BEFORE THE

Oil Conservation Commission

SANTA FE, NEW MEXICO

April 18, 1956

IN THE MATTER OF:

CASE NO. 1054

TRANSCRIPT OF PROCEEDINGS

ADA DEARNLEY AND ASSOCIATES

COURT REPORTERS

605 SIMMS BUILDING

TELEPHONE 3-6691

ALBUQUERQUE, NEW MEXICO

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
April 18, 1956

IN THE MATTER OF:

CASE NO. 1054: Application of the Oil Conservation Commission upon its own motion for an order promulgating rules and regulations affecting and concerning the Ballard-Pictured Cliffs Gas Pool, San Juan and Rio Arriba Counties, New Mexico. The matters to be considered in the above-styled case will pertain to gas pool delineation and definition, gas proration, gas well spacing, gas well allowables, gas proration units, and related matters including the possible combination of the Ballard-Pictured Cliffs Gas Pool with other gas pools producing from the Pictured Cliffs Formation.

BEFORE:

Honorable John F. Simms, Jr.
Mr. E. S. (Johnny) Walker,
Mr. A. L. Porter, Jr.

TRANSCRIPT OF PROCEEDINGS

MR. PORTER: We will move on to Case No. 1054.

MR. GURLEY: Application of the Oil Conservation Commission upon its own motion for an order promulgating rules and regulations affecting and concerning the Ballard-Pictured Cliffs Gas Pool, San Juan and Rio Arriba Counties, New Mexico.

MR. PORTER: I might say at the outset of this case that I have received letters from four parties interested in this case, each requesting a continuance, and indicating that their respective companies may be ready with testimony at a later hearing. The request for continuance comes from J. Glenn Turner, Benson-Montin, Southern Union Gas Company and El Paso Natural Gas Company. Are

there any objections to the continuance of this case?

MR. SELINGER: Selinger, Skelly. The Commission recalls these matters, and there is a number of matters covered by 1054, has been the subject matter of a number of hearings beginning with May, 1955, which lasted several days, and through October, 1955, which lasted several days. We feel that the Commission should hear this matter as quickly as possible, mainly because of the confusion in this entire area, and when operators seek permits to drill wells in the socalled critical area of Township 27 North, Range 9 West, they are unable to determine which field their permits are to be in.

The members of the Staff themselves are confused. Furthermore, to make matters still worse, you now have a number of offset wells on an imaginary line which on one side are prorated and on the other side unprorated. We feel that a year's time is wholly adequate for not only Skelly Oil Company to be prepared, but the four parties requesting the continuance, Turner, Benson-Montin, Southern Union and El Paso.

Notwithstanding the fact that the Commission itself -- the Commission Staff -- has been wrestling around with this problem, and I sincerely feel for them in this entire matter, we believe that in view of these circumstances that the Commission should hear this matter. We, ourselves, as a result of the notice published and received for some time, are prepared, we are fully prepared at this time to present it; we feel that the Commission should take this matter and assume jurisdiction right away, because, as I said, this has been pending for over a year, and we urge the Commission to permit this matter to be heard today.

These four letters, although I haven't read them, seem to indicate

a later day for another hearing. We think this, that that later day may also mean May, 1957, and we urge the Commission to assume jurisdiction immediately over this problem.

MR. GRENIER: I feel quite confident that in our case the intention was not May, 1957, but May, 1956; also, this is not a specific matter which has been going on for a year, this is the first time that this particular matter of proration itself has come up for this pool.

The other cases involved, to be sure, matters of delineation between South Blanco, portions of the South Blanco Pool and the Ballard, but the exact question of what the proration pattern should be for this pool was not in issue in those previous cases, and those are the matters which we are now called upon to consider for the first time.

Now, perhaps Mr. Selinger had more advance notice that this case was coming up than we did, I don't know. The first thing we knew about it was when we got this notice; we are not a great big company with a whole lot of technical staff, we can only do so many things at once. We have other things that have kept us from putting everybody that we have in a two-week space onto this problem. By next month we will be ready to go, and I think our situation is fairly typical of some of the others.

Again, this may not be a legally persuasive point, but it is quite obvious that the tecnhical people from Benson-Montin, from ourselves and from Glenn Turner are not here. El Paso may be adequately represented, but it does strike me that for the best results in this case all around, it is desirable that the engineers and geologists of the various companies be able to be here and hear per-

sonally what is put on by way of testimony by the other interested parties' witnesses, and we therefore request, again, a continuance until May in this matter.

It is certainly not our thought, Mr. Selinger, to delay this thing unduly, we want to see it set up and squared away just as firmly and rapidly as you do.

MR. WOODWARD: We, likewise, believe a speedy but sound solution should be found for this area, and we would like to point out that the cause of the hearing is extremely broad and encompasses pool delineation and definition, gas proration, gas well spacing, gas well allowables, gas proration units, and related matters including the possible combination of the Ballard-Pictured Cliffs Gas Pool with other gas pools producing from the Pictured Cliffs Formation.

It is true that various phases of the very large problem have been considered piecemeal, perhaps, in the past, but we would like to point out that this is not an adversary matter -- at least it shouldn't be, and it certainly isn't as far as we are concerned. I think its proper solution depends upon geological and engineering facts, and we feel confident that the Commission wants all worthwhile information that can be presented to it.

Inasmuch as it is not an adversary matter, we do not feel that any particular prejudice results from putting on various engineering and geological facts piecemeal if various interested parties desire to do it; we certainly have no objection to Skelly going forth if they are here and prepared to set forth the facts as they see them or a portion of them, and give the Commission and the Industry a chance to study and understand those facts and add whatever worthwhile

information they can.

In view of the extremely wide scope of the hearing, speaking for El Paso, we simply haven't had time to make the investigations concerning all of the ramifications that are involved in the short period of time when this whole integrated problem has been presented as such.

For that reason, we urge that the Commission leave the door open for additional testimony, or a special hearing called the day after the regular hearing in May, when,as I say, we would have no objection to the presentation of the engineering or geological data upon which a sound determination of this problem can be made.

MR. SELINGER: Might I add just one point? The matter of prorationing in this field, Mr. Grenier, was specifically mentioned by the Commission in its order written in October, 1955. The Commission specifically recognized the fact that the Ballard-Pictured Cliffs should be prorated and so stated in their findings of fact in that order of October, 1955.

MR. PORTER: The Commission has ruled that the case will be continued to the day after the regular May hearing, which will be May 17, 1956.

MR. SELINGER: And I gather from the remarks by Mr. Grenier that they will be prepared on May the 17th to present whatever information they have?

MR. PORTER: May I add that we would like to urge all interested parties who are going to present testimony to be fully prepared at that time. It is a matter which we would like to finish as soon as all the facts are available.

MR. GRENIER: That is the time we have been working on, Mr.

Selinger, and we started to work and had been working on May.

MR. SELINGER: Thank you for your cooperation, Mr. Grenier.

** * **

STATE OF NEW MEXICO)
:ss
COUNTY OF BERNALILLO)

I, THURMAN J. MOODY, Notary Public in and for the County of Bernalillo, State of New Mexico, do hereby certify that the foregoing and attached Transcript of Proceedings before the Oil Conservation Commission for the State of New Mexico was reported by me in stenotype and reduced to typewritten transcript by me, and that the same is a true and correct record to the best of my knowledge, skill and ability.

WITNESS my Hand and Seal, this, the 3rd day of May, 1956, in the City of Albuquerque, County of Bernalillo, State of New Mexico.

Thurman J. Moody
Notary Public

My Commission Expires:
April 3, 1960.

BEFORE THE

Oil Conservation Commission

SANTA FE, NEW MEXICO

IN THE MATTER OF:

CASE NO. 1054

TRANSCRIPT OF PROCEEDINGS

ADA DEARNLEY AND ASSOCIATES

COURT REPORTERS

605 SIMMS BUILDING

TELEPHONE 3-6691

ALBUQUERQUE, NEW MEXICO

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
May 16, 1956

IN THE MATTER OF: Application of the Oil Conservation Commission upon its own motion for an order promulgating rules and regulations affecting and concerning the Ballard-Pictured Cliffs Gas Pool, San Juan and Rio Arriba Counties, New Mexico. The matters to be considered in the above-styled case will pertain to gas pool delineation and definition, gas proration, gas well spacing, gas well allowables, gas proration units, and related matters including the possible combination of the Ballard-Pictured Cliffs gas pool with other gas pools producing from the Pictured Cliffs formation.	Case No. 1054

BEFORE:

Mr. A. L. Porter
Mr. E. S. (Johnny) Walker

TRANSCRIPT OF HEARING

MR. PORTER: The meeting will come to order, please. The case for consideration in this hearing is No. 1054 which was continued from last month's regular hearing.

MR. GURLEY: Case 1054 involves the application of the Oil Conservation Commission upon its own motion for an order promulgating rules and regulations affecting and concerning the Ballard-Pictured Cliffs Gas Pool, San Juan and Rio Arriba Counties, New Mexico. The matters to be considered in the above-styled case will pertain to gas pool delineation and definition, gas proration, gas well spacing, gas well allowables, gas proration units, and related matters including the possible combination of the Ballard-Pictured Cliffs gas pool with other gas pools producing from the Pictured

Cliffs formation.

I would like at this time to move the entry into the record of the letter dated May 12, 1956 from Benson-Montin oil producers and operators and signed by Albert R. Greer, Field Superintendent. I would like to move that it be included as a part of the record and so that the record may show that it was read.

MR. PORTER: Let the record indicate or reflect the letter to which Mr. Gurley refers.

MR. GURLEY: If it please the Commission, in view of the fact that we have received considerable requests from the various operators to continue this case until a later date in order that the operators may give further study to the possibilities involved therein and in order to give the Commission staff ample opportunity to look further into the proper solution, I hereby move the Commission that this case be continued until June 12, 1956 and set at a special hearing.

MR. PORTER: Are there objections to Mr. Gurley's motion? Case 1054 will be continued to nine o'clock A. M., June 12, 1956.

The hearing is adjourned.

C E R T I F I C A T E

STATE OF NEW MEXICO)
: ss
COUNTY OF BERNALILLO)

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

IN WITNESS WHEREOF I have affixed my hand and notarial seal this 22nd day of May, 1956.

Ada Dearnley
Notary Public-Court Reporter

My commission expires:
June 19, 1959.

8-15-56

Emery has one copy of transcript BP

BEFORE THE

Oil Conservation Commission

SANTA FE, NEW MEXICO

June 12, 1956

SPECIAL HEARING

IN THE MATTER OF:

CASE NO. 1078 & 1054 Consolidated

TRANSCRIPT OF PROCEEDINGS

DEARNLEY-MEIER AND ASSOCIATES
COURT REPORTERS
605 SIMMS BUILDING
TELEPHONE 3-6691
ALBUQUERQUE, NEW MEXICO

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BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
June 12, 1956

SPECIAL HEARING

IN THE MATTER OF:

Application of Skelly Oil Company for an order deleting certain acreage from the South Blanco Pictured Cliffs pool, and delineating the west limits of said pool in San Juan County, New Mexico. Applicant, in the above-styled cause, seeks an order deleting all of the presently delineated acreage located in Township 27 North, Range 9 West, from said South Blanco Pictured Cliffs Pool and further delineating the east line of Township 27 North, Range 9 West, San Juan County, New Mexico, as the west limits of said pool. Case 1078

&

Application of the Oil Conservation Commission upon its own motion for an order promulgating rules and regulations affecting and concerning the Ballard-Pictured Cliffs Gas Pool, San Juan and Rio Arriba Counties, New Mexico. The matters to be considered in the above-styled case will pertain to gas pool delineation and definition, gas proration, gas well spacing, gas well allowables, gas proration units, and related matters including the possible combination of the Ballard-Pictured Cliffs gas pool with other gas pools producing from the Pictured Cliffs formation. Case No. 1054 (Consolidated)

BEFORE:

Governor John F. Simms, Chairman
Land Commissioner E. S. Walker, Member
A. L. Porter, Director

REGISTER

NAME	REPRESENTING	LOCATION
George W. Selinger	Skelly Oil Company	Tulsa, Oklahoma

O. Seth	Seth & Montgomery	Santa Fe, N. M.
Elvis Utz	O. C. C.	Santa Fe, N. M.
John R. Gisburns	Skelly Oil Company	Tulsa, Oklahoma
Barton W. Ratliff	Skelly Oil Company	Tulsa, Oklahoma
Emery Arnold	N. M. O. C. C.	Aztec, N. M.
A. R. Kendrick	N. M. O. C. C.	Aztec, N. M.
P. T. McGroth	U. S. G. S.	Farmington, N. M.
John Woodward	El Paso Natural	El Paso, Texas
R. S. Dewey	Humble Oil & Rfg. Co.	Midland, Texas
S. J. Stanley	Benson-Montin-Greer	Farmington, N. M.
William Webb	J. Glenn Turner	Dallas, Texas
J. W. Gurley	O. C. C.	Santa Fe, N. M.
W. W. Mankin	O. C. C.	Santa Fe, N. M.
T. W. Bittrick	El Paso Natural Gas	Farmington, N. M.
R. L. Hamblin	El Paso Natural	El Paso, Texas
L. D. Galloway	El Paso Natural	Farmington, N. M.
D. C. Adams	El Paso Natural	Farmington, N. M.
F. Norman Woodruff	El Paso Natural	El Paso, Texas
A. M. Wiederkehr	Southern Union Gas	Dallas, Texas
A. S. Grenier	Southern Union Gas	Dallas, Texas
A. R. Greer	Benson-Montin	Farmington, N. M.
Foster Morrell	Independent	Roswell, N. M.
Al Greer	Independent	Aztec, N. M.
Robert L. Maddox	Independent	Aztec, N. M.
R. R. Spurrier	Tom Bolack	Santa Fe, N. M.
W. C. Russell	R & G Drilling Co.	Farmington, N. M.
G. W. Marron	Skelly Oil Co.	Tulsa, Oklahoma

TRANSCRIPT OF HEARING

MR. PORTER: The meeting will come to order, please. Cases to be heard this morning are Cases 1054 and 1078. Mr. Gurley, would you read those cases, please?

MR. GURLEY: Case Number 1054, the application of the Oil Conservation Commission upon its own motion for an order promulgating rules and regulations affecting and concerning the Ballard-Pictured Cliffs Gas Pool, San Juan and Rio Arriba Counties, New Mexico.

Case 1078: Application of Skelly Oil Company for an order deleting certain acreage from the South Blanco Pictured Cliffs Pool and delineating the west limits of said pool in San Juan County, New Mexico.

MR. PORTER: Mr. Selinger?

MR. SELINGER: We are interested in Case 1078 as applicant, and Case 1054 as an interested party, and would like to make the request for the consolidation of these two cases for the purpose of taking testimony, and the operators, I believe, will have one witness on both cases.

MR. PORTER: Is there any objection to Mr. Selinger's motion to consolidation?....Let the record show that the cases will be consolidated for the purpose of receiving testimony.

Will the witnesses all come forward in this case, please, to be sworn, at the same time?

(Witnesses sworn by Mr. Walker.)

MR. PORTER: Mr. Greer, would you proceed first?

ALBERT R. GREER,

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

DIRECT EXAMINATION

By MR. WEBB:

Q Would you state your name, please, sir?

A Albert R. Greer.

Q Where do you live, Mr. Greer?

A Farmington, New.Mexico.

MR. WEBB: Will the Commission waive qualification of the witness?

MR. PORTER: Yes, sir.

Q Mr. Greer, are you familiar with the boundaries and the delineation of the Ballard-Pictured Cliffs Formation Gas Pool in San Juan and Rio Arriba Counties, New Mexico?

A Yes, sir.

Q The South Blanco Pictured Cliffs Gas Pool?

A Yes, sir.

Q And the Fulcher Kutz-Pictured Cliffs Formation Gas Pool?

A Yes, sir.

Q I direct your attention to what will be Benson-Montin-Greer Exhibit Number 1, which is attached to the board behind you, copies, reduced copies of which we hand the Commission.

A I think we should make these the exhibits and this the reproduction. Could we have one of these marked as an exhibit?

(Marked Benson-Montin-Greer Exhibit No. 1 for identification.)

Q Will you explain to the Commission the meaning of the

different colors, as indicated on that exhibit?

A We have colored in on this Exhibit Number 1 the different pools, as we will talk about them in this case, around the Ballard Field. Now, the Ballard Field we have colored in yellow, as the field is presently defined. The red hatching with the yellow background indicates the extension to the Ballard Field which we recommend be added at this time.

The solid green color represents the present Fulcher-Kutz Pool, and the hatched green area shows extensions to Fulcher-Kutz, as we recommend them.

The area colored in brown is the main part of the South Blanco Pool, and the area colored in blue is the west part of the South Blanco Pool, and represents a part of the South Blanco Pool which we recommend be separated from it and given a new pool designation.

The four quarter sections colored in red represent the impermeable barrier between the Ballard Pool proper and the part of the South Blanco Pool colored in blue.

Q Mr. Greer, in directing your attention to the blue portion of the map, have you made a study of that area as compared with the area colored in brown? And if so, upon what do you base your recommendations that the same, that the blue portion should be segregated from the brown portion?

A It is apparent that the bulk of the wells in the blue area have pressures which are substantially less than the wells which are in the main part of the South Blanco Pool in the area colored in brown.

Now, we do not have the exact type of pressures which wells

like to have to make a very careful delineation of these two areas. Part of the wells were drilled three years ago and at that time the operators were not aware of the necessity of taking accurate and careful shut-in pressures. It's therefore, a little difficult to draw an exact line at this time, and we would recommend that the areas be kept under consideration and that the operators attempt to gather information which will enable us to make an exact determination of the line separating the blue area from the brown areas as a starting point.

The area that we have now recommended to be taken out of South Blanco appears to be a reasonable one, and the majority of the wells are very definitely producing from a reservoir separate and distinct from the wells set out in the brown area.

Q It is your opinion that pool delineation should then be based upon, from a reservoir from which the particular wells are producing. And how do you determine from what reservoir a particular well is being produced?

A It is necessary, of course, to study all the well information. We have found that the occurrence of production in the Pictured Cliffs can be from different lenses, separate reservoirs within the Pictured Cliffs Formation. And we can trace these lenses and reservoirs partly through study of the formation characteristic itself; the sand characteristic; the electric logs; but primarily we can tell from initial stabilized wellhead pressures, for wells which have been drilled at a time when they were not influenced by production from surrounding wells.

Q Have you made such a study in the case of that, the area in

blue, and the area in brown, the immediate adjacent area there?

A Only insofar as we have the information which has been given to the Commission from initial potential tests. And, as I said awhile ago, that information is not as accurate as is deisrable.

Q Based upon the information available to you, it is your recommendation that the blue area be deleted from the South Blanco Pool and placed in a newly designated gas pool?

A That is correct.

Q Now, Mr. Greer, directing your attention to the yellow area which is the Ballard Pictured Cliffs Pool, have you made an independent study of that particular gas pool and if so, to what extent have you studied the initial stabilized wellhead pressures?

A I've studied the Ballard Pool in some detail, Our company was one of the first operators in the pool, as a producing company, and our drilling company has drilled and completed approximately 90 percent of the wells in the Ballard Pool. We have accumulated information on wells operated by Benson-Montin, and we have also attempted to accumulate information on wells which we have drilled for other operators, especially those of J. Glenn Turner.

Q Have you made any interference tests of wells drilled and completed in the Ballard Pool?

A Yes, sir.

MR. WEBB: Mark this Benson-Montin-Greer Exhibit Number 2.

(Marked Benson-Montin-Greer Exhibit No. 2, for identification.)

Q Will you then explain to the Commission the type of tests you made which have been styled, "Interference Test Number 1", and "Interference Test Number 2", as indicated on the Benson-Montin-

Greer, Exhibit Number 2; also give the Commission the results of those tests.

A Yes, sir. It is our thought that wells producing from these common sources of supply in the Pictured Cliffs, are within, are in communication with each other. The reservoir, for the most part, is comparatively tight, and gas does not move over large distances in short times. It does, however, move around within the reservoir, as wells are produced, and tends to drain from one area to another, as gas is taken from the low pressure area.

We believe that the Ballard Field, when it was first discovered, a well drilled into it, that the pressure throughout the pool was very nearly stabilized. It has millions of years to reach stabilization, and the fact that the sand is permeable, the gas can move within it, within this one common source of supply, has allowed the pressures to equalize over these millions of years.

Now, if the gas can move within the reservoir from one area to another, it should be possible for us to demonstrate that by producing one well, taking gas out from under it's tract, and observing the shut-in pressure on an adjoining well, to determine if the removal of gas from one place in the reservoir causes a pressure disturbance in another part.

Now, it is somewhat difficult and expensive to conduct these interference tests. It means we have to shut a well in for a considerable period of time, in order to observe the pressure behavior. This means that we cannot produce the well, we miss the well's allowable and if it is a large well, why, of course, that means considerable revenue lost, just to conduct an interference test.

From time to time, in areas that we operate, we try to conduct an interference test or two.

In this case, particular case, we have two interference tests we would like to show this morning. The first test is in the north part of the Ballard Field, as presently defined, and is in an area in which we have found wells to be completed with potential on the order of 2,000,000 feet per day, or less. And probably can be considered as an area having less than average permeability in the field. In other words, we have found the production from some of the wells in this area have drained gas from another well, and this gas drainage is reflected in a pressure decline in the well which was shut-in.

Now, the particular shut-in well in Interference Test Number 1, is J. Glenn Turner, Number 18-2 Huerfanito Unit. That particular well is circled in red and the producing wells within the test area are circled in green. The list of these wells is shown on our exhibit -- Can we give this exhibit a number?

(Marked Benson-Montin-Greer Exhibit No. 3, for identification.)

A Should we introduce this exhibit?

MR. WEBB: We would like to, as Benson-Montin-Greer Exhibit Number 3.

MR. PORTER: Any objection to the admission of these exhibits or this exhibit, rather? It will be accepted.

A Exhibit Number 3 is composed of two pages. The second page shows the record of wellhead pressure as they were observed on the shut-in well No. 18-2. These pressures are platted on a graph.

(Merked Benson-Montin-Greer Exhibit No. 4, for identification.)

MR. WEBB: We would like to introduce Benson-Montin-Greer Exhibit Number 4, being the graph of the J. Glenn Turner 18-2, Huerfanito Unit.

MR. PORTER: Without objection it will be admitted.

MR. GURLEY: I would like to intervene, as to the foundation of this, if these were prepared by him, or under his instructions.

Q Are all the exhibits you have introduced and will introduce prepared by you, or under your supervision?

A That is correct. The pressures themselves, or most of the pressures were measured by one of our engineers under my direction, and part of the pressures were measured by El Paso engineers as they took potential tests.

I would like to refer to Exhibit Number 4, which shows the decline in wellhead pressure, as this well was shut in,and the adjoining wells produced. Pressure Measurements Numbers 2, 3, 4, 5, 6 and 7, are shown on this exhibit. These particular pressure measurements were made with Benson-Montin's dead-weight tester, which has a sensitivity of one-tenth of a pound. All measurements were made with this same tester, and by the same engineer.

Q What period of time is covered by those--

A (Interrupting) The well --

Q (Continuing) --measurements?

A The well was shut in a total of about 127 days, and the shut-in pressure measurements were taken from the 53rd day to the 127th day, and during that period of time we noticed a total pressure

drop of three pounds. We believe that that pressure drop could have been caused by only one thing, and that's production of gas from the adjoining wells.

Now, in that respect, I would like to point out that of all the wells producing during the period of the test, only the wells south of the test well were produced for any length of time. The longest time interval that any of those wells had produced was 12 months. Two of the wells had been on the line 12 months. The rest of the wells had been on the line for a period of time less than that, and the wells to the north of the test well were put on production only during the last, approximately, 30 days of the test.

Q During the period represented by your Exhibit No. 4, being the last, I believe you said, 53 days, how many wells were producing during that interval?

A For the most part, only the eight wells to the south of the test well. There were four wells went on the line in October of '55 and the test ended November 18th of 1955.

Q But it is your opinion that during that interval the 18-2 well was being drained to some extent by the surrounding wells?

A That is correct. And I would like to point our that in conducting this interference test, we took into account factors which we believe are necessary to properly qualify an interference test.

One thing which might cause pressures to drop in a well that is shut in would be the build-up of water or other fluids in the hole during the time of the test. Now, it is our experience in drilling and completing some 200 Pictured Cliffs wells, that ordinarily when

wells are shut in, even though they be making as much as one barrel of water per hour, after they are shut in the water has a tendency to go back into the formation and the well bore be filled entirely with gas.

However, to be certain that the well does not contain any water or other liquids, before we make our first pressure measurement in an interference test, we blow the well through the tubing and this tubing is landed within the interval which is productive of pay at the bottom of the hole, and in this manner assure the hole is clear of liquids at the time we start the test. At the conclusion of the test we do the same thing. To date we have not found a well which showed any build-up of water during the time of an interference test.

Now, there's another thing which might cause a well to have a lower than average pressure. If, for instance, there were a leak in the casing, the well pressure might not build up to the maximum for that area. There's no reason, however, to believe that the pressure would build up and then drop off. It simply would not reach the maximum.

Now, we are talking about a reasonable, or rather, a considerable amount of gas which has been drained from this tract. At the time the well test was completed, in November of 1955, the shut-in pressure was a little over 638 pounds, and we have reason to believe that the true initial pressure in that area should have reflected a wellhead pressure on the order of six hundred sixty to seventy pounds. This means that some amount of gas represented by approximately 20 to 30 pounds had been moved from that well's tract

at the time it went on the line.

Q Did you make a similar test, with similar interference test in another portion of the Ballard-Pictured Cliffs Pool?

A We are currently conducting an interference test in the south part of the Ballard Pool in an area where we have higher permeability and more rapid and sever pressure fluctuations. This--

MR. WEBB: (Interrupting) I would like to introduce Benson-Montin's Exhibit Numbers 5 and 6.

(Marked Benson-Montin-Greer's Exhibits Nos. 5 and 6, for identification.)

MR. PORTER: Any objection? If not they will be received.

A Exhibit 5 is composed of two pages, the first page shows the location of the test area and the producing wells within the test area, and the date they went on production, and it shows the test well which has been Benson-Montin-Greer No. 1 Foster-Riddle, and it is located in the northwest quarter of Section 13, 25 North, Range 8 West. The second page shows the pressure measurements taken on this particular test well, the Number 1 Foster-Riddle.

Exhibit Number 6, is a graph showing the pressure measurements on this particular well, during the time that it has been shut in, the pressure measurement beinf plotted against the time shut-in.

Now, this well was completed in an area which had an original reservoir pressure which reflected well-head pressures of about 660 to 70 pounds, depending upon the elevation of the well. The first production from offset wells which are shows in green in the yellow area, was one year ago, and at the time the Foster-Riddle Number 1 was completed, those wells had been on the line less than one year. Yet, when this well was potentialed on April 26th of

1956, it's shut-in pressure was only 610 pounds.

Now, ths pressure was measured by one of El Paso Natural Gas Company's deadweight testers, whch we presume is within three or four pounds of the same calibration as Benson-Montin's deadweight pressure. The rest of the pressure measurements were made with Benson-Montin's instrument and the pressures measured during the entire period of the test, which are from a shut-in time, of 71 days, to a shut-in time of 116 days. The last pressure measurment is not shown on Exhibit Number 5, but is shown on another exhibit which we will present later. And the total pressure drop during that time, approximately 14 pounds.

