.

MR. MORAN: We looked at the blue area and thought they were throwing us in as a buffer. We looked at the figures and, saw they were correct in the petition for 320 acres. We believe this is a logical spacing pattern to follow through there. That is why we are in accord.

MR. GRAHAM: We tend to think of the unit as a unit agreement.

MR. MORAN: We are to, but we feel from the size of the

unit, it doesn't look practical to us, at this time, the undeveloped nature of our land, to commit it to the unit, although it is open and the question is open that we can change our mind and petition to join.

MR. GRAHAM: And just openly, it probably should be in the unit?

MR. MORAN: Yes, sir, we will say that.

MR. GRAHAM: You are not ready to join?

MR. MORAN: If you go along with the common development plan, same as the unit, we see no difference except we retain our operations instead of turning them over to someone else.

MR. SPURRIER: You have no objection to the unit if you can do your own development?

MR. MORAN: We couldn't do it in the unit.

MR. SPURRIER: Does anyone have a question of this witness? The direct examination is over. It is time for cross examination.

MR. TAYLOR: In the good old days of the country store they had two sets of scales. I think most oil men have two sets of scales. I want to know what this was prepared on, buying scales or selling scales? If it is selling scales, we had better give it back to the indians.

MR. GREER: Do you want me to answer that?

MR. SPURRIER: Anyone else have a question or observation?

MR. GRAHAM: May I ask another question? Who holds the

controlling interest in the blue area?

MR. MORAN: I have not seen a lease ownership. We own in the blue area, 1,560 acres there against the unit. That is in Section 27, 28 and 31.

MR. REED: Can you answer that, Mr. Greer?

A I don't have an ownership plat.

MR. MACEY: What sections did you say you have?

MR. MORAN: 600 in 27, all in 28, and 320 in 33, it is not 31.

MR. SPURRIER: Any further questions? Anyone that --

MR. TAYLOR: There is one question. If this proposed spacing was inaugerated and proration was inaugerated up there, how would it work against 320 and 160 spacing on pull from each well?

MR. SPURRIER: That is a good question. The Oil Commission has also set allowables based on acreage and, therefore, the well would get no allowable as such. Consequently, according to our previous theories, you would get as much production from 160 in one case as you would the other. You get twice as much from a well on 320 as you would from a well on 160.

MR. TAYLOR: In other words, on the South side of the unit the wells drilled on 160 acres, on the presently developed area, would only pull half the gas the 320's across the line would pull.

MR. GREER: Might I say something there? We propose to meet the 160 acre wells on the South with 160 acre wells in the unit,

so in that case, if you went along with your proration formula on an acreage basis, then offsetting wells would produce the same volume of gas because they would be on 160-acre spacing.

MR. GRAHAM: And under their own rules?

MR. GREER: Yes.

MR. SPURRIER: Actually the Commission has no formula for gas proration in talking about past history of oil proration. Gas proration is not that simple. Nevertheless --

MR. GRAHAM: (Interrupting) It is in the future isn't it?

MR. SPURRIER: Yes, in the future. Anymore questions? If not the witness may be excused.

(Witness excused.)

MR. SPURRIER: We have, incidentally, a lot of letters which have been sent to us in opposition of this application. We will not take the time to read them because they all substantially state that they are against the application, and there is no expert testimony presented.

MR. REED: We have examined the letters and we have no objection to their appearing in the record.

MR. SPURRIER: Without objection they will appear in the record.

MR. TAYLOR: I would like to make a statement, Mr. Spurrier. I am Lloyd Taylor, one of the blue babies referred to in that Exhibit.

MR. SPURRIER: Thank you.

MR. TAYLOR: My attorney, Mr. Howe, was due to appear here and was detained at Federal Court in Albuquerque, and I just got a wire during the meeting that he was unable to be here. I am not an engineer. I am just an operator and I want to make these statements for the record here.

I would like to present this as an Exhibit 1. That is a copy of an agreement we have signed by about 75 lessors in this blue area that is referred to here. In this agreement, it commits us to the drilling of some 15 wells in this blue area based on 160-acre spacing. That is the problem we are faced with, as operators, to meet our committment with these lessors. I have here the original of the agreement that is with the lessors names signed to the thing. I wouldn't like to leave this as an exhibit, as it is my original copy, but the Commission can see there are 75 lessors involved. That area is cut up in very small tracts, from one acre to ten acres. I think the highest tract is 320 acres. So that is the problem we are confronted with on the 320.

Another thing that we are confronted with, one of the areas that comes within the Gallegos Canyon Unit area referred to by Mr. Greer, we hold the lease and these people are parties to this agreement here, and it overlaps into the Gallegos Canyon unit area. That area, described specifically, is the Northwest quarter and the South half of the South quarter of 23, 29, 13. In order to protect the lessors on that agreement that we had

signed, we have filed a notice of intention to drill, with the Aztec office, and Mr. Greer approved the locations in some of the blue area, but he withheld approval on the 160-acre spacing, or the 1 to 160 that was within the unit pending the action of the Commission on that application.

