BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
February 14, 1963

REGULAR HEARING

IN THE MATTER OF:

(Rehearing - Continued from December 19, 1962) Application of Consolidated Oil & Gas Inc., for an amendment of Order No. R-1670-C, changing the allocation formula for the Basin-Dakota Gas Pool, San Juan, Rio Arriba and Sandoval Counties, New Mexico. Applicant seeks an amendment of Order No. R-1670-C to establish an allocation formula based 60% on acreage and 40% on acreage times deliverability. The Commission will hear opening statements and under the provisions of Rule 1214, and Rule 1215, may refer the presentation of evidence concerning recoverable reserves in the Basin-Dakota Gas Pool to Daniel S. Nutter, duly appointed examiner, or A. L. Porter, Jr., alternate examiner. The Commission would then hear all closing arguments. CASE 2504

BEFORE: A. L. Porter, Jr.
E. S. (Johnny) Walker
Governor Jack Campbell

TRANSCRIPT OF HEARING

MR. PORTER: We're going to take up Case 2504. The Governor has been delayed in his return to the Hearing Hall for a few minutes, but he will be back in a few minutes.

This is an application of Consolidated Oil and Gas Company for an amendment of Order R-1670-C, changing the allocation formula for the Basin-Dakota Gas Pool, San Juan, Rio Arriba and Sandoval Counties, New Mexico.

Most of you here, of course, are familiar with what

has transpired before. I believe it was last April that we had three and a half days of hearing and one night session, after which we entered an Order R-2259 denying the application, with the finding to the effect that the evidence presented at the hearing of this case concerning recoverable gas reserves in the subject pool is insufficient to justify any change in the present allocation formula. The Applicant applied for and was granted a rehearing, and certain information was subpoenaed from individuals and companies.

As you recall, we spent quite a bit of time hearing motions to quash the subpoenas. We issued an order modifying the subpoenas. The information which we subpoenaed has been delivered to the Commission and is available here at this time.

Now, when we advertised the case for rehearing, the Commission indicated that the taking of technical testimony might be referred to an Examiner. The Commission has decided to go ahead and hear the case instead of referring it to an Examiner; so at the beginning of the case, I would like to call for appearances.

MR. KELLAHIN: Jason Kellahin, Kellahin and Fox, Santa Fe, New Mexico, appearing in behalf of the Applicant. I have associated with me Mr. T. P. Stockmar, a member of the Colorado Bar, who will handle the presentation of the case on behalf of Consolidated. I would like to also enter an appearance for Southern Union Gas Company and a new participant in this proceeding,

Benjamin K. Horton and Associates, in association with Mr. Benjamin K. Horton, who will appear in the case later today.

MR. PORTER: Mr. Federici.

MR. FEDERICI: Mr. Porter, Bill Federici of Seth, Montgomery, Federici and Andrews, on behalf of El Paso Natural Gas Company; and I have associated with me Mr. Ben Howell of El Paso, Texas, who will handle the case. On behalf of Aztec Oil and Gas Company, also, Seth, Montgomery, Federici and Andrews. Associated with me is Mr. Kenneth Swanson of the Dallas Bar, who will handle the case. I have also the following appearances for Seth, Montgomery, Federici and Andrews: Sunset International Petroleum Corporation and Calkins Oil Company.

MR. PORTER: Mr. Keleher.

MR. KELEHER: If the Commission please, W. A. Keleher, counsel for Pubco, Albuquerque.

MR. PORTER: Mr. Verity.

MR. VERITY: George L. Verity for Southwest Production Company.

MR. PORTER: Mr. Kelly.

MR. KELLY: Booker Kelly of Gilbert, White and Gilbert in Santa Fe, appearing on behalf of Skelly Oil Company; and I have Mr. George Selinger associated with me; and also appearing on behalf of DX Oil Company, and Mr. Loehr is associated with me; and also appearing on behalf of Texaco Oil Company.

MR. PORTER: Mr. Bratton.

MR. BRATTON: Howard Bratton, Roswell, associated with Mr. Robert Wein of Dallas, on behalf of Delhi Taylor Oil Corporation. In addition, Humble Oil and Refining Company would like to enter a statement in the proceedings. I would like to ask the Commission at this time, to request that statements, written statements of position be heard or received by the Commission within a period of twenty days after the hearing is concluded.

MR. PORTER: Would there be any opposition to the period of time requested for filing statements?

MR. KELLAHIN: Is counsel referring to statements or briefs or just what does he contemplate?

MR. BRATTON: Just the normal statement of position.

MR. KELLAHIN: We certainly have no objection to that.

MR. PORTER: Then the Commission will grant a period of twenty days from the date of the closing of this hearing in which to file statements. Are there other appearances? Mr. Buell.

MR. BUELL: For Pan American Petroleum Corporation, Guy Buell.

MR. PORTER: Mr. Hampton.

MR. HAMPTON: Ken Hampton, appearing on behalf of Marathon Oil Company.

MR. PORTER: The Commission will recognize Mr. Kellahin, the attorney for the Applicant.

GOVERNOR CAMPBELL: May I, since I didn't participate in the original hearing and this is a re-hearing, as I understand it, have for the record an indication of whether there's any objection to my participating in the re-hearing proceedings, since I did not participate in the original hearing? I have no great desire to do it.

MR. KELLAHIN: We certainly have no objection and welcome your participation in the case. In that connection, am I correct that the record in the preceding hearings is a part of the record in this case today?

MR. PORTER: The record of the previous hearings will be made a part of this record.

MR. FEDERICI: Governor, we certainly have no objection to your hearing the case.

MR. KELEHER: Pubco has no objection, and let the record show that insofar as we are concerned, the Governor may read the transcript of the record in the prior proceeding, with the understanding that it will serve to the same extent as if he had been personally present.

MR. WALKER: Mr. Porter, the Land Commissioner has no objection to the Governor sitting in on this case.

MR. PORTER: Mr. Kellahin.

MR. KELLAHIN: Mr. Stockmar will proceed.

MR. PORTER: Is Mr. Stockmar to make the opening statement?

MR. KELLAHIN: Yes.

MR. PORTER: Mr. Stockmar.

MR. STOCKMAR: Gentlemen of the Commission, I first would like to thank Mr. Porter for summarizing what has transpired in the year past. It will shorten my statement somewhat.

This entire Case No. 2504 to date has been a little like a play in three acts. It started, the first act, with Order R-1670-C, Rule 9 of it, which was granted in November of 1960. At that time it was based on a limited amount of data relating to 160 wells, and that order established not only the present allowable allocation formula but it established the proration units.

Consolidated sought a hearing of that a year ago, based on additional experience, when it became convinced that the proper allocation formula should have a factor of no less than 60 percent acreage and no more than 40 percent deliverability. At the conclusion of that hearing, we felt and still feel that we had substantially borne the burden of proof necessary to cause a change, based on the ground rules as we all then understood them.

The second act I referred to is very short and sweet. Prior to the determination of our case, prior to the denial of our application, the Jalmat decision was handed down. This had a substantial impact on all of us, upon all of our understanding of proration matters. We cannot say, of course, that except for the Jalmat case we might have won the case or not. We do not

know what was in the minds of the Commission. We do feel, however, that we had sufficiently borne the burden of proof, by a preponderance of the evidence had sustained our position that the time was ripe for a change; that we felt it appropriate to ask for this re-hearing.

Now part three of our little play has been the legal wrangling and what-not over subpoenas and what-not which has taken place since last May. This is what I hope to be act four and the final act. We hope that out of this hearing will arise a valid conservation order. I say this because it is my sincere conviction that under the holding of the Jalmat decision, the existing Rule 9 of Order 1670-C is void, and we are purporting to operate under what is a void order. You will recall that it was based solely on a finding, as was the order in the Jalmat decision, that there is some general correlation between deliverability and reserves.

In addition to it being void on a jurisdictional basis, we feel and have felt this since the decision, that it was subject to a direct attack in court on the basis of its invalidity; that any time we had chosen instead to make the court approach, as much as we might have had fun with the temporary chaos that would have existed with no order should we have prevailed, there would have been take or pay clauses that would have given rise to many problems -- we have chosen instead to come back on an administrative basis to bring forward to you what is

required by the Jalmat decision; that is, the reserves for each tract for the whole pool, and it is our hope that you will from this hearing create a valid order.

We feel that it will not be sufficient for you simply to deny our application; then we will still have a void order. I would like to talk about the existing order for a moment and relate it back to some of our prior testimony. The first is the effect of the order, and in our judgment it causes waste. There was testimony that because of the economics under which the parties operate because of the present order that only ten percent of the whole area which you have defined as the Basin-Dakota Pool has been developed to this time. It might be fair, after a review of all of the evidence, to say that within an area of economic production it is only thirty percent developed to this time. As we stated before, this is not, this lack of development is not because of the lack of producible reserves. It is because of the lack of economic incentive.

It was also testified that 58.8 percent of the then wells were uneconomic or economic failures, not because of the lack of reserves but because of this order that now exists. This situation has not changed. This lack of development as an economic thing is waste. If there is recoverable gas in these areas and the development of it is not encouraged by an appropriate order, this is waste.

This lack of development also impedes the opening of a

market for this gas. We sincerely hope that Texas will not capture the Los Angeles market simply because we have not developed our known reserves. The opposition said that we were not intelligent to drill economic failures, under this rule that they shouldn't be drilled. We say that not to drill these wells that could be economic under a proper order is waste. It's waste caused by this presently invalid rule. It's avoidable waste.

We say that this is not the way to protect a valuable natural resource, to simply skim off the cream and pour the milk down the drain. We're really doing this in two ways. One is through this lack of development; the other is a matter of field management. I don't understand all the technicalities of this, but if we are simply popping off our easily recoverable reserves through high deliverability wells, we are destroying at least the flexibility of being able to serve them.

There is further waste that arises out of economics caused by the premature abandonment of wells. This is a fairly clear and easily understood thing. If these wells are not now economic successes, as time goes on they will become less so.

To also talk about the effect of the existing order on correlative rights, there are three definitions I would like to have you bear in mind. The first is our fairly clear statutory definition of what correlative rights is. To paraphrase it somewhat, it's an opportunity for each owner of property to be able to produce for himself without waste a just and equitable share

of the total gas in the reservoir, and that which bears a proportion, the part that's under his land to that that's in the whole field. The Jalmat case certainly makes this clear.

There's another definition, also, and I would like to repeat what I stated a year ago. The right of a party to take and capture oil or gas under the rules of capture is perfectly clear. He has a right to take all that he can produce from his well, the full capacity of his well. Now deliverability also has this same definition. It is the capacity of the well to produce. Now to that extent a 100 percent deliverability allowable formula, even though it might be diluted some by restricting everybody, is still the rule of capture. That's all it's ever been. It does not protect correlative rights.