Now, that means to me that gas is being produced from offset wells, and is draining gas from the reservoir beneath the Foster-Riddle Number 1, at a rather high rate. Right now the pressure is down some 60 to 70 pounds from what it would have been had we drilled the well a year ago. And it represents more than 10 percent of the recoverable reserves which might be produced from a well in that area. This is a substantial amount of gas.

It shows that the gas has a tendency to move, and to migrate within the reservoir over reasonably short time. And the point that we would like to make with these interference tests, is that if gas will move within a period of a year to the extent that is shown by these interference tests, then certainly the gas within one common source of supply will equalize without the pool over the million of years that it has time to equalize.

Q Based upon the interference tests and other studies that you have made of the Ballard Pool, do you believe the area covered

by your Interference Test Number 1 and Interference Test Number 2 are producing from the same common source of supply?

A I believe ther are producing from a same common source of supply. The wells which were drilled initially in each area showed stabilized, or as nearly stabilized pressures as we could obtain at that time, to be within a few pounds of each other.

The offsetting wells to the Foster-Riddle Number 1 being Benson-Montin Number 3 Quitzau, was one of the first wells completed in the area covered by Interference Test Number 2. This particular well showed a shut-in pressure of 655 pounds after 95 days. That well is a good well for the determination of the reservoir pressure in that area, for the reason that it had good natural permeability. It had a natural openflow on the order of 2,000,000 feet per day. And, after shot, it had a potential of four and a half million cubic feet a day. The adjoining wells were good wells with good permeability and for that reason we believe that it was not just a local well, a local -- I mean a local area of high permeability. It was one which we could depend on as representing the pressure rather accurately.

Now, that well was drilled up on a mesa, as compared to other wells in the area, and if we reduce it's pressure, it's 655 pound, to what it would have been had the well been drilled down in the valley with most of the other wells, it's wellhead pressure of 655 pounds would be equivalent to about 668 to 70 pounds, which is what we found on the wells which encountered the sand at a depth of about 2,000 feet. Now, thats within two or three pounds of the pressures found in the initial wells, some 10 or 15 miles to the northwest in the other part of the field.

Now, if we take the pressures in the other direction from southwest to northeast, we found the same thing. Wells in Section 30 and 31 in Township 26 North and 8 West, had stabilized shut-in pressures within one or two pounds of the well in the southeast quarter of Section 23 in 26 North and 8 West. That's a distance of nearly five miles in the northeast-southwest direction.

So, we have this pool, this one common source of supply, approximately four or five miles wide and ten to fifteen miles long, that had an equalized reservoir pressure at the time the first wells were drilled in that pool. And all the wells since that time, when allowed to build up and reach their stabilized pressure, showed pressures around 660 to 670 pounds. The only exception being one or two wells drilled in a very tight sand, which had an extreme -- took an extremely long time to build up, or wells which were drilled close to the wells which had been on the line for awhile, and were influenced by drainage from the original well.

Q Have you reflected these last statements by a schedule, and a graph?

(Marked Benson-Montin-Greer's Exhibits Nos. 7 and 8 for identification.)

MR. WEBB: We would like to introduce these as Benson-Montin Greer's Exhibits 7 and 8.

MR. PORTER: Are there any objections to the introduction of these? They will be received.

Q The facts reflected on Benson-Montin-Greer's Exhibit Number 7 -- do they --

A (Interrupting) Excuse me. I need to make one qualification before we go on. I just made the statement that within the area

which we considered the Ballard Pool, and for the extensions to the Ballard Pool, as we recommend them, there have not been any wells drilled in that entire area colored in yellow, which have pressures in excess of 670 pounds. Now, there is one exception, Huerfanito Unit Number 29 in the southwest quarter of Section 35 in 27 North and 9 West. We have a pressure measurement reported of 704 pounds for that well. We feel that that is either one eratic well out of about 150,,or it could be a mistake in the measurement.

Q Then, as I understand --

MR. GURLEY: (Interrupting) Could I ask at this point who prepared this exhibit?

MR. WEBB: Well, we can introduce them all at one time if you want us to.

MR. GURLEY: I will appreciate that.

Q Did you prepare Exhibits 1, 2, 3, 4, 5, 6, 7, 8, or were all same prepared under your supervision?

A That is correct. The pressure measurements were taken by petroleum engineers with our company, and the information was compiled, studied and assembled either by me or under my direction.

Q Again directing your attention to Exhibit Number 7, does this exhibit reflect that all of the wells which are listed thereon are producing from the same common source of supply?

A No, sir, we have the pressure measurement on some one or two that are.

Q Well, point out the wells which are not, which you now consider in the Ballard Pool and why they are not being considered in the Ballard Pool?

A This exhibit represents all the pressures which we could

accumulate on wells which we have completed in this Ballard Field area during the months of February, March, April and May of this year.

We have kept these wells off the pipeline in an effort to determine the type of pressures we need to determine pool boundaries. And we have accumulated all the information we could and one of the wells, -- Well, let me say that again. Most of the wells are within the Ballard Field, as we believe it to exist, but there are two, or maybe three wells which we will come to later, which are not in the Ballard Field, and which show different pressures and all of this information is set out in Exhibit 7.

Now. Exhibit 8 shows part of the information of Exhibit 7 in a graphic form, and represents a plat of build-up pressures, versus time for four wells, which are close to the edge of the Ballard Field. The location of these wells are south offsetting wells to the four quarter-sections colored in red on Exhibit Number 1, and are wells right next to the area we consider to be the impermeable zone between the west part of the South Blanco Field and the Ballard Pool.

Q Do the pressures, as reflected on that Exhibit Number 8, indicate that they more closely associated with the Ballard Pool than with any other pool close by?

A Yes, they do. It would be desirable, of course, if we could have let the wells build up another 20 or 30 days to determine a more definite limiting build-up pressure.

However, the final pressures as shown on this exhibit were just taken day before yesterday, and we just didn't have time to accumu-

late the additional pressures. They did establish a pretty definite trend, however, which indicates to us that the final stabilized pressures would be on the order of 670 pounds or less.

The reason I say this is because most of the wells which we drilled in the area seem to reach their maximum pressure within a period of 40 to 60 or 70 days. We can tell by extrapolating the curves shown on Exhibit Number 8 to a period of 60 or 70 days, that they probably would not build up to pressures much in excess of 670 pounds.

Q Then, it is your recommendation that the area --

A Yes.

Q The southeast-southwest quarter of Section 26, the northeast quarter of Section 35, the southwest quarter of Section 36, all in Township 27 North, Range 9 West, and the northeast qyarter of Section 1 in Township 26 North, Range 9 West, should be additions to the Ballard Pool?

A That is correct.

Q What other acreage in either Township 26 North, or Rownship 27 North, Range 9 West, do you recommend should be added to the Ballard Pool, and if any, why?

A I would recommend that in 27 North and 9 West we also include in the Ballard Pool, Section 27 and the southeast quarter of Section 28.

Now, this particular area is one of extremely low permeability and is characterized by three wells which are very poor wells, and will never pay out the cost of drilling. Those three wells are Huerfanito Unit 38, 39 and 40 in the southeast quarter of Section

28, and the south half of Section 27.

It's just possible that that entire section is an area representing the transition from the Ballard Field to the Fulcher-Kutz Pool, and actually it might not make a lot of difference which pool those three wells were in. Three of them will be marginal wells, it doesn't make any difference what pool they are in, they will never produce their allowable.

But from the pressure build-up tests we have to date, it appears that the wells more closely fit the pressure of the Ballard Field than they do of Fulcher-Kutz. And for that reason I would recommend that they be added to the Ballard Field.

We have a pressure differential of about 20 pounds between Huerfanito Unit Number 41 in the Fulcher-Kutz Pool in the northeast quarter of Section 28 and Huerfanito Unit Number 42 in the northwest quarter of Section 27. Those particular wells are represented on Exhibit Number 7. Number 41 shows after 57 days the pressure of 637.2 pounds. Number 42 shows after 73 days a pressure of 658.3 pounds.

Q With the exception of certain eratic wells which you have mentioned, do you find that large a degree of pressure differential at any point from the most southerly portion of the Ballard Pool to the northern reaches of the Ballard Pool, or are the pressures within a few pounds of each other, assuming the same can be stabilized?

A That is correct. In the Fulcher-Kutz Pool, in this particular area of it, although we don't have the type of shut-in pressures we would like to have, it's apparent from the information now available that the maximum pressures in Fulcher-Kutz were on the order

of 640 pounds. For the main part of Fulcher-Kutz, as shown on our Exhibit Number 1, then, as compared to the Ballard Pool, there's about 30 pounds difference in pressure.

Now, as to just exactly the line where the pressure changes, it's a little difficult to set out, but where it is difficult to determine, we have wells of low capacity, wells which will not make their allowable, and wells which we feel makes no difference which pool they are in, they will be marginal wells.

Q But, you do feel it would be very detrimental to the majority of the wells in a pool not to respect the dominant pressure differential in the pools as a whole?

A I think it is necessary that we recognize these different reservoirs, these different common sources of supply that they very definitely should be, that wells within these different reservoirs should be prorated, produced between themselves, among themselves.

Wells within these common sources of supply can drain each other if they are not properly prorated, but wells within one common source of supply will not affect wells in another source of supply, and where they have large pressure differentials between two different reservoirs, we can create some very difficult problems by trying to prorate and produce wells as one pool, which, in reality are two separate pools.

Q Do you have available before you, information as to any pressure differential between the Ballard Pool and the acreage colored in blue on Exhibit Number 1?

A Most of the information we have for wells in the west part

of the South Blanco Pool, which we recommend be taken out of the South Blanco, isiinformation taken from initial completion tests.

Most of the operators did not take build-up pressure tests, so we do not have as complete information as we need, but the information we have shows that the minimum pressure of the original wells in that area to be on the order of 720 pounds or more. And wells which exhibited 720 pounds may actually have had higher pressures than that, had they been allowed to stabilize.

We have just completed one well in the blue area, J. Glenn Turner Number 46 Huerfano Unit, in the southwest quarter of Section 25, 27 North, and 9 West. That well had a pressure on the order of 683 pounds, and there is a possibility that that particular well may be experiencing drainage from the wells originally drilled close to it.

It's first pressure we measured on May 22nd, was 683.6 pounds, and the last pressure measurement was 682.5 pounds, which is only a one pound drop, but it could be indicative of communication with the other wells. If so, it is reasonable to assume that the original pressure under that tract, when the wells were first produced, two or three years ago, was 20 or 30 pounds higher than it is now.

Q Based upon that study, you believe that there is a different source of supply on the acreage colored in blue, from the acreage colored in yellow?

A Yes, sir. There is very definitely two different reservoirs when we compare the Ballard Area colored in yellow to the Blanco, or west part of the South Blanco Pool colored in blue.

Q Is there a lot of difference between the Ballard and the green?

A There is a difference between the Fulcher-Kutz area in green and the Ballard area in yellow, which, on the whole, approximates 30 pounds.

Now, the exact line between Ballard and Fulcher-Kutz, and the exact line between Ballard and the west part of the South Blanco is a little bit difficult to determine, but we have it narrowed down to within about half a mile, and we believe, for all practical purposes, that that is close enough.

I would like to point out that the quarter sections colored in red, in Township 27 North and 9 West, which represent the separation between the two pools, contain two dry holes and two marginal wells.

Q Would you point out to the Commission just where the location of the dry holes and the location of the producing wells are?

A The two dry holes were drilled in Section 26, in the northwest quarter and the southeast quarter; the two marginal wells are drilled in Section 36 in the northwest quarter and the southeast quarter. The well in the northwest quarter has been potentialed for 380,000 cubic feet per day, and is a well which we feel will never pay out the cost of the drilling. Number 52, was completed some time ago, and we have not been able to make a potential test on that well yet, because of the poor producing characteristics.

Those wells are undoubtedly drilled in the tight zone separating the two pools. One one side we have 670 pounds stabilized pressure, and on the other side we have the minimum of 720 pounds stabilized pressure, a difference in a half mile, of approximately 40 to 50 pounds; whereas, throughout all the rest of the Ballard Pool, 10 or 15 miles by 4 miles, 60 or 70 square miles, a pool that's

pressures are stabilized, they were originally the same. Wells within that area can drain each other.

There we have stabilized communication within that pool, and yet, within a space of just a half mile we find the difference of 50 pounds in pressure. Now, that can mean only one thing, that the wells north of that red line are producing from a different reservoir.

Q I believe that we have covered all of the acreage in 26 and 27 North, Range 9 West, which are your recommended additions to B Ballard, except the southeast quarter of Section 1, 26 North, 9 West. Do you likewise recommend that that be incorporated in the Ballard Pool?

A Yes, I do. We have a build-up pressure on that well. That's the J. Glenn Turner Huerfanito Unit Number 14-1, which, after 125 days, shows a pressure of 663.8 pounds. In the last 15 days, the well has built up about 1.7 pounds, and we believe the well is reaching stabilization. It's apparent that its pressure won't likely exceed 670 pounds.

Q Directing your attention to the acreage colored in brown, on Exhibit Number 1, you already discussed the reasons why you recommend that the acreage west of the township line be deleted. Therefore, I would like for you to tell the Commission why you believe that the acreage colored in brown is not a portion of the Ballard Pool, which is colored in yellow, if that is your belief?

A The majority of the wells in the South Blanco Pool in the area colored in brown, show pressures on the order of 850 to 900 pounds, which is some 200 pounds difference, as compared to the Ballard area colored in yellow.

There's no doubt at all that the area colored in brown is producing from a reservoir separate and distinct from the area colored in yellow. It is also apparent that the bulk of the wells drilled in the area colored in blue have initial pressure substantially less than the wells in the east part of the South Blanco Field, which is colored in brown. For that reason I recommend that the area we have shown colored in blue, which is all of the present part of the South Blanco Field in Township 27 North, and 9 West, be taken out of the South Blanco Field and established as a separate pool itself.

And in that respect, I think I would like to point out once again, that the wells completed in that area do not have the type pressures reported for them that we should have, to determine properly an exact pool boundary. Part of them were drilled at a time when operators didn't realize the necessity for determining stabilized pressures. But its apparent that we have enough room left for new wells that as they are drilled, and the operators are now aware of the fact that we need to be careful about obtaining pressures, that initial stabilized pressures can now be determined, and those pressures used to more properly, or more accurately determine the pool boundary between the new pool colored in blue and the main part of the South Blanco Pool.

Q And, summing up, if I may, on that point, Mr. Greer, the net of it is that you find less pressure differential in this 15-mile distance than you did, say, in a three or four mile distance here, or a one or two mile distance here, a one or two mile distanc here, or a one or two mile difference here; and, that indicates t you, as an ingineer, that this is one common source of supply, a

is not inter-connected, inter-related with these other pools, or other sources of supply?

A That is correct.

Q Directing your attention now to the south half of Section 16, the west half of Section 22, and the northeast quarter of Section 28, 27 North, Range 9 West, in which of the pools as we have discussed, do you recommend that that area be placed?

A Well, in the area just described have pressures, insofar as we are able to obtain them, more characteristic of the Fulcher-Kutz Pool than either the Ballard Pool, or the South Blanco Pool. And, for that reason, I recommend that that area be added to the Fulcher-Kutz Pool.

Q Directing your attention now to the north half of Section 13, and the south half of Section 14, in 25 North, Range 8 West, with this yellow cross-hatched with red, to which pool do you recommend that acreage be added?

A Those wells are producing from the reservoir of the Ballard Pool, and should be included in the Ballard Pool.

Q Now, directing your attention to the northeast quarter of Section 23, 26 North, and Range 8 West, I notice that you have that quarter section double cross-hatched. Would you explain the meaning of that illustration and what you recommend should be done with the acreage?

A There's a well completed on that quarter-section which produces from a separate lense in the Pictured Cliffs Formation, as compared to the Ballard Pool. The offsetting well to the south produces from the main part of the Ballard Pool, which in this area

occures in the bottom of the Pictured Cliffs Cormation. The sub-well in the northeast quarter of that section, produces from an interval in the Pictured Cliffs, close to the top of the formation. It's in a separate reservoir and that separation is represented by a difference in 50 pounds in shut-in pressures of the two wells.

For a distance of some five miles southwest of this section, all wells had pressures approximating 670 pounds, when allowed to stabilize. Within a space of a half mile the pressure jumps 50 pounds. It indicates only one thing, the well is producing from a different reservoir.

Q Do you believe that 160-acre tract would be drained by wells drilled to the southwest?

A I think there would be no communication between the well in the northeast quarter of Section 23, and the well in the south-east quarter.

Q What is your recommendation to the Commission as to the status they should place that partciular well in?

A That well should be left out of the pool until additional drilling allows us to determine if there will be enough other wells to justify a separate pool being set up for that well.

It's just possible that this well will later tie in with the reservoir under the wells in Sections 4, 5 and 6 in the same town-ship. It's even conceiveable it might tie in with the area colored in blue, later on. But the wells are, there are not enough wells, in my estimation, to justify a separate pool, at this time, and I see no harm can be done by leaving them out of the pool, and producing them outside of the pool.

Q You don't believe, then, there would be any violation of the correlative rights of the various owners surrounding that 160-acre tract, by leaving out the quarter section, out of the pool at this time?

A That is true, I think there's no communication with the pools in the field, and regardless of how it is produced, it could affect the other wells in Ballard Field, so there is no harm producing it as a well by itself, or in a separate pool later on.

Q Mr. Greer, you have made reference to the -- what we'll call the overall pressures in the various pool boundaries of which are shown on Exhibit Number 1. Its my understanding that the various wells drilled in those particular pools, a large percentage of them are operated either by, or the gas from them is taken by El Paso Natural Gas Company, under gas purchase contracts which contain provisions whereby the pipeline company is not obligated to reduce its line pressure, if 80 percent of the wells in the particular common source of supply can meet their allowables. Are you familiar with that type of contract?

A Well, yes, I am familiar with it.

Q Do you believe if all of these, if the pool boundaries are designated by the Commission as you have recommended they be designated, would there be any discrimination or violating of correlative rights between the various owners in a particular pool, under that type of contract?

A No, sir, there would not be, as long as the wells were produced in accordance with the understanding of the parties when the contract was entered into. It was very definitely understood

between the producers and the El Paso as a gas purchaser, that our wells would be considered as producing from a common source of supply, and the obligation of El Paso to take gas from those wells would be based upon the competition of those wells within that one common source of supply. It did not contemplate that we would be prorated against wells with some 400 or 500 pounds greater pressure than we have.

Q Assuming the same set of facts, would there be any violation of correlative rights, or any injury to any of the parties in any of the various pools, as between pools, assuming the pools are left as they are?

A If the pools are left as they are, assuming that we begin to properly separate the west part of the South Blanco from the main part of it, and attempt to recognize our different reservoirs, these different common sources of supply, and keep the wells separated on the pressure basis by which they should be separated, we should have very little difficulty in properly prorating, allocating and producing wells in each common source of supply.

But, if we throw them all together, we are going to create a large number of problems, and one of them I think we should point out. As we move farther back inwards, and wells have higher pressures, they can produce their allowables against high pipeline pressures. Now, whether the pipeline company will see fit to operate at a high pressure is, of course, up to them. But, it's only logical and practical, and it's saving in cost and expense to a pipeline company to produce wells at the highest possible pressure they can produce them. If they drop the pressure at the wellhead to an unreasonably

low amount, and have to compress it again to the pipeline to transmit it out of the State, it causes an added expense, and its only reasonable to assume that in time the pipeline companies will produce wells at as high pressure as is reasonable.

Now, if we call this all one common source of supply, call it all one pool, prorate all the wells together, the type problems we could comeup with would be one such as this. A man who has a comparitively high pressure well, but a low deliverability might be producing into a pipeline pressure of, say, around a hundred pounds and couldn't make his allowable. Now, maybe, he could make his allowable at a lower pressure. But, actually, as far as he is concerned, in competing with other wells in the same reservoir, the same common source of supply, he can not be hurt too bad, if the other wells are producing against approximately the same pressure.

But, suppose his neighboring offset is producing against 200 pounds pressure, then his offset well might drain gas out from under him. Well, now, it makes no difference to this man whether it is an offset well that has 200 pounds line pressure, or another well in the same reservoir, the same prorated pool, that has 200 pounds line pressure. He has a legitimate problem to bring to the pipeline company, and a definite complaint.

We think that the pipeline company would be faced with very serious problems if they had to produce as one reservoir, wells with pressures varying from 300 to 400 pounds up to a thousand pounds.

Q Then, in your opinion, if the pool boundaries are set by the Commission as you have recommended them, and as are reflected on your Exhibit Number 1, no inequities will result as between producers?

But, if they are either partially, or wholly consolidated into one pool, and prorated as such, then inequities and violation of correlative rights of the various owners involved will surely result?

A Very definitely inequities would result.

MR. WEBB: That's all.

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

(Recess.)

MR. PORTER: Meeting will come to order, please. Mr. Webb, are you through with your direct examination?

MR. WEBB: I am through with my direct examination. However, there may be some cross.

MR. PORTER: Are there any questions of the witness?

MR. STANLEY: I would like to ask a question or two.

MR. PORTER: Mr. Stanley.

CROSS EXAMINATION

By MR. STANLEY:

Q Mr. Greer, pertaining to your Exhibit marked Number 1, you do have a brown coloration and yellow coloration, which you recommend be separate pools, approximately, plus a volume minus millions of years. How old is that formation?

A For all we know, it is over a million years old.

Q And yet, you have proved that in a matter of a hundred plus days, approximately,116 days, that there has been pressure interference between the wells tested and the Ballard area. In other words, as old as these Pictured Cliffs Cormations are, how do you explain the fact that these pressures are not equalized between the Pictured Cliffs area in question?

A Because they are in two different reservoirs. The wells in one reservoir equalized over all these years, whereas between two reservoirs they didn't equalize.

MR. STANLEY: That's all.

MR. PORTER: Any other questions. Mr. Arnold?

By MR. ARNOLD:

Q I believe you spoke of a pressure difference of 50 pounds within a half mile difference in Section 23 of 26 and 8. You say that this indicates to you that those are separate reservoirs, is that correct? In other words, the northwest quarter of Section 23 is one reservoir and the southeast quarter is in another reservoir?

A What section are you talking about?

Q Section 23 of 26 North, 8 West.

A Yes, sir, I believe so.

Q Doesn't it seem strange to you that you would have had two Pictured Cliffs reservoirs so close together --

A (Interrupting) Oh, no, sir, I see nothing --

Q (Continuing) -- within -- I wasn't through with the question -- Within which you would have initial pressures which were that different?

A Oh, no, I think it's entirely possible to have two reservoirs within two or three hundred feet of each other.

Q But, to what do those reservoirs owe their pressure?

A To what do they owe their pressure?

Q Their initial pressure, at the time of accumulation?

A Well, sir, that's a good question. We ordinarily believe that the source rocks for the accumulation of oil and gas are

ordinarily formations more of a shale nature.

Q Any reason you would arrive at two pressures that far apart if you were deriving the gas from the same source?

A Oh, that's -- oh, yes, sir. They could easily have come from the same source.

Q What would have caused the pressure difference at the time of accumulation?

A Let's say, for the purpose of this question, that the source of the gas is the overlying shale and maybe an underlying shale. We know that the permeability and porosity of shale is very low. Ordinarily, however, it has porosity and permeability. It can be measured. We can take it in the laboratory and put it under enough pressure and force liquids or fluids into shale and hard tight sands.

And,over a period of millions of years, gas can migrate out of a tight shale, or a very tight sand, into a more permeable one, into a type of sand which will be a reservoir that has enough permeability to allow production over a period of, say, 15 or 20 years. Now, it might have taken millions of years for the gas to come out of the shale and into the various sands below, which it can do.

Now, as to why there is a difference in pressure in the two areas, we don't know exactly, but one theory which I believe is probably a good one, is that gas is continually migrating from the deeper part of the basin into the outcrop. As we get closer to the outcrop, we find lower pressures, and I really believe that gas is moving right now, and has been, over geologic time, moving from the higher pressure area in the basin to the outcrop.

Q Could I interrupt you there? Hasn't it been your testimony that these were all separate sources of supply? And, do you mean when you say a separate source of supply, that you have a barrier between the pools which would prevent that migration?

A Mr. Arnold, in talking about drainage within these pools, and no drainage between pools, and in talking about production of gas from the pools, we try to be practical. We are concerned with the production of gas during the lifetime of the pool, within the time of our -- within our lifetime. The time of man, for instance. And, insofar as that is concerned, insofar as the time that we produce these pools, they are separate from each other. Now, over the period of millions of years of geologic time, and right now there's probably migration between different pools in the Pictured Cliffs. I feel that's probably true, but as compared to the 15 or 20 or 30 years that we produce gas, and entirely deplete each area, that migration amounts to nothing.

Q You think that it's a matter of defining what a barrier is. Son't you think it would be also rather difficult for the Commission, in each case of trying to determine the difference between the two sources of supply, to determine the degree of migration? Isn't that impractical, also?

A Yes, sir. The degree of migration and the degree of permeability ks, of course, what we are talking about. All of the Pictured Cliffs has permebbility, I feel certain of that. It has permeability; gas can move through it. What we are concerned about is the degree of permeability and productivity, and compared to 15 or 20 years, when compared with millions of years.

Q I believe you testified --

A (Interrupting) It's a little bit difficult problem. I grant that there's a lot of things in our life that's not easy.

Q You testified on one of your exhibits up there, there are areas within the Ballard Pool, which within a relative short space oftime you had proof that the gas was moving?

A That is correct. Within each common source of supply, it's quite likely that we can show that, and show it within a reasonable length of time. If we can't, if gas doesn't move through the reservoir that way, there can be no gas production, there cannot be enough gas produced from a well to begin to pay for its cost. There certainly is not enough gas in the well bore of the well to the Pictured Cliffs Formation to pay for the first valve. It has to come out of the sand, has to move for a distance away from the well bore. If it can't move, there is no permeability, the well be at best, not commercial, and probably dry.

Q Do you think the Commission should be very careful in view of the test you have just made, in drawing barriers between sources of supply in the Pictured Cliffs?

A That is true, careful, and in being careful, should lean toward the direction of separation of pools, not toward combining them.

Q Now, why do you say that?

A Because it's very apparent as we go from the west side of the basin to the east side, that they are different pools, different reservoirs.

Q You are saying they are different pools, but you have testi-

fied they are connected?

A Oh, yes, connected over geologic time. We are concerned with production in the next 15 or 20 years, and production of gas in the Ballard Pool within the next 15 or 20 years will not affect the production of gas, or the wells in the South Blanco Pool; if they have not equalized over these millions of years, they are not going to. There's not going to be any drainage from Blanco to Ballard. There's 200 pounds difference now over 200 years. Say, the next 20 years tool all the gas out of Ballard and not a drop out of South Blanco, it would still be there.

Q I agree as far as South Blanco and Ballard are concerned, but considering Ballard and Fulcher-Kutz, I believe that everyone does agree that there is better permeability connecting Ballard and Fulcher-Kutz than connecting Ballard and South Blanco.