We would like that clarified some way before the Commission. We want the Benson-Montin operators and the Bay Petroleum operators to know that we have no fight with them or, we would like to get along with everyone, but at the same time we have this agreement to meet and we don't know how we are going to meet it with the 160-acre spacing. That is our problem.

MR. SPURRIER: In other words, in these escrow instructions you have agreed to drill on 160-acre spacing?

MR. TAYLOR: Yes.

MR. GRAHAM: Will Mr. Greer yeild to a question?

MR. GREER: Yes.

MR. GRAHAM: Could the same sort of situation be worked out in the Northwest, around the blue area, as contemplated down here in the green?

MR. GREER: No, sir. That is our problem. If we had 100% unitized land we couldn't. We could meet the 160-acre offsets up there the same as we propose in the South.

MR. GRAHAM: Are those agreements improbable to negotiate?

MR. GREER: We have tried very hard and we can't get all the land. For instance, there is part of it right there.

MR. MORAN: Isn't that agreement that you have subject to Federal and State rules and regulations considering development?

MR. TAYLOR: Yes.

MR. MORAN: If they set up 320 that would cancel the agreement as far as the 160 and throw it to 320 --

MR. TAYLOR: It probably would, but it wouldn't protect us with the guns over there. The way we feel on that, we made the agreement prior to any agreement on 320, we made it in good faith and they made it in good faith. In order for us to keep faith with the lessors we have to make an honest effort to fulfill our contract if the Commission rules against us.

MR. MORAN: I don't believe it would be a question of your good faith. The matter would be taken out of your hands by the State Regulatory Body.

MR. TAYLOR: We have Mr. Dustin.

MR. DUSTIN: The most of these fellows, I have 6 on the petition, leased this land to Benson and Montin or some of the other fellows with the agreement they were to drill on 160 acres. Now they are asking for 320. It started out here, not long ago, at 40-acre spacing. The State finally fixed it at 160, which looks like it was fair to everybody. As for 320, 640, we won't have much left. I would like to leave these petitions here with you fellows to look them over.

MR. TAYLOR: The position we take, we are caught between the devil and the sea. We are mixed up with the agreement with

the land owners and at the same time we want to have horse sense in the development of the area, at the same time, we want to not welch on our agreement.

MR. MORAN: You don't want to drill wells that aren't commercial, do you?

MR. TAYLOR: We just got through doing that.

MR. REED: Mr. Taylor, do you have any information that tends to go against the expert testimony that was presented today, or is your problem just one of the contract?

MR. TAYLOR: We have no geological information assembled whatsoever. Our information is taking into consideration the Northeast, Northwest, Southwest trend of that Fulcher Basin and Kutz Canyon, and I want to complement Mr. Greer on a very comprehensive report. We don't have anything, we don't attempt to repute any information that he gave us, but we are committed under that and we felt that we had to keep faith with those lessors. They are neighbors and we live right along with them.

MR. GRAHAM: Would Bay State object to, say, a unit of some sort covering the blue area?

MR. MORAN: We hadn't even considered that up to this time. We would like to take that under consideration and let you know by letter.

MR. GREER: I don't believe that would solve the problem. If you want 160-acres that is not going to satisfy --

MR. GRAHAM: (Interrupting) You are not afraid of the

correlative rights?

MR. GREER: The correlative rights --

MR. TAYLOR: (Interrupting) Here is another thing I would like to bring up in the blue area that we have there, it is very very difficult to get 320 without having some hold out similar to what you have got in your unit.

MR. GREER: If you think 320 is hard you should have tried 40,000.

MR. TAYLOR: In those small areas there is one fellow with a one acre.

MR. GREER: One fellow with a city lot. There interest in the thing is very small and they are just not interested.

MR. GRAHAM: Is the river bed involved in that?

MR. GREER: The river bed runs through that area.

MR. MORAN: You went on to 320-acre spacing instead of 160 in the blue area. Wouldn't the individual land owners ultimately recover more gas and more proceed from the sale of the gas than they would --

MR. GREER: (Interrupting) Yes, sir, they will receive more gas, just like we will, because the second bunch of wells would not be blowing gas to the air.

MR. GRAHAM: That is time considered?

MR. GREER: It would take a little longer to get it. We figure in the end of ten years we will have recovered only about 93% as much gas from one well on 320 acres as two wells on

320 acres, but that is so close to the same, it is inconsequential.

MR. TAYLOR: Another thing I would like to bring up is the proposed well locations in relation to the sections. I believe you gave the Southwest and Northeast corners of the section?

MR. GREER: Yes.

MR. TAYLOR: If that proposal were carried out in our instance it would prohibit us from drilling our only location that we have in Benson-Montin's unit out there.

MR. GREER: I can tell you how we can get together on that. If you have 320 we can pool it with you.

MR. TAYLOR: We have 240 acres in their unit. It is on the outside of the unit, sort of out on the corner there. It is sort of an orphan anyway.

MR. GRAHAM: Is it committed?