Now we've stated before that the methods of showing the correlation of deliverability to reserves is that mathematical device that cannot be supported. I think we demonstrated that convincingly at the last hearing. I hope we are past that. I hope we can now do what the statute says, what the Jalmat case says, and look at reserves and allocate the best way we can on that basis.

There's one other point and I would like to discuss this because I have a feeling that it's not always clearly understood. I have had the feeling that some people, some engineers feel that when a proration unit is established, that this somehow automatically is a legal and factual determination; and from that

time forward no gas can cross the boundary lines of that spacing unit. This is not true. People that have that feeling that there's some kind of a shield suddenly put around each tract, and that the allocation of allowables is simply that of allocating the market are losing sight of the fact that allocation must be carefully watched, may be changed from time to time so that the order which permits production permits the production of the equivalent of the gas that's under the 320-acre tract; it does not follow automatically because of proration. I'm sure this is clear to the Commission. I'm not so sure that it's generally understood.

As a last point, and this can't really be made part of testimony, in the most recent issue of the Oil and Gas Journal at page 96, there's the fourth of a series of articles entitled "Crises in Gas Proration." I certainly recommend this as reading for anyone interested in this problem, particularly because it shows what is hard for us to do here. It tells of the history of correlative rights versus gas proration. It tells of there being no problem in the beginning. The gas was being flared, and when it was taken, people were glad to get rid of it; and then there was a shortage and everybody was more or less satisfied by the market. Now in this day and age, as we temporarily, I hope, have an excess supply of gas for the first time, the correlative rights situation deserves great attention, for the first time, instead of allowing -- I'm not criticizing anybody,

but instead of allowing the gas purchasers and the pipeline to determine how it should be done because this satisfies their needs and nobody else objected, we're years behind the protection of correlative rights, years behind that which we have learned to do for oil. It certainly is time now to do it properly for gas. Thank you.

MR. PORTER: The Commission will recess the hearing until 1:15.

(Whereupon, a noon recess was taken.)

MR. PORTER: The hearing will come to order. Mr. Stockmar, are you ready to call your first witness?

MR. STOCKMAR: Yes, I would like to call Mr. Harry A. Trueblood.

MR. PORTER: I would like to remind all of the interested parties of the order granting the re-hearing in which we limited the matters of testimony to discussions of recoverable gas reserves in the Basin-Dakota area. The Commission would like to move along with the hearing. We want a full and complete record, but we would like to ask you to refrain from being repetitious as much as you possibly can. You may proceed.

MR. STOCKMAR: We will endeavor to make it as short as we can.

(Witness sworn.)

HARRY A. TRUEBLOOD,

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

DIRECT EXAMINATION

BY MR. STOCKMAR:

Q Would you state your name for the record, please?

A Harry A. Trueblood, Jr.

Q Are you the same Harry A. Trueblood, Jr., that appeared as a witness at the prior hearing in Case 2504 on April 18, 1962?

A I am.

MR. STOCKMAR: If the Commission please, is there any need to re-qualify this witness as an expert?

MR. PORTER: No, sir. His qualifications are a matter of record in the previous hearing.

MR. STOCKMAR: Thank you, sir.

Q (By Mr. Stockmar) Mr. Trueblood, I hand you two tabulations. Will you identify them, please, for the record?

A This first tabulation is a group of eight pages which is a photocopy of the 460 wells which El Paso Natural Gas handed us in the previous hearing and later produced to the Commission, and which we made a copy of subsequent to the issuance of the subpoenas.

The second tabulation is one of numerous pages which has put the wells, has identified the wells by township that had appeared previously only by deliverability and reserves under the original eight pages of information previously referred to. These were delivered to the Oil and Gas Conservation Commission in response to the subpoenas issued, and we then got a copy of them.

MR. STOCKMAR: I would like to ask that these documents be marked as Exhibits 1 and 2 for Consolidated and accepted in the record.

MR. PORTER: Will the reporter please identify them?

(Whereupon, Consolidated's Exhibits Nos. 1 & 2 marked for identification.)

Q (By Mr. Stockmar) Mr. Trueblood, I hand you Exhibit 2; will you please explain for the record what that exhibit purports to show?

A This exhibit is a breakdown of the wells which appeared in the El Paso Natural Gas review by township, with each well described and with the captions showing the initial deliverability of the wells, 1961 deliverability based on 1960 tests, the 1962 deliverabilities based on 1961 tests, the net feet of pay, the number of acres in the unit, the acre feet of sand, the township recovery factor, the initial reserves in place, the cumulative production through December 31st or to January 1, 1962, and the then current reserve as of January 1, 1962.

Q Thank you, Mr. Trueblood. Mr. Trueblood, have you made efforts to acquire or develop reserve information with respect to the producing tracts of land in the Basin-Dakota Field?

A Yes, sir, we have. Following the denial of our original application, and following the Jalmat decision, the Commission will recall that we made an attempt to get all of the operators to come forward with their own reserve figures and

present them to the Commission for interpretation, and we were unsuccessful in this attempt. Our idea at the time was not to particularly act in some sort of folly, but we felt quite certain that if all the operators were to have to produce their reserves to the Commission, and the Commission was going to make a finding on a proper proration formula based on reserves, that undoubtedly everyone would come in and be somewhat high on their reserves, but at least they would be consistent and it would have been consistently high; so therefore, still in all, when you considered the tracts or a tract by tract interpretation of what should be a proper allowable, that at least it would be consistent as between tracts.

We met with absolutely zero success in this attempt, but we did ask and receive through the subpoenas a great deal of information; namely, core analyses and logs on 58 wells that had been cored in the reservoir. We compared the El Paso work on the 460 wells that appeared on Exhibit 2, Consolidated's Exhibit 2 in this case, with a certain amount of our work, and also with respect to the cored data which was available. We found that of the 58 wells that had been cored, that by comparing the reserves we calculated from the cored information that the average reserve that we computed without regard to cutoff points, which have previously been testified to as six percent, and log interpretations and what have you, we found that we ranged on the order of between 70 percent to a high of 130 percent, as

compared to the El Paso numbers which were in this group of 460 wells. Quite frankly, with the amount of information and the lack of information from core data and what have you, we felt that the El Paso work had been remarkably accurate, that all of the engineers in this room all realize that there are several ways to go to arrive at reserves under a given tract, and any one of these several ways would be reasonable.

When we discovered that of the 58 wells that our computed reserves were 108 percent of the computed reserves for the identical wells available, we were satisfied that El Paso -- and I believe I testified in previous testimony that we were satisfied that El Paso had basically made a very honest appraisal of the reserves underlying the Basin-Dakota Field. Since we had been unable to compare all of the operators' own indication of the reserves as between tracts, there was only one other way in which we could at least be uniform in an approach to establish total reserves in the field, as required by the Jalmat case, reserves as between tracts. This would be to have an entire analysis made of the field as, say, it existed in December, as if El Paso's engineers, who had been very fair in their approach, had done the work.

Well, obviously, our own engineers and the people under my supervision could not possibly be El Paso's equivalent engineers, so therefore we had to make use of the common tool available to all engineers and geologists; namely, the contour map. This is

our Exhibit No. 3.

(Whereupon, Consolidated's Exhibit No. 3 marked for identification.)

A Now Exhibit No. 3 is a map of the Basin-Dakota Field with a one billion reserve outer limit, that being the approximate reserve at which you arrive at a break-even point on your money for the expenditure, and beyond which no one would drill a well, if they did any previous economic thinking at all, to exploit reserves. So to that extent, this map has been prepared with a limiting one billion cubic foot reserve outer limit.

All of the 460 wells which El Paso had on our Exhibit 2 were then plotted throughout the Basin. The Commission will notice that there's a great deal of empty void space yet to be developed in the Field within the outline of this situation. However, we have for the most part mechanically contoured with an eye to the overall situation and an eye to the recovery factors that an engineer would normally expect to receive in this type of arrangement. From that point, we were able to construct or to pick reserves from this map as if the remaining missing wells in the December proration schedule had been done by El Paso engineers.

Well, now, that opens a general line of argument; well, this might not be exactly what El Paso gets, but keeping in mind the ground rules which El Paso laid down, and that is that they used a township recovery factor which in itself is a contouring device, it's an averaging device, in arriving at individual

reserves that they calculated. Certainly the fact that we found in the interpretation of the core analysis data that within the accuracy of computation of reserves of from 30 percent low to 30 percent high on a given reserve, that this overall picture fell within a reasonable approach as to what numbers El Paso would have come up with for all wells in the Basin-Dakota Field as it appeared in the December proration schedule.

Now we have considered only 699 of the 743 wells since the balance of them are in this instance marginal and not subject to the proration formula at this time. The key to this map is this: We adopt El Paso's numbers and we adopt the numbers that we have developed as numbers for the Basin-Dakota Field as if we had prepared them, because we believe under our study and after all of this study that this is a fair and reasonable approach to the problem at hand; and that is, what is the total amount of recoverable reserves underlying the Basin-Dakota Field, and what is the recoverable reserve underlying each connected 320-acre tract which has a well thereon which had a deliverability factor in the December proration schedule.

Q Mr. Trueblood, is your adoption of the results of this work adoption by you as an expert petroleum engineer?

A That is correct. Now the results of this map show that as of the December proration schedule for 699 non-marginal wells which had deliverabilities, the average reserve per well was 3.03 billion cubic feet; that the total reserve for the 699 wells,

exclusive of the marginal wells, was 2,159,000,000,000; that the total reserves underlying the field outline which had completed wells thereon was 2,255,000,000,000 cubic feet.

Furthermore, we found that the average deliverability for the 743 wells, which included the marginal wells, was 1340 MCFD, which is down slightly from where our position was in April, and that the 699 non-marginal wells had an average of 1410 MCFD. As I stated, we were able to determine a reserve for each individual tract, as required by the Jalmat decision, from this method, and these are our reserve numbers. We have these in the form of Exhibit 4.

(Whereupon, Consolidated's Exhibit No. 4 marked for identification.)

Q I think you were stating, Mr. Trueblood, that Exhibit 4 is a tabulation of the individual reserve data for each of certain wells. Would you explain the code that exists here and what other data this shows?

A If the Commission please, this is, because of the way an IBM machine works, this fairly could be considered complicated, but it really isn't. Basically, Exhibit 4 contains 699 wells located by township, range and location within each tract, under the Commission's use of letters for code, it contains the acreage factor for each of the 699 non-marginal wells. It contains a deliverability factor and it contains a reserve factor.

Q Are these the items "A", "D", and "R" in that order?

A These are the items "A", "D", and "R" in the second column. Now the reserve number, I might point out, is either the direct calculated number of El Paso, or it has been picked from the contour map. The next column is percent, and that is, referring to the legend, percent of total reserves. That number is that percentage which the particular well bears to the total reserves under the 699 wells.

Now theoretically, the Commission could stop right here and come up with an allowable formula which is nothing more than a tract factor. Now this tract factor, however, would be changing every month as new wells were brought in. It would also be changing from a month to month basis as new information became available on reserves underlying specific tracts; and the Commission would probably be overwhelmed with every single operator appealing his reserves under his particular tract as set out by the Commission. However, we do propose that this is the only way to protect completely, without any question, correlative rights.