A Maybe split, better permeability, but it is not adequate to have allowed two pressures to equalize. And we have along the west side of the Ballard Pool, dry holes that have already been drilled within -- drilled recently with modern completion methods.

We have three wells in the south half of Section 27, and the southeast quarter of Section 28, which are completed in a sand which is very tight. It's doubtful that, in fact, there is no doubt the wells will ever produce enough gas to pay for expenses. One of these wells now, we can't get any gas into the line. We managed by shooting the wells, and sand fracking them to establish a flow right which was measurable.

But, as far as those wells producing any substantial amount of gas, they can't do it, and there will be no migration across the

south half of Section 27, and the southeast quarter of Section 28, because of the low capacity wells in that area.

Another small well is the original well in that area, Magnolia No. 1, Cleveland, in the northwest quarter of Section 28 it just had enough gas that it could be measured when it was completed.

Q I believe there is a well drilled in an offset 40-acre tract, isn't there?

A That is true.

Q I would like to point out the fact, although you have a dry hole on one 40, you might find a different situation.

A Yes.

Q Although you have a dry hole on one 40-acre tract, you might find a different permeability situation on an offset 40-acre tract?

A That is quite true. The general area, however, is one of low productivity, too, and one so low as to have prevented equalization of pressures over these millions of years. That being the case the production of Ballard, to the south, is not going to affect production of gas in Fulcher-Kutz, to the northwest. There can be no communication across that very low premeability zone.

Q One more point that I would like to bring up. You speak of pressure equalization within pools, and you have also testified that you think you are losing gas at the outcrop. That would certainly affect pressure stabilization in each one of these permeability trends, the fact you were moving gas?

A Yes, its possible that there is a pressure gradient across each one of these reservoirs. It might even be a tenth of a pound.

Q Might be considerable larger than that?

A It might be, but it's doubtful. It's doubtful within one reservoir there's any shorter pressure gradient over that. Let's say, the pressures were dropping 10 pounds a year in each of these fields, due to gas leading to the outcrop. If this were the case, then 100 years ago we would have a thousand pounds more pressure in each of the pools than there is now. I doubt seriously, had we drilled these pools a hundred years ago we would have found a thousand where we now have a hundred.

Q I doubt that, too. I don't believe the gas got away at the outdrop that fast.

A I think it's reasonable to believe over geologic time we have the drainage from one pool to another, but as far as we are concerned, in our lifetime, it's not going to affect us.

MR. PORTER: Do you have any further questions, Mr. Arnold?

MR. ARNOLD: That is all for now.

MR. PORTER: Mr. Utz?

By MR. UTZ:

Q Mr. Greer, I gather from your testimony that you believe that you can have two or more common sources of supply, or two or more reservoirs within the top and the bottom of the Pictured Cliffs Formation, is that correct?

A Yes, that is correct. Often that's the case.

Q Were you speaking in those terms for the Pictured Cliffs Formation as a whole, throughout the basin, or just this particular area?

A Of course, we are talking now about this particular area which I have studied in detail. It probably occurs throughout the

basin; I think it does. In other words, the reservoirs sometimes are in the top of the formation, sometimes in the middle, sometimes they are in the bottom.

Q Sometimes. In 1948 the Commission designated the Pictured Cliffs Formation as a whole, as a common source of supply, is that right?

A I don't recall that order. Perhaps you did.

Q We have done so. You recognize that, don't you, in the nomenclature for the past several years, the vertical limits of the Pictured Cliffs being from the top of the Pictured Cliffs to the bottom of the Pictured Cliffs as a common source of supply?

A Well, sir, if that's so I didn't realize it. It seems to me if that is the case the Commission certainly hasn't been prorating the wells within this common source, within the area, in that fashion. Certainly you have not held to your order, and we don't think that this is proper and that you should. The wells as they are now produced, are produced as pools as they are defined, and I believe the pipeline nominations are made in that fashion, and the wells are prorated within each reservoir. And we have been under the impression that they are considered as separate common sources of supply.

Q You mean -- I don't believe you understand my question, Mr. Greer. Take the north part of Ballard, as you have just defined it there that you recommend, that part of the pool. Well, take Ballard as a whole. That part of the pool which you say is one common source of supply, lies within the vertical limits of the Pictured Cliffs Formation, is that correct?

A Yes, sir.

Q But you have just said that there are possibly two or more common reservoirs within, between the top and the bottom of the Pictured Cliffs Formation.

A Oh, I see what you mean. When we go from one reservoir to another, often producing interval changes from, say, the bottom of the Pictured Cliffs, to the top of the Pictured Cliffs.

Now, ordinarily where they overlap, sometimes we have two producing intervals in one wellbore. Now, in that instance, where one lense overlies another, you have a very large area which allows pressure equalization. And, ordinarily, those pressures will have a good tendency to equalize.

Just as an example, I would estimate that is we have, say, two lenses separated horizontally, in the Pictured Cliffs, by as much as a hundred feet, that there would probably be, oh, say, one --- thousandths possibility that those two lenses would equalize in pressure as compared to one overlying the other.

If we take two lenses of the same permeability, and the intervening distance is the same, say, a hundred feet, or 50 feet, separating the two lenses, if one overlies the other, it will equalize, say, just, oh, in round figures, a thousand times faster than if they were separated horizontally.

So, ordinarily where we have two lenses in the Pictured Cliffs in the same wellbore, the chances are pretty good they are going to have been equalized. Where we get the separation between the reservoirs, ordinarily will occur when there is a horizontal break in permeability.

Q Would you recommend that the Commission, on the basis of

your testimony, would you recommend that the Commission change its method of defining Pictured Cliffs Pools, to say Pictured Cliffs Zone 1, Zone 2, and so forth, since you say they are different reservoirs?

A I just explained to you, Mr. Utz, that ordinarily where you find two zones in the same wellbore, they will be equalized, and be in the same reservoir. We have not yet encountered two lenses in one wellbore that carry different pressures, not to our knowledge.

Q By virtue of the wellbore they become one pool?

A No, sir, by virtue of the fact that they have communication and have the same, approximately the same pressure. Often they are tied together back two or three miles in another direction, for instance.

We have shown the Commission, I believe, before, where the Pictured Cliffs can start as one fairly solid body in one area and blends out with fingers in the top and bottom, and maybe only one or the other, and maybe they are tied back, say, two or three miles from where they occur as separate lenses, over two or three miles in one direction they may be tied together, and be within communication with each other.

Q Then, in effect, what you originally said, would be two reservoirs are in communication, wouldn't it; maybe around it, may be around for the Joneses three or four miles away, and back to the wellbore, but there is communication, is that what you are saying?

A It could be. We have measured communication in the Pictured Cliffs over a mile distance.

Q Then the way the Commission has been defining Pictured Cliffs Pools, you agree with, as far as vertical limits are concerned?

A Yes, sir, I would not recommend at this time you try to make a vertical separation of pools in the Pictured Cliffs.

Q Mr. Greer, I would like to direct your attention to Section 20 in 27 and 9, the northeast quarter, I believe your Exhibit 1 showed a 630 pound shut-in pressure in 21 days, is that correct?

A Which -- would you tell me again the location of the well?

Q The northeast quarter of Section 20-27-9?

A I believe that is correct, 617 pounds in 24 days.

Q Well, now --

A Is that the well?

Q Section 20?

A Here it is. 630 pounds in 21 days, yes. Yes, I have the well.

Q Do you believe that pressure is a stabilized pressure?

A In 21 days, I doubt it. We didn't take a build-up pressure on it.

Q In Section 21, the same township and range, the southwest quarter, you show a pressure of 632 pounds, in 17 days.

A Yes, sir.

Q You believe that's a stabilized pressure?

A Oh, I doubt it.

Q Now, in Section 27 of the same township and range, the southwest quarter, the pressure, 648 pounds in 12 days? Section 27.

A This shows 649 in seven, I have here. That's close enough.

Q Do you believe that to be a stabilized pressure?

A No, I doubt that it's stabilized.

Q The pressure in Section 20 and the pressure in Section 21

would average about 631 pounds, is that correct?

A Yes, sir, that is correct. I think you are getting pretty close to what I would consider the pressure drop area. I think it's around 640, 45 maybe, where they stabilize.

Q And the pressure in Section 27 is 648 pounds, or a difference of about 17 pounds between the two areas?

A No, sir. No, sir. You are trying to compare unstabilized pressures and we just can't do that.

Q That's the point I am making.

A That's the reason, Mr. Utz, we have taken build-up pressures. That's the information we should use, not something that's obviously incorrect.

Q When you spoke of -- what was it, 30 or 50 pounds differential between these two areas?

A Approximately 30, yes.

Q What kind of pressures were you using?

A Stabilized pressure, initial stabilized pressures, as best we can determine them.

Q Have those pressures been reported to the Commission?

A Yes, sir, and I have testified to them before the Commission a couple of times, and we have taken pressure build-ups as long as a year on wells, and you have that information in your records.

Q Those pressures are not shown on your Exhibit 1?

A They are not shown here. I can get them for you. They were very meticulously taken.

Q I was under the impression you were using the pressures shown on your exhibits as stabilized pressures.

A Oh, no, sir.

Q I wanted to take exception to --

A Oh, no, sir, those do not represent stabilized pressures.

Q Have you taken any stabilized pressures in what you recommend to be the limits of the Ballard-Pictured Cliffs Pool, that is, the north part versus the south part?

A The most recent information we have on build-up pressures tending towards stabilization are those shown on our Exhibit Number 7 and Exhibit Number 8, which we have just discussed, which show that the pressures are tending toward 660 to 670 pounds in the north part of the Ballard Pool. And, it's true that we would like to have had another 10 days to let the wells build up. We have asked the Commission to give us time to complete these build-up pressures, but the Commission didn't see fit to give us that time.

Even so, we have enough information there to make a reasonable projection to about 60 or 70 days, that ordinarily takes for wells to build up to say, that on this Exhibit Number 8, that well, Huerfanito Unit Number 51 and Number 49 and Number 48 would probably build up to something on the order of 660 to 670 pounds. Huerfanito Unit Number 11-1 is closer to wells which have been produced.

It's possible that that well has been drained by the adjoining well, and although we wouldn't definitely say on just one pound pressure drop, the indications are that that well is currently being drained and is in communication with the adjoining wells, and could be one reason why it quit building up at a pressure higher than 655 pounds. Nevertheless, it did build up that high, which is higher than any pressure we show in the southeast part of the Fulcher-Kutz.

Q In your opinion, is there a pressure differential between

the north part of the Ballard and the south part of the Ballard?

A The original stabilized pressures in the north part of Ballard and the south part of Ballard, as best we can determine, are within just two or three pounds, probably within the accuracy of the instruments we used to measure them.

I can point out two wells, or three, if you would like. The first one in the southeast part of Ballard, Benson-Montin Number 3, Quitzau, which I referred to earlier this morning, in the southeast quarter of Section 11, in 25 North and 8 West, showed 655 pounds in 95 days. That was a good well for taking reservoir pressure measurement. If we reduce that --

MR. ARNOLD: What was that pressure again?

A 655 pounds in 95 days. Wells at about an elevation of 7,000 feet, which corrected to an elevation approximating the other wells would give us a wellhead pressure of about 668 to maybe 670 pounds. Moving northwest to the original well in the center of the Ballard Field, which is the McManus-Benson-Montin Number 1, that well had a shut-in pressure at 67 days of --

Q What is the location of that well?

A Southeast quarter of Section 30, 26 North, and 8 West. After 67 days shut-in, that well has a shut-in pressure of 668 pounds. We left that well shut in for nearly a year, another nearly two hundred some days, as I recall, and it built up one more pound. That's very close to stabilization, as we are going to use it in the next 20 years to produce the well.

Now, if we move on up to the north part of the Ballard Field, we can take one of the early wells up there, J. Glenn Turner Number-- Well, let's see, Well Number 2-11 in the northeast quarter of Section

11, showed 650 pounds in only 13 days. Another well --

Q You think that's a stabilized pressure?

A No, sir, but it shows that the pressure was at least 650 pounds in 13 days, which is more than any well in Fulcher-Kutz. Then another well is J. Glenn Turner Number 12, northwest quarter of Section 21 in 26-9 had 666 pounds, and that well is close now to the wells we have these build-up pressures on, which show 660 to 70 pounds.

Move on over to the, more to the west side of the field, J. Glenn Turner Number 1 Ballard, in Section 15, the northwest quarter. It had 661 pounds in 7 days. The south offset to it had 662 pounds in 38 days. Those are reasonably close pressures. Those are wells that were drilled at a time before there was any opportunity for drainage from offset wells.

I would like to give you one more pressure. Southern Union Number 1, way over on the northeast side of the field, southeast quarter of Section23-26-8, 668 pounds in 34 days. Those are pressures that are within just a few pounds of each other. The differences could be difference in elevation of the wellhead.

Q The pressure just north of that last pressure, you say is another pool, because it is 724 pounds?

A Yes, there's no doubt whatsoever about that.

Q The pressure, I believe you said the pressure in the southwest quarter of Section 35, 26, 9, which was 704 pounds in 13 days, you thought was an eratic pressure, am I right?

A Yes, extremely eratic pressure, or could be a mistake. The well tested 270,000, it's all even due to produce into the line,

and it could be a real tight spot in the reservoir that's not in communication with the rest of it. It's just possible it is. It is not going to affect anybody, I am sure of that. It probably won't produce $20.00 worth of gas a month.

Q What affects the pressure build-up?

A There's a number of things affect pressure build-up. One of the things is how long the well has been over during the process of completion. Another is the permeability within the immediate area of the well, as compared to the rest of the reservoir around it. If we have a small area of high permeability, then during the course of completing the well, the comparitively large amount of gas will be blown into the air, and the gas cannot be replaced into that area very fast, because it's coming from a surrounding area that's tight, so that's an instance of a well of high capacity that will take a long time to build up.

We might have a small well that would build up very rapidly. We might have a well that would make only a half million feet of gas a day, but coming from only a two foot interval of sand, the permeability may be higher than in an average well. That well might build up in seven or eight days.

There's always one possibility that affects pressure build-up we try to be careful about. We might have a leak in the casing. Of course, we test our casing after we cement it, and we think it's quite doubtful that we have any leaks in any of our wells. Of course, it's only possible if there's such a condition, then the pressure would not build up to the maximum.

Now, all these things you have been talking about -- Another

thing, drainage from offset wells will prevent a well from building up to its maximum pressure. We have a number of things that tend to slow down a well from building up to its maximum pressure. The zone is tight, a leak in the casing, or production from offset wells. For that reason we have to be careful about using wells that have unusually low pressures in trying to determine the original pressure in an area.

There's a lot of things that will tend to keep the pressure down. But there's nothing that we can do to a well to create a higher pressure in it than it originally had. There's nothing we can do to that. Once we get a pressure in an area that's of a certain magnitude, we can be certain that the pressure in the area is at least that high.

Q In other words, when we try to use pressures to delineate pools, we should be very careful to use stabilized pressure?

A We should attempt to get stabilized pressure, that is true. That's the difficulty we had in the past, the operators hadn't recognized that necessity.

Q Mr. Greer, did you attempt to run an interference test across the area that you have drawn in the division line between the Fulcher-Kutz and Ballard?

A No, sir, I haven't. That would be an extremely costly experiment. The control of it would require the shutting in of a large number of wells for a period of months. We couldn't be certain that there's no communication until the wells had all built up in that area to a certain pressure, and stabilized, and then begin to produce one of them.

That would mean shutting in wells for two or three miles in that area, because we know that we can have communication over a mile or two miles within a common source of supply. So, in order to conduct such a test, as that, we would have to shut in probably 30 or 40 wells, and they would probably have to be shut in for a period of a year, and in producing the wells, you wouldn't be satisfied there is no communication until they had probably been produced for six months, and had shown no communication, Then we don't know. Some people are hard to convince, they might want another year. I wouldn't attempt such a test as that.

Q But, you agree, it would prove whether or not there was communication in that area?

A I think the millions of years they had time to equalize and didn't equalize, for just a common sense practice approach to the problem, is pretty good information.

Q You know of any other Pictured Cliffs Pools in the Basin which have pressure differential in 30 to 50 pounds?

A Oh, I think it's possible that we have been quite lax as far as the number of the pools are concerned, in trying to properly define the reservoirs. And I will grant you, it might be pretty difficult in some of them, and might even be impractical to separate some areas where you have a few marginal wells, and a few scattered lenses, but where we have a pool like the Ballard Pool, with 150 or maybe 200, or ultimately 250 wells, all within the common source of supply, all within the same reservoir, definitely the Commission should recognize that pool and produce it, and prorate it as a separate common source of supply.

Q Then you are not sure but what some of the other pools should not be broken up into two or more pools?

A Properly some of them should. South Blanco is one, and we recommend the starting point on it today.

Q As a matter of proration in the San Juan Basin, what, in your opinion, is the Commission's obligation in that regard?

A I should say that the Commission should strive to give each operator an opportunity to produce his fair share of the gas,

Q Under his individual tract?

A Well, if you want to look at it that way, he should be given his opportunity to produce his fair share of the gas. Now, that --

MR. WALKER: Shouldn't be produced under somebody else's tract, should it?

A That is right.

Q Then, if we should have different demands for different pools in the basin, which -- well, using an example of across this boundary between Fulcher-Kutz and Ballard, a distance of one location, 160-acre location, we have a different demand in Ballard than we do in Fulcher-Kutz. In relation to each pool's acreage and deliverability, then we are going to have different allowable across that quarter section, are we not?

A Yes, sir, that is correct.

Q You think that's equitable?

A It depends, Mr. Utz. The proper pool nomination for any pool or reservoir is, of course, something that is subject to several considerations. I don't think that it's absolutely essential that the allowables be the same in each pool. If they are not in communi-

cation, we cannot destroy correlative rights. There will be no migration from the pool that's produced at a higher capacity.

But, I certainly do believe that each pool should be produced as nearly in accordance with its reserves as it is practical to produce it. Now, if we have the same reserves in two different pools, then, for my own personal opinion, I think they should be attempted to be produced about the same.

Now, that, of course, is a matter between the pipeline companies and the Commission to establish these nominations. But, it certainly does not appear to me that every well in the San Juan Basin should have exactly the same allowable if it has the same deliverability of some potential, because sooner or later down the line, one of the pools is going to run out of gas and it just can't produce it.

Now, if they can adjust to where each year you take approximately the same amount of gas out of each pool, then over the life of the pool we will have what we might say is consistent withdrawals from each pool, but that can be done with your pipeline nominations and certainly should not be attempted by throwing pools together.

Q You do agree that it is possible there would be some adjustment between pools?

A Oh, I think the Commission should very definitely consider pool nominations, and try to make an equitable nomination, as far as their relation with the pipeline company is concerned, and should be careful consideration each month.

Q Did I understand you to say that you didn't think that -- we will use an example, a well of a million deliverability in one pool should be given a different allowable in another pool, wells

of equal deliverability?

A Oh, that's right. I don't believe because they have the same deliverability in different pools, that they should be given the same allowable. And the reason, as I pointed out, is because they could have different reserves in the different pools.

Q With the same deliverability?

A Oh, certainly. You could have twice as much reserve in one pool as compared to the other, and they would both have the same deliverability.

Q Then reserves and deliverability really are not, in your opinion, related?

A I didn't understand your question.

Q Then reserves and deliverability, in your opinion, aren't directly related?

A No, sir, I so testified before the Commission before, that I don't believe that the reserves and deliverability are directly related, there is a relation. In some areas, it's more a linear relation than it is in others, but definitely there is not a direct relation between deliverability and reserves, especially now that most of the wells are completed by sand fracking. Earlier in the history of the area, when all the wells were shot, we had a pretty close relation between deliverability and reserves, but now it is farther apart.

Q Do you have any opinion as to what the relarionship is?

A It varies. It varies with each pool. In Fulcher-Kutz we had the closest relation between deliverability and reserves of any area that I have studied so far. Part of that was because most of

the wells were shot, we had high connate water. Connate water is reflected by the permeability, and in turn affects the porous basin of reserves.

MR. UTZ: That's all I have.

MR. PORTER: At this time we will recess the hearing until 1:15.

(Noon recess.)

AFTERNOON SESSION, June 12, 1954, 1:15 P. M.

MR. PORTER: The meeting will come to order please. Does anybody have any more questions of Mr. Greer? Mr. Mankin.

MR. MANKIN: Warren Mankin of the Oil Conservation Commission.

By MR. MANKIN:

Q Mr. Greer, is it your testimony that the Ballard-Pictured Cliffs, which is designated in the yellow area, should not be prorated?

A Yes, sir, we have no objection to proration.

Q Including the extensions you have projected and the deletion which you have indicated?

A That is correct.

Q Is there any real reason why the blue area which has been taken from the South Blanco shown as the brown area, is there any reason why that line was drawn along the township line?

A Well, as I explained before it is an area in which we do not have as good information as we would like to have, but in general from the information we do have, it is apparent that the bulk of the wells are producing from a reservoir separate from the wells to the east in the area colored in brown, and as a starting point and until we get additional wells and additional information, we recommend that for simplicity we break the pool along the township line.

Q Was that breaking out area from the South Blanco based on pressures primarily?

A Pressures on the bulk of the wells, yes, sir.

A Pressures on the bulk of the wells, yes, sir.

Q Even though you have some wells in the blue area which are considerably higher than the normal? In other words, the wells are like the wells in the brown area?

A That is true. The bulk of the wells in the blue area have a lower pressure than the wells in the brown area.

Q There is a well in the northeast quarter of Section 12, Skelly's well, which is in the same range as the wells in the South Blanco area as you intend to leave it, is it not?

A That well shows a pressure of 840 pounds. It is surrounded by wells which shows pressure about 770 pounds. Those pressures for the most part, as near as we know, were two and three day pressures and really they are just not very good pressures for us to base a boundary on as far as the exact delineation is concerned. We just need better information in that area.

Q I believe you indicated the blue area had an average pressure of 720 pounds, am I right there?

A No, sir, it has a minimum average pressure of 720 pounds. The average I judge may be 750, just from the information we have on the short time shutin pressures.

Q But even though you have a well in this area which is considerably higher in the blue area than the other wells, that is to your best judgment at this time, a good breaking place between the two places as you could find?

A That is right. It might be an eratic well or it might be an erroneous pressure. It is only one well and has an undrilled offset to the south on which a well could be drilled in the future and on which we could determine good pressures and use information

from that to more exactly determine to which pool it would be placed.

Q On your Exhibit 1 has been marked four red quarter sections in which you have determined an impermeable barrier between the Ballard area and the area in blue. Two, you term marginal producing wells, what pool do you think they should be put into?

A The pressure characteristics insofar as they have now built up, indicate that the wells more closely fit the pressures of the Ballard Pool, and I would recommend that they be placed in the Ballard Pool. It really doesn't make much difference. They will be marginal wells in whatever pool they are placed.

Q Your Exhibit 1 reflected no particular designation for those two wells in 26, 27 north, 9 west.

A We should have brought it out and failed to do it.

Q Is it your recommendation that the other two marked as dry holes be left as is for the moment?

A That is correct.

Q Do you have any recommendation for the area now being drilled between the Fulcher Kutz as to what it should be designated or should it wait until later?

A It should wait until the wells have been completed, and we should try to get good buildup pressures on them and then determine to which pool they belong.

Q You indicated, of course, the Ballard should be immediately prorated?

A Yes, sir, we have no objection to proration.

Q The blue area which up until the present time a portion of it has been in the South Blanco and has been prorated, do you

recommend that it be prorated under another pool now instead of under the South Blanco?

A That is correct. We recommend it be prorated as a separate pool.

Q I believe you said previously this morning that there was many variances of pressures within the South Blanco. Is it your recommendation that South Blanco in the future possibly be broken apart into numerous pools instead of the one pool which we now know it as?

A I think that the answer to that question could come with time, and as operators are now aware of the necessity for obtaining good pressures and attempting to determine reservoirs. If it appears practical to do so later on, why we can consider it at that time.

Q On your Exhibit 1, I wish to call your attention in Township 26 North, 7 West in Sections 13 and 14 which is Lowry leases interests there that on a Mead well in Section 14, southeast quarter, it has a pressure of 1040 pounds and the direct offset to the east of Section 13 which is Lowry McLee Well, 875 pounds, that is about 165 pounds difference. Would you feel that would be a means of separating those as separate and distinct reservoirs?

A No, sir, I think I have explained several times to the Commission that we can't take these short time shutin pressures and make definite conclusions as to the true reservoir pressure in the area, especially to just indiscriminately pick out wells with different pressures on short time shutins. There are a number of reasons why the pressures might be a 100 or 150 pounds lower on offset wells and still be completed in the same reservoir. Unless we take these factors into consideration we can easily make a

mistake.

MR. PORTER: Mr. Kendrick.

MR. KENDRICK: Al Kendrick, Oil Conservation Commission.

By MR. KENDRICK:

Q Mr. Greer, how long would you recommend that new wells be shut in in the future, being an engineer and closely associated with the nomenclature of the San Juan Basin, if we are using pressure to determine what pool a well would be assigned in an area say between Fulcher Kutz and the area you have on Exhibit 1, colored in blue, how long a time should that well be shut in so we can determine from its pressure or its initial shutin pressure as to what pool the well should belong?

A I would like to see the well shut in about 60 days. During that time if the operator has available the engineers to test the well pressure, measurements should be made at least once every ten days so that a definite trend of the wells' buildup in pressure can be determined.

Q Would it be your recommendation that all new Pictured Cliffs wells be shut in for a period of more than 30 days after completion of drilling for the purpose of determining the proper pool for its assignment?

A No, sir. I think we can pick out areas which are critical and which are approaching reservoir boundaries than just wells in that area which we would need to spend additional time on to determine their true pressures.

Q Do you recommend that all wells drilled in the critical or controversial areas between two pools all be shut in for a period of more than 30 days?

A Insofar as it is practical I would recommend that. Especially where the pipeline connection is not available and it doesn't cost the operator any loss in production, and all it requires is taking the pressures, then I would like to see that information accumulated and I think that it would be helpful if the Commission's engineers would help the operator in making those pressure tests.

MR. KENDRICK: That's all.

MR. PORTER: Mr. Utz.

By MR. UTZ:

Q How many operators do you think would be willing to shut in a well 60 days?

A If the well does not have a pipeline connection readily available and they wouldn't lose any allowable, I believe that most operators would be willing to cooperate, especially if the Commission's engineers would go out and test the well. A lot of the operators don't have the engineers or the means to do that.

Q One point I would like to make clear, perhaps you have covered it, but if you did I missed it. In the green area or Fulcher Kutz area, what stabilized pressures and how long with the wells shut in, would you use in order to make your 30 to 50 pound comparison across the boundary that you recommend in Ballard and Fulcher Kutz?

A We don't have as good information there as we would like to have. We have two or three wells that have built up pressures in excess of seven or eight days, one of them is J., no, Frank Schultz No. 8-16-State.

Q Is that on the exhibit?

A In the southeast quarter of Section 16 and 27 north, and

9 west. After 37 days that Bell H. built up to 646.7 pounds and was put on the pipeline shortly thereafter. In the last four days it only built up three tenths of a pound, so it was, I think approaching stabilization. Those pressures are shown on our Exhibit No. 8 I believe. Another well is J. Glen Turner, No. 41-28 in the northeast quarter of Section 28 in 27, 9; that well after 57 days has built up to 637.2 pounds. In the last five days it has built up one and two tenths pounds. It conceivably could build up to the 640 pounds that the 8-16 reached. Unfortunately that's all we have in that area. It is significant, however, that none of the wells on their short time shutin pressures are in excess of 650 pounds, whereas a lot of the wells in the Ballard Field even though they were shut in seven days or less showed that much pressure.