MR. TAYLOR: No.

MR. GRAHAM: What is your drilling obligation on that contract there? Suppose you get a dry hole?

MR. TAYLOR: We have to start another well on another location.

MR. GRAHAM: How often, every six months?

MR. TAYLOR: Every 30 days.

MR. GRAHAM: You are obligated to drill how many?

MR. TAYLOR: 15.

MR. GRAHAM: If the first 14 are dry you can go right ahead?

MR. TAYLOR: We can abandon our program after we drill

three wells, if the three wells are dry, why we are without any further obligation, but we are stuck for three wells. On the second well, the third well we want to drill is in the yellow area, we felt like we had a better chance in ultimate recovery from the three well commitment that we had made there.

MR. GRAHAM: That is in the unit created?

MR. TAYLOR: It is in the unit, but not committed.

MR. REED: I might say, at this time, that in the application we only ask that the location of wells be established for Southwest and Northeast with such exemptions as are necessary for existing wells, and future wells on good cause shown and whatever offset wells are necessary.

MR. GRAHAM: Pending the proration of gas, a well in a unit now drilled by an uncommitted lessee, what position would you take?

MR. GREER: We could, the time that it takes to drill the well, we could go either way. We can join part of the unitized land in a single pooling agreement and drill one well. For instance, they have 240 acres. We could pool 80 acres with their 240 to make one spacing unit. That well would be operated separately from the rest of the unit area. Of course, we prefer to bring them into the unit. If they don't want to we are easy to get along with.

MR. GRAHAM: Would you have any reason to suggest something like that?

MR. TAYLOR: I don't think we have, would have a right to commit in the unit without the lessors consent.

MR. GREER: It would be a normal pooling agreement. You would pool the land into one pooling unit. We would let you operate the well in that case.

MR. TAYLOR: In the instance that you mentioned there, the way you have it outlined you would be running the half section North and South, rather than East and West. That would complicate your pattern.

MR. GREER: That depends on however that is set up. We can pool your 160 with 160, and your 80 with 240 of ours. That part is pretty easy to work out.

MR. DUSTIN: The driller is obligated to drill on 160 in that 240 and he has poolings in that --

MR. TAYLOR: (Interrupting) It so happens in this agreement, the 160 we are discussing is the only 160 that is in a single unit and doesn't have to be pooled. Everything else has to be pooled with someone else's land. All of them are pooled units, with that exception.

MR. SPURRIER: Anyone have any further comments?

MR. GRAHAM: What is your interpretation of Paragraph 5 of that agreement?

MR. TAYLOR: Do you care to read?

MR. GRAHAM: I can't see very good.

MR. TAYLOR: "It is understood and agreed by and between

said lessor that the wells herein above required to be - (Reads from contract) I would like to submit by mail the names of the lessors that are on the agreement, if I may?

MR. SPURRIER: Very well. We will include those in the record without objection. Without objection this will be included in the record, if we haven't already done so. This Exhibit No. 1 of Mr. Taylor.

MR. GREER: And Mr. Dustin's signed petition.

MR. TAYLOR: Do these concur with Mr. Greer, with reference to draining 320 acres with one well?

MR. WHITE: They are not in a position to answer that until they have studied the testimony.

MR. SPURRIER: If no further questions or comments, we will take --

MR. TAYLOR: (Interrupting) There is one more question I would like to ask. In relation to the question brought up about these applications that have been filed in the blue area, permission to drill, we are under obligation to get on at least one of those locations within the next few days.

MR. SPURRIER: We will give you an answer within the next few days.

MR. TAYLOR: So long as the locations fall within the position in the section that Mr. Greer has asked, there wouldn't be any objection to those?

MR. SPURRIER: That is right.

MR. TAYLOR: It is still on 160 acre basis because we don't have authority to ask for anything more.

MR. GREER: If they did go ahead and drill a well, then they could go ahead and assign the rest of their acreage to make it a 320 acre unit. There would not be another unorthidox location.

MR. TAYLOR: What would happen in regard to Mr. Dustin? He has a location that falls within the Southwest quarter of Section 14?

MR. GRAHAM: 29 and 13.

MR. GREER: Do you own anymore acreage in that section?

MR. TAYLOR: Yes, we've got one fellow that is balky and so far hasn't committed his acreage. We are not able to make a 320 committtment on the acreage if the Commission ordered it at the present time.

(Discussion off the record)

MR. SPURRIER: If no further comment, the Case will be taken under advisement and we will get you an answer as soon as we can.

Next Case on the Docket is Case 378.

STATE OF NEW MEXICO)
: SS.
COUNTY OF BERNALILLO)

I HEREBY CERTIFY that the foregoing and attached transcript of proceedings before the Oil Conservation Commission in Cases No. 363 & 377, taken at Santa Fe, New Mexico, June 19, 1952, is a true and correct record to the best of my knowledge, skill and ability.

DATED at Albuquerque, New Mexico, this 27th day of June, 1952.

Ada Dearnley
REPORTER