Now understanding that the Commission, through its experience in the years gone by, found that the use of a formula which includes acreage and deliverability is the most satisfactory tool from an administrative standpoint, we proceeded to develop certain other information for the Commission's use in connection with the use of deliverability factors in various percentages. Now this appears under "F" percent, which is the factor percent, which is column four and appears at 75 percent deliverability,

100 percent, of 75 percent, of 50 percent, 40 percent; and if you'll move over to the next "F" column, because of the way the IBM machine had to tabulate this, it also includes 30 percent, 20 percent, 10 percent, and zero percent deliverability, which in effect is 100 percent acreage. Under "A.L.", "A.L." stands for the allowables and those are the allowables which the well in the instance of the 75 percent deliverability factor number was the actual allowable that any particular well received during the month of December. The allowable at 100 percent deliverability factor is that allowable which it would have received had the deliverability factor been 100 percent, and so on down to what the allowable would have been had it have been 100 percent.

Now I would like to point out at this particular time that the whole purpose of establishing the right allowable is that the allowable percentage that a well is granted be exactly that same percentage that it bears to the total reserves; hence the column percent allowable. That has to do with the percentage of the allowable which the well received, which may be compared with this percentage of the reserves. For example -- actually, in support of the present order, it's a very good one, and apropos, that the first particular one here shows that under 75 percent that the well was already getting more of its percent of allowable than it should have been getting. However, if you'll look at the third from the bottom --

Q Mr. Trueblood, would you make a further explanation of

the column "A" over "R"?

A All right. Excuse me. The column "A" over "R" is the percentage of allowable that the well receives under the various deliverability factors as opposed to its percentage of reserve. Now if a formula could be constructed where in every instance this ratio were unity, then and in that event there would be absolutely no abuse of correlative rights.

Now pointing this out, you will see that in the instance of the first well that it's receiving more than its proper share of the allowable, and yet it is a low deliverability well; but if one looks at the third from the bottom one can -- 113, 113, you can see that the 25 percent deliverability would appear to be the closest and best factor. The next one right below it shows that 40 percent is the best, and so on.

Now if one will look on page 12, at the second well on page 12, one sees that this happens to be an average well. It has approximately an average deliverability and an average reserve for the field; and no matter what the acreage factor is or the deliverability factor is, it really never changes, and it basically gets its pro rata share and proper share of the allowable under the proper circumstance. I only throw those in for examples, because one might more easily, under a fairly complicated IBM setup -- as stated before, this was done to arrive at factors or ratios of percent allowable to percent of reserves for every single well in a non-marginal category in the different percentages of

deliverability in the formula varying from 100 percent deliverability down to zero.

The results of the investigation of Exhibit 4 led us to Exhibit 5.

(Whereupon, Consolidated's Exhibit No. 5 marked for identification.)

Q Mr. Trueblood, will you proceed with your description of Exhibit 5?

A Exhibit No. 5 is nothing more than a count of the wells which fell into the various categories of percent of their proper allowable, assuming that 100 percent is the proper allowable that it should be receiving. This was done for each of the deliverability percentages in the proration formula, and a count was made thereof for each and every single well of the 699 wells. For example, under the current 75 percent deliverability in the proration formula, one may see that 418 of the 699 wells were receiving under 100 percent of their proper allowable, and that 281 wells were receiving in excess of their proper allowables.

Under the proposed 40 percent, one may see that unity of wells on both above and below 100 percent of proper allowable begins to become achieved.

Now Exhibit 5 demonstrated to our engineers and to me that a formula must be devised, if one insists on using deliverability and acreage in a formula, which would best group the maximum number of wells at unity and relieve the variation from

unity. Hence we prepared a graphical presentation of four different percents of deliverability in the formula for our figure, Exhibit No. 6.

(Whereupon, Consolidated's Exhibit No. 6 marked for identification.)

Q Mr. Trueblood, before you proceed, only ten or so of Exhibit 6 have been colored. For the benefit of those in the audience that received uncolored ones, will you identify each of the lines?

A The lines on Exhibit 6, for those who have colored exhibits, the 100 percent line is colored red. This is the use of 100 percent in the deliverability formula and is a circular red dot. The dashed line with the circular black dot is the 75 percent number, which is the current deliverability in the formula. The 40 percent, as requested by Consolidated, is the triangular line with long dashes, the triangular points, and is colored green. The yellow or square boxes for the points is the 20 percent deliverability in the formula.

This presentation is made merely to show that as you increase acreage participation in the formula, all the curves begin to shift toward unity, and that somewhere in the range of 40 percent deliverability down to 20 percent deliverability in the formula, you have the maximum number of wells at unity and the narrowest type of curve. The best possible curve, of course, would be one in which all wells fell on the 100 percent of proper

allowable line, or the next best thing within a reasonable tolerance on each side; and once again, referring to our 30 percent on either side of accuracy of computation of reserves, one in which all wells or practically all wells would fall within 70 percent to 130 percent of their proper percent of allowable, based on their rightful percentage of the total reserves.

One other exhibit arose from this interpretation, and it is our Exhibit No. 7.

(Whereupon, Consolidated's Exhibit No. 7 marked for identification.)

Q Due to the interruption, will you again explain your concept of the reasonable range of accuracy, the 70 to 130 percent that you were just speaking of?

A Yes. Based on our numbers for the reserves underlying each tract, and based on our thorough investigation of the wells which had been cored, and comparing same to the work we have presented, we found that in general we ranged between 70 percent and 130 percent of the numbers which we have deducted from this map, or were calculated originally by El Paso. This we interpret to be a reasonable interpretative range of reserves that engineers should be able to make from log calculations when compared with actual core data, and should be the range of accuracy wherein anything falling in that range, from a standpoint of reserves, of receiving percent of proper allowable, would not necessarily be an abuse of correlative rights.

Due to the limitation of the accuracy of the actual prediction of the reserves themselves, however, any wells falling outside of that reasonable range of accuracy of prediction of reserves would tend to be an abuse of correlative rights. Hence our Exhibit No. 7, in which we have plotted the number of wells which fell outside of receiving at least 70 percent nor not more than 130 percent, or did receive more than 130 percent of their rightful allowable based on their share of the reserves. We have chosen, for obvious reasons, to entitle our graph "A Number of Abuses of Correlative Rights versus Percent of Deliverability in the Formula."

We then counted the wells falling outside of this reasonable range for each deliverability factor in the formula, and found that as the deliverability in the formula reduced to approximately 40 percent down to 20 percent, that the number of abuses were at a minimum.

Now to further investigate and not as an exhibit here, we also counted wells outside of reasonable limits of only 10 percent accuracy of reserves, 15 percent, 20 percent, 40 percent, and 50 percent. This we found produced very similar curves in every single instance, and all bottoming out in the 40 percent to 20 percent deliverability in the formula. Now the only thing that the range of accuracy does is to change the definition of what might be called an abuse of correlative rights. In essence, if one says that one may accurately determine reserves no better than

50 percent of the actual reserves, the number of abuses necessarily lowers. As a matter of fact, the number of abuses under that particular definition dropped to 181 at 40 percent deliverability in the formula. However, we contend that even as we studied the various logs and the wells in the field and the accuracy of El Paso's determination of average recovery factors by township, that this number of 30 percent appears to be reasonable and appropriate; and therefore we utilized it in the preparation of Exhibit 7.

In summary, we have here produced for the Commission's review a way to arrive at a formula, if they continue to wish to utilize acreage and deliverability in a formula, which will cause the least harm to the most people. We feel that via the testimony in April, and we believe we thoroughly destroyed the correlation that there is a general correlation between deliverability and reserves; that if one averaged enough averages in different directions that he might come up with all sort of curves; and we further stated at that time that we could find no place where deliverability actually entered into the determination of reserves. Even the El Paso work itself was done on a volumetric basis, and we subscribed to it.

We therefore submit to the Commission that we have complied with every single portion of the Jalmat case for the Commission's review. We have individual reserves for each tract, we have a reserve for the field. We are convinced that this

broad space out here that is presently under-developed will be a long time in being developed if the Commission allows a deliverability factor in the formula which makes 60 percent of the wells on a non-commercial basis which could be commercial if given the opportunity to be produced.

MR. HOWELL: I submit that this particular testimony is purely argumentative, is not directed to reserves, and El Paso objects to introduction in this testimony of rates of development of the area, the percentage of development of the area, and the witness' conclusions along those lines because that has no relationship to the issues of this case, which are now limited to reserves.

MR. STOCKMAR: These matters already appear in the prior transcript. I think we can drop that.

Q (By Mr. Stockmar) Do you have any further comments to make?

A Not at this time.

MR. STOCKMAR: I would like to ask that the Commission accept in evidence the exhibits offered.

MR. KELEHER: We object to the exhibits.

MR. STOCKMAR: I would like to have the remaining five exhibits numbered and marked for identification.

MR. PORTER: You have seven exhibits, and you are moving admission, that Consolidated Exhibits 1 through 7 be admitted into the record?

MR. KELEHER: To which we object on the ground they are irrelevant, immaterial and incompetent. The witness testifies that they're based on exhibits in the former case tried here before the Commission April 18, 19, 20, 21; no evidence here of independent investigation. These exhibits are based entirely on hearsay, on what some other witnesses have testified.

MR. STOCKMAR: I think the witness clearly testified that he has examined every scrap of information available to him, that he has studied the reserve data forwards and backwards, every way that he can, and has arrived at this conclusion, which is his conclusion and he is bound by it. These are his numbers now. He testified that they were reasonable. They were constructed in a reasonable and uniform manner; that they were well done; that they were of the type that reasonable engineers could use. He has studied all other assorted data done by different people, non-uniform parameters, and he has made this his work.

MR. HOWELL: If the Commission please, on behalf of El Paso, we would also object to the introduction of the testimony, because all of the exhibits in turn are based upon the accuracy of reserve determinations made which appear in Exhibit 1. If Exhibit 1 should be inaccurate, if the reserves as set out in Exhibit 1 are inaccurate, then all of the other exhibits have no basis and the figures which are used there would not be applicable if the reserve figures are not correct. The witness has not seen fit to establish the data which he used, the manner in which he

allocated reserves upon the 239 wells which appeared on the schedule which were not covered in the work that was done by El Paso.

Now the testimony of El Paso as to its 460 wells was very clear to the point that in order to determine the reserves applicable to any particular tract, it was necessary to take first the township parameters as used, the averages, which were the best information available:where something other than the average was available, we have used the exact, but the porosity, the water content, and the pressure and temperatures were then applied individually on the basis of logs. El Paso did not attempt to give any reserve data to any one well in which it did not have both logs and deliverability.