It would be reasonable to think that if the pressure were around 670 pounds in the Fulcher Kutz area that we'd have some indication of more than 650 pounds on at least one or two of the wells.

Q Even though that is the low permeability area that you have testified to?

A The low permeability area which I referred occurs across the south half of Sections 27 and 28 on which we have already completed three wells, and they are all very poor producers. We probably won't drill a fourth location.

MR. PORTER: Mr. Gurley.

By MR. GURLEY:

Q Is it your testimony then, Mr. Greer, that you are basing your entire case more or less on the difference in pressures between the two areas nearly connected, and the low permeability of that particular area which joins your green and your yellow on your

exhibit, is that correct?

A Yes, sir, the two together, the low permeability area and the difference in pressures indicate to me a separation of the two pools.

Q But you have got production in yourlow permeability areas, is that correct?

A Oh, that is right, we can get gas out of almost any place in Pictured Cliffs formation.

Q Has it been commercial gas?

A In this particular area the wells that are completed there will never produce enough gas to pay for the cost of the drilling.

MR. PORTER: Mr. Arnold.

By MR. ARNOLD:

Q When you use the word separation as you have been using it, you don't mean complete separation?

A No, sir, I mean separation insofar as we are concerned with it over the producing life of the pool. I do not mean over geologic time there won't be some gas migrate from one time to another.

Q I wonder if it wouldn't be better to qualify the word separation.

A I would like to qualify all of my statements referring to the producing life of the field and the practical time during which we produce the wells. Really I believe that is what we are concerned with here.

MR. PORTER: Are you through, Mr. Arnold?

MR. ARNOLD: I have one other question.

Q Have you studied the north end of the Fulcher Kutz-Pictured Cliff Pool enough to come to any conclusion as to what the reasonable

stabilized pressure was there?

A In the north end of Fulcher Kutz?

Q Yes.

A I remember the original wells had pressures on the order of 575 to 585 pounds as measured at that time and with the gauges and instruments which were in use at that time. I am sure they were all dead weight tests, but it is pretty close to 575 to 585.

Q Therefore, you would have a pressure difference of approximately 60 to 65 pounds within the limits of the Fulcher Kutz Pool as you have it defined up there?

A That is correct, on approximately the south end of the original Kutz Canyon Field, the Pictured Cliffs changed into little eratic zone with eratic pressures, and there is definitely two different reservoirs in the Fulcher Kutz Pool right now. One in the north end and at least one in the south end.

MR. PORTER: Mr. Woodward.

MR. WOODWARD: John Woodward, El Paso Natural Gas Company.

By MR. WOODWARD:

Q Mr. Greer, assuming that the area marked in yellow and blue on your Exhibit No. 1 are separate reservoirs for all practical purposes, are the conditions in those two areas such as to justify adoption of the field rules and proration formula in general use throughout the Basin for prorated Pictured Cliffs Pools?

A Yes, the characteristics are enough the same for that.

MR. PORTER: Are there any other questions? Mr. Greiner.

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

By MR. GREINER:

Q Right at the end of your direct testimony, Mr. Greer, some reference was made to these contracts that you or possibly other operators had with El Paso Natural Gas Company, and I got a little bit puzzled by the character of the studies you had made. Did you work from the contracts to the reserves, or did you start from the reserves and try to see what that meant under the contracts, or was this a study to try to prove something in the light of those contracts? Just what kind of a study is this that you have made here?

A The study was made to delineate the reservoir from which our wells were producing. We're concerned particularly with J. Glenn Turner and Benson Montin wells which are for the most part in the Ballard Pool. It was definitely a reservoir study to determine the limits of that particular pool.

Q Do you feel that the provisions of the contracts that have been referred to influenced you in the conclusions that you have drawn as to the separateness of these different pools?

A No, sir.

Q I gather from the general tenor of your testimony that you have tended to regard the southern part of Fulcher Kutz and Ballard as being separate pools, and I also heard a line of questioning from Mr. Utz and Mr. Arnold which indicated that they weren't so sure whether they were separate pools or not. Without meaning to attack the conclusions which you have drawn, particularly, but just saying that perhaps there is a question of difference here in professional opinion so that perhaps it is questionable as to whether or not these are or are not a single reservoir, which do you think would have the least disruptive effect as far as the operators are

concerned, to leave the pools separate or to throw them together? Which is the more conservative approach in your opinion?

A Well, the more conservative or the least disruptive approach would be to leave the pools separate, because the problems which we are going to see in producing these pools are going to be problems which are peculiar to the reservoir from which the wells are producing. For instance, the Commission can assign us an allowable in each pool, but whether the wells can make the allowable or whether the pipeline company can take the allowable, is going to depend on problems and characteristics peculiar to each reservoir.

We have two reservoirs with different characteristics, the producing characteristics of the wells are quite different. Fulcher Kutz for the most part is composed of marginal wells with low deliverabilities, Ballard has high capacity wells, and regardless of the allowable that the Commission might assign us by throwing the pools together or leaving them separate, the particular problems which the producer is going to have with the pipeline company and which must be considered in producing the wells, are problems that are going to arise from the peculiar characteristics of the particular reservoir that we are trying to get the gas out of. For that reason the pool should be kept separate.

Q Now, taking these two pools that we have been discussing here, Fulcher Kutz and the Ballard, and assuming for the moment that they were to be combined and put under the same type proration formula as is presently in operation for Fulcher Kutz, what would the effects of that combination be, well, let's just say on the Fulcher Kutz operator since they are the only ones that have been under proration up to now?

A Well, if the same amount of gas were produced from the two areas combined as is now produced from the two areas separately and they were allocated together, the allowables of the wells in the Fulcher Kutz area would probably be higher.

Q So that looked at the other way with the same volume of gas being taken from the combined area, the amount allocated to the Ballard area would be less if it were a combined pool than if it were prorated as an individual pool, is that correct?

A That is correct.

Q Now, then, going back to the Fulcher Kutz pool with higher allowables being assigned generally there, what would the effect be within that pool as to the percentage of wells classified as marginal wells?

A Well, the percentage of wells which are marginal would be higher in the Fulcher Kutz.

Q Significantly or in minor degree only?

A Well, of course it depends on the nominations set for the pool as a whole. It could be significant.

Q It could be significant?

A I believe so.

Q Now then, under the proration type formula which we have had here, what limitations are imposed upon marginal wells by the proration order?

A I believe they are allowed to produce against the pipeline at whatever they can make against it.

Q In other words, they are just permitted to flow wide open?

A Yes, sir, in effect they are prorated on deliverability basis.

Q So that they then are just removed from the operation of the formula established for the pool as a whole, is that correct?

A That is correct.

Q By combining these pools there would then be an increase in the number of wells which would be producing without regard to the proration formula established, is that correct?

A Yes, sir, that is correct.

Q Assuming that the present formula is reasonably accurate, then this would tend to increase deviations from proper allocation of allowables in proportion to reserves, would that be a fair conclusion to draw?

A Well, yes, sir. Of course, the problems of marginal wells are remaining and it might be difficult to give them a good proration formula.

Q It certainly wouldn't help the situation, would it?

A No, sir.

Q You said that in your opinion the same proration formula should be applied in the Ballard area and in the new Southwest Blanco, if such be established as a separate pool, as is currently in effect for the Pictured Cliffs Pool?

A That is correct. Both the Ballard and the new area should have the same proration formula as the other Pictured Cliff Pools.

Q Did you intend by that recommendation to imply that in your opinion the proration formula currently in use there is perfect or beyond hope of improvement?

A No, sir. I believe our proration formula could stand some improvement, but we can't afford to change it in a pool that we produce from for this reason. If we have to change the formula and

especially in the direction that we would have reduced allowable for higher deliverability wells, then in effect that could change the pool nomination which a pipeline company could assign to our pool as a whole, and could change it downward. We feel that our proration formula should be the same as in the other pools.

Q In other words is it correct to say that you think that re-examination of the overall problem might be appropriate, but that it ought not to be done piecemeal?

A That is correct. I think our formula could stand reducing.

Q Would you recommend to this Commission when, as and if they have the time and willingness to do it, that it would be well worth while to go into that?

A Yes, sir, it is a serious problem and I think it should be reviewed.

Q Just a couple more questions. Mr. Arnold referred to the Fulcher Kutz Pool and spoke in terms of the pressure differentials within that pool. At the time of the original designation of nomenclature in that area, did it start out as the Fulcher Kutz Pool?

A It originally started out as Kutz Canyon Pool as I recall, and then was later joined with the old Fulcher Basin Pool.

Q Was there a Kutz Canyon Pool as such?

A There was originally a Kutz Canyon Pool as such.

Q And the Fulcher Basin Pool, wasn't it?

A Yes, that is correct.

Q And the two were combined to form the Fulcher Kutz Pool?

A That is correct.

Q Do you remember whether at the time of the combination did you participate in the proceedings leading up to the combination of

those two pools?

A I don't believe I participated in that.

Q So you don't know whether or not these matters were gone into at that time as to whether the pressure differentials which you have now indicated exist or did exist of the first production, should or should not have justified combination?

A I believe when the pools were joined they were producing from the same reservoir. The higher pressure area to the south has been developed since the pools have been combined.

Q I see, thank you. One last question now. Mr. Utz, in one portion of his questioning, expressed concern about a situation where we might have one man on 160 acre tract producing under one proration formula and another man on the adjoining tract producing under another formula so that perhaps the one would be getting a considerably greater allowable than the first man. How did you justify that as being in keeping with the general concept of ratable take which we have had in this state?

A Well, if the wells, even though they be offset wells, are producing from different reservoirs, then they can produce under different proration formulas, they could produce under different pool nominations, different total allowables, and there would be no cross drainage from one tract to another because they are in separate reservoirs and as such there could be no destruction of correlative rights. One man might take him a little longer to get his gas out, but if the allowables are different and if the reserves are correspondingly different, then each man will get his reserves out in the same length of time and we could conceivably have two offset wells produced at different rates from different reservoirs

and each man would be entirely protected.

Q Suppose that one of the property owners, the one with the lower allowable, were to come in and claim that his land was being drained. Would you think that the burden of proof should be on him to show that he was being drained, or on the other man to prove conclusively that he wasn't?

A If he is in a pool established as different from the producing well which he thinks is draining him, then he has no foundation. It would be, the burden of proof would be upon him to show that he was in the same pool.

Q Elsewhere in the San Juan Basin-Pictured Cliffs area, are you familiar with any instances where there will be a dry or nearly dry whole pretty well surrounded by good to medium producing wells, or just be a sudden eratic nonproducer or dry hole?

A Yes, it is possible. It has occurred.

Q There are some actual instances of that occuring?

A Yes.

Q When that happens does the presence of the dry hole tend to indicate that exactly that 160 acre drilling site is dry and that all of the others around that perfect rectangle are productive?

A No, sir.

Q And would it in your opinion be equitable for that man to come in and say, well, I just had bad luck here, but it can't be just a perfect rectangle so you fellows are bound to be draining from some part of my land and you ought to make me whole. Do you think he has a plea there or one that ought to be recognized?

A I think each man should make the gas under his tract available by drilling and properly draining his well. If he hasn't done that

and doesn't have a well capable of producing, he can't very well expect his offset operators to produce his gas and pay him for it.

Q Do you feel that this man who got assigned a somewhat lower allowable than his adjacent neighbor is in any unhappier condition than the one who had the dry hole?

A No.

MR. GREINER: Thank you.

MR. PORTER: Anyone else have a question of the witness?

MR. UTZ: Yes, sir, I have.

MR. PORTER: Mr. Utz.

By MR. UTZ:

Q Mr. Greer, are you familiar with the workings of the proration scheme in the Fulcher Kutz, in your opinion is it working protecting correlative rights and ratable take and so forth?

A It could be improved considerably, Mr. Utz. When we first talked about proration I recall making a definite recommendation as to marginal wells, which had the Commission accepted my recommendation we wouldn't have near as many problems as we have right today.

Q You mean insofar as the minimum allowable?

A That is correct.

Q Is that the only thing that you see wrong with the scheme of proration in the Fulcher Kutz?

A No, I think the proration formula could be improved. That too would help considerably the problems that are now before us.

Q I believe you testified that you think that there is actually two pools in the Fulcher Kutz, is that right?

A Yes, sir.

Q Do you think by separating those pools it would correct the

situation you have stated?

A Not necessarily, but combining them with Ballard by going around the bush is not going to especially help them either. The problem of low allowables in Fulcher Kutz should be met squarely in the face. If the pool nomination is not correct for Fulcher Kutz then it should be examined and treated directly rather than trying to go around the bush and get a higher allowable by combining it with a pool of high capacity wells.

MR. UTZ: That is all.

MR. PORTER: Anyone else have a question? Mr. Webb, have you entered all the exhibits?

MR. WEBB: I believe we have introduced them. If we haven't we tender Exhibits 1 through 8, all of which were prepared under Mr. Greer's supervision.

MR. PORTER: If there are no objections, they will be received. The witness may be excused. The next witness.

(Witness excused.)

MR. GURLEY: We have two witnesses, Mr. Arnold and Mr. Elvis Utz. It will take about five minutes for us to place our exhibits. May we have a short recess?

MR. PORTER: We will take a five minute recess.

(Recess.)

MR. PORTER: The meeting will come to order. Mr. Gurley, would you proceed with the witness.

E. C. ARNOLD

having first been duly sworn, testified as follows:

DIRECT EXAMINATION

By MR. GURLEY:

Q Would you please state your name?

A E. C. Arnold.

Q What is your position?

A Geologist with the Oil Conservation Commission.

Q Have you testified before this Commission before, Mr. Arnold?

A Yes, I have.

MR. GURLEY: Are the witness' qualifications acceptable?

MR. PORTER: They are.

Q In your official capacity with the Commission, have you had the opportunity to study the area which embodies the Fulcher Kutz and Ballard-Pictured Cliffs Gas Pools?

A Yes, I made a study of the area which embodies the Fulcher-Kutz and Ballard Pictured Cliffs Gas Pools and particularly of the area in Township 26 north, ranges 8, 9 west and Township 27 north, ranges 9 and 10 west.

Q Will you state the nature of your study and your reasons therefor?

A I have made a study of the gas development in the Pictured Cliffs sandstone in this area. For the geological study I have used electric log surveys and sample information from Commission files. I have attempted with this information to arrive at a conclusion regarding the geological characteristics of the Pictured Cliffs reservoir in this area and more particularly, to determine if there is a connection between the Fulcher Kutz and the Ballard Pictured Cliffs Pool.

Q I point out to you the map which will be marked Commission's Exhibit No. 1. Was this exhibit prepared by you, Mr. Arnold?

A Yes, it was.

Q Would you state just what this exhibit represents?

A Exhibit No. 1 is a structure contour map drawn on top of the Pictured Cliffs sandstone in this area. Drawn on this map are the Pictured Cliffs Pool boundaries in this area as defined by the Commission. I have also indicated with a red line the geographical location of the cross sections which I have made. These are indicated as AA prime, BB prime, and CC prime. These cross sections will be referred to later as Exhibits 2, 3, and 4.

GOVERNOR SIMMS: Have you marked those exhibits or are you going to mark them later?

MR. GURLEY: We have them marked. They will be marked officially a little later.

Q I will point out to you an instrument which will be marked as Commission's Exhibit 2. Was this Exhibit prepared by you?

A Yes, it was.

Q Will you state just what this exhibit represents?

A Exhibit No. 2 is the cross section in the center which is marked A-A prime. This is a cross section which I have made from the electric log surveys from the Commission files. The section is wholly within the horizontal limits of the Fulcher Kutz Pictured Cliff Pool. The datum line is indicated by the upper red line, and the sea level plus 4500 feet. The lower red line is the top of the Pictured Cliffs sandstone that is connected from well to well.

All the wells shown on this cross section are producing gas wells completed in the Pictured Cliffs formation. I think I had better read the individual wells into the record. Beginning on the west or left end and going to the east or to the right the wells are

as follows: Frontier Refining No. 1 Evensen, southeast of 19, 27, 10. No. 2 is El Paso No. 4 Pipkin, northeast of 18, 27, 10; No. 3 is El Paso No. 3 Hargrave, in the southeast of 16, 27, 10. Stanoline A-1 Eva Martin, southwest of 14, 27, 10. Southern Union No. 1 Riddle, southwest of 17, 27, 9.

Q I point out to you, Mr. Arnold, the instrument immediately to the right of Exhibit 2 and identified as Section BB prime which will be marked as Commission's Exhibit No. 3. Did you prepare this exhibit, Mr. Arnold?

A Yes.

Q Will you state just what this exhibit represents?

A Exhibit No. 3 is a cross section also made from electric log surveys. The direction of the cross section is from west to east and is wholly within the horizontal limits of the Ballard Pictured Cliffs Pool as defined by the Commission. Datum lines in the top of the Pictured Cliffs are the same on this section as on Section AA prime, the upper line being the datum, the lower line being the top of the Pictured Cliffs formation. There is considerable variation in the Pictured Cliffs Section you will note from west to east across the section. The wells on this section are from left to right or west to east, El Paso No. 48 Huerfano, southwest of 9, 26, 9. Stanolind No. 36 Huerfano, northwest of 23, 26, 9. Stanolind No. 27 Huerfano, northeast of 23, 26, 9. Southern Union No. 2 Newsom, southwest of 17, 26, 8. Southern Union No. 6 Newsom, northeast of 20, 26, 8. Southern Union No. 4-B Newsom, southwest of 15, 26, 8. Southern Union No. 1-A Newsom, southeast of 15, 26, 8.

Q Are those all producing wells, Mr. Arnold?

A Yes, sir, these are all producing wells in the Pictured Cliffs formation.

Q I point out to you, Mr. Arnold, the exhibit immediately behind you which will be marked as Commission's Exhibit No. 4. Was this exhibit prepared by you?

A Yes, sir.

Q Will you state just what this exhibit represents?

A Exhibit No. 4 is another cross section which is made from an electric log survey from Commission files. You will note that the northwest or left end of this section is within the limit of the Fulcher-Kutz Pictured Cliff Pool as defined by the Commission. The southeast or the right end is within the limits of the Ballard Pictured Cliff Pool as defined by the Commission. It therefore traverses the area between the Fulcher-Kutz and the Ballard Pool.

The upper red line is plus 4500 datum line, and the lower line, the top of the Pictured Cliffs formation. All of the wells shown on this section are producing gas wells in the Pictured Cliff formation with the exception of the Magnolia No. 1 Crandell in the northeast of 3, 26, 9. This was a Dakota test and was not completed in the Pictured Cliffs. However, there is another well now completed in that quarter section which is the J. Glenn Turner No. 19 Huerfanito Unit in the northeast of 3, 26, 9, Unit H which is completed in the Pictured Cliffs for initial potential of 970 MCF per day with a pressure of 654 pounds.

Q Now, Mr. Arnold, will you examine exhibits, reexamine Exhibits 2, 3 and 4 and state to the Commission exactly what they indicate to you?

A First I would like to state that the reason I used the par-

ticular wells that I have used on this section is because those happen to be the wells on which we had electric log surveys on file. Electric log surveys were not made on many of the wells in the area where the Ballard and Fulcher-Kutz Pools approach each other. Therefore, I realize that we have gaps in our information. Exhibits 2, 3 and 4 indicate to me that each of the wells represented on each of these cross sections is a producing gas well with the exception as I have noted, each completed in the same geological formation, namely, the Pictured Cliff Sandstone.

Exhibit No. 1 shows that the producing wells have now been drilled on offset contiguous 160 acre blocks along the boundaries of the Fulcher-Kutz and the Ballard Pictured Cliffs Pool as defined by the Commission. The electric log surveys as well as available initial potentials of wells in the zone immediately between Fulcher-Kutz and Ballard indicate that there is a low permeability area located here.

However, using the information available and based upon production as shown by these exhibits, I concluded that there is no basis for the separation of the Ballard and Fulcher-Kutz Pictured Cliff Pools from a geological standpoint.

Q Then, is it your opinion after careful examination and study of the exhibits, that the Fulcher-Kutz Gas Pool and the Ballard Pictured Cliffs Gas Pool constitute a common source of supply or a common reservoir?

A Yes, sir.

Q Do you have anything further to offer in this case, Mr. Arnold?

A Yes. I have prepared a statement concerning a depositional

environment in this portion of the Basin during Pictured Cliffs time which I would like to read into the record.

Q Proceed.

A I believe that this might shed some light on the manner in which permeability trends were developed in the Pictured Cliffs formation and why the pools have been developed in a NW to SE direction as shown on Exhibit #1.

Most authorities on the subject now agree that the Pictured Cliffs Sandstone was depositied at or near the shore line of a relatively shallow sea which was regressing from SW to NE during Pictured Cliffs time. This regression occurred due to the fact that detrital material was behing supplied at a faster rate thanthe rate of subsidence of the Basin at that time. Therefore the strand line migrated in a northeasterly direction and the Pictured Cliffs Sandstone was deposited along successive strand lines into the Basin in a Northeasterly direction.

The Gruitland formation, which consists of dark shales and coals was being deposited simultaneously in swampy and lagoonal areas on the landward side to the Southwest and the Lewis shale was being deposited in the deeper water on the Seward side to the Northeast.

As the Pictured Cliffs sea regression was caused by the rate of supply of material overbalancing the rate of subsidence of the Basin, the Pictured Cliffs Sandstone migrated upward stratigraphically as it was built further northeast. Therefore a time line drawn from Southwest to Northeast would start in the Fruitland formation, pass through a narrow section of Pictured Cliffs Sandstone and end in the Lewis shale, whereas a time line drawn

from Southeast to Northwest along the shore line at a given time would stay within the Pictured Cliffs Sandstone throughout.

Permeability differences in the Sandstone in a Northeast direction are probably very closely related to the rate of regression of the Pictured Cliffs Sea, although other factors may have contributed.

When the strand line was relatively stable for a long period of time the sand which was being deposited was washed and re-washed so that silt and finer material was removed and the sand was very well sorted. This caused the development of more permeable sands along the shore line a northwest-southeast direction.

During periods when the strand line was moving relatively rapidly in a northeast direction, wave action along the shore line did not have sufficient time to wash the silt and finer material from the sand and therefore during these periods low permeable or nonpermeable belts of sand was deposited roughly paralleling the good permeability trends and also extending in a Northwest-Southeast direction.

From the above reconstruction you would expect that the best Pictured Cliffs gas production would be found in the Northwest-Southeast trending belts separated by low or non-productive areas trending in the same direction. Development has shown this to be true.

Using the above theory in reference to the geographical location of the Fulcher-Kutz and Ballard Pictured Cliffs Pools it appears that the Pictured Cliffs Sandstone was probably deposited at the same time in both pools and that the permeability development in both pools is closely related. It is true that there are permeability differences encountered laterally along the trends. It is also

true that there appears to be an area in the South half of Township 27 N Range 9W in which Pictured Cliffs permeability is relatively low compared to areas further inside the Fulcher-Kutz or Ballard Pool boundaries.

However, based upon information presently available there is certainly no evidence that sufficient permeability was not developed throughout the area between the two pools to allow the passage of gas.

MR. GURLEY: I should like to move at this time the introduction of Exhibits 1 through 4.

MR. PORTER: Without objection they will be received.

MR. GURLEY: That is all we have from this witness.

CROSS EXAMINATION

By MR. WEBB:

Q Mr. Arnold, I noticed in your concluding statement prior to the geologic dissertation you stated that there was no basis for separation of the Fulcher-Kutz and Ballard Pools based on it from a geological standpoint. If the nature of your testimony is that insofar as geology alone there is no basis for separation of the two pools, are we then to conclude that there might not be another basis for separation?

A Well, I am sure thatsome people hold that view in the light of this morning's testimony.

Q You don't concur in the thought or the opinion of some people that engineering from a pressure data standpoint might be as valid or more valid basis of separation than geology alone?

A No, I think your statement is true that there would be times the two have to be used together, almost in all cases I would say.

Q Have you used engineering?

A I haven't prepared any exhibits from engineering data.

Q Did you take engineering into account in making the conclusion you did?

A Yes, I think that I have.

Q However, you haven't testified as to the difference of pressure between the Fulcher-Kutz and Ballard Pools, have you?

A No, I didn't testify to that.

Q But in your thinking you took that into account?

A Yes, sir. Pressure differences throughout the Pictured Cliffs formation in the San Juan Basin, you might be strictly or generally correct in stating that depending on how you approach the problem, I might end up with one Pictured Cliff Pool or five hundred Pictured Cliff Pools in the San Juan Basin from the engineering standpoint.

Q Taking the two in conjunction in the particular controversy we are discussing right now, the combination of the Fulcher-Kutz and the Ballard isn't it possible that if you considered both of them then there is a logical and rational basis of separation?

A I wouldn't say that what you are saying is impossible. However, in my opinion, from the studies that I have made, I don't believe there is enough information presently available to say that they are separated.

Q Do you think there is enough information presently available to say they should be combined?

A Well, in order to answer that question I would like to go into another matter. There seems to be some discretion as to whether or not the Oil Commission has the power to prevent

ratable, non-ratable take between adjacent pools in the same formation. If the Commission doesn't have that power, then I think before we call two pools separated, it should be proved beyond question.

Q But aren't you then putting the cart before the horse there? They are now separated and you are seeking to combine them.

A Well, their combination or separation happened a million years ago, not since we started drilling wells up there.

Q But the Commission has designated them separately within the last two or three years.

A The reason we did that, of course, was because of development. The early wells developed in Ballard were drilled several miles from the Fulcher-Kutz Pool boundary, and we had no way of knowing at that time whether or not there would be development in the area between Fulcher-Kutz and Ballard without the drilling being done first.

Q Those original wells then appeared to be in a separate pool?

A They appear to be in a separate pool because we had no foundation for putting them with any other pool at that time.

Q Now you think there might be a foundation to place them together?

A Well, I think the best foundation we have is the fact that we have drilled the area solid on contiguous 160 acre drill blocks so they are now, so there are now offset wells along the two mile common boundary, which iscertainly better grounds for saying they are together than we would have had when they first started drilling in Ballard.

Q The mere fact that they are offsetting wells doesn't

necessarily in and of itself prove they are producing from the same pool?

A No, that is right, it wouldn't, not in itself. However, I think the burden of proof should certainly be on the people who say they are separated.

MR. WEBB: I would like to make just one statement. In prefacing his answer to one of my questions, he stated that he didn't know whether it was within the Commission's power to prevent or force ratable take as between the pools. I don't think that argument or point is a proper subject of discussion in this hearing. That would be more for the Courts to determine and not for this hearing to determine.

MR. ARNOLD: Were you putting that in the form of objection to my answer?

MR. WEBB: No, just as a statement of your position. I am not going to do anything on it.

Q (by Mr. Webb.) One further point, from a geologic standpoint would you recommend the combination of the Ballard and South Blanco Pools?

A No, I believe that my testimony would show why I think there is more basis for the separation of the South Blanco and the Ballard. I think the pool map indicates that there is more basis.