There's no testimony in this record to support this exhibit as to the character of examination of logs, the methods that were used by this witness in determining the net pay, what kind of logs he used, how he determined the net pay of these 239 wells that he has added now. His determinations as to reserves of those might not agree with ours. He said he used the same parameters, but he did not necessarily use the same factors that our work is based on in selecting the number of feet of net pay.

We submit that the Exhibit No. 1 is not supported by sufficient proof to establish the accuracy of his selections of net pay; and therefore, all of the exhibits would fall if that is not accurate.

MR. STOCKMAR: All of these questions, gentlemen, may

go to the reliability of the evidence and might be explored on cross examination, but there is no question that Mr. Trueblood has testified as an expert petroleum engineer that these are the reserves for this field. It is also quite clear that he testified as to the additional 239 wells that they were based on an appropriate contouring method. It's perfectly clear that each of the items going into the determination of reserves that Mr. Howell mentioned can be contoured, they can be contoured separately. There is certainly no problem about contouring them together. This is what he testified that he's done.

MR. KELLAHIN: I would like to point out in response to Mr. Howell's argument that he casts some doubt on the accuracy of Exhibit No. 1.

MR. HOWELL: It should have been Exhibit No. 3.

MR. KELLAHIN: You said No. 1, and that is your exhibit.

MR. HOWELL: No. 3 is what I referred to. I mis-named it.

MR. KELLAHIN: You do not quarrel with Exhibit No. 1?

MR. HOWELL: That is correct.

MR. KELLAHIN: You do not quarrel with Exhibit No. 2?

MR. HOWELL: I do not know, because that represents work done by other people other than ourselves.

MR. KELLAHIN: It is my opinion that the Exhibit No. 2 was furnished by El Paso under the subpoena.

MR. HOWELL: I would like to correct my motion, thinking

the map was Exhibit No. 1. It is the exhibits from 3 on that we object to.

MR. PORTER: The record will show the objections by Mr. Howell, Mr. Keleher to the admission of these exhibits. The objections are overruled. The exhibits will be admitted to the record, and the Commission will determine, of course, the proper weight to be given to those exhibits; and, of course, the opposing counsel will have the opportunity to cross examine the witness now concerning any phase of his testimony or anything that appears in these exhibits.

(Whereupon, Consolidated's Exhibits Nos. 1 through 7 admitted in evidence.)

MR. STOCKMAR: I would like then to offer --

MR. KELEHER: May the record show an exception on the part of Pubco?

MR. PORTER: The record will show an exception on the part of Mr. Keleher for Pubco.

MR. STOCKMAR: I would then like to offer Mr. Trueblood for questioning by the Commission or the staff, for cross examination.

MR. PORTER: Does anyone have a question? Mr. Howell.

MR. HOWELL: Ben Howell, El Paso Natural Gas Company.

CROSS EXAMINATION

BY MR. HOWELL:

Q Mr. Trueblood, referring to your Exhibit No. 3, will

you tell the basis that you used in placing the 239 wells that appeared on the December proration schedule upon which you have none of El Paso's work?

A Mr. Howell, if I understand your question, all of the wells that were in the December proration schedule were first plotted. Then the numbers for which we had El Paso data were placed opposite those wells which had been identified on Exhibit 2, and subsequent to that, I believe I testified that under my supervision the map was contoured with some interpolations put in where lack of general information was sufficient to cover a few of the areas.

Q Well, Mr. Trueblood, did you examine the logs on those 239 wells?

A No, Mr. Howell, I didn't.

Q Did you make in any way a determination of net pay on those 239 wells?

A No, we did not, Mr. Howell.

Q Did you make any revisions in the work which was at the time current in April of 1962, which was done by El Paso, which the record will show is a continuing process and which is constantly revised as additional wells are drilled and additional cores become available to cover the additional information that is now available as the result of those 239 wells having been --

A Mr. Howell, I believe I testified, if you'll recall,

that we made a very thorough investigation of the 58 wells that were made available to us on core analysis; that from those 58 wells we compared the calculated numbers without using the same parameters that El Paso had used. We calculated the reserves and found that the 58 wells, some of which had been calculated previously by El Paso, some of which had to be taken from our contoured map, compared very favorably, in the range of from 70 percent to 130 percent of reserves which had been calculated by El Paso.

Now this additional data that was available to us served to confirm to us that El Paso's work was done in complete objectivity and done by very competent engineers. We felt no compulsion to try to improve upon it, and we could not duplicate their work since we are not El Paso's engineers.

Q Did any of the 58 cores that you examined cover the 239 wells?

A Yes, sir. I don't have the number with me, Mr. Howell, but several of them did.

Q Well, would you give just an estimate? Was it a half a dozen, five?

A I think it was eight or ten, something on that order. I don't recall.

Q Eight or ten. Now in determining the reserves, let's take one of the 239 wells that you don't have a core on, you don't have a log on the well, you put it on the map with contours; you do not have El Paso's estimates as to the reserves of that well.

What was the method you used in giving reserves to that well?

A To pick it off of the contoured interval.

Q In other words, your contours are supposed to represent that everything within certain contours are arbitrarily or empirically, however you want to call it,given the same reserve calculation?

A This is exactly right. I believe that's exactly what I testified. I said, if you recall, that this percent is within the accuracy of the prediction of reserves, and we felt quite confident that there would be variance of 30 percent low to 30 percent high in individual instances, as we had found in the 460 well investigation on certain spot checks of it, and also on the 58 cored wells.

Q Now, assuming that cores or logs show that the reserve estimates which you assigned on the basis of contour lines are not accurate, is it not a fact that all of your calculations would come out with different curves and different results, if different reserves were used for the individual wells which appear on your exhibit?

A Would you ask that question again? I don't know what you asked.

Q You have done work which is based upon assigning reserves to each of 699 wells; that's correct, isn't it?

A That is correct.

Q And as to 239 of them, you didn't have any logs?

A Well, that's not necessarily so. We had some of the logs, and as I believe I testified a moment ago, and before that, that in some instances we had core analyses for wells which El Paso had not had available or had not chosen to compute in the April hearing.

Q What did you do with those cases where you had a core analysis and the core analysis differed from El Paso's figures; which did you use?

A We used El Paso's figures throughout, because we felt that they were within the range of accuracy of prediction of reserves.

Q Even though you had before you a core which showed that the averages were not applicable to that particular tract?

A This doesn't disturb us particularly, because the average of the 58 wells -- and we have been averaging averages throughout this hearing, we found that we were only eight percent different on the overall average than El Paso's number for the core, and this is well within range of predictability of reserve.

Q Nevertheless, though, Mr. Trueblood, am I correct or am I incorrect in stating that if another engineer acting in the same good faith that you've acted should assign different reserves to these wells than these that you have, the resulting curves and the computations as to the amount of error would be changed by the use of different reserves?

A Well, if the engineer did on the 239 wells or 460 wells,

originally, I'm sure that computations could be changed, but the method could still be used.

Q The point I'm getting at is, looking at this Exhibit No. -- which is this, Exhibit No. 4?

A 4.

Q Now there are a number of wells in here in which the bottom figure is a reserve which was assigned, but on the basis of a contour map?

A No question about it, that's right.

Q Now suppose -- let's look at this, let's take this very first one here. You have shown a reserve of 947. If another engineer in equal good faith would assign 1547 to that, it would then follow that all of your comparisons which you have made over the rest of the page would be different?

A One well would change that, Mr. Howell. Any one well out of 699.

Q I just asked you as to any particular well, a change in the reserves would result in a change in all your computations as to relationship?

A On all 698 other wells, one well change would.

Q Therefore, all of the other work is likewise dependent upon the reserves which you have assigned to the individual tract?

A That is correct.

Q Now, Mr. Trueblood, why did you exclude the marginal wells?

A Because they don't figure in the proration formula.

Q Well --

A They get their --

Q If the allowable is low enough, wouldn't a marginal well figure into it? Wouldn't it cease to become a marginal well?

A Well, it could cease to become a marginal well. But now you are forecasting, and I'm just working off of December schedules.

Q Well, as a matter of fact, the direction is to determine the reserves under all the tracts; these wells are in the Basin-Dakota Pool, these marginal wells, are they not?

A That is correct. I believe I stated a reserve for them.

Q What is it?

A I believe I stated a reserve for them.

Q Are they listed anywhere in these --

A They're not listed in Exhibit 4 because we used Exhibit 4 for determining the proper proration formula for wells being prorated.

Q And these marginal wells in all instances are obviously low deliverability wells because they don't have the capacity to make the allowable that's been assigned to them?

A That is correct.

Q So that the exclusion of marginal wells, wells which by reason of their inability to make the allowable which was assigned to the application of the formula, by reason of exclusion

of these marginal wells you have excluded a substantial block of low deliverability wells from your calculation?

A That is correct, and I believe under my testimony, I think you'll see that less than one percent of the reserves of the field are involved.

Q Mr. Trueblood, I believe that you have testified that the use of deliverability and acreage in a formula can, in your opinion, result in a reasonable proration allocation among the wells in the Basin-Dakota Pool?

A I believe that I testified that in the Commission's past history, that they had chosen to use acreage and deliverability, and I say that the only complete elimination of abuse of correlative rights is to assign tract factors and prorate on that basis.

Q You have, however, used in all of your studies both acreage and deliverability?

A Well, this is the subject of the application.

Q That's correct. The only quarrel that we have is as to the weight to be given the two factors?

A That's correct.

Q And I believe you will agree that with the difficulties inherent in actual reservoir determinations either on a volumetric basis or on a pressure decline basis, that some formula using acreage and deliverability can in a practical manner prorate the allowables in this field?

A Well, it can from a practical standpoint, if that's what you are asking me; from an exact standpoint, no, it can't.

Q Would it be possible to make an exact standpoint without imposing upon the Commission a duty of making a reserve determination of every tract in the field?

A It would not.

Q So as a practical standpoint, you are willing to agree that an acreage and deliverability formula does accomplish the result; the only quarrel being as to the weight to be given the respective value of the two?

A I have to state again, Mr. Howell, I believe you recall what I stated before, that there's only one way to protect correlative rights in a complete manner, and that is to have it on a tract factor basis; and if the Commission chooses to reach a minimum abuse approach, then you could use acreage and deliverability and I believe that's what I've testified to and re-testified to.

Q That's right. But it is a practical matter of achieving something that would be extremely difficult to accomplish upon a tract by tract factor?

A But not impossible.

Q It would, however, involve a change every time another tract was brought into the producing area?

A Absolutely.

Q It would involve recomputation constantly as more information became available?

A Absolutely.

MR. HOWELL: Thank you, Mr. Trueblood.

MR. PORTER: Does anyone else have a question?

MR. STOCKMAR: I would like to ask one or two questions on redirect.

REDIRECT EXAMINATION

BY MR. STOCKMAR:

Q Mr. Trueblood, is it not true that all of the reserve data for individual wells that are in the marginal capacity can be determined from Exhibit 3, even though it does not appear in the schedule in Exhibit 4?

A Yes, they can.

Q In case you did not previously testify to the total reserve figure allocated to the marginal wells, would you do so?

A I'll have to do some subtraction. Approximately 96 billion cubic feet.

MR. UTZ: How many wells was that?

A 44. I have 699 in Exhibit 4, and I counted 743 in the proration schedule.

MR. PORTER: Is that 44 marginal wells?

A Right. Now there were additional wells in the proration schedule for which there were no deliverabilities, and hence we couldn't use them in the 699-well study.

Q (By Mr. Stockmar) Mr. Trueblood, did you by any chance make a similar comparison using only the 460 wells which have been

calculated and try to arrive at some table showing the distribution of wells that are above and below 100 percent of their proper allowable?

A Yes, I did. We had the IBM machine also run off a count on the wells, which is identical to Exhibit 5, I believe, for just the 460 wells, as a further check to see how we compared at the end of 699 wells with the 460 wells. We found that under the 75 percent deliverability factor in the formula at this time, that 266 wells were receiving less than 100 percent of their proper allowable, and 161 wells were receiving in excess of their proper allowable; and this ratio of those receiving under their proper allowable was almost identical to the number of wells under the 699 schedule. So that we keep coming back to this 60-40, 65-35 range that has appeared throughout the original testimony and this testimony.

MR. STOCKMAR: We would like to offer a sheet showing this tabulation as Consolidated Exhibit 8. I ask that it be marked for identification.

(Whereupon, Consolidated's Exhibit No. 8 marked for identification.)

MR. PORTER: What is that tabulation?

A The 460 wells of El Paso distribution.

MR. STOCKMAR: I think Mr. Trueblood testified it is similar to our previous Exhibit 5, but limited to our wells on which calculations were made instead of contour.

MR. PORTER: Any objections to the admission of this exhibit?

MR. KELEHER: I would like to enter an objection on behalf of Pubco for the same reasons stated previously.

MR. HOWELL: El Paso objects to the introduction of Exhibit No. 8 on the basis that there hasn't been sufficient predicate laid of the basic material, the manner in which the machine computation took place to establish the authenticity of the work.

MR. STOCKMAR: I have no further questions.

MR. PORTER: The objections will be noted and they will also be overruled and the exhibit will be admitted to the record for whatever weight the Commission may give it.

(Whereupon, Consolidated's Exhibit No. 8 admitted in evidence.)

MR. KELEHER: May the record show an exception.

MR. PORTER: May the record show that Pubco has asked for an exception to the ruling. Does anyone else have a question of Mr. Trueblood? He may be excused.

(Witness excused.)

MR. PORTER: Do you have another witness?

MR. STOCKMAR: We have no additional witness at this time. We may on rebuttal have additional testimony.

MR. PORTER: At this time we are going to take a ten-minute recess.

MR. HOWELL: If it please the Commission, before we recess, may we ask if there will be any additional testimony offered by the proponents? I think that we have a group of several -- that is, the proponents of the change. We have a group of several companies that would necessarily need to confer, and if this constitutes the case that will be put on, we would like to ask for time to confer and make a determination as to whether we will put on any testimony or not.

MR. PORTER: Mr. Stockman, do you plan to put on any additional testimony?

MR. STOCKMAR: On behalf of Consolidated, the only additional testimony might be in the nature of rebuttal. If we have any friends here, what they might be prepared to do, I don't know.

MR. PORTER: Any other of the proponents of the application plan to put on any testimony?

MR. KELLAHIN: In behalf of Southern Union and Benjamin K. Hooton and Associates, we do not anticipate putting on any testimony unless it would be in rebuttal of testimony offered by the opposition.

MR. PORTER: Mr. Howell, it seems that there will be no further testimony unless it is in rebuttal to the testimony of the opposition.

MR. HOWELL: If it please the Commission, we would like to ask for a recess of 30 minutes in which the various interested

parties may confer and make their determination.

MR. PORTER: The hearing is recessed for 30 minutes.

(Whereupon, a recess was taken.)

MR. PORTER: The hearing will come to order. Mr. Howell, did your group come to a decision?

MR. HOWELL: I believe Mr. Keleher is ready to proceed with them.

MR. PORTER: Mr. Keleher.

MR. FEDERICI: May it please the Commission and Mr. Keleher, before your proceed, on behalf of Aztec Oil Company and Calkins Oil Company and Sunset International, I assume and understand that the objections made by Pubco and El Paso are concurred in, and that the record will show that these companies which I represent also make the same objection. If there is some objection by Mr. Kellahin, I'll make a motion at this time that Exhibits 1 through 8 be stricken on the grounds stated by Pubco and El Paso, and on the additional ground that there was no sufficient foundation laid.

MR. KELLAHIN: We have no objection to the companies represented by Mr. Federici. We certainly do object to his motion to strike the exhibits.

MR. PORTER: The record will show the objection as stated by Mr. Federici. They are also denied. Mr. Keleher.

MR. KELEHER: Mr. Chairman and Gentlemen of the Commission: The Commission has been very patient in hearing this case, and the petition was filed February, 1962, almost a year ago.

This case was tried on its merits on April 19th, 20th and 21st, following which the Commission was asked to grant a rehearing, and an order granting that rehearing was entered on June the 7th, 1962.

I would like to direct the attention of the Commission to this fact, that the order granting the rehearing contained the following words, "that the scope of such rehearing shall be limited to matters concerning gas reserves in the Basin-Dakota Pool". In preparation for this hearing, Pubco has endeavored to comply with the recommendation and the order of the Commission as to limitation. For the past several months it has been work on the part of the entire staff, a large portion of the geological and engineering, evaluating the recoverable reserves to the Basin-Dakota Pool, and the recoverable reserves of each individual well within the entire pool, total.

After examining in detail all of the 769 total wells in the Basin-Dakota Pool, Pubco specifically computed the recoverable reserves on 382 wells where sufficient information was available to establish their recoverable reserves beyond reasonable doubt. The remaining wells either had insufficient information, or that pertinent information which was deemed necessary was unavailable to the Company. The number of wells specifically studied provides the necessary information for the calculation of the total recoverable reserves in the pool, as well as the individual well reserves within that pool.

In addition, Pubco studied the deliverability of each well, the total deliverability in the pool, and prepared two maps which will be introduced before the Commission, and which in Pubco's opinion, graphically portray individual well recoverable reserves and individual well deliverability. Points of equal deliverability and points of equal reserves were connected to form iso lines, and graphically show insofar as practicable the direct relation between recoverable gas reserves in the Basin-Dakota Pool, and deliverability.

Further studies by our Petroleum Reservoir Engineer resulted in graphical studies to show the direct relationship between deliverability and recoverable reserves; graphs were also prepared and will be submitted here showing the ideal formula where an individual well will share in the existing market in direct proportion to its individual well recoverable reserves as related to the entire pool. These graphs, in our opinion, further demonstrate that any inclusion of acreage within the formula will create a serious inequity, since all wells are drilled on essentially 320-acre spacing units.

Any change in the current formula of 75 percent deliverability times acreage, should be in the direction of 100 percent deliverability, since acreage is consistent with each individual well in the area, and does not in any way reflect the market change in individual well reserves within the individual pool. The Commission is reminded, on the original establishment of the current

formula, the acreage factor was introduced in order to create an artificial minimum allowable. An order of the Commission has now established minimum allowables in most of the various gas pools in the San Juan Basin, which should include the inclusion of acreage in the formula.

Our company has two witnesses, who will testify as to the methods and results obtained from this detailed study of the Basin-Dakota Pool. Our first witness, Dan Cleveland, Reservoir Engineer for Pubco, will undertake to explain the standard volumetric formula used by Pubco in determining reserves, and will show the results obtained by the company by a series of graphs which demonstrate the direct relationship between recoverable reserves and deliverability, the ideal formula, and the relationship thereto of the current formula, proposed formula, and the formula based entirely on acreage.

The second witness, Frank Gorham, Executive Vice-President of Pubco, will undertake to show the method of calculating individual well net pay thicknesses, individual well porosities, and individual well water saturations.

The comparatively recent decision of the Supreme Court of the State of New Mexico, relative to the well-known Jalmat case, indicate any proration formula utilized by the Commission in creating a gas pool in the State of New Mexico, should be that formula which, insofar as practicable, gives each individual well its fair share of the market, in direct relation to the individual wells

recoverable reserves as related to the recoverable reserves of the entire pool. Pubco's studies have positively shown such a formula would be 100 percent deliverability. And incorporation of acreage, except for those minor adjustments necessary for the few wells having less or more than 320-acres in their respective drill sites, would be in opposition to the Supreme Court decision; again, in our opinion.

At this time I would like to swear Mr. Cleveland and Mr. Gorham.

MR. PORTER: Will both witnesses stand and be sworn, please?

(Witnesses sworn.)

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D A N C L E V E L A N D, a Witness, called by Pubco Petroleum Corporation, having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. KELEHER:

Q Please state your name, with whom you are employed and your occupation.

A Dan Cleveland, Petroleum Reservoir Engineer with Pubco Petroleum Corporation.

Q Have you testified before this Commission as an expert Petroleum Reservoir Engineer before?

A Yes.

Q Mr. Cleveland, you have previously testified before the Commission in this particular case, Number 2504, have you not?

A Yes, sir, I have.

Q Since the last hearing on this case, have you made additional studies of the Basin Dakota Gas Pool?

A Yes, sir.

Q To what extent have you made a study of the Basin Dakota Pool?

A Recoverable reserves were determined from the developed portions of the entire pool and the relationships of deliverability to recoverable reserves for initial and 1962 conditions were determined. Further determinations included the effects which the current formula and the proposed formula have on a well's share of the pool allowable in relation to its share of total pool recoverable reserves.

Q Will you define your meaning when referring to recoverable reserves?

A Yes, initial recoverable gas reserve is that volume of gas to be recovered over a period of time beginning when production is first initiated and ending at some future time corresponding to a minimum producing rate of income equivalent to operating costs.

Present recoverable reserve is that volume of gas that is defined as Initial Recoverable Gas Reserve less the volume of gas which has been produced to the present time.

Q Do you have an exhibit setting forth these definitions of reserves and the method of computing the initial recoverable gas reserve?

A Yes, I do.

Q Directing your attention to what may be identified as Pubco's R-1, would you explain this exhibit to the Commission?

A On Exhibit R-1, which I have prepared, is a written definition of recoverable reserves as stated previously.

The method of calculating initial recoverable gas reserve is known as the Pore Volume, or volumetric method. Initial recoverable gas reserve was computed by equation One, as shown on Exhibit R-1. The initial recoverable gas reserve is equal to the original gas in place times a recovery efficiency factor.