Q If you drew a cross section from your C prime point in Ballard Pool up through your A prime line and then over into South Blanco, would that show approximately the same thing that these exhibits show insofar as the electric logs are concerned?

A Insofar as the electric logs are concerned it might, yes.

MR. WEBB: That is all.

MR. PORTER: Does anyone else have a question of Mr. Arnold? Mr. Woodward.

By MR. WOODWARD:

Q In fairness to yourself, Mr. Arnold, I would appreciate it if you would clarify one of your statements. You are not suggesting to this Commission that they consolidate separate reservoirs for the purpose of circumventing a statutory limitation or increasing statutory authority, I am sure, is that correct?

A You are getting over into the field of law. I am not sure I am qualified to answer it.

Q This is not a legal question. I am just asking you to clarify one of your statements or an inference that might be drawn from it. We were discussing the possible separation or consolidation of these two areas and you were taking into consideration the statutory obligation of ratable purchases within a single common source of supply. You were not suggesting to the Commission that irrespective of the geologic or engineering facts that two separate areas be combined for the purposes of circumventing or extending statutory authority?

A No, I didn't mean that at all.

Q By the same token, Mr. Arnold, you would not suggest a separation for the same purpose, is that correct?

A That is right. I say that the separation should be proved beyond any doubt before we assume that they are separate sources of supply.

Q That is as to any separate pools that have been set up heretofor by the Commission that that separation subsequently be proved beyond any doubt before the Commission refrain from

consolidation?

I think the burden of proof is ultimately a question for the Commission. I withdraw that question.

Turning to your testimony, Mr. Arnold, I believe you have testified what we have is a blanket sand in the Pictured Cliff formation with continuous permeability and porosity, is that correct?

A No, I certainly don't --

Q (Interrupting) Do you have a blanket sand along the trends running from the northwest to the southeast, particularly in the Fulcher-Kutz and Ballard area?

A I think you have all degrees of porosity and permeability. I think permeability ordinarily was developed along the northwest-southwest trending shore line, so you have your best inter-connected permeability trends running in that direction. However, you do have lateral changes along those trends and permeability also. But you have more and more rapid changes in permeability in a southwest and northeast direction, because that was the direction that the shore line was migrating.

Q You do have regional differences in permeability running along the old shore line, is that correct?

A Yes, that is correct.

Q While you have substantial initial pressure differentials in the Bulcher-Kutz and Ballard, it is your opinion that there will be a migration of gas across the area of low permeability between these two presently delineated pools?

A No, I don't contend that either because obviously the higher pressure areas of the Ballard Pool, if there was going to be any gas migration right at the present time, it would be in the other

direction, I would think.

Q That is considered a two-way stretch. Will there be a tendency to equalize the pressures in the two areas due to this permeability between the two areas?

A I would think so, yes, however I don't know how rapid --

Q (Interrupting) You don't know how rapid?

A (Continuing) -- that would be.

Q Considering they have not equalized over the last million some odd years, how long do you think it would take for those pressures to equalize?

A That's a rather academic question, so I guess I can give an academic answer.

Q An academic answer would be accepted.

A I would take the same position on that Mr. Greer took. That in all probability the Pictured Cliff gas that is being lost at the outcrop, we don't know for sure whether originally the Pictured Cliffs was one pressure throughout or not. Itmay have been at the time of accumulation, but after the Pictured Cliffs outcrop was cut so that it was brought to the surface, it is entirely possible that the movement of gas may have started toward the outcrop. This would have been complicated by the variable permeability throughout the reservoir, the low permeability areas would naturally lose their pressure slower than the good permeability areas, and I think that is borne out by the fact that we often find the highest Pictured Cliff pressures toward the edge of the good permeability trends in the areas of low permeability.

Q Let's try a direct answer instead of this academic answer. How long will it take in your expectation, for the pressures in these

two areas to equalize?

A I don't know.

Q Within the next fifteen years?

A I don't know that either.

Q Now, you say geologists are aware that the pressure differences have existed and haven't equalized over a million years?

A One of the reasons they haven't equalized is that it is being lost at the outcrop so that you have a continual movement of gas so you have a pressure gradient from the far southeast to the northwest which would certainly slow the pressures that the rate would stabilize.

Q Do you think there is any reasonable possibility now that the pressures are going to stabilize in the next fifteen years?

GOVERNOR SIMMS: Stabilize or equalize?

Q Equalize.

A No, I doubt that they do.

Q You doubt they will. You feel the rate of migration across the impermeable area between the two pools will be great or small?

A I think that that would be hard to say, probably small on the basis of the pressure information.

Q Well, just shut one of the pools in and produce the other, do you think that within the next fifteen or twenty years that the pressure in the pool that would be shut in would be materially effected?

A It might be.

Q And it might not?

A And it might not.

MR. PORTER: Anyone else have a question?

MR. GREER: I would like to ask a question.

MR. PORTER: Mr. Greer.

By MR. GREER:

Q I am a little concerned as to what you consider a pool to be. I wonder if you would tell us what you consider a pool as we are talking about it along the gas business here.

A Well, I would consider a pool a common source of supply within one reservoir with intercommunication throughout. I am not qualifying the intercommunication.

Q Now, about this intercommunication, do you feel we should be concerned with communication during the lifetime of the pool as we produce it, or are we concerned with communication over geologic time?

A We are concerned with communication over geologic time. I mean, pardon me, we are concerned with communication during the economic life of the pool. However, it's pretty hard to draw a line on that.

Q You think --

A (Interrupting) It's hard to show enough evidence as far as I am concerned, enough evidence hasn't been presented to show that there couldn't be some movement of gas even within the economic life of the field.

Q You based your thought that these pools should be combined and are one pool on geology especially your Schlumberger log, is that correct?

A That is correct. Along with, of course, I have been exposed to Pictured Cliffs pressures, and I have given that matter some consideration.

Q Just as far as your logs and the geology is concerned, are you familiar with a pool of the type we call a stratigraphic trap?

A I believe that's almost all we have in the San Juan Basin, stratigraphic traps, yes.

Q We can have say two stratigraphic traps producing from the same geologic formation, can we not?

A Yes, that's true.

Q Just because they are from the same formation doesn't necessarily of itself mean that they are producing from the same pool?

A No, that's right.

Q We could have two separate stratigraphic traps?

A Yes.

Q Could they be separated by as much as a mile and still be separate stratigraphic traps?

A If you could prove it beyond any doubt that they were separated by thirty feet it would be adequate.

Q (Interrupting) Adequate. In other words, we don't have to have a wide difference between two pools to separate them?

A No, I wouldn't say so.

Q Suppose we had a difference between two stratigraphic traps which are really two separate reservoirs, and they are a mile apart and we drill a well in one pool and drill a well in another pool and we run electric logs in both wells and we set them on a cross section such as you have done here. Could you from that cross section tell whether the wells were in one pool or two pools?

A Well, in the light of all that we have learned about the Pictured Cliffs formation, I would certainly assume that they were in the same pool until I had reason to think otherwise.

Q You would assume they were in the same pool because they both show characteristics of the electric log they are Pictured Cliff formation, they could be in two separate pools but you would consider them as one pool until proven different?

A That is right.

Q On the basis of geology, how would you go about proving whether they are in one pool or two pools? Could you drill say a number of wells in between the first two wells until you finally reached a dry hole and then base it on the dry hole?

A I wouldn't recommend doing it that way, but that would be one way to find out.

Q As a matter of fact, it is the only way to find out, isn't that true, if we use geology alone?

A That is right, and you can insofar as Pictured Cliff pressures are concerned, I also think you can take two or three avenues on your thinking there insofar as arriving at pool separation.

Q Of course, we are talking about geology. That is what you based your conclusion on, wasn't it, geology especially or primarily?

A Insofar as my exhibits are concerned.

Q I understand you didn't put on any testimony as to pressures?

A No.

Q Couldn't you have extended your cross sections in either direction to go into the West Kutz Pool into the South Blanco Pool, and shown exactly the same thing which you have shown on these cross sections?

A I believe I at least supported my cross section with the statement which I read in regard to the deposition of the Pictured Cliff Sandstone. I -- doesn't the fact that you have real good

Pictured Cliff production running in lines indicate to you that that was possibly the direction of good permeability, whereas in some of the areas, particularly to the east and west of all these pools, we have had dry holes drilled which pretty well substantiated the fact that there were completely nonpermeable belts in there.

Q Now, you started talking about permeability. We keep getting away from these cross sections which you have drawn on which you based the pool combination, and we start to talk about something else, first about pressures and then about permeability. How do you determine these permeability belts that you are talking about, from these cross sections?

A No, I would say you determine permeability belts first of all from development.

Q By development. What do you mean?

A I mean those areas which have proven to be productive by the drilling of wells.

Q By the fact that they produce gas, is that right?

A That is right.

Q Now, when you talk about production of gas we begin to talk about the movement of gas in a reservoir and pressures, do we not? What causes the gas to move in the reservoir?

A What causes it to move in a reservoir?

Q That is right.

A Pressure differences I would say.

Q So now we are getting back to the fact that you have established the permeable trends that you are talking about by movement of gas in the reservoir. You didn't establish them from your cross sections up here?

A Well, I think that you can certainly use the information to get it. I chose that place to make a cross section because of the fact based upon other things I was convinced that that was where the permeability trend lay.

Q But if you had chosen the pool in West Kutz and another in southwest and another in Jicarilla and added those wells to your cross section up here, we would see no difference?

A That is right, if you consider nothing else.

Q Except your geology?

A Not except my geology, except my sections.

Q Except what?

A The cross sections I have used here. In other words, if you use just electric log cross sections to the Pictured Cliffs formation throughout the basin, you would come up with a conclusion that many areas were the same reservoir which they actually are not.

Q Yet you use a cross section in view of this last statement, you use a cross section to show that two pools should be combined?

A To tell you the truth, the main reason I used a cross section was merely to substantiate for the record the fact that the production was coming from the same geological formation in both pools.

Q I think --

A (Interrupting) We needed to establish for the record for one thing.

Q I think that is fine. I am glad you have put that on. Nevertheless, isn't all that cross section shows is that the wells produce from the Pictured Cliffs formation? It doesn't show pool separation, it doesn't show pool boundaries?

A The cross section don't, that is correct.

Q It just shows that all the wells produce from the Pictured Cliffs formation?

A Yes.

Q So really now on your permeability trends and on your pool separations they are based, and your thinking was based on gas production?

A Well, I don't see how you can separate one from the other. I mean in an opinion you formulate over a period of time, you use all the information available.

Q Yes, you use all your information, but you told us that you couldn't determine permeability from these logs, from these cross sections.

A I don't believe I stated that you couldn't determine permeability from these cross sections because generally at least you can as you know.

Q When you talk about permeability trends, however, you based your conclusion on them from drilling of wells and from gas production from those drilled wells, did you not, for the main part?

A Yes, I would say from all three.

Q So really now, the pool separation that we are talking about, you based most of your thinking on productivity of wells and pressure related with the production, did you not?

A I don't believe I would say that all, Mr. Greer.

Q I am really interested on what you did base your thinking of permeability trends.

A I think I read a statement here which explained one reason that I think --

Q (Interrupting) You explained how it could happen.

A I explained how I thought it did happen.

Q How you thought it did happen, but in this reasoning of yours as to how the sand was layed down, you didn't and couldn't pick out on the map where these permeability trends were going to occur, could you?

A You mean now?

Q I mean from your dissertation, you couldn't go to a blank map and pick out permeable trends where they are tight streaks and where they are --

A (Interrupting) Oh, I think a lot of the development in the San Juan Basin has been done on the basis of what they call yardstick geology whereby you extend off the end, off the southeast end of the permeability trend and thereby get production, so I think that in a general way you can certainly predict where those trends will be.

Q You can extend it by extrapolation of wells which have already been drilled. Again the basic information you got from the wells that have been drilled and the production therefrom?

A I certainly don't think in the early days of Pictured Cliffs development and say the north end of the Fulcher-Kutz Pool on the first four or five wells predicted that they were going to have all these permeability trends running across the basin, no. However, I don't believe that development had gone on very long before it did become evident that for some reason those trends extended in that direction.

Q What evidence, drilled wells, produced wells, is that the evidence?

A Yes, you had to have the well drilled to know that.

Q So you base then your permeability trends, you locate them by productive and nonproductive wells or low productive wells, is that right?

A Yes, plus examination of the results when you drill a well, core analysis, electric logs, and within an area at least you can determine to some extent in a relative way from the electric log what your permeability will be.

Q Do you believe that the West Kutz Pool is in the same pool as you defined the pool as Fulcher-Kutz?

A I am not absolutely certain that it has a completely non-permeability barrier separating the two pools. However, I think that for 95% of the length of the pool it is pretty well separated.

Q You wouldn't recommend combining West Kutz and Fulcher-Kutz right now?

A No, I wouldn't because they are separated by this area which is non-productive.

Q And you don't recommend combining Ballard with all of South Blanco at this time?

A No, however, I would see no objection to the proposition which you made of also just based strictly on development basis. You will note that there is an area along the west side of Township 27 north, Range 8, west, which has not been developed. As you also see, this area has been developed toward the Fulcher-Kutz toward the Ballard Pictured Cliff.

Therefore, I believe it might be reasonable to consider taking this section, that portion of 27 north, 9 west, being in the South Blanco Pool, out of the South Blanco Pool and incorporating it with

the Fulcher-Kutz and Ballard Pool.

In order to do that, because of the area between South Blanco and Fulcher-Kutz, we would also have to include the north half of Section 2, 27, 9; northwest quarter of Section 3, 27, 9; the north half and the southwest quarter of 4, west half of 9, all of 16, all of Section 15, east half of 22, the west half of 23, northeast of 35, the west half and the southeast of Section 36, all in 27 north, 9 west.

Q In other words, wherever two pools happened to meet, if you have offset wells, then you believe that the pool should be joined into one pool, is that correct?

A Well, that particular area in 27, 9 is a little fuzzy I must admit. I am not sure, I would not be sure at the present time which pool that should properly go in on the basis --

Q (Interrupting) Do you believe that you can have offsetting wells in two different pools if the Commission recognizes it were a pool?

A I think that is possible.

Q You think this is possible?

A However, I think it would certainly be, the burden of proof would be on the one showing the area.

Q If offset wells join Township 9 between the west part of South Blanco and Fulcher-Kutz, you would recommend that they be thrown together in one pool?

A Pardon me again.

Q This area that you just gave us a description of.

A Would you just repeat?

Q If the area between the two pools which now has no wells on

it were drilled up so that there was a continuous row of wells from South Blanco to Fulcher-Kutz, would you then recommend that the pools be thrown together in one pool?

A If I become convinced they were within the same source of supply, yes.

Q On what are you going to base your conclusion that they are in one source of supply, on another cross section such as you have drawn here?

A Well, I hardly know what information I will use until I know what information will be available.

MR. GREER: That is all.

MR. PORTER: Did anyone else have a question of Mr. Arnold? Mr. Stanley.

By MR. STANELY:

Q Isn't it possible, Mr. Arnold, to go up structure in the Pictured Cliffs sand and finally produce water?

A To go up structure in a Pictured Cliffs sand?

Q Yes.

A Are you speaking --

Q (Interrupting) Aren't there certain areas in the Pictured Cliffs where the gas occurs down structure and the water up structure?

A Yes, I believe.

Q Doesn't that defy the law of gravity?

A Yes, it sure does.

Q What makes that water stay up there?

A Well, it probably is moving in. I would say what is making it stay up there, I, probably the very low permeability of the Pictured Cliff sand plus the fact there has to be a reversal in

position.

Q Well, it is possible for that water to be there because there might be an impermeable barrier at that particular point, isn't that right?

A Is your line of reasoning.

Q Well, could you pick that out on your cross sections?

A I don't believe there is any place on those cross sections where you encounter that particular type of water production. The only place that I have seen very much of that is off the west and northwest edge of the West Kutz Pool where you do seem to have water encroachment from the outcrop along the southwest edge.

Q Over a period of a million years, and over geological time, actually that water should be in the lowerest part of the Basin and gas should be up structure, shouldn't it?

A Well, maybe it should, but the fact that it isn't -- maybe you had better ask the question again.

Q Well, I was just trying to define the fact that there could be many impermeable barriers throughout the entire Pictured Cliffs sand.

A I have testified to that.

MR. STANLEY: All right.

MR. PORTER: Is that all, Mr. Stanley?

MR. STANLEY: Yes.

MR. PORTER: Anyone else have a question, Mr. Weidekehr.

MR. WEIDEKEHR: A. L. Weidekehr, Southern Union Gas Company.

By MR. WEIDEKEHR:

Q Mr. Arnold, would you point out on your Exhibit 4 I believe it is, where the present boundary between Fulcher-Kutz and Ballard

exists?

A Yes, right here.

Q Right in this particular area right here?

A Yes.

Q If you examine the rocks on each side of the two wells that we are talking about, do you find that on the left side or in the Fulcher-Kutz Pictured Cliffs field at the upper portion of the Pictured Cliffs sand, the top of it, as we determine it right under the coal seam, as being non-existent?

A On Benson-Montin Greer No. 38, 28 Huerfanito Unit, the sand in the upper part of the section is very poor for sure.

Q Would you call that sand or would you say the sand has been rewashed, or as your article said, the latter part of it, had been washed and rewashed and so it was much more shale than sand?

A I think there are a lot of areas in the Basin where you may still have sand which would almost appear like a shale on electric log. I would, the permeability is low.

Q Do you think there would be production, commercial production from the first forty feet of this Pictured Cliffs sand then to your knowledge of the one we are talking about here? The first forty feet of the Pictured Cliffs was from 2310 to 2350, forty feet you said, as I understand, do you think that would be commercially productive?

A I doubt it.

Q Then in all probability that would be an impermeable zone, as far as our lifetime is concerned, it is an impermeable zone?

A Where that particular well was drilled, yes.

Q Well, if that happened there, then is it not logical, or is

it not possible to presume that that is what happened across the boundary line, we have the impermeable barrier we have just picked up forty feet that is impermeable, couldn't the same forty feet exist between the two wells and cause the pressure differential that we know exists?

A There are no dry holes in there. That is a small producing well there all right.

Q If you moved a few feet from it, it might be a dry hole?

A Or if you moved a forty over it might be a lot better well.

Q It could work either way?

A It could work either way.

Q It would sort of logically assume, if you got between these two now, you moved over one more step both of them being poor, it sure enough would be sorry?

A That is possible.

Q Actually then, between the forty foot of Pictured Cliffs sand here and the same equivalent forty foot of Pictured Cliff sand in the Magnolia's Crandell Federal No. 1, there is a great variation in the permeability?

A Yes.

Q Through there?

A I believe I testified to that.

Q You mentioned in your testimony also that you thought that maybe the gas had been escaping, the reason for the pressure differential was due to the fact that gas had been escaping to the outcrops?

A That is a theory.

Q Now, doesn't the outcrop go all the way around the Basin?

A Yes.

Q On all sides?

A On all sides except I believe it is absent on the southeast.

Q You have to go a long ways down to find it?

A Yes.

Q Wouldn't West Kutz then outcrop here somewhere, and wouldn't Fulcher-Kutz outcrop and Aztec-Pictured Cliffs outcrop, and wouldn't Tapacito outcrop, wouldn't they outcrop both north and south?

A They certainly would, yes.

Q If they were connected together --

A (Interrupting) I haven't testified they were connected together.

Q You have testified for these two, Fulcher-Kutz and Ballard?

A But I haven't testified that South Ballard and Aztec or --

Q (Interrupting) Let's keep the two, Fulcher-Kutz and Ballard. You have testified that they are connected together. You have also testified that they would both outcrop together. If they are connected together and they do outcrop, then they would outcrop together, right?

A It would be one section of outcrop.

Q It would be one section of outcrop which would be a continuation of this, the two fields are tied together here so they would consequently be tied together at the outcrop. If that is so, then would it not be logical to assume that the pressures would have bled off together unless you had a restriction in there to keep pressure in one end of the field higher than the other one?

A Well, I think you would have a gradient from the outcrop away from the outcrop, you would start losing gas at this end

before you started losing gas at that end.

Q Unless it was bleeding through the outcrop?

A In fact, it would be a long time before you would lose any gas from that end at all.

Q I agree with that, that is fine. Why then, or how do you account for the fact that we lost gas, so much more gas from Fulcher-Kutz than we did from Ballard? We have a pressure gradient that has been tested from this end of Fulcher-Kutz right on down to this point here, and then all of a sudden we have a strand of eight or ten miles where the differential is practically non-existent. From a geological standpoint, how would you account for that?

A It is possible that within the trends you may have a great number of segments of good permeability, fair permeability, sorry permeability within a segment of very good permeability, you will come a lot closer to getting pressure stabilization all right.

Q You mean then that there is a permeability barrier of some kind, you wouldn't say it is a complete one. You would say there is a permeability barrier in there?

A I think my testimony was to that. I didn't say it was a barrier. I said an area of low permeability.

Q It could be so low that there could be no migration of gas across it through our lifetime as was discussed over here from your logs and cross section?

A That is conjectural.

Q It has as much right to be true as it has to be wrong, does it not? Is there any more reason to believe that my statement is wrong than your statement is wrong? In other words, I am trying to say that the burden of proof is on us. I want to find out why

is it on us, why isn't it --

MR. GURLEY: (Interrupting) I object to that question, if it please the Commission. It was brought out before that the burden of proof is not for this gentleman to decide as a witness.

MR. PORTER: Objection sustained.

Q Mr. Arnold, you, I believe, said if you shut in one part of a field and produced another that the pressures throughout the field might equalize. In Mr. Greer's testimony, --

A I think it is, -- I think you can assume too many things insofar as stabilized pressures are concerned.

Q Do you think they would get within fifty pounds of each other from one end of the field to the next?

A Yes, I think they would.

Q Are you familiar with the old Fulcher Basin, Kutz Canyon Field?

A Yes.

Q You know when the first production was taken from those fields, approximately?

A In about 1931 I imagine.

Q Are you familiar with the pressures that were in the developed part of the Fulcher-Kutz Fulcher Basin, Kutz Canyon Field, say in 1945 or thereabouts? Let's say '45. Are you familiar with the general average pressure in the old Fulcher-Kutz Basin Canyon Field, especially the area north of the San Juan River and the Fulcher Basin Field, do you know what they were, say ten years ago?

A I tried at one time to make a determination of what the maximum pressure was in the north end of the Fulcher Basin Field. As Mr. Greer was saying, we don't have very good information on that.

The highest pressure I encountered was 589 pounds.

Q Say in the period of 1945 before the south end of the present Fulcher-Kutz field was developed, what was the pressure in there?

A I know it was dropping off considerably.

Q Yet, as a matter of fact, you know approximately what the pressure is today?

A At what point?

Q Let's just say the area north of the San Juan River, Fulcher-Kutz Field.

A I don't know exactly. Are you speaking about stabilized pressures?

Q Well, within fifty pounds.

A Are you speaking of stabilized pressure or seven-day shutin?

Q Either way.

A Of course, I think after considerable amount of production it probably takes longer to get a stabilized pressure again, so any pressure you arrive at is going to be a weighted pressure, I would imagine between 350 and 400 pounds, but that might be a little high.

Q You suspect it would since some of them were shut in seven days, that is not a very good time, but several of them shut in, less than 375 pounds. So you have now existing between one part of your field a pressure differential from less than 300 pounds to less than 640 pounds that exists in there. If we do have drainage across that entire area, why would those pressures equalize?

A They might be in the process of equalizing.

MR. WEIDEKEHR: That is all.

MR. PORTER: Let's take a short recess.

(Recess.)

MR. PORTER: The meeting will come to order, please. Anyone else have a question of Mr. Arnold? Mr. Grenier.

By MR. GRENIER:

Q Mr. Arnold, as I understood your testimony, you stated at one point that in a situation such as this, where there was proof on the one hand tending to indicate that Fulcher-Kutz and Ballard were a single reservoir, and also other data or testimony indicating that they were separate reservoirs without practical communication between them in present economic productive time compared to geologic time, that it was your opinion that the burden of proof was upon the party who was suggesting that they be separate, is that correct?

MR. GURLEY: I object, if it please the Commission about the burden of proof.

MR. GRENIER: Well, Mr. Gurley, am I to understand that Mr. Arnold, as a long-time employee of this Commission, just doesn't have any opinion about the burden of proof?

MR. GURLEY: I am quite sure he has quite an opinion, but I don't think that he should be subjected to questions on burden of proof, because that is a legal matter and he is not a legal man.

Q Have you consulted and advised with the legal staff of the Commission as to who has the burden of proof in these matters, Mr. Arnold?

MR. GURLEY: Object, on the ground this was not covered in the direct examination and, therefore, it should not be brought up at this time.

MR. GRENIER: I think he testified this was his assumption

about what the burden of proof was, Mr. Gurley.

MR. GURLEY: He testified on cross examination, and the question was later withdrawn, I believe, as to --

MR. GRENIER: I am not talking about Mr. Woodward's question here, I am talking about the prior --

MR. GURLEY: The question I believe was asked by Mr. Woodward and he withdrew it, as to the burden of proof.

Q Let's see if we can get it this way. In the absence of any assumption on your part as to the burden of proof, Mr. Arnold, do you have any other reasons for stating that in an inconclusive situation as you seem to deem this one, the best policy would seem to be one of favoring combination of pools as opposed to separation of pools, disregarding entirely questions of burden of proof which Mr. Gurley says you may not consider or take into account?

A I believe the reason this problem first came to our attention was because of the fact that through development we reached the point where we had offset 160 acre drilling blocks within the same formation which were all producing gas.

Q Well --

A I believe, and correctly so, that we should have been concerned with whether or not they were inside the same source of supply.

Q I cannot quarrel with your concern.

A I would like to elaborate on my answer.

Q Yes, sir.

A The assumption has always been, in the San Juan Basin whether correct or not, that one well will drain at least 160 acres, that is why we have 160 acre spacing.

Therefore, if you drill in two offset 160 drill blocks, I think

it is fair to assume that there is no separation there.

Q Well, now, there was some --

A (Interrupting) Until it is proven.

Q Now, that is one element to be considered then, is proximity of wells, is that correct, Mr. Arnold?

A I would say that is one big factor.

Q Now then, on your questions of permeability, are they also to be considered, such as you and Mr. Greer were discussing when he was cross examining you?

A Yes.

Q And are questions of pressure differentials also to be considered?

A Yes, but -- I think I will just answer that yes.

Q So that, and do you feel that after having considered all these various types of data that it is clear beyond a question of doubt that these two pools are a single pool and that there is communication in there which will permit drainage from what is now the Fulcher-Kutz?

A You are now putting your question in two parts, and I don't believe I will be able to answer them both with one answer.

Q Take them one at a time please.

A Okay. The first one again?

Q Do you feel that it has been proved conclusively, after weighing all of these data, that Fulcher-Kutz and Ballard are so interconnected and that there is such communication between the pools that the one is capable of draining the other within the economic life of either of the pools?

A I think my answer to that would be that I don't know whether

there would be drainage within the economic life of a pool.

Q Well, I asked you if you thought it had been shown beyond a reasonable doubt. You answer you don't know. By that do I assume you don't feel it has been proved beyond a reasonable --

MR. GURLEY: (Interrupting) I object. This man is here as a witness to testify as to his opinion as a specialist or expert witness in his field. I can't see that he should be subjected to what has been proved or not been proved. The question should be held, in my opinion, to that which he was questioned on direct testimony and what he knows of his own knowledge.