The original gas in place is computed by equation Two. This is a standard volumetric formula. The original gas in place equals to area times pay thickness times rock porosity times the fraction of pore space occupied by the gas, expressed as 1 minus water saturation, to result in cubic feet of gas at original reservoir pressure and temperature. To express the reservoir gas in cubic feet at standard conditions, the gas volume at reservoir conditions is multiplied by the ratio of initial reservoir pressure to a base pressure of 15.025 psia times the ratio of base temperature of 60 degrees Fahrenheit or 520 degrees Rankin to reservoir temperature times the reciprocal of initial gas compressibility.

The recovery factor is computed by equation Three, which is

a simple gas law theory, which states that the difference between 100 percent of the original gas in place and the gas in place at final conditions is the percent of original gas that is to be recovered from the reservoir underlying the acreage for which the computation is made. The fraction of original gas remaining in the reservoir at abandonment is the ratio of abandonment pressure, corrected for gas compressibility at abandonment conditions to the initial pressure corrected for gas compressibility at initial conditions.

This recovery factor expresses the fraction of original gas in place to be recovered to abandonment when the producing rate of gas income is equivalent to operating costs.

Q Mr. Cleveland, is this a recognized method for computing gas reserves?

A Yes, sir, it is described in many reservoir engineering texts, one of which is Sylvain J. Pirson Oil Reservoir Engineering, second edition 1958, pages 454 and 466; also in the Natural Gas Engineering handbook by Katz, and others.

MR. KELLAHIN: If the Commission please, I want to, on behalf of Southern Union Gas Company, interpose an objection to any testimony relating to gas reserves for individual wells, based upon this formula, for by its very definition shows that such testimony would be incompetent, in that it defines initial recoverable gas reserve as that volume of gas to be recovered over a period of time, beginning when production is first initiated and ending at

some future time, corresponding to a minimum rate of producing income equivalent to operating cost. That has no bearing whatsoever on the statutory definition of the reserves which this Commission must determine in prorating gas in the Basin-Dakota Pool.

As it was stated in the Jalmat case, the basic findings which this Commission must make, must determine insofar as practicable the amount of recoverable gas under each producer's tract, and the relation of that amount of gas to the total amount of gas in the pool. Now, this definition on its face shows that it gives no consideration to the amount of gas under the tract dedicated to the well, but only to the amount of gas that that particular well would produce during its productive life, without regard to its source, or what particular tract or portion of the tract it came from.

MR. KELEHER: If the Commission please, later on we'll connect it up.

MR. PORTER: The Commission will reserve a ruling on the objection, and we'll determine whether or not the testimony is connected as Mr. Keleher suggested it will be.

Q (By Mr. Keleher) Now, Mr. Cleveland, will you briefly describe where and how you got the various pieces of data necessary to compute the reserves for the wells you studied using this method of computation?

A To compute the original gas in place the acres used for each well studied was determined by multiplying the Dakota gas

spacing unit of 320 acres by the acreage factor given in the January 1963 proration schedule.

Q Excuse me, but how many wells in this pool have acreage factors equivalent to a full 320 acre spacing unit?

A I found that there are 790 wells or about 90 percent out of a total of 767 wells shown on the January 1963 schedule which have acreage factors equivalent to 320 acres. Of those wells having acreage factors other than 320 acres, 47 wells or about 6.1 percent of the total wells had less than 320 acres, and 30 wells or about 3.9 percent of the wells were greater than 320 acres.

Q With 90 percent of the wells in the Basin Dakota having an acreage factor equivalent to an established spacing of one well per 320 acres, is it logical that acreage should have a significant relationship in this pool to the reserves under each well tract?

A No, sir. In my opinion, it is not logical in this case because acreage is nothing more than a constant factor characteristic of all wells except a few. If acreage varied for all wells, then it would be logical to give some weight to acreage in any proration formula wherein the intent is to allow a well to produce its fair share of the market corresponding to its share of reserves in the pool.

Since all wells in the Basin Dakota Gas Pool but a few have the same acreage factor, inequities in sharing the market and violation of correlative rights will persist increasingly as more

weight is given acreage in a proration formula.

Q How did you determine the sand thickness, porosity, and gas saturation for the wells you studied?

A These values were furnished to me by our geological department who made a detailed study of each well using core and log information; and they plan to testify to this later on.

Q What is the basis for the pressure data used in your study?

A The initial surface pressure data was taken from data sheets as recorded with this Commission for each well. The gas compressibility was derived by standard procedures knowing the gas gravity and formation temperatures.

Q How about the pressure at abandonment conditions?

A The recovery factor as used in my study is a means of computing the volume of gas which is to be removed from the reservoir resulting in the reduction of original static pressure to some lower static pressure below which the reservoir is incapable of sustaining the delivery of enough gas to the well head to offset the expense of operating the well.

A study of Pubco's operating costs in the Basin Dakota indicated a yearly operating cost of $1130.00 per well, which is equivalent to the net income from 27 MCF per day.

A study and projection of draw down characteristics in key wells across the field concluded that wells of higher deliverability had more favorable draw down characteristics than those wells having

lower deliverabilities. That is to say that the higher deliverability well will have a lower static abandonment pressure at the economic flow rate of 27 MCF per day and an assumed flowing pressure, than a lower deliverability well will have at the same economic flow rate and flowing pressure.

Q Have you estimated the volume of present recoverable reserves from the developed portion of the entire pool?

A Yes, sir, I have estimated that the present recoverable reserves for the developed portion of the Basin Dakota Gas Pool represented by those wells shown in the January 1963 proration schedule to be about 2,791,638,000 million cubic feet.

Q How many wells did you compute the reserves on by the volumetric formula?

A Well, all wells were considered in our study, but the reserves were computed only on 382 wells, or about 50 percent of a total of 767 wells. The information required for computing the reserves on the other 385 wells was either not available, or was of unsatisfactory quality for computation of recoverable reserves.

Q Have you studied the relationship of deliverability to recoverable reserves?

A Yes, sir, I have. Mr. Keleher, on one of your previous questions there, I might elaborate a little more on the determination of this total recoverable gas for the pool.

Q Go ahead.

A The reserves that were computed for the 382 wells, these

reserves were plotted on a map. Iso lines were drawn through points of equal MCF per acre values. Now, from this map gridded values of MCF per acre were interpreted for those wells on which inadequate information was available. These values multiplied by the wells acreage factor times 320 acres resulted in the initial recoverable reserve by well. The total initial recoverable reserve less the production to November 1st, 1962, resulted in a present reserve estimate of 2,791,638,000 million cubic feet of gas for both marginal and non-marginal wells.

Q Have you studied the relationship of deliverability to recoverable reserves?

A Yes, sir, I have.

Q Do you have some exhibits which would demonstrate the relationship?

A Yes, sir, I do.

Q Can you number them?

A I have numbered them, R-2 through R-8, and I will describe each exhibit as we go through them.

Q All right. Start in with 2, R-2.

A Exhibit R-2.

MR. KELLAHIN: I want to renew my objection, in that no sufficient foundation has been laid for any conclusions on the part of this witness, as to relationship between reserves and deliverability. In the first place, it's their definition for reserves, and not the Statute of the State of New Mexico; and in the second place,

as pointed out in the Jalmat Case, the finding based on relationship between reserves and deliverability has no sufficient finding to support before this Commission.

MR. KELEHER: We can't get this witness to tell the whole story in one answer. As I promised the Commission, we will connect it up later on.

MR. PORTER: Mr. Kellahin, the Commission will defer ruling on this too, on the same basis.

MR. KELEHER: Mr. Kellahin has repeatedly referred to the Jalmat case, and it's our statement here that we are conforming exactly to the Jalmat case, and to the statutes.

MR. PORTER: You may proceed to examine your witness on the exhibits.

Q (By Mr. Keleher) Now, directing your attention to Exhibit 2, Mr. Cleveland, will you state what that exhibit may be?

A Yes, sir. I have Exhibit 2.

Q Will you state to the Commission what that is?

A Exhibit R-2 is a plot of initial deliverability versus initial recoverable reserve, as previously defined, for 382 wells on which reserve values were computed. This plot represents an average relationship of deliverability to recoverable reserves. To facilitate the averaging process, wells were grouped according to reserve range of 0 to 1, 1 to 2, 2 to 3, billion cubic feet of initial recoverable reserve. Within a recoverable reserve range, each point represents an arithmetic average, deliverability

per well versus an average recoverable reserve per well for those wells within a reserve range. The number of wells in each range is shown along the base of the graph.

Q Directing your attention to Exhibit 3, what does that purport to show?

A Exhibit Number R-3 was prepared on the basis of 1962 deliverability versus present recoverable reserve as of November 1st, 1962, for 357 wells having a non-marginal classification. The significance of Exhibits 2 and 3 is the fact that the two curves demonstrate a proportional relationship of deliverability to recoverable reserves. The more recent data bears out the evidence apparent from the initial data, and the proportionality of deliverability to recoverable reserve continues to hold true.

Q Do you have an Exhibit R-5?

A My next exhibit would be R-4.

Q R-4.

A Exhibit R-4 demonstrates that that similar average relationship holds true when using deliverability data as shown in the January 1963 proration schedule for the same wells. The deliverabilities in this case are primarily 1961 data with only 1962 data for those wells completed in 1962. Now, the purpose of this exhibit is to demonstrate again, the proportional relationship of deliverability to recoverable reserves and provide an additional foundation for supporting a study of the effects of various formulas on a wells share of the January 1963 market allowable,

compared to that wells share of the total pool's present reserve.

Q Can you present to the Commission, the results of the study to which you referred?

A Yes, sir. I have Exhibits 5, 6, 7, and 8.

Q Referring to Exhibit R-5, state what that is.

A Exhibit Number R-5 demonstrates a gas well's share of present pool allowable, compared to its share of the present developed recoverable pool reserves under the current formula of 75 percent acreage times deliverability, plus 25 percent acreage. On the vertical scale is the share of pool non-marginal allowable per well as the percent of total pool allowable. While on the horizontal scale is the share of pool reserves per well, as a percent of total developed pool reserves.

To protect correlative rights and prevent drainage between producing tracts, the ideal allowable reserve relationship would be the line as shown in red on this Exhibit R-5. For example, a well having a 4/10ths percent of the total developed pool reserves should have 4/10ths percent of the total allowable. Based on 356 wells, and the allowable for the same 356 wells as shown in the January, 1963, proration schedule, the effect of the current 75-25 formula is compared to the ideal line. Under the existing formula, as well reserves increase they have a lesser share of the existing market as compared to what they should be getting under the ideal formula.

Now, Exhibit Number 6 was constructed similarly to the Exhibit

Number 5. Again, the red ideal allowable reserve line is shown. Exhibit Number 6 was constructed similarly to Exhibit Number 5, and it compares the effects of the proposed 40-60 formula to the ideal relationship. Now, it should be noted under the 40-60 formula, as reserves increased those wells with higher reserves will receive even a lesser share of the market than they would have received under the ideal or current formula.

Exhibit Number R-7 demonstrates the effect of an allowable based on 100 percent acreage. It is apparent under 100 percent acreage that there is no change in the allowable per well, although there is a variation in reserves per well. Despite the fact that there is a marked difference in recoverable reserves per well, each well would receive the same allowable under a hundred percent acreage.

Now, Exhibit Number 8 is a summation value of these curves, and it demonstrates the effects on a well's share of the present pool allowable compared to its share of present developed pool reserves for the ideal allowable reserve relationship, which is this red line, the 75-25 formula, green line, the proposed 40-60 formula which is the orange line, and 100 percent acreage which is shown as the yellow line.

It is apparent that as more weight is given to acreage in a proration formula, the allowable per well progresses further from an ideal allowable, corresponding to the wells proportionate share of the pool reserves. The 75-25 formula more closely approximates

the equitable allowable reserve relationship than does the proposed formula of 40-60.

Q Can you, at this time, Mr. Cleveland, briefly summarize your testimony?

A In so far as is practicable, reserves have been determined for the developed portion of the Basin Dakota Pool. It has been demonstrated that deliverability is proportional to recoverable reserves, and the same relationship has held true from the initial conditions to the present. Because deliverability is proportional to recoverable reserves, the most equitable formula for prorating the available market between wells is to incorporate maximum weight to deliverability. That is, the most equitable formula would be 100 percent deliverability. Any change in the current proration formula should be to increase the weight of the deliverability factor.

Now, most certainly the change requested by Consolidated, in my opinion, would be an unprecedented disturbance of long established equities in the field and a violent assault upon correlative rights.

MR. KELLAHER: At this time, we would like to offer in evidence, our Pubco's Exhibits R-1 through R-8.

MR. STOCKMAR: Excuse me, may I interrupt long enough to see if I do have a set of exhibits, and to find out which one is which.

A Mr. Stockmar, the first exhibit, R-1 was the Definition

and Volumetric Formula; R-2 was the Initial Deliverability Curve; R-3 was the 1962 Deliverability Curve; R-4 is the Deliverability for the January 1963 Proration Schedule; R-5 was the Gas Well's Share of Present Pool for 75-25; R-6 was the 40-60 Formula; and the next one was the Acreage Formula, and finally was the Summary.

MR. KELLAHIN: If the Commission please, I would like to renew my objection previously stated, and I would like to add to it, that it would be impossible for us to Cross-Examine this witness on the basis of his definition of reserves, since it has no bearing to the reserves that this Commission must consider before it makes any proration order. His entire testimony is based upon the assumption that the area of drainage of a well constitutes the reserves dedicated to that well, which is obviously wrong. It also assumes that deliverability is in direct proportion to reserves, which has not been established by this witness. And, particularly since we are talking about reserves which are defined without regard to the Statute, I feel we can't even Cross-Examine the witness.

We object to the witness' exhibits, and move that his testimony be stricken from the record.

MR. HOWELL: If it please the Commission, Ben Howell for El Paso. I would like to correct, if I may, Mr. Kellahin's statement there, with reference to both the Statute and the decision of the Court. It is the recoverable gas reserves which are to be found, they are necessary. As I understand this witness' testimony, he has attempted to determine the recoverable gas

reserves, and I certainly heard nothing in his testimony to justify Mr. Kellahin's statement that the testimony that he's offered has been a determination of reserves based upon the amount that any one well would drain. I find nothing to that effect, and I certainly think that the objection does not state what the testimony actually was.

MR. KELLAHIN: May I point out, if the Commission please, that is inherent in his definition of reserves; it has no connection to the tract dedicated to the well, and that's what the Statute says, and that's what the Jalmat case says. We are in the same identical argument we were in the Jalmat case; we are talking about two different kinds of reserves. We are not talking about here in his testimony, the kind of reserves the Statute says the Commission was considering.

MR. KELEHER: In the Jalmat case, if the Commission please, Page 6, third paragraph on page 6, the Court found that the Commission had failed to make a finding as to the amounts of recoverable gas in the pool, or under the various tracts, and the amount of gas that would be practicably obtained without waste. It was the opinion of the Supreme Court, the Commission should have returned findings that correlative rights were not being protected under the old formula or being better protected under the new formula, insofar as practicable.

As I see it, the Commission would not have been reversed had they estimated reserves on the wells in the Jalmat Pool, and

related those recoverable reserves to deliverability, insofar as practicable. And that is exactly what this witness and petroleum engineer has endeavored to do.

It's unfortunate that Mr. Kellahin has reached the position where he is unable to Cross-Examine this witness. It's unfortunate that this witness has not testified to what they might like him to testify to. He's here, he's ready for Cross-Examination, and perhaps Mr. Kellahin can elicit from him the methods he used, what he means, and otherwise disect his testimony to the best of his ability. We contend this comes squarely in the ruling of the Jalmat case, and is exactly in accordance with the Statute.

MR. KELLAHIN: Mr. Keleher has seen fit to open the Jalmat case in part. I would like to read the entire quote from 375 Pacific Second. I'm quoting, starting at the bottom of page 814, it says:

"Therefore, the Commission by basing conclusions of fact, or what might be determined findings, must determine insofar as practicable, the amount of recoverable gas under each producer's tract, the total amount of recoverable gas in the pool, the proportion that 1 bears to 2, and what proportion of the arrived at proportion can be recovered without waste."

Now, without some testimony in the record as to what each tract's reserves are, we have no testimony before the Commission.

MR. STOCKMAR: Do I understand that the witness will be ready for Cross-Examination after ruling on these exhibits?

MR. KELEHER: Yes, sir.

MR. PORTER: That's my understanding.

MR. STOCKMAR: I would certainly like to strongly support Mr. Kellahin's statement. I find nothing in any of these exhibits which gives us the reserves for any particular tract, which gives us the reserves for the total pool, or which gives us any ratio of one to the other. Now, if they are being offered for this purpose, we do strenuously object.

MR. KELEHER: We offer them in evidence, and submit that the witness is ready for Cross-Examination.

Mr. Chairman, I would like to say this, that reference to Pubco's Exhibits 1 and 2 fully demonstrate the method and indicate that comes exactly within the Jalmat case, 1 and 2. In addition to that we have, by the next witness we will show the reserve map and reserves on our map, the exhibit which we have prepared, by Mr. Gorham.

MR. PORTER: The Commission will overrule the objection, and will consider the testimony, admit the exhibits, and give it whatever weight the Commission feels it is due.

MR. KELEHER: Exhibits R-1 through R-8 will be admitted subject to that condition?

MR. PORTER: They will be admitted in the record.

MR. KELEHER: You may have the witness for Cross-Examination.

MR. PORTER: Does anyone have a question of Mr. Cleveland?

Mr. Stockmar.

CROSS-EXAMINATION

BY MR. STOCKMAR:

Q Mr. Cleveland, is there any place on any of Exhibits R-1 through R-8 where you have set forth the recoverable reserves under any specific 320-acre tract in the field, and if so, identify it.

A No, sir, I haven't.

Q Is there any place on any of these eight exhibits where you have set forth the recoverable reserves for the entire field?

A I have set forth on, starting with Exhibit R-5, the total developed pool reserves which correspond to reserves under the total non-marginal wells in the pool, as shown by the January 1963 proration schedule. And in this case, I'm working only with non-marginal reserves, and non-marginal deliverabilities. This was the basis on which I based my study.

Q Nowhere then is there set forth the total recoverable reserves on all the, on the entire pool, on these exhibits?

A No, not other than -- nowhere,except in my testimony, I--

Q No, I'm speaking only of the exhibits.

A Yes.

Q Is there any place on any of these eight exhibits where you have set forth the ratio between the recoverable reserves under any tract, and the recoverable reserves from the entire pool?

A No.

Q No?

A No.

Q We may look at Exhibit R-2 for a moment; I was not able to hear how you had averaged these various wells. Would you tell me again how that was done?

A The wells were grouped according to reserve range, from zero to one billion, to two billion, and so forth, cubic feet; and after grouping the wells in this manner, then an arithmetic average of those wells reserves was determined, and correspondingly the arithmetic average deliverability was determined.

Q Is this the same procedure that you used last time, in April, when you referred to 33 wells?

A Yes, that is correct.

Q Is this the same procedure that the witness Rainey used with respect to his exhibits covering 460 wells?

A I understand that that would be correct.

Q Would you identify for me, this single well on Exhibit R-2 which shows a reserve of sixteen and one-half million MCF.

A I could identify it by digging back through my work sheets--

Q Do you have those with you?

A --which would take some time. Yes.

Q Please do, if you will.

A Mr. Stockmar--

Q Yes, sir.

A --which point were you asking for?

Q On your Exhibit R-1, you show a one well point which has a 16-plus million reserve.

A Okay.

Q I would like the identification of that well, please.

MR. PORTER: Is that Exhibit R-1?

MR. STOCKMAR: Excuse me. R-2, I'm sorry.

A Mr. Stockmar, that particular well is the Southern Union Production Company's Newlander Federal Number 1, located in Unit J, Section 31, Township 29, 11.

Q (By Mr. Stockmar) Thank you, Mr. Cleveland. Did I understand you to say, with respect to determination of reserves, that acreage is not a material factor in determining reserves?

A I said it's not a material factor insofar as making a distinction from well to well, in allocating the market between wells. Acreage is an important value in the determination of reserves, when calculating by the volumetric method, which I have demonstrated here. There happens to be only about ten percent of the wells in the pool that have acreage factors, either more or less than 320-acres per well.

Q In such determinations as you may have made, did you use the particular acreage factor in the formula, the particular acreage factor for that particular well?

A Well, in that case, the acreage factor was one, it was

320-acres.

Q Did you always assume that the well would drain its 320 and no more and no less, is that correct?

A Well, that's correct, because the spacing distribution out here is on 320-acres.

MR. STOCKMAR: Thank you, Mr. Cleveland.

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

CROSS-EXAMINATION

BY MR. KELLAHIN:

Q Mr. Cleveland, your exhibits are based on initial deliverability and initial recoverable reserves, and present recoverable reserves and present deliverability, that is correct, is it not?

A Maybe you better run through that again.

Q Well, referring to your Exhibit Number 2, which you are talking about initial recoverable reserves.

A That is correct; initial recoverable reserves.

Q How do you calculate the initial recoverable reserves for the wells shown on this exhibit?

A I calculated those reserves by following this, or using this volumetric formula as demonstrated on Exhibit Number 1.

Q Now, that formula gives no consideration to the tract to which the well is dedicated, does it?

A Well, the tract designation would come in the acreage factor, or the amount of acreage that you use in the formula for

each tract.

Q But in your definition of initial recoverable reserves, you ignore that factor.

A No. I beg to disagree with you. In equation Number 2, you have--

Q But I'm talking about your definition under 1-A.

A Well, initial recoverable gas reserve can apply to the entire field, as well as one tract.

Q Is that what you are talking about in that definition, the entire field?

A I'm talking about that, regardless of whether it is a tract or the entire pool, which is initial recoverable gas reserve. Then the definition would apply to either a tract, pool, groups of wells, or any number of wells.