GOVERNOR SIMMS: Just a minute. We will overrule the objection. We are getting to doing a lot of quibbling over words. Your question was --

MR. GURLEY: I was not trying --

GOVERNOR SIMMS: (Interrupting) Your question was whether or not Mr. Arnold thought it had been proved beyond a reasonable doubt that there was communication between the pools, and he said he didn't know whether there was or not. The answer to that question is no, it hasn't been proved conclusively. Now go on.

A I think I tried to answer that improperly.

Q Thank you. Now, in this situation then where we did not have conclusive proof one way or the other, what leads you to say conclusively, which is implicit to me in the recommendation you made to the Commission, the two pools be combined? What makes you feel that is the better practice, the better proration practice, the better conservation practice, than leaving them separate?

A Well, because I rather doubt that under the way proration has worked in the last six months with the pools being separate, that

they each have been prorated according to their reserves.

Q Well, has Ballard been prorated during the past six months?

A Well, I should say Ballard production against Fulcher-Kutz production.

Q Well, now, you are comparing what?

A This is what I mean. If you nominated gas for about - on the same basis it has been producing and compared that with the Fulcher-Kutz nomination as it has been, then I doubt that the two pools would be prorated on the basis of their recoverable reserves.

Q And how does that fact lead you to conclude that it is better geological and engineering and conservation practice to combine them? I may be a little dense, but I just don't follow it through.

A I think one of the things which the Commission has to consider is the protection of correlative rights, and when you prorate gas, the first thing you determine is the reserves and supposedly you fit your form and list the reserves so each operator recovers his just and equitable share of the gas. I believe in that way it's a proper matter of conservation.

Q Do correlative rights apply as between pools?

A That's a legal question which I don't feel qualified to answer.

Q Well, then, leaving out -- again it seems to me we are in an area here where you are making an assumption, then you are not qualified to make the assumption or testify about it. I just have a hard time with this.

GOVERNOR SIMMS: Mr. Grenier, he hasn't done any testifying on direct examination about the economic advisability or inadvisability

of the formulas or of the nominations or anything else. He is your witness for this purpose, you asked him that question and you are bound by it. No where in direct examination did he take up anything about the economic justice of the nominations between the two pools. This is brand new information on cross examination. Now you go ahead and develop it, but don't attack his credibility. You asked him a question he wasn't qualified as an expert to answer.

MR. GRENIER: I agree with you, Governor. Thank you.

MR. GURLEY: Go ahead, Governor.

GOVERNOR SIMMS: I don't believe he has been qualified as an expert in this field.

MR. GRENIER: No, I think it is clear he hasn't been.

GOVERNOR SIMMS: Nor did he testify on direct examination about this phase.

MR. GRENIER: I agree with you on that, sir, yes.

GOVERNOR SIMMS: Go ahead.

Q Have you given consideration in making your recommendations to the Commission as to the economic effects of combining or not combining these two pools as respects the operators in the two pools?

A I don't believe that you can work for the Commission in an area like that over a six-month's period without considering some of those things, particularly when you are making a study of this kind. I have arrived at a few conclusions as to what I think the effect would be.

Q And do you feel that the overall economic effect on all the operators in Fulcher-Kutz and Ballard Pools will be better served and that the interest of the State in providing good conservation

practice will be better protected by having them together than apart?

A I would like to point out one reason I do think so. Breaking point allowable in the Fulcher-Kutz Field on a couple of different occasions has been as low as 780 MCF per month, that is $78.00 worth of gas, for the month, I don't believe that an operator will find it economically feasible to drill additional wells for that kind of a return. I think the effect of throwing the two pools together would be to raise the breaking point in the Fulcher-Kutz Pool so that quite a large number of those small deliverability wells would become marginal wells.

Q Now again --

A (Interrupting) And I don't believe that it would greatly effect the allowables in the Ballard Pool. It would lower them somewhat.

Q But again, go back to the point we were on before. You are not expressing any opinion as to the fact that would be the only way of accomplishing this result from the information available to the Commission, you are not saying that it is or it isn't, is that correct, Mr. Arnold? I think we all agreed you are not an expert.

A No, there are other methods we could arrive at the same end result without combining the same pools, possibly insofar as proration is concerned.

Q So that this is not the only way in your opinion that this could be done, it's just a way, is that correct?

A That is right.

MR. GRENIER: Thank you.

GOVERNOR SIMMS: Anyone else have a question?

MR. KENDRICK: I have a question.

By MR. KENDRICK:

Q In the answer to Mr. Weidekehr's last question, Mr. Arnold, I believe the question was stated similar to this. I believe his question was, do you think that over a period of fifteen or twenty years that the pressures in Fulcher-Kutz Pictured Cliffs would equalize after a stated pressure difference between the north end of the Fulcher-Kutz and the south end of the Fulcher-Kutz at the present time. Do you not think that maybe Fulcher-Kutz is receiving an additional supply of gas from the south end which may be from Ballard or from a portion of South Blanco which would restore some of the pressure to the south end and at the same time I believe it's been testified that there may be leakage at the northwest end of the pool due to friction in the formation. Do you think the pressures could ever equalize under those conditions?

A Well, I think that if the gas was escaping at the outcrop, the only place you would ever reach pressure equalization completely within the reservoir would be at zero or very near that.

MR. KENDRICK: That's all.

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

(Witness excused.)

MR. PORTER: Mr. Gurley, call your next witness.

MR. GURLEY: I will call the next witness, Mr. Elvis Utz.

E L V I S U T Z

having first been duly sworn, testified as follows:

DIRECT EXAMINATION

By MR. GURLEY:

Q Would you state your name, please, sir?

A Elvis A. Utz.

Q What is your position?

A Engineer with the Oil Conservation Commission.

Q You have testified before the Commission before?

A Yes, I have.

MR. GURLEY: Are the witness's qualifications acceptable?

MR. PORTER: They are.

GOVERNOR SIMMS: As an engineer.

A Thank you.

GOVERNOR SIMMS: Go ahead.

Q Mr. Utz, in your official capacity with the Commission, have you had an opportunity to study the Fulcher-Kutz and Ballard Pictured Cliff Pools and South Blanco?

A Insofar as past production history is concerned, yes.

Q I would like to call your attention to your Exhibit No. 5 which is marked as Commission's Exhibit No. 5. Did you prepare this, Mr. Utz?

A Yes, I did.

Q Would you state just what this exhibit represents?

A This is a map of the questionable area on a one-eighth scale base map of the north part of San Juan Basin, which so includes pipelines in the entire area. The portion colored in red is all of the presently defined Fulcher-Kutz Pictured Cliffs, the lower part being what I have termed as Area A. The part in green is the now designated Ballard Pictured Cliff Pool which I have chosen to call Area C, and the part in blue is the part of Souch Blanco Pictured Cliff covered in Case 1078, which have been asked to be depleted

from the South Blanco Pictured Cliff Gas Pool.

This whole area is on production trend. I believe we are by this time familiar with the area, so there is not much use dwelling on that one.

Q I point out to you, Mr. Utz, the instrument which will be marked Commission's Exhibit No. 6. Did you prepare this Exhibit, Mr. Utz?

A Yes, I did.

Q Would you state just what the exhibit represents in the time that is covered therein?

A This exhibit is a graph showing the production history of individual wells from the period of July the 1st, 1955 to December the 31st, 1955, plotting load factors against the deliverability. The left side of the graph traces the production history of Ballard Pictured Cliffs Pool as defined during this time, and the right side portrays the production history of Fulcher-Kutz in the area of 27, 9 and 27, 10, which is the area I have chosen to call Area A.

This was prepared for the specific purpose of showing the Commission what the production history was in these two areas during this period.

By load factors, I mean this. The Commission requires a deliverability test is taken under Order 333 C and D, which is a calculated deliverability, calculated to 50% of the seven day individual well shutin pressure. The production history on the individual well production divided by the individual well calculated deliverability.

This is shown on the vertical scale. The deliverability is shown on the horizontal scale on both sides. These curves are

broken down by pipelines, Pipeline A being the green curve which jossels up and down and varies considerably, there being no wells in this range of deliverability, and shows the variation in the percentage of production as compared to the wells calculated deliverability.

As you may see, the green line varies considerably and goes up and down. This indicates that the well was not produced consistently or the various ranges of deliverabilities was not produced consistently with their calculated ability to produce.

The green, or the red curves rather, shows the load factors for Pipeline B. You will note that in the low deliverability ranges the load factor varies considerably. As a matter of fact we have one that goes up to a load factor of 8.7 times its calculated ability to produce. I am sure that if this particular well was retested, the load factor should fall somewhat lower. There is very little question in my mind but what it was an incorrect deliverability test.

You will note that the load factors vary considerably on this pipeline in the low deliverability range. As a matter of fact, the average load factor for the range from zero to 100 was 3.4, which means that during this period of six months that group of wells produced 200.4 times greater than their calculated deliverability. And, this was done against an average line pressure of 411 pounds.

As a matter of fact, that's the best group of little wells that I have seen in San Juan Basin, as I am sure that 411 pounds back pressure is substantially higher than the calculated or deliverability pressure.

On Pipeline A the load factors range from .8 to as high as 2.6.

On Pipeline B, the load factors range from .64 to as high as 9.7, which is probably an inaccurate test. But the next lowest is about 2.65. It is a considerable spread in load factors.

Pipeline A produced, took gas at an average pressure of 229 pounds for this period. Pipeline B took gas at an average pressure of 411.8 pounds. The average pipeline pressure for both pipelines was 271 pounds. The average load factor for Pipeline A was 1.10. The average load factor for Pipeline B was 1.34. In other words, Pipeline B operated its wells at about 24% higher than Pipeline A.

Now, assuming that we could have prorated Ballard Pictured Cliffs during this period, which we did not -- As a matter of fact, we couldn't have prorated Ballard Pictured Cliffs on the basis of the takes during this period because the wells were operated as 12⅓% above the calculated deliverability for the pool. Therefore, we see here in blue line probably the straightest and flatest proration curve that will ever be drawn in the Basin, because every well had to produce at 112½% of its calculated deliverability if the production had been distributed among the wells according to their calculated deliverability to produce.

This in itself with Ballard demonstrates to me that proration in the Ballard Pictured Cliffs Pool is considerably overdue. Under proration we should have a demand less than the ability of the wells to produce, and somewhat more consistent load factor. As a matter of fact, under real proration and production according to allowables, the load factors would be very consistent.

On the right hand side of this graph as I previously stated, is the same information for Area A which is the southwest part of Fulcher-Kutz.

Q This covers the same period of time, Mr. Utz?

A Exactly. Again, the drain curves indicate load factors for Pipeline A. The load, again, in the lower deliverability ranges, we have some discrepancies. As a matter of fact, they range from .25 load factor up to as high as 15.2. But I feel sure the 15.2 load factor is a bad deliverability test.

Then in the range above 100 MCF you will note that the load factors for Pipeline A are considerably more consistent in this prorated pool than they were over in Ballard. The Pipeline B load factors are shown by the shotgun pattern of red dots. These are individual well load factors. They seem to group themselves in this particular area here ranging from .43 to as high as 1.25, which is considerably more consistent than the ones shown in Ballard.

You will also note that I have shown an average six months proration curve on daily basis for the period preceeding. This little horizontal portion of the curve is the marginal wells. And marginal wells, because the demand is higher than the, or the calculated deliverability rather, calculated allowable, I will get it soon, is greater than the well's ability to produce. Therefore, the well is given a hundred percent of its ability to produce. That is its calculated ability to produce.

So, the straight line indicates the marginal wells, and you will note the sling, the curve slings down sharply and levels off as the deliverability of the wells increased. This, of course, is due to more weight being given to deliverability than is to acreage. You note further that this grouping of load factors is somewhat above the average proration curve. This is due to the fact that these wells were produced, overproduced, that is produced above

their, the wells as a group were produced somewhat above their allowables.

As a matter of fact, the wells in this area overproduced above their allowables 131, a little over 131 million cubic feet of gas for the six month period. This accounts for the fact this grouping of wells and load factors is somewhat above the proration curve. Had they produced in accordance with their allowables, these load factors would have fallen very close to the proration curve.

In this area the Pipeline A had an average load factor for the period of 1.06. Pipeline B had a load factor of .784. Pipeline B operated at a load factor of, 28% load factor higher than Pipeline A. Average line pressure to take this production for Pipeline A was 196 miles per square inch. Pipeline B was 269 pounds, an average pressure in the pool for the period, or in this area for the period of 223 pounds. This is not a high pipeline pressure.

Comparing the Fulcher-Kutz area with the Ballard area, we have a load factor for the Ballard area for this period of 1.25. For Area A we have an average load factor of .922. In other words, this area here, in spite of the fact it was produced substantially above it's allowables, had an average load factor of 20% above the Ballard Pictured Cliffs.

If Area A had been produced more in line with its allowables, the difference in load factors between the two areas would have been substantially higher due to the overproduction. This condition will persist unless these two areas are placed in one pool, or the demand for both pools distributed to each pool in their relation to each pool's acreage and deliverability bears to total acreage and

deliverability for both pools.

Now, I know I am going to be questioned as to whether this is legal or not. I don't know. I am just showing the Commission what happened.

Q Did these wells produce according to the proration schedule, Mr. Utz?

A The wells in Fulcher-Kutz?

Q Yes.

A No. They were produced above potential of their allowables, that is taking the group as an average. I believe that states my conclusion for Exhibit 6.

Q I would like to call your attention to what is marked Commission's Exhibit 7. Was this exhibit prepared by you, Mr. Utz?

A Yes, it was.

Q Would you state, please, exactly what the Exhibit No. 7 represents?

A Exhibit No. 7 is again a graph which shows the allowable versus deliverability allowable, being on the vertical scale, deliverability again being on the horizontal scale, as the demands were for the Fulcher-Kutz and Area B, and as the allocation was during the month of March. The demand for Ballard was based on what Ballard actually produced, during the month of March.

The 45 degree slope down at the lower left hand corner of the graph again indicates the marginal wells. Where the curve breaks from this point is what we term as the breaking point. All wells under the breaking point receiving a hundred percent deliverability. If Ballard had been prorating it during the month of March, 1956, in accordance to the production that was actually produced from

Ballard, the proration curve would have looked like the green line.

In other words, the breaking point would have been something like 138. A well of a thousand deliverability would have received about 540 MCF allowable per day. The well with the deliverability of 2,000 MCF would have received about 990 MCF per day. And so on up the scale.

Now, let's look at what the allowables were in the Fulcher-Kutz Pool, that is the whole Fulcher-Kutz Pool, including this area clear down to the green area, for the same period based on the demand that was actually allocated to Fulcher-Kutz Pool. We have a breaking point of something like 24 MCF. We have a well with a thousand deliverability receiving an allowable of about 90 MCF per day. We have a well with 1500 MCF deliverability receiving allowable of about 130 MCF per day.

During the same month, based on Ballard's production, a well with 1500 MCF per day deliverability would have received an allowable of about 780 MCF, quite a difference. The Fulcher-Kutz Pool is flat and this is caused by the demand being considerably lower ratio to pool's deliverability than Ballard. The nearer we get to a demand, or nearer the demand gets to the actual deliverability of a pool, the higher the breaking point becomes and the steeper the prorated well curve becomes. So, eventually you arrive at a 45 degree curve which is based strictly on deliverability.

Now, during the month of March if we had been prorating Fulcher-Kutz as a whole, Ballard as a whole, including Area B, the South Blanco, we wanted to leave or at least some people wanted to leave, the proration curve would have looked exactly like the brown curve. In other words, the area as a whole would have received slightly less

allowable in accordance to the individual well's deliverability.

As a matter of comparison, a well with a thousand deliverability would have received 450 MCF, 90 MCF per day less than Ballard would have, had it been prorated separately. A well with 1500 MCF deliverability would have received an allowable of 650 MCF, or 130 MCF less than the same size well in Ballard had it been prorated separately.

Now, if we had forgotten about Area B and prorated Fulcher-Kutz, including Area A and Ballard Pictured Cliffs, Area C, the proration curve would have looked like the green line. Very little difference from including Area B. In other words, if these pools were combined, had been prorated on the basis of March allocations and Ballard productions, the proration curve would have been substantially higher than and steeper than the Fulcher-Kutz curve alone, with not very much less than the Ballard proration curve.

In this study there were 76 wells included in the Ballard study with an average daily demand of 36,892 for the pool. The load factor that Ballard would have had to operate at was .61. In Fulcher-Kutz Pool alone, it's this blue curve, there were 320 wells with an average daily demand for the pool of 16,864, and a total pool deliverability of 42,159. The pool operated at a .40 load factor, 21% below what Ballard would have operated at had it been prorated.

The Fulcher-Kutz, Ballard combination, or the green curve, would have had a demand of 54,267 as compared to a total deliverability of 103,072, or it would have operated at a load factor of .52. By including Area B with the Fulcher-Kutz and Ballard, the daily average daily demand would have been 55,760 and a total pool daily deliverability of 106,895, or a load factor, or would have operated

at a load factor of .52.

Now, by combining these two pools, these wells would have to operate at an average load factor of .52. This is not unreasonable in view of the fact that during a six month period, the same period for which Exhibit 6 shows, that the Aztec Pool actually operated at a load factor of .54 with an average per well deliverability of 222. That is about 2% higher on actual performance basis than Ballard, than the combined Ballard and Fulcher-Kutz and Area B would have had to operate.

The South Blanco Pictured Cliffs Pool operated at an average load factor during this six months period of .58. The average well in South Blanco only had a deliverability of 281 MCF per day, which is only about 20 MCF higher than the average well for the combination of Fulcher-Kutz, Ballard and Area A -- Area B, I am sorry. The point I make in this comparison, is that as far as the ability of the wells to produce by a combining of pools, it is reasonable, because we have had pools that operated at somewhat higher load factor over a six month period when the demand was probably lower than it was in the month of March. I used March because I feel that March is an average month, and these curves shown an average condition.

As a matter of fact, the average nominations for the six months period of February 1st to August the 1st, 1956, average 16,967 for Fulcher-Kutz, and the curve demand I used for this curve here was 16,684. Therefore, how Fulcher-Kutz would undoubtedly operate during the first proration period of 1956, is very similar to this curve shown here.

By combining Fulcher-Kutz and Ballard, the allowable will be

much more ratable and consistent than they have been, in an area which I believe that Mr. Arnold has shown to be a common source of supply. To prorate these areas together is not unreasonable for the reason that I have shown by the difference in load factors in my previous statement, and I would recommend that the Commission seriously consider combining Ballard and Fulcher-Kutz in order to prohibit the inequality or non-ratable take between Area A and Area C.

We may not be able to prove conclusively there is communication across that area, but by the time we did prove it, it should be 10 or 15 years down the line, one of these areas is going to have more gas, probably going to have more gas produced than their allowables would warrant, and I don't believe I need to make a point of the fact that after the gas is produced, it's darn sure there's nobody going to be able to put it back in there and say, "You got gypped, I think you should have more gas".

As far as Area B is concerned, I don't know whether it could be included with these areas or not. I do know that there is continuous production in this portion, Section 26 and 36 and 35 and 27 north, 9 west, between the Ballard Pictured Cliffs Pool is now designated, and Area B. And I have no doubt but what there will be more wells in this so-called no man's land between these two areas which will make production continuous across this area. As to whether they are connected with the other area, I hesitate to make any recommendation. That is all I have.

MR. GURLEY: I would like to move at this time, if it please the Commission, admission of Exhibits 5, 6 and 7.

MR. PORTER: Any objection to admittance of these exhibits?

They will be admitted.

MR. GURLEY: That's allwe have.

GOVERNOR SIMMS: Let me ask you gentlemen, do you anticipate the cross examination of Mr. Utz will be pretty extensive?

MR. WOODWARD: Yes, it will.

GOVERNOR SIMMS: Fine, I don't want to be not attentive to my duties, but I have to get back and get some long distance calls and I will be happy for you to go along without me. This is very interesting to me, but I don't want to delay the proceedings. It is twenty minutes to five by my watch and I have got some calls to make and with your leave, I will go on back then and if it goes over until tomorrow I will hear some more of it, and if not, I will get briefed on it later.

(Discussion off the record.)

(Whereupon, Governor Simms leaves the hearing room.)

MR. PORTER: Are there any questions of Mr. Utz?

MR. MANKIN: I just want to clarify one point.

CROSS EXAMINATION

By MR. MANKIN:

Q Mr. Utz, you were speaking of the load factors in the Ballard during this last six months of 1955 and the load factors in Fulcher-Kutz. I believe you indicated the load factor in the Ballard Pool, the average load factor was lower than Fulcher, you meant the opposite, didn't you?

A If I indicated that, it was certainly an error. The load factor in Ballard is 1.125. The average load factor in the area is .922.

Q So the load factor in the Ballard area is higher than in

the Fulcher-Kutz, or Area A?

A By about 20%.

Q I just wanted to clarify the record because I believe you indicated the other way.

A Thank you.

MR. PORTER: Anyone else?

MR. WOODRUFF: I have some questions.

By MR. WOODRUFF:

Q I think you said the load factor in average daily production to calculating the deliverability of the well by the test required by the Commission is a percentage relationship?

A It is a percentage relationship between actual production and calculated deliverability, yes, sir.

Q Evidently in the Ballard Pictured Cliffs Pool the actual producing capacity of the wells on the average are in excess of the calculated deliverability capacity of the well, is that correct?

A Would you run that one by again, please?

Q In the Ballard Pictured Cliff Pool the actual producing capacity apparently on most of the wells is greater than the deliverability which you have plotted here, isn't that correct?

A I think that depends entirely on what line pressure those wells produced at. When you speak of ability to produce, Mr. Woodruff, you necessarily have to take into consideration what back pressure that well has to produce against.

Q Mr. Utz, isn't it true that the exhibited productive ability of these wells has shown they are capable of producing at .12 times what you have plotted on the graph?

A At a lower, substantially lower back pressure than the

calculated deliverability.

Q Assuming, Mr. Utz, that the obligation in the pool that wasn't prorated, was to produce the contractual obligation, and assuming that the contractual obligation was based on deliverability, would it then be abnormal to assume with the producing ability being greater than the calculated deliverability plotted here, that production would and could exceed the amount of gas which you might expect the wells to produce under proration?

A Well, that would depend on what you say the ability to produce is. Now, I would like, before I answer your question, I would like for you to say what the ability to produce is for a well. Is it the back pressure, the deliverability pressure, or 50% of the seven day shutin pressure, or is it at some other back pressure?

Q Well, in answering your question --

A (Interrupting) It has to be.

Q Are you referring to deliverability into a pipeline?

A Pardon.

Q Are you referring in your question, asking me to define deliverability, a deliverability into pipeline?

A I am asking you to clarify to me so I can answer your question what you mean by ability to produce.

Q The ability to produce would be the capability of the well to produce against existing line pressure.

A That being the case, and since the wells produced during this period at a back pressure substantially below the calculated deliverability pressure, or the deliverability pressure for the pool as calculated, by that I mean 50% of the average shutin pressure, seven day average shutin pressure, it would be possible to produce

at a rate higher than the calculated deliverability.

Q If your contractual obligation were to require that this would be an abnormal aspect?

A Your contractual relations with your operations, I don't think, has any bearing as far as what we should have done in the way of proration. I don't believe the Commission can prorate on contractual obligation.

Q I am asking you the reason for what you find here and ask you that question to explain that.

A In the absence of proration, I think probably you were in order to fulfill your contractual obligations.

Q Going to the Fulcher-Kutz Pictured Cliff Pool, you have taken here an outline of your Exhibit No. 5 and compared it with what allowable it would have received considering the whole Pictured Cliff Pool, is that correct, the whole Fulcher-Kutz Pictured Cliffs Pool?

A Which Exhibit were you referring to?

Q I am referring to the Fulcher-Kutz portion, Exhibit 6, and ask you if you compare the producing, the production of the wells in Area A with the allowable which the wells would have received considering the whole pool under proration.

A For the period shown on Exhibit 6, is it?

Q Right.

A In other words, the blue line is the allowable which those wells would have received under proration of the whole Fulcher-Kutz Pool, is that correct?

A That is right.

Q Is it true, during this period of time, that allowables

were assigned to wells in many instances in excess of their producing capacity?

A In this Fulcher-Kutz Area?

Q Yes.

A Taking the area as a whole, I don't believe that is true, Mr. Woodruff, because the wells, the average group of wells in that area produced above their allowable.

Q Was there not a considerable portion of the total pool demand accrued to wells in the pool which didn't have the producing ability to produce that demand?

A You are speaking primarily of the wells in the north part of the Fulcher-Kutz?

A That is right.

A During this period I believe that would be true, yes. Those marginal wells accrued substantial amounts of underage.

Q Do the rules provide that the wells would be restricted to their actual producing ability and any underate accumulated to those wells would be redistributed to the other wells in the pool, or after having been restricted to their deliverability, would not undercrue underproduction?

A I think we have gone into this before off the witness stand. There seems to be considerable differences in opinion as to what ability to produce is.

Q Mr. Utz --

A To one person ability to produce is against existing line pressures.

Q Do the rules provide, as I asked?

A Yes, they do, but there is still the question as to what

deliverability to produce is.

Q Assuming, Mr. Utz, that a number of the wells accrued under production, which it was anticipated would be redistributed under the provisions of the rules. Assuming that the pipeline company in order to meet the total market demand expressed for the area produced from those wells that could produce that much demand in excess of their current allowables, considering that the portion of the market demand allocated to those wells that couldn't make it would be redistributed, then do you anticipate that you would show a condition sufficient on Exhibit 6 for the Fulcher-Kutz Pool?

A If the wells accumulating underage had been producing against a back pressure comparable to the wells in this area, and also assuming that those wells were left open twenty-four hours a day every day during the proration period, I would say that the answer would be yes to your question.

Q Now, those wells in Area A in the Fulcher-Kutz Pool are for the most part better wells, are they not?

A Yes.

Q So that were that condition to exist, you would expect the production from those wells to exceed that which would be allowed during the period shown on your Exhibit No. 6?

A Under the conditions I stated in my previous answer, yes.

Q Now, since that time has that accumulated under production to wells which were determined to be marginal wells be redistributed to the other wells in the pool?

A It will not be distributed until the first of August.

Q Should the underproduction then be redistributed, the allowable for those wells that could produce there at market demand will be

in excess of that shown by your blue line on Exhibit 6?

A The allowable that could not have been produced and also the allowable that might could have been produced, will be distributed among these wells.

Q And would result then in a blue line if plotted at that time, more nearly in line with the actual production taken from those wells as indicated by the dots and lines for the Fulcher-Kutz Field on your Exhibit No. 6?

A Yes, for this area it would -- well, now, let's see, yes, I believe it would raise the curve somewhat.

Q Mr. Utz, on Exhibit No. 6 again, if for the Ballard Pool, approximately say half a dozen of the wells which you have plotted load factors versus deliverability for that six month period were taken off, would it not be true that the fluctuation in load factors and average load factor would be more nearly equal for the two pools?

A I don't quite follow you, Mr. Woodruff.

Q Let me restate it in a different manner. Assuming that we took the wells off that were plotted for the Ballard Pictured Cliff Pools above 1.6 load factor, would the fluctuation of your load factor curves then in the two pools be almost identical in variation of load factor?