Q Well, if you are talking about tracts, you would have to put an acreage factor into it, of course?

A Well, the initial, the broad definition of initial recoverable gas reserve was made under the definition of reserves there on Exhibit Number 1. Then, I proceed in part two, to explain the volumetric formula for calculating initial recoverable gas reserve, and what the initial recoverable gas reserve is, and I proceed then with the formula. Now, in equation Number 2, I have included there, acres, that is included in that formula.

Q You treated that as being uniform throughout the pool, in this case?

A No, I did not; for each well, depending upon its acreage factor.

Q You used the AD factor, is that correct?

A I used the acreage factor that was shown in the 1963 proration schedule. If the acreage factor was 1, then I used 320-acres; if it was less than 1, then I multiply that acreage factor times 320 acres, and that was the acreage I assigned as being in place, or the acreage under which I would compute the initial recoverable gas reserves.

Q Now, in your formula, you use a cubic feet per acre foot factor; that would have to relate to your 320-acres, wouldn't it?

A I beg your pardon?

Q Well, you use, do you use a cubic foot per acre factor in the formula?

A Well, yes. The 43,560, which is a constant of square feet per acre, times thickness, give you volume of cubic feet per acre.

Q How did you determine your thickness throughout this study?

A Well, the thickness was determined for all of these wells by our geological department, who furnished me these data.

Q On what did they base that study, do you know?

A Well, they will be coming on next, to give testimony to that, if you would like to wait. I'm aware of how they did do

it, but I think they are more qualified to testify on it.

Q Now, as I understand you, you used 382 wells because you did not have the data on the rest of the wells, is that correct?

A We did not have what we would consider adequate data in order to calculate.

Q So, then you plotted them on an Iso map, similar to Exhibit Number 3 offered by--

A That's right.

Q --is that right. Now, did you make the determination that the information wasn't available, or did someone else make that determination?

A No, sir, someone else made that determination.

Q And that will be the witness who is going to be offered?

A That is correct. All logs and material like that, was available in our geological department; it was either available, or not available.

Q Now, referring to your Exhibit Number 2, for example, you have a point located here with 57 wells. What was the range of deliverabilities included in that point?

A Well, this would require my going back to my work sheets again.

Q If you would.

A Now, you are asking for the point that shows 57 wells?

Q You can take any one of those points, 63, 44, any of them along there, you can give me the range of deliverabilities.

A Okay. Well, that second grouping there, if you please, of 59 wells--

Q Yes.

A --is that okay?

Q Yes, sir, that's fine.

A Mr. Kellahin, it would appear that that range would be from 204 to about 975, unless I have--

Q 204 to 975?

A Yes.

Q Is all of this based on work sheets that you have with you, Mr. Cleveland?

A All of what?

Q All of your work on the--

A Yes, all of my work, that is represented by these exhibits, is in work-sheet form.

Q Could you make those work-sheets available to us for comparison with your exhibits?

A Certainly may.

MR. KELEHER: I object to it, unless it's on a specific well basis. Why should we turn over all our sheets to them? They have got sheets of their own. If it please the Commission, we object to any fishing expedition like that, to using the same technique that was used in the original hearing, using our maps and our papers to build up their case.

MR. KELLAHIN: If the Commission please, I think we have

a right to examine the underlying data on which these exhibits were based; the information has not been offered here. We can go through and ask him well by well, if the Commission sees fit.

MR. KELEHER: We prefer it that way, to ask him well by well; that will be fine.

MR. PORTER: Mr. Kellahin, to be clear on your request here, is it your request that he furnish you the work-sheets so that you can go through the work sheets to establish the facts concerning these wells on Exhibit 2, or his other exhibits, one by one?

MR. STOCKMAR: Mr. Kellahin and I have been conferring on this. What we would like to have is the identification of each of these 382 wells that appears on Exhibit R-2, the initial deliverability attributable to each, and the initial recoverable reserves attributable to each. Now, we are extremely reluctant to burden the Commission with this type of well by well situation; we are perfectly glad to do the work on our own time from these data sheets. But if we must have, to support, to get at the basic data underlying R-2, well, we are prepared to have Mr. Cleveland do it well by well.

MR. KELEHER: Well, we think the request is most unreasonable, but if they want to ask this witness well by well, to produce the core analyses on 389 wells, well, we can bring it all here tomorrow and it will take at least a week.

MR. STOCKMAR: No, I have not asked for that, as I am

sure the Commission appreciates.

MR. KELEHER: Well, we decline to do what they asked us to do before. We furnished them before, with all of our maps, all our computations, and overnight they came back here the next day with a set of figures, to say that we were all wrong. They did that same thing with El Paso's exhibits. Now, we object to that method of procedure. They have had months to prepare this case.

MR. STOCKMAR: So there is no difference of opinion, that is precisely why we are asking for it.

MR. KELEHER: You want to build up a case?

MR. STOCKMAR: Same type of data, same matter, subject to the same defects, but we must have the underlying data to demonstrate the error.

MR. KELEHER: We specifically ask the Commission not to grant that request. If they want to ask him in open court here, well by well, one by one, it will take at least a week, but that's all right. But to furnish our papers, they have no more right to ask us for our papers, than we have to ask them for their papers.

MR. PORTER: Mr. Kellahin--

MR. KELEHER: By our next witness, Mr. Gorham, we will submit two maps showing all of the 690 deliverabilities listed in the pool, and individual tract reserves under the 382 wells that this witness has testified to.

MR. PORTER: Mr. Kellahin, do you think that your question might be resolved by the next witness--

MR. KELLAHIN: Very well could be, yes, sir.

MR. PORTER: -- if he does give the deliverabilities and the reserves, individually?

MR. KELLAHIN: Well, as I understand the exhibits, however, Mr. Porter, they are based on more than 382 wells.

MR. KELLAHIN: Three hundred and eighty-two.

MR. KELLAHIN: And they are proposing to offer the figures on 382 wells, whereas, their calculations are based on all the wells in the pool, or am I wrong?

A I beg your pardon there. The reserves were computed for 382 wells, as I stated previously. Now, to determine, or estimate the total reserves for the entire developed portion of the pool, the reserves for those 382 wells were placed on a map and iso lines were drawn through points of equal MCF per acre recoverable reserves, so that we had an iso MCF per acre map, and that map was gridded for those wells, or for those tracts that we did not make the exact computation. And reserve was determined from this iso map. The total of those wells reserves, plus the reserves from the 382 wells that we actually made the computation, gave me the total reserves for the entire developed portion of the pool.

MR. STOCKMAR: Well, is it clear, Mr. Cleveland, that the exhibit coming up will identify the location, the name of each

well, or some means that could be located?

A It will identify the location.

MR. STOCKMAR: And the initial deliverability?

A The initial deliverability will be shown.

MR. STOCKMAR: And the initial reserves as calculated, or controvert?

A That is correct.

MR. STOCKMAR: I would like to suggest we proceed with the next witness, but reserve the right to Cross-Examine Mr. Cleveland further, after this evidence is made available to us.

If the Commission please, we are volunteering to do this kind of thing, so that we have this available, so that we can work on it, I would assume that we would be at least given this map so that we could look at it tonight, should we adjourn before it is introduced in evidence?

MR. KELLAHER: Oh, I don't think so. As I say, that's the same technique they used before. We haven't asked for any of their papers in advance, or anything of that sort.

MR. WALKER: Off the record.

(Discussion off the record.)

MR. PORTER: Does anyone else have a question of this particular witness?

MR. KELLAHIN: I haven't completed my Cross-Examination. If the Commission please, we got off on this when I asked him for these figures, when he testified to them. I would like to complete

my Cross-Examination.

MR. PORTER: In other words, if this information is available--

MR. KELLAHIN: No, I would like to go ahead now, with further questions, on other matters.

MR. PORTER: But you would also like to Cross-Examine this witness after the reserve picture by tracts is given?

MR. KELLAHIN: Perhaps, but I'm not taking any position on that at the moment. What I want to do is complete my Cross-Examination now.

MR. PORTER: Well, go ahead, Mr. Kellahin.

Q (By Mr. Kellahin) Now, Mr. Cleveland, referring again to your Exhibit Number 2, you have points at the lower range of initial, that related to initial deliverabilities, the larger number of wells in the pool are at the lower range of deliverability, that is correct, is it not?

A Well, the wells in which we had adequate information, we found to be grouped in the lower range.

Q And yet you give the same weight, insofar as your curve is concerned, to one well which you identify as a Southern Union Production Company well, Federal Number 1, I believe, Newlander Number 1, that is accorded the same weight as 57 wells, and 59 wells, and 44 wells, in the lower range of your curve?

A Well, of course, this is my opinion, if we had more wells, or had wells in which we had adequate information to

calculate reserves, this well would probably represent an average well for that group, and this is why I plotted it on this graph.

Q Now, do you have any core information on that well?

A I wouldn't know offhand.

Q Well, did you calculate the reserves on that well?

A Yes.

Q How did you calculate those reserves?

A You want the factors used?

Q Yes, sir, on that particular well.

A All right. The acreage factor was 1 in this case, and equivalent to 320 acres. The average porosity, that was supplied to me, and I don't have it noted as to whether that is core porosity or sonic porosity or a log porosity, but the average porosity was ten and a half percent. The water saturation was computed as 16 percent. The net pay thickness, 87 feet. The initial reservoir pressure, 2,335 pounds. The abandonment pressure of 140 pounds. The reservoir temperature, 142 degrees Fahrenheit. Specific gravity of the gas, 7/10ths. And these factors were used in the volumetric formula on Exhibit Number 1, to compute initial recoverable reserve of 16,877,440 MCF.

Q Would you give me that last figure again, please?

A 16,877,440 MCF.

Q Now, you used an abandonment pressure of 140 pounds. How did you determine that? I believe you covered that in your testimony, but I would like to go back over it again.

A Mr. Kellahin, I made a study of key wells over the field, made a study of their flow characteristics, and related these flow characteristics to an economic rate of flow. In other words, it would be a drawdown characteristic that could be correlated to the ability of the well to flow, and at the economic flow rate of 27 MCF per day. Then, at that point, assuming that the flowing pressure would be approximately 120 pounds, then I computed the abandonment pressure.

Q Was the abandonment pressure uniform?

A I beg your pardon?

Q Was the abandonment pressure thus calculated, uniform for the pool?

A Well, it seemed to be only uniform for those groups of wells that would fall into a high deliverability class, as compared to, and would be different from those wells that would fall into the low deliverability class. Now, most of the high deliverability wells would indicate that they would have this lower abandonment pressure, as compared to varying higher static abandonment pressures in the lower deliverability wells.

Q Now, what factors enter into the flow characteristics of a well?

A In this case, it was taking the surface pressures as reported on the deliverability sheets to this Commission by the operators, and plotting the static shut-in pressure squared, less the flowing pressure; or, P sub a squared on a log scale,

versus flow rate from the well on a log scale. An extrapolation of points plotted