A If that group of wells which was above 1.6, I believe you had your pencil, was retested, and we had actual deliverability, or ability to produce calculated ability to produce, they would fall farther to the right on the graph and probably fall closer in line, yes.

Q You know whether any of these wells were actually reworked

after the initial deliverability test so as to be the possible reason for the severe load factor exhibited here?

A If they were, we have no record of it, and if they were they had no deliverability tests submitted to us.

Q Actually, though, from the conditions exhibited here, very likely the condition of the well has evidenced some change from that condition at the time the deliverability test was taken?

A You must take into consideration too, Mr. Woodruff, that these wells operated at an average line pressure substantially below the deliverability pressure, calculated deliverability pressure. Therefore, their production would have been higher than their calculated deliverability which is substantiated by the blue curve.

MR. WOODWARD: If the Commission please. This matter has gotten considerably outside the area of my understanding. I am sure that the witness and Mr. Woodruff know what they are talking about. I don't. I am not sure from what the small part of this discussion I have absorbed whether under the statute some of these considerations are relevant or whether the conclusions that have been drawn have been based on valid or invalid considerations. The only way that we can possibly understand that is either through a very lengthy process of cross examination at this time, which I am afraid would not be concluded before the Commission adjourned or through further study of this matter with the idea if necessary of putting on some testimony to investigate the matter further if is given a relevant consideration. I realise that other people perhaps have business elsewhere and would like to leave, but this is a matter to which the Commission has devoted two days and it seems like an understanding of this situation here by all directly

concerned is essential. I would, therefore, move the Commission to continue this matter until tomorrow morning in order to give us an opportunity to study the testimony that has been given and the exhibits and possibly prepare some additional testimony with the idea of fully investigating this matter.

A May I ask one question?

MR. PORTER: Yes.

A Are you attempting to discredit the actualities shown, the information shown on Exhibit 6 and 7 as information not presented to the Commission?

MR. WOODWARD: No, indeed we are not trying to discredit anything. We would like to understand first the assumption which might have been made the basis on which these various exhibits have been prepared, and what they purport to show, and to investigate the relation to the statute, the relevancy of certain developments which are indicated here. I could clarify, and it would require some discussion and some quoting of scriptures here what we mean as to the relevancy of the matter. I don't think there would be any useful purpose served by going into that now. I think the chances are that we would probably need additional time. I think probably the whole proceeding would be facilitated by continuing this thing until tomorrow, two days having been contemplated here.

This is an unexpected development that seems to me goes to the entire heart of the mechanics of proration. It goes far beyond the engineering and geological question as to the connection of the two pools. We are talking about a proration problem and intimating that that proration problem might be solved by making some engineering determination in grouping these fields together, quite obviously

under the statute, the Commission is required to consider common sources as separate. They have considerable latitude, of course, in delineating them. But the fact that separation may produce certain results is not necessarily a basis for consolidation for these results are inevitable under any proration plan, and are contemplated by the statute.

It is nice to know what happens, but I am not sure that would serve as a basis for delineating the pools. That, in essence, is one thing we would like to investigate, but far more from a time consumption standpoint, I think a very careful study of this matter is in order because it does go to the heart of proration. If we are all off on the wrong foot here, I think we ought to know about it. If we are not following the statute, we ought to know about it. If these things are inevitable in any proration plan, we ought to know about it. I don't think it is a matter that should be settled out of hand. I don't know how many of the people assembled understand the questions and answers that have been asked and made. Frankly, I don't.

MR. PORTER: Is there any objection to Mr. Woodward's motion that this case be continued until tomorrow morning? If that is agreeable, we will recess and continue in the morning at nine o'clock.

MORNING SESSION, TUESDAY, JUNE 13, 1956

MR. PORTER: The meeting will come to order, please.

Mr. Webb?

MR. WEBB: If it please the Commission, we would like to at this time except to the entire body of Mr. Utz' testimony on direct examination, for the reason that we believe that approximately ninety-five per cent of the testimony was immaterial, irrelevant entirely foreign and non-germane to the primary issues involved in the call of this Hearing and properly before this Commission.

The testimony of Mr. Utz to which we object was that portion thereof which attempted, through the demonstration of certain economic facts and circumstances, to justify a consolidation of the Fulcher Kutz and Ballard-Pictured Cliff Pool. We believe that his testimony was singularly lacking in any basis or cause for this consolidation other than the economic factors. The same did not consider either engineering or geological reasons or necessities therefore.

We believe that Mr. Utz has attempted in these graphs to compare one pool, which during the period of comparison was prorated, with a pool which during the period of comparison was not prorated, and that in so doing you are comparing apples with oranges. Or has invited the Commission to compare apples with oranges.

Secondly, the wells in the Fulcher Kutz area as distinguished from the Ballard area were completed under vastly different and divergent completion practices. The wells in one area are operated by an entirely different group of operators with vastly divergent aims and economic objectives, which we believe makes the comparison

of the two areas vastly unfair and irrelevant to the issues here involved.

Fourthly, the primary portion of the gas from one field is taken by a pipeline carrier, whose market demands and contract obligations are vastly different from the primary pipeline outlet in the other area, and therefore, a comparison of their allowables, deliverabilities, load factors, is not germane here.

Lastly, one of the areas which was the subject of comparison was in a state of lush virgin production, while the production in the other area was in a state of semi-sterility insofar as the productive life of that particular pool is involved.

In short we do not believe that it is the subject of an apt comparison to compare areas where the only comparable, or only similar feature about them is that they both produce gas which will burn, and which will ultimately find its way to the burner tip in Albuquerque or Los Angeles or Seattle or elsewhere.

It is our contention that the testimony of Mr. Utz was inspired by and was directed toward a situation which was created through no fault of the Commission, through no fault of the operators, through no fault of the pipeline carriers; but which was primarily caused by the discovery in a comparatively recent period of time, of a lush field of new production which had theretofore been untapped and which during the period of comparison was not prorated but which we have recommended be prorated on the same basis as the other areas involved.

We believe that the problem which Mr. Utz has sought to solve by merely throwing it together can best be solved by the application

of the Conservation Statutes of this State, and the proration of both pools, as we believe all of the credible testimony heretofore introduced has demonstrated are separate pools.

The problem involved is one of application of the Conservation Laws of the state. If the Conservation Laws do not permit or make some unfairness impossible to get around, it is not the proper function of this Commission to attempt to circumvent those laws by throwing hodge-podge, two pools together which are not one pool.

We believe that all Mr. Utz' testimony was directed at a circumvention of the Conservation Laws of the state, and that the primary inquiry of this Hearing is whether or not these pools are in fact separate, and not inquire into how best to adjust certain economic disparities between the areas.

For that reason we respectfully urge the Commission to disregard and hold as immaterial and irrelevant all of Mr. Utz' testimony heretofore introduced.

MR. GURLEY: May I make a statement. I would like to call the attention of the Commission in the call of the Hearing matters to be considered in the above styled case will pertain to gas well spacing and gas well allowables, gas proration units and related matters.

It is our feeling that Mr. Utz' testimony is definitely within the call of the Hearing and at this time I would like to call upon him to explain to the Commission precisely what he is attempting to show by his testimony.

GOVERNOR SIMMS: I think we ought to rule on Mr. Webb's motion.

Mr. Webb, as I understand your objection, it's first, that Mr. Utz' testimony was not germane because it is a pure economic argument rather than one based on the engineering and the geological features of the delineation of the pool.

I understand secondly, that you don't think that the things he presented as such are proper comparisons for the reasons you stated.

I think very possibly that not only is this within the call of the requirement of the Hearing but I think that you opened up the economic question with Mr. Greer, who was your witness, and I will say further than that, that as far as I am concerned the exonomic factor is of great importance. We are interested in it. I think all of you are.

I think it is proper although I might have sounded technical on my ruling to Mr. Greiner, in telling him on bringing it out on cross examination he was attacking the credibility of his own witness.

Insofar as it not being a proper comparison, I believe this is expert testimony that the Commission is at liberty to take all of it or reject all of it, so you are protected. It is the feeling of the Commission that your motion should be overruled, and your objection will be noted in the record and we will go on.

MR. WEBB: If you will note my exception.

GOVERNOR SIMMS: It will be noted.

MR. WEBB: In considering the cross examination of Mr. Utz by Mr. Woodruff, which will surely follow if you keep those factors in mind, I think the Commission is not entirely capable of keeping

all factors in mind. We would like to note specifically that point, so we can argue it on final argument.

GOVERNOR SIMMS: It will be noted and it is my feeling that during the course of this Hearing that anyone could have examined Al Greer extensively about economics, or Mr. Utz, because they have both gone into it on their direct testimony and certainly they could cross examine Mr. Arnold about it, but I don't think they could cross examine him and attack his credibility when he said nothing about it on direct. We will give you wide latitude in your cross examination.

MR. GURLEY: If it is agreeable with opposing counsel I would like Mr. Utz to explain again what he is attempting to show by his testimony.

Is that agreeable with you gentlemen?

MR. WALKER: Are you going to give the same testimony you did yesterday?

MR. UTZ: No, I am going to explain very, very briefly my point in presenting this testimony. Also, make a couple of corrections.

GOVERNOR SIMMS: Does this, Mr. Utz, tend to show why you think this evidence means something, why you presented it this way? I am not clear, exactly, on what Mr. Gurley wants to bring out now.

What is this again, Mr. Gurley?

MR. GURLEY: We feel we can expedite this thing by getting it clear in the minds of everyone concerned, just what this testimony is brought forth to prove. It seems to be the general consensus it would help them considerably.

MR. WOODWARD: I think it would undoubtedly clarify matters. As I understand Mr. Utz' testimony the other day it was not for the purpose of showing whether separation did or did not exist in fact. It, in his opinion, indicated the conditions that had existed in these two areas during the past six months, separated or delineated as separate pools.

GOVERNOR SIMMS: The economic reasons for combining them for proration, regardless of whether the engineer data backs it up or not?

MR. WOODWARD: I don't know whether his purpose goes that far or not, or whether he is simply indicating what the consequences are. We have a factual question before us which must be determined, of course, on the basis of the record and the facts that are introduced.

Obviously that factual determination becomes more important as the risk of prejudice is involved, and it doesn't tend to prove or disprove a fact, as far as I can understand. It may indicate the consequences of a mis-indication.

GOVERNOR SIMMS: Go ahead, Mr. Utz.

MR. UTZ: First, my point in showing the graph shown on Exhibit 6, left hand side, was to show the need of proration in the Ballard-Pictured Cliff Pool. I would like to go a little farther with it if I may.

The red lead factors which were shown there for pipeline "B", I discovered last night are only for a period of from two to four weeks during this period, however, and they may not be as representative of all actual producing conditions for that four or five

weeks as they are now during the first months of this year. I don't know what that condition is. I have not studied it. I rather doubt that it has changed substantially, but it may have.

Therefore, the Commission may not want to consider the red load factor shown on this curve at all. I wouldn't complain if they didn't, but even without it the green load factors as shown for pipeline "A" substantially show variation in load factors which should be remedied by proration.

The second purpose in presenting the testimony was to show the history of how those two areas had been produced to adjacent areas. One, of course, under production, one under proration, one not under proration. I have no reason to believe that the productive history of Ballard-Pictured Cliff will not be carried on in the future in nominations. I have no reason to believe that they will even under proration, that they will even nominate any less.

Therefore, I have taken the only avenue available and that is past production history, to show that there has been, the way they have been produced, a discrepancy in takes between two adjacent areas. And, also, to show that it could well go on in the future unless something is done about it.

One correction I would like to make on Exhibit 7, this curve for Fulcher Kutz here was based on March allocation. The figure was somewhat erroneous due to a large amount of under production in January due to over allocation, inadvertent over allocation. Therefore, the demand for March was considerably lower than the actual production. So this curve is probably, well, it is erroneous as far as the average conditions for the first four

months of this year is concerned. The actual curve based on actual production from January through May would fall right along this area here. The breaking point would not change due to the large number of marginal wells in the Fulcher Kutz Pool, but this curve would swing up considerably and steepen, and be almost parallel with the Ballard in the same period.

The load factor for the first four months would be substantially higher than this curve would indicate but there would still be a seven per cent difference between the two pools. This condition has only been current during 1956.

As I showed yesterday, the same areas or the same pool in 1955, the last five months only had a load factor of .42, while it now has a load factor of .54. The situation has improved in this in 1956.

GOVERNOR SIMMS: Mr. Utz, let me clarify something in my own mind. At the end of your direct testimony yesterday afternoon did you say substantially or in words to this effect, that you were recommending to the Commission or asking the Commission to consider the combining of these pools for proration purposes, regardless of whether you were in a position to prove the separation or the non-separation from an engineering or technical point of view?

MR. UTZ: Yes, I did. I recommended that they do so. I could elaborate.

GOVERNOR SIMMS: You rather clearly took yourself out of the engineering field and put it on the basis of the desirability of prorationing, regardless of the engineering factors?

MR. UTZ: That is right, in order to protect correlative rights across

the area. To elaborate a little bit on that, if we do have separation across that area, I doubt that it has been proven one way or the other, but if we do have separation across this area and the whole area is allocated together, the only harm that can come to the people in Ballard-Pictured Cliff is that their allowables will be cut slightly.

If there is no communication across this area then the gas is going to be there when they want to take it. If on the other hand we leave the area separate and it comes to the fact that there is communication across the area, then we are going to have just the condition that I presented here where you could likely have unless the condition is corrected, unless the load factors are the same in this pool as they would be in this pool, then somebody is going to get hurt in one of the two areas by drainage.

MR. GURLEY: There are two, same two pipeline companies in both areas, is that correct?

MR. UTZ: That is correct, yes.

GOVERNOR SIMMS: We are all sitting down close to the front, do you need the microphone?

MR. WOODWARD: John Woodward, representing El Paso Natural Gas Company. Since last night I have gotten educated a little bit. Enough to ask some questions, maybe.

I would like to go over each of these exhibits and ask Mr. Utz if he will again explain what his various points in curves represent.

E L V I S U T Z

CROSS EXAMINATION (Continued)

BY: MR. WOODWARD:

Q As I understand it, Mr. Utz, this green line and the green points represent wells to which pipeline "A" is connected, is that correct?

A That is correct.

Q Now, the position of the green points on the graph are the load factors for these wells during a six months period?

A The average load factor.

Q The average load factor?

A That is correct.

Q Now, this load factor measures the relationship between the actual production of the well and what the well was supposed to be able to produce on its calculated deliverability, is that correct?

A That is correct.

Q We have here in the Ballard an unprorated pool, a bigger spread between the load factors and the calculated deliverabilities than we have over here in Fulcher Kutz, which is a prorated field?

A That is correct. Yes, sir.

Q That comparison leads you to believe that Ballard should be prorated?

A That is right.

Q And that is all this indicates?

A Yes, sir.

Q The only purpose of this exhibit is to indicate that this spread, through the fixing of allowables would tend, or that this spread will be reduced through a fixing of allowables for Ballard?

A Yes, sir.

Q Now, in Fulcher Kutz, which is a prorated field, it also shows a discrepancy here in the actual production and the calculated deliverability?

A Yes, it does.

Q All right, now what are some of the reasons why the well is capable of producing substantially more than its calculated deliverability?

A Variations of line pressure is one reason. The way a well is tested is one reason; to explain that a little bit, an operator may take a great deal of pains in testing a well to get a good deliverability test, then he may go home and sit in his rocking chair the rest of the year and let the well produce logged up with water half the time. When that happens the well will not produce at its most efficient rate and the lead factor will certainly vary.

Q So there are at least three conditions that would explain the variation in load factor. The initial deliverability or the calculated deliverability may be incorrect?

A It is a possibility, it is not a definite possibility. I would say there is not very much of that.

Q That is a small possibility?

A That is right.

Q The operator, through his operation, may be responsible for the fact that the well is not producing its calculated deliverability?

A That is certainly correct and I think it has happened.

Q It would not account for a production above the deliverability if he was not diligent, would it?

A Low line pressures or incorrect deliverability would cause that.

Q In other words, these points above your proration line here are accountable by reason of either low line pressure or an incorrect computation of the deliverability?

A Could be.

Q This load factor, you feel is a measure of whether the wells in the various pools and possibly between pools, are receiving their fair share of the market, is that correct?

A I think it is a very good indication.

Q Recognizing that it is a variable, or that it is subject to variations by reason of different line pressures and different deliverability calculations?

A Yes.

Q It is subject --

A (Interrupting) It is subject to that. However, we are prorating on calculated deliverability.

Q We realize that, but so far as the load factor is concerned is an indication of prejudice or not or of equity here, it is subject to variations brought about through differences in line pressure and through the inevitable mistakes that creep into any calculation?

A That is right.

Q Turning to Exhibit No. 7, will you explain again how these various curves were drawn for Ballard and Fulcher Kutz?

A The Ballard curve was drawn on the basis of production. Actual production used as a demand. The breaking point was calcu-

lated by the regular method, which I daresay you don't want to go into now.

Q No.

A And from this point up the balance of the demand, non-marginal demand is allocated to the various deliverability wells in accordance with the existing formula.

As I said, before, this was on allocation which I have corrected and have shown a new curve based on production, which I feel is much fairer in comparing the two areas. This curve is calculated on the same basis that the red curve is.

Q All right. Now, the actual production then for wells of varying deliverabilities can be spotted on this curve to indicate their production, their actual production, is that correct?

A What-- No, sir, not the individual wells actual production, what their share of the actual pool production should have been.

Q Should have been, based on the actual production and not the allowables?

A The actual pool production.

Q As redrawn it's a little difficult to see here, but there is a pencil line running here, this is the Fulcher Kutz line redrawn, is that correct?

A That is correct, based on production.

Q This line roughly parallels the red line at the present time, is that correct?

A Very closely, yes, sir.

Q Does the fact that this pencil line parallels the red line indicate that the same relationship exists between demand and

deliverability in these two pools?

A No, sir, it doesn't. It is probably co-incidental that this percentage of non-marginal allocation was the same as non-marginal allocation in the Ballard. The fact that the lines do not coincide with each other or lie on top of each other indicates there is a difference in load factors between the two pools of about seven per cent.

Q Well, now, if you had different demands for different pools, would these lines ever coincide?

A No, they never would.

Q The only way that this line could coincide with the Ballard line is to have exactly the same demand?

A In relation to pool deliverability.

Q In relationship to your pool deliverability?

A Yes, sir.

Q They can bear the same relationship, however, if they parallel. In other words, does demand in relationship to deliverability bear the same relationship as long as these lines parallel, or must they coincide?

A They must coincide in order to have the same allowable load factors.

Q But the only way they can coincide is if you did have the same demand for the pool?

A In relation to deliverability.

Q Is this variation at the present time a substantial one?

A I'd say it is probably somewhat more than it should be; however, it isn't extremely serious. I might add that the way it

operated the last six months of last year at twelve per cent difference, I believe would eventually end up in some inequities in the pools.

Q Now, the only purpose that you have introduced Exhibit 7 then, is to indicate that the, that a different relationship between demand and deliverability exists between Ballard and Fulcher Kutz, or has existed?

A Well, that is one purpose. The other purpose,of course, is to show what would happen under the same conditions by combining the two areas.

Q You would, of course, make a correction in your combined curves as a result of redrawing the Fulcher Kutz line?

A Yes, sir, these two curves would fall in above, in between these two curves and fall much closer to Ballard than they do at the present time.

GOVERNOR SIMMS: Are there any other questions?

MR. WOODWARD: We have no further questions.

GOVERNOR SIMMS: Who is next? Mr. Greer.

BY: MR. GREER:

Q We still are talking about proration and the ability of wells to make their allowable or whether or not they produce into the line, and I would like for us to get some very pertinent factors clear. Now, Mr. Utz, you recognize in production of gas along with gas well allowables that we have an entirely different problem than we do with oil in this respect, the gas well has to put its gas into a line against some operating pressure, is that not correct?

A Yes, that is quite true.

Q When the producers and the pipeline companies first get together to talk about buying and selling this gas they recognize that problem and they talk about line pressures and compression costs, and they realize that somewhere down the line in the life of the pool they may come to a point where they have difficulty in getting the gas into the line. Is that not correct?

A Yes, it is. During the latter stages of pool depletion.

Q And this comparison that you have made on load factors, you have in the Fulcher Kutz Pool some rather old wells, have you not?

A Well, older than they are in Ballard. I don't know just when those wells in Area "A", when most of them were completed, but I'd say any way two, three, or possibly more years ago. There has been some recent drilling in the area, however.

Q There are some wells in the north end of Fulcher Kutz, however, which are fifteen or twenty years old, are they not?

A Been producing since 1928.

Q Yes. Now, the reservoir pressure or the seven day pressure of wells as we take the pressures now in determining the deliverability in that area, and part of it is on the order of three hundred pounds, is it not?

A Yes, sir, the seven day shut-in pressures are on the order of three hundred pounds for the northern area. I am not speaking of area.

Q But they are within the Fulcher Kutz Pool --

A (Interrupting) That is right.

Q (Continuing) -- that we are talking about?

A Yes, sir.

Q Now, with the shut-in pressure of three hundred pounds, the deliverability pressure would be approximately one hundred fifty pounds, would it not?

A Yes, sir.

Q Now, if the deliverability pressure is one hundred fifty pounds and the line pressures, say, that the wells must produce against is two hundred pounds, what will be the relation or what approximately would be your load factor for wells in that area? Would it be more than one or less than one?

A It would be less than one.

Q It would be less than one. Now, there are some wells in that area that have been assigned allowables which they can't make, are there not?

A I am sure there have been. There is considerable underage in that area.

Q Underage has accumulated. In other words, the allowable which was figured basically on the deliverability formula and deliverability pressure of one hundred fifty pounds, we have some wells that physically cannot produce that much gas into the line at two hundred pounds, say?

A That is right.

Q Now, I gathered from your comparison that you would like to have the load factors the same in both pools, is that correct?

A Yes, I think they should be very close.

Q We can get the load factors the same by two ways. We might increase the load factor in one pool or decrease it in the other, couldn't we?

A That is quite right.

Q As to these old wells, the ones with the low pressures. The only way we can increase their load factor is to reduce the line pressure, is that not correct?

A That is right. If they are operated properly.

Q If they are operated properly. Now, suppose that the pipeline company finds it economically impractical or not feasible to lower the line pressure in the low pressure pool, then in order to bring the load factors the same we must decrease the production from the other pool, is that not right?

A That is right.

Q It would be impossible to increase the load factor in the low pressure pool?

A Well, I don't believe you are taking into consideration when you say that a balancing period, in effect what a balancing period will do is cancel the underage after it is carried for twelve months and allocate it by formula to the non-marginal wells in the pool. That, of course, evens out the load factor somewhat.

Q To a limited extent?

A Yes.

Q Don't you think that is a pretty good reason to keep pools of different pressures separated, in order to bring the load factors the same it becomes essential to cut the production in the high pressure pools, that in effect would reduce the total basin's market outlet, the total amount of gas that the basin could produce if we must always compare the low pressure pool with the high pressure pool and cut back the high pressure pool in order to balance

load factors?

A If you are speaking of, for example, of the Fulcher Kutz-Ballard thing, if the pools were separate.

Q That is right.

MR. WIEDERKEHR: What was that statement?

GOVERNOR SIMMS: He said, if he is speaking of the Fulcher Kutz-Ballard, if the pools were separate.

MR. GREINER: He is testifying now that the pools were separate.

A If the pools were separate.

MR. GREINER: I am sorry, I missed the "if".

A First, in a low pressure pool which only has shut-in pressures of, in the neighborhood of three hundred pounds, I would certainly think that the pipeline should have a lower pressure than two hundred pounds, if we are going to get any gas out of the thing at all.

The under production, that is if you had a pool with, well, with all marginal wells and then they would all be marginal wells under those conditions, I think we should recognize that fact. However, we are talking about a Fulcher Kutz Pool where there are a number of wells which have the capacity to take up that slack, or take up the under production from the marginal wells.

I believe that in itself should keep the load factors relatively high until the pool is beyond any help at all. I recognize the fact that there are certain marginal wells in the basin in every pool that the Commission can't help, and no one else can help, God included, and so all they can do is just produce whatever they will produce.

Q But all of these smaller wells that can't make their allowable do tend to give you a lower load factor which you have calculated or would calculate for that part of the pool, either Ballard as an average or between, individually?

A They would tend to if the larger wells could not take that slack. If the pool was overdominated, all to the point to where there were not enough good wells left in it in order to overproduce to take up the slack of the under production, then you definitely could have a situation that you are speaking of.

I think in considering that the load factors, in my statement that the load factors should be the same, I think that should be taken into consideration if that is the point you are making. When the pool gets to the point you just indicated, why, certainly I would want the Commission to recognize that fact.

Q You made one statement that you thought that if the wells had a shut-in pressure of three hundred pounds, that the pipeline company should operate its line at less than two hundred pounds, that is really a matter over which the Commission has no control?

A That is absolutely right, as I understand it. We can't tell the pipeline how to operate the pipeline.

Q It is the problem of the pipeline company, which gives us a very realistic problem in the production of gas in this area, is that not right?

A Yes, that is quite true, but I don't think that alleviates the Commission of the obligation to calculate allowables and to inform by a record, proration schedules, whatever operator's allowables should have been, whether he produces it or not.

Q This principle that you have applied as to Ballard and Fulcher Kutz of trying to balance load factors, actually would apply in principle the way you have applied the principle to all of the pools in the San Juan Basin regardless of their proximity, is that correct?

A I would say it should definitely apply to all pools which are served by the same pipeline system.

Q So, in other words, if the pipeline has connections in all wells in the San Juan Basin, you would recommend that all the pools be thrown together in one pool, is that what you are trying to tell us?

A No, sir, I am not recommending that. I am recommending that as a possibility. If the load factors are kept within reason between pools, then it don't make a bit of difference what you do as far as nomenclature is concerned and as far as ratable take is concerned.

Q I see. Now, who decides what the load factor will be?

A Well, up to now the pipelines have nominated, the Commission has accepted their nominations per se.

Q You don't think that the Commission can adjust that in any fashion, or attempt to adjust it, or talk about it as to each pool; or do you think it is necessary to throw them all together?

A I don't think it is necessary to throw them all together in order to get the results that I have stated should be obtained there.

Q How else could you get the results?

A By the Commission changing the demands for each pool, balancing, in other words, as between pools.

Q Would you recommend that?

A Yes, I would.

Q Don't you think that is a more practical approach than putting the pools together?

A To be perfectly frank about it, I do, but I don't know, I can't do the thinking for the Commission. I give them two avenues, that will accomplish the very same thing that I am trying to accomplish here. If they do do it I think it is the right thing to do within reason.

Q Well, I don't want to draw this out too long, but I would like to ask just two or three more questions. You made the comparison of load factors and one thing and another, then you drew a conclusion which as I understand, was to put the pools together if the load factors couldn't be adjusted or balanced, in order to protect correlative rights.

Now, I don't quite see how you go from one directly to the other. How would correlative rights be destroyed, for instance, if the pools are not combined and the load factors are different?

A We have gone through a number of Hearings all in regard to relationship of reserves and deliverability, and arrived at a proration formula, which, I may or may not agree with, is a correct relationship between, between reserve and deliverability; but which the Commission has accepted and therefore I have accepted it as the correct relationship. The allowables are assigned by that formula.

I assume, therefore, that the allowables in either of the two pools are assigned correctly insofar as their reserves are concerned, in accordance with pool demand.

Q In other words, it is your thought that correlative rights are not protected if in two separate pools, two operators have the same reserves, and one operator is allowed to produce his gas at a higher rate than the other, is that what you mean?

A If there is no connection between the two pools then it would be a matter of the operator receiving his gas sooner than the other operator.

Q But has anyone's correlative rights been destroyed? Have they been affected?

A He is not getting his fair share of the market demand for the whole area.

Q But has anyone taken away from him, has the gas been taken from anyone else?

A If the pools were separated.

Q The only way that could happen, there would have to be drainage from one area to the other?

A That is correct, and that is a possibility here.

Q You feel that is a possibility?

A Yes.

Q A real possibility?

A Yes, I think it is a real possibility.

Q I would gather from the way you presented the load factor and the fact that Fulcher Kutz has produced at a lower lead factor than Ballard, you feel that Fulcher Kutz operators then are not getting their fair share of the market, then their correlative rights are affected and they are losing gas, is that what you mean to say?

A They are not getting their fair share of the market.

Q By that you mean that their correlative rights are affected and they are losing gas, is that what you mean to say?

I believe you just said, in order for their correlative rights to be affected there has to be drainage away from the property?

A I assume that you are now getting into pressure difference between the two areas.

Q I am just asking you if that isn't what you have been telling us.

A What could happen there, Al, is that if Ballard, if there was drainage across the two areas and Ballard was operated at a substantially higher rate than Fulcher Kutz, the Fulcher Kutz people would not be getting their fair share of the market demand, but since the pressure is lower in that area there would supposedly be drainage from the Ballard area to the Fulcher Kutz area.

Q So the Fulcher Kutz people which you are talking about as being discriminated against, in effect really are the ones that are receiving the excess gas?

A If the Ballard continued to produce at a higher rate, the pressures would decrease sooner and faster at an increasing rate and eventually Ballard would drain Fulcher Kutz, if the condition persisted over a number of years.

Q As of right now and as of the time that you have set out in your exhibits, you feel that there has been no drainage from Ballard, from Fulcher Kutz to Ballard, and the Fulcher Kutz

operators have not yet suffered drainage from their property, is that correct?

A No, I don't believe they have been drained yet, and I don't believe I said that.

Q In order for them to be drained, first Ballard must be produced at a high rate until the pressures in the Ballard are lower than in Fulcher Kutz, is that what you said awhile ago?

A Substantially, yes.

MR. WOODWARD: If the Commission please, I would like to move that they disregard the testimony concerning the prejudice to the correlative rights, for the reason that the concept of correlative rights as defined in the Statute is not involved in the problem that Mr. Utz has outlined as to inter-pool discrimination.

In order to make the motion clear I would like to review with the Commission very briefly the statuatory concept under which we work, and what we feel this term "Correlative rights" means.

As defined in Section 65-3-29-H, correlative rights is said to mean, "The opportunity afforded, as far as it is practicable to do so, to the owner of each property in a pool to produce without waste his just and equitable share of the oil or gas, or both, in the pool, being an amount, so far as can be practicably determined, and so far as can be practicably obtained without waste, substantially in the proportion of the recoverable oil or gas, or both, under such property bears to total recoverable oil or gas, or both, in the pool, and for such purpose to use his just and equitable share of the reservoir energy."

You will note that the concept deals entirely with

intra-pool relationships between producers. It does not deal with inter-pool discrimination as to the takes from the pool. Other sections of the Statute deal with that subject.

It is important to know the difference in the statutory scheme with respect to the proration of gas and oil. That subject is covered in Sections 65-3-15D and 65-3-13C. Section 65-3-15D provides in part, this is the section that deals with the pipeline purchaser's obligation within the pool. Provides that "Any person now or hereafter engaged in purchasing from one or more producers, gas produced from gas wells, shall be a common purchaser thereof within each common source of supply from which it purchases, and as such it shall purchase gas lawfully produced from gas wells with which its gas transportation facilities are connected in the pool and other gas lawfully produced within the pool and tendered to a point on its gas transportation facilities."

This Statute requires the pipeline purchaser to take ratably among its connections within a pool. The object of your purpose is to see to it that the pipeline purchaser does not so discriminate in its take that it permits one operator to drain the other, particularly where the pipeline purchaser is also a producer, and the possibility of discrimination of its own production exists.

Now, the pipeline purchaser has some other obligations or operates under some other limitations. Section 65-3-13C provides, and this applies to the stand that the Commission shall follow in allocating gas production: "Whenever, to prevent waste, the total allowable natural gas production from gas wells producing from any pool in this state is fixed by the Commission in an amount

less than that which the pool can produce if no restrictions were imposed, the Commission shall allocate the allowable production among the gas wells in the pool delivering to a gas transportation facility upon a reasonable basis and recognizing correlative rights, and shall include in the proration schedule of such pool any well which it find is being unreasonably discriminated against through denial of access to a gas transportation facility which ir reasonably capable of handling the type of gas produced by such well."

It goes on to tell in protecting correlative rights the factors that the Commission can consider. This relates entirely to the distribution of the pool allowable to the wells in the pool.

Section 65-3-13D provides that,"In fixing the allowable of a pool under Section 12-(c)", which is 65-3-13C, " the Commission shall consider nominations of purchasers but shall not be bound thereby and shall so fix pool allowables as to prevent unreasonable discrimination between pools served by the same gas transportation facility by a purchaser purchasing in more than one pool."

It is clear from this statutory limitation that the purchasers obligations are fixed in large measure upon a pool basis and that a disregard of the facts, the physical facts as to whether or not separate pools exist, can immeasurably tend to increase this statutory obligation. It is quite apparent that if a purchaser has to take ratably within a pool and a pool is a fact, there is no authority for manipulating the fact for the purpose of increasing this statutory obligation.

Now, the question naturally comes to mind, is the Statute adequate. We feel that in this particular point the Statute is

adequate. There is a sound reason why it has been phrased in the manner that it has. We will attempt to indicate the basis on which this statutory scheme was drawn, why it is drawn in that way, and why as a practical matter we can not follow the plan that is set out for the proration of oil production in allocating the total demand among fields and then to producers within fields, upon the same basis as has been provided for the allocation of gas production.

Considering now what correlative rights means under the Statute, the testimony as to inter-pool discrimination, by reason of the fact that the takes from one pool are greater than another doesn't tend to prove that correlative rights as defined in the Statute have been prejudiced in any manner.

Now, I would like to talk a minute about two kinds of prejudice which we are all concerned with. There is an inevitable prejudice in fact in the production of oil or gas from any pool. Some operators will get more than their share and some will get less under any proration scheme or schedule. That is inevitable for a number of reasons. All that the State is required to do and all it can do is to afford each of them an equal opportunity of getting their fair share.

If the man does not drill his well, or he completes it in an improper fashion, or he shuts it in, or if he does not or cannot market his production, or if he contracts with a pipeline purchaser having a higher line pressure than his neighbor, or the pipeline purchaser to whom he is connected markets less gas than another system in the pool; some actual inevitable prejudice is involved.

There will be some drainage by reason of disproportionate

takes, and these disproportionate takes in the line from any field, and as Mr. Utz has stated there are some prejudices that none of us can do anything about and some disparities that none of us can do anything about.

Now, the other type of prejudice is one brought about by State action where, by some action of the Commission one operator is denied the same opportunity as another. That is the type of prejudice which we feel the Statute forbids. It goes no further than that. We have used this analogy before, that the rights of producers are a little like a couple of fellows along side a stream bailing water out with a bucket, one of the fellows bucket breaks, you can't make the other one quit bailing water that he needs until the first one gets his bucket fixed. They each had the same opportunity, there are forces that can occur and do occur which prevents them from fully realizing their opportunity.

That is not the concern of the Commission, it is beyond their jurisdiction to correct that type of prejudice short of a completely managed economy by the state. There is no way under a private enterprise system that such discrepancies can be totally prevented.

Now, we are much more concerned than just reading statutory obligations and in being as technical as we can in fulfilling obligations. We feel we have certain, not only statutory and contractual obligations but certain moral obligations. For that purpose I would like to introduce some brief testimony to indicate what our policy has been to minimize to the extent possible the prejudice between producers in the same pool and producers in the different

pools from which we take.

If the Commission please, I would like to have Mr. Norman Woodruff sworn.

GOVERNOR SIMMS: Mr. Woodward, there was a motion made that part of Mr. Utz' testimony that pertains to correlative rights be stricken, generally that the statutory definition is strictly in one pool.

If my memory serves me right, you are a protestant or you are an adversary to Mr. Utz and so is Mr. Greer, and Mr. Greer developed but I don't think has urged correlative rights on this Hearing at all except as it has been elicited by cross examination. Let me ask Mr. Greer if he is willing to have it withdrawn.

You developed it as your line of testimony. How do you feel about it?

MR. GREER: It is not entirely my line of testimony. The thing I objected to and the reason I questioned Mr. Utz, he talked about load factors and proration.

Now, proration is a part of the call of this Hearing. But he took proration and he took load factors and then he made a conclusion that the pools must be combined or correlative rights would be affected. That was Mr. Utz.

MR. WEBB: It was on his direct testimony.

GOVERNOR SIMMS: The only time I heard him answer correlative rights was in respect to the question I asked, whether or not he was urging proration regardless of the engineer background and if it was from a truly engineering standpoint. And he ended, "to protect correlative rights."

Do you have any objection to the information that you developed on cross examination on correlative rights being withdrawn?

MR. GREER: Well, yes, sir, I think it is pertinent to this.

GOVERNOR SIMMS: We have two protestants.

MR. WEBB: It is our recollection that he made a statement on direct testimony yesterday, basing his entire argument, saying that they should be combined to correct correlative rights. It is only that point that Al was going after.

GOVERNOR SIMMS: There may have been a couple of naked trivial mentions to correlative rights. It is only on this cross examination of Al Greer that it has been developed. I want to know where you stand on having Mr. Woodward move to strike your testimony.

MR. GREER: If there is a reference in his direct to correlative rights, if that will also be stricken and we will agree to strike ours on cross.

MR. STANLEY: Could we have a five minute recess?

GOVERNOR SIMMS: Sure, if you want it. The Commission will be in recess for five minutes.

(Recess.)

GOVERNOR SIMMS: The Commission will come to order.

I think that Mr. Gurley desires to make a statement before we rule on the motion.

MR. GURLEY: If it please the Commission on the motion to delete that testimony concerning correlative rights, counsel for El Paso Natural Gas Company brought out the definition of correlative

rights concerning the pool.

Calling attention to the Commission Section 65-3-28 from the Statute. I beg your pardon, 65-3-29 in the definitions, Paragraph "B", ""Pool" means an underground reservoir containing a common accumulation of crude petroleum oil or natural gas or both. Each zone of a general structure, which zone is completely," and I emphasize the word "completely", "separated from any other zone in the structure, is covered by the word "pool" as used herein. "Pool" is synonymous with "common source of supply" and with "Common reservoir."

I would like to call attention to the Commission, at no time during this Hearing has any evidence been introduced to show that the Fulcher Kutz and the Ballard-Pictured Cliff Pools are completely separated, in fact it has been generally accepted that there is a low permeability area between the two.

That in the testimony, that it was brought out that there are producing wells in the supposedly separating area, and therefore, Mr. Utz' testimony that if there is a connection between the two and correlative rights would be affected is pertinent to the case here. We therefore feel it should not be deleted from the testimony.

GOVERNOR SIMMS: Thank you Mr. Gurley.

The Commission feels that to rule favorably on Mr. Woodward's motion, I might state it was very well put and very pursuasive, would mean that in effect and of necessity we have to rule at this time that there was absolutely no communication between the two pools or the two reservoirs, and that's a matter that actually is still in issue.

And for that reason we are going to overrule you, note an exception in the record; and if the parties are through with cross examination of Mr. Utz, suggest that we will grant your request to put Mr. Norman Woodruff on the stand. Now, is there --

MR. WOODWARD: I would like to withdraw that request at this time, On reconsideration we feel that that matter is well beyond the call of this Hearing, it has gotten into a discussion, I think improperly; we therefore wish to withdraw that request.

GOVERNOR SIMMS: Are there any more cross examiners or potential cross examiners of Mr. Utz?

You will be excused as a witness, Mr. Utz, And now on our procedure here, Mr. Gurley, do you have any other witnesses for the Commission?

MR. GURLEY: That's all the witnesses we have.

MR. SIMMS: We will consider as part of the redirect that the protestants here can open their case again by putting Mr. Woodruff on if you still desire to, Mr. Woodward.

MR. WOODWARD: We have no desire to.

GOVERNOR SIMMS: Is there any other witness in the case?

Anybody wish to make a statement?

The Commission will take the case under advisement.

MR. GREINER: If it please the Commission --

GOVERNOR SIMMS: Okay. Mr. Greiner.

MR. GURLEY: If it please the Commission I was asked by Mr. Oliver Seth to read a statement into the record. I thought he was still here and would do it himself.

After a study of all available pressure, performance, and

geological data and interpretation of these data, Stanolind concludes that the presently designated Ballard Pictured Cliffs Pool is a separate and distinct reservoir from the Fulcher Kutz and South Blanco Pictured Cliffs Pools. Based on this conclusion, Stanolind desires to support the continued designation of the Ballard Pool as a separate pool. We do not believe it should be combined with the Fulcher Kutz or South Blanco Pools.

Further study of the available pressure, performance and geological information indicates to Stanolind that the wells designated in Case 1078, Township 27 North, Range 9 West are in the South Blanco Pictured Cliffs Reservoir and we therefore urge the Commission to continue prorating these wells in the South Blanco Pool.

In the event it is decided to combine the Ballard Pictured Cliffs Pool with another pool in the area, Stanolind recommends that existing proration rules of that pool be applied to the Ballard Pictured Cliffs Pool.

MR. SELINGER: We wish to object to the statement of Stanolind insofar as that part that applies to Case 1078, on the grounds that they are presenting technical testimony in the form of a statement to which we have no opportunity of cross examining the results of their, or conclusions of their statements. And therefore we wish to object to that statement insofar as it pertains to Case 1078.

GOVERNOR SIMMS: The objection will be noted, Mr. Selinger.

Are there any other statements? Mr. Greiner.

MR. GREINER: It seems to me --

GOVERNOR SIMMS: Excuse me, this is A. S. Greiner, Southern Union Gas Company.

MR. GREINER: It seems to me, speaking on behalf of Southern Union Gas Company, that the basic issues of this case came into rather sharp focus during the final cross examination of Mr. Utz by Mr. Greer.

Prior to that time we had had two witnesses. The first Mr. Greer, himself, had stated on the basis of engineering data that in his opinion these are either completely separate pools or pools so nearly completely separate for all practical purposes they should be treated as if completely separate.

We then had the testimony of Mr. Arnold who testified as a geologist, that in all of these Pictured Cliffs Pools the top of the Pictured Cliffs formation was approximately level. He said that based on that fact, as I remember his testimony, and based also on certain other engineering data which he did not go into, and which I think all of us at that time assumed the other Commission witness who was an engineer would go into, that it was his opinion that these pools might or might not be, he couldn't state permanently that they were just bound to be the same pool but there was some indication that they might be.

With that background then we came to Mr. Utz,and Mr. Utz did not do what we, perhaps, improperly, had assumed he was going to do and talk about engineering data. He instead testified as a statistician.

He compiled some production data, and showed what the effects of these pools might be if they were together or were apart and if

a particular proration formula were to be applied.

But here it seems to me is the crux of the situation. Mr. Utz told us under, in his cross examination testimony that if it were desirable to correct inequities in takes, as between these two pools, that the better remedy was not to combine the two pools together in a dubious situation, but rather take advantage of these other statutory provisions which Mr. Woodward read to the Commission, about adjusting the takes of pipeline companies between the various pools to which they were connected, that was the better remedy.

He further testified that there could be no adverse effect on correlative rights because of differences in load factors such as indicated on his exhibit unless the wells were in fact in the same pool.

He then came down to the proposition that in his opinion there had been no drainage yet, either from Fulcher Kutz to Ballard, or from Ballard to Fulcher Kutz.

Now, if there had been no drainage from Ballard to Fulcher Kutz with Fulcher Kutz having been long prior developed to Ballard, the only conclusion to be drawn from that testimony is that these must be separate pools. So there we have one Commission witness stating that he thinks maybe there is an exception. And the other one making a statement which can have no sensible basis,unless what the first man said might be true is untrue. There just could not have been ever any communication between these two pools.

GOVERNOR SIMMS: Excuse me, Mr. Greiner.

(Off the record.)

GOVERNOR SIMMS: Mr. Greiner, thank you very much, go right

ahead.

MR. GREINER: It seems to us in the light of this situation then, where we have strong testimony in the one case of the pools either are completed separate or so nearly so for all practical purposes within the proven life of these fields, they should be so considered with no testimony to the contrary except that the tops of these pools happen to fall about the same level underground, but there needs to be some very strong and compelling reason for the Commission to take the step which they are asked to take by the staff.

Yet actually, it seems to us this is an extremely premature step at this time. The only purpose of combining the pools would appear to be to prevent drainage of Fulcher Kutz properties by Ballard properties.

Since the indications of Exhibits 6 and 7 seem to be that the pool is being made harder on Ballard now than on Fulcher Kutz, and if that is so and since the testimony indicated that the pressures are still materially higher than in Ballard, than they are in the other areas, there would seem to be no present purpose to be served by a combination of the two pools.

On the contrary there would, well, there might be one result. The people in Fulcher Kutz would be pushed into a position where they would be able to sell more gas and the pipeline companies might be pushed into a position to take more gas and correspondingly those in Ballard would have it reduced.

Whether or not that is a proper objective of this Commission to help one group of people at the expense of another, I don't feel

I can say. I don't believe I would so regard it if I were on the Commission at the time there are some unhappy results of that reduction of wealth.

First of all in the Fulcher Kutz field there has been testified the results of this would be to increase materially, I believe was the phrase that the witness used, the number of wells in marginal position, that is to say wells producing unrestrictively anything and everything that they can every day of the year. True, these are little wells, but still the more marginal wells there are in the pool the less effective the proration Statute in the pool is. Because they are being allowed to produce only in relationship to deliverability in that case, and without regard to any of the other factors any geologist or reservoir engineer would consider in trying to determine reserves underlying particular tracts.

Also, it would have this result, that as to the people and the producers and the pipeline companies affected in the Ballard area; that it would be needlessly, in our opinion, interfering with legitimate and proper contractual relationships entered into in the past, and legislative procedures sought to be received at this time.

In our opinion, the balance is very clearly in leaving these pools separate at the present time where there is no danger or drainage from one pool to the other, that is to say from Fulcher Kutz to Ballard, because of the differential in pressure, and where if it is going the other way the situation is already being corrected by the larger takes currently in effect in the Ballard area.

We respectfully urge the Commission to delineate the pools as they have been generally delineated before as separate pools,

with the changes and alterations suggested by Mr. Greer in his testimony and recommend to the Commission that pending a general re-examination of the proper proration formula for the Pictured Cliff area, generally, that the same formula be applied if proration is now instituted for the Ballard Pool that is being applied in the other pools in this area, the other Pictured Cliff Pools, and that the same general pattern also be applied in the event the western portion of the South Blanco Pool is set up by itself and proration is instituted there.

Thank you very much.

GOVERNOR SIMMS: Thank you, Mr. Greiner.

Any other statements, Mr. Webb?

MR. WEBB: If it please the Commission I don't want to reiterate neither my former argument nor to duplicate Mr. Greiner's very lucid and concise comments on the evidence which has been presented to the Commission.

I only want to make this one point, it normally would be considered that the proponent of any change in the status quo as it exists at the present time would be faced with presenting a prima facie case and convincing the jurisdictional body that by the overwhelming weight of the evidence that the status quo should be changed. In this case, we believe the proponent was the Commission staff, we don't believe they have made out the prima facie case to change the status quo, and thereby consolidate the Fulcher Kutz with the Ballard Pool.

We believe that all the overwhelming weight of the evidence adduced here in the last two days is that there is conclusive

practical separation of these two pools, or these two areas. As against this, the only evidence that has been introduced is that there are certain inequities which presently exist between the two pools which are inherent in any system of proration, which cannot be overcome and circumvented by combining the two pools, and therefore compounding the inequities.

It is our belief that by prorating the Ballard Pool on the same basis as the Fulcher Kutz Pool is presently prorated, that the inequities can more nearly be made equities and thereby serve the purpose of the industry and of the Commission in regulating that industry.

I wish to thank the Commission for their tireless and very courteous treatment of everyone here today. I think that the Hearing has been one of the least vituperative but nevertheless has produced the most evidence in support of the feature and problem before the Commission.

GOVERNOR SIMMS: Thank you Mr. Webb.

Any other statements? Mr. Woodward.

MR. WOODWARD: In previous tesitmony, El Paso Natural Gas Company has pointed out significant differences in the producing characteristics of the Ballard-Pictured Cliff Pool and other Pictured Cliff Pools in its immediate area. We have heard a great deal of very able testimony on that same subject at this Hearing.

Although subsequent development has filled the gap between these pools at some points, we think such development has fully confirmed the existence of regional pressure differentials and different producing characteristics for these areas, and that the pressure

differentials have not equalized over a very substantial period of geologic time, and shown no tendency to equalize during the producing time.

While we can live with either separation of the pools with different producing characteristics or consolidation of some of them upon individual consideration, we do not think indiscriminate consolidation of Pictured Cliffs Pools as now delineated is practical or equitable. We think any conceivable benefit that might be derived from such action is out-weighed by a large number of difficulties, practical problems, operational problems and additional inequities.

Any attempt to impose a single unit allowable upon two areas having substantially different producing characteristics we will be able to produce the results satisfactory to neither.

The Commission, I am sure, is well aware of the administrative problems involved in the accumulation of underages and overages and the adjustment in allowables which they entail. These problems are inherent in any proration plan; no useful purpose is served by intensifying the disparity between capacities and allowables through consolidations of areas of different producing characteristics.

In practice, a disparity of this character results in large retroactive adjustments in allowables which make it difficult, if not impossible, for producers to plan their operations and calculate the return on their investments with any degree of certainty.

Consolidation of areas having different producing characteristics in the same pool also renders the operations of pipeline purchasers more difficult and expensive. The purchaser must meet a fluctuating demand at one end of its system through ratable pur-

chases at the other end. Some flexibility in operations is essential if the pipeline company is to satisfy both of these requirements. Temporary inequities in takes from various areas are bound to occur. Practically, these inequities can be corrected within a reasonable time only upon an area basis, in accordance with the conditions which exist in individual areas.

In separating producing areas on the basis of such conditions, or in making such a separation, we do not purport to say where the line should be drawn. Any line will be arbitrary to some extent. However, on the record in this case, we are confident that the Commission has the authority and the discretion to delineate Pictured Cliff Pools in the Basin, particularly Ballard and Fulcher Kutz, upon a reasonable and workable basis.

We think that the statutory definition of a pool is essentially a pragmatic one, it relates to a common source of supply although there may be several overlying lenses or zones, and essentially contemplates a single reservoir for all practical purposes.

Obviously, such a consideration eliminates the possibility of prejudice that would result through varying allowables as between two offset allocations having recommunication.

As long as there is no practical communication there we feel that a separation is fairly justified. As for other issues raised in the call of this Hearing, we concur in the need for field rules establishing proration and spacing units. I think the record in this case also supports the adoption of the proration formula in general use throughout the Basin.

GOVERNOR SIMMS: Thank you, Mr. Woodward.

Any other statements in this case?

MR. SELINGER: I have a statement.

GOVERNOR SIMMS: Off the record.

(Discussion off the record.)

MR. SELINGER: If the Commission please, my statement is a concluding one as an applicant in Case 1078. My statement is with respect to that case only.

The testimony presented by all the witnesses and the lack of any opposition on the part of anyone present at these two days of Hearing, indicates very conclusively that the area as indicated in Case 1078, Notice in 27-9, which has heretofore been carried in the South Blanco field, which has been depicted on Benson and Montin Exhibit No. 1 as the blue area on his exhibit, stands uncontroverted. Actually, all witnesses have recommended that that portion of 27-9 in South Blanco be deleted from the South Blanco area.

All that stands in the way of a unanimity is a bald statement on the behalf of Stanolind, to which statement we objected, in which they made a conclusion that from their study of available pressure and performance and geological information, that 27-9 portion of South Blanco should not be deleted.

We think that the testimony stands uncontroverted that 27-9 portion of South Blanco should be deleted from the South Blanco Pool.

Personally we feel that South Blanco, what I will now designate as the north Ballard, the blue area depicted on Benson and Montin Exhibit No. 1, is connected to the Ballard. We have that personal feeling; yet we have no objections to the testimony of

the witnesses and the recommendations, particularly Mr. Greer, of the separation based on the fact that apparently all the witnesses and probably all the conflicting opinions have apparently come together to the conclusion that whatever discrimination might occur can be best handled by the adjustment of nominations for the individual pools. Based on that contention I believe that the Commission could well properly handle any alleged discrimination between the north Ballard Pool and the Ballard Pool on the basis of the adjustment of nominations.

Therefore, we can see no reason why the pool delineations cannot be had as Mr. Greer has depicted on his Exhibit 1. We therefore feel that in conclusion that the Commission should grant our application in 1078 by deleting any production in 27-9 from the South Blanco Pool, and designate it as the North Ballard and place it under the same rules and regulations that exist in the area generally for the Pictured Cliff production.

GOVERNOR SIMMS: Thank you, Mr. Selinger.

Any other statements?

MR. GURLEY: If it please the Commission, on behalf of the Commission staff we have attempted to prove that the Fulcher Kutz and Ballard-Pictured Cliff Pools are one and the same reservoir.

At no time during the testimony was it brought out that there is an impermeable barrier between these two, as it was specifically set forth between that area of the South Blanco and Ballard-Pictured Cliff Pool.

We feel that the evidence adduced herein has shown that the South, or rather the Ballard-Pictured Cliff and the Fulcher Kutz

are definitely joined. We further feel that in any event, due to the present unratable take within the Ballard-Pictured Cliff Pool that proration should be established therein.

GOVERNOR SIMMS: Any other statements?

Gentlemen, the Commission will take the cases under advisement. If there are no other announcements the regular docket, I think, will start at nine tomorrow.

MR. PORTER: Right.

GOVERNOR SIMMS: Anything else?

The Commission is in recess. Thank you very much.

STATE OF NEW MEXICO)
: ss
COUNTY OF BERNALILLO)

WE, ADA DEARNLEY AND MARIANNA MEIER, Notaries Public in and for the County of Bernalillo, State of New Mexico, do hereby certify that the foregoing and attached Transcript of Proceedings before the Oil Conservation Commission for the State of New Mexico was reported by us in stenotype and reduced to typewritten transcript by us and/or under our personal supervision, and that the same is a true and correct record to the best of our knowledge, skill and ability.

WITNESS our Hands and Seals, this, the 27th day of June, 1956, in the City of Albuquerque, County of Bernalillo, State of New Mexico.

Ada Dearnley

My Commission Expires:
June 19, 1959.

Marianna Meier

My Commission Expires:
April 8, 1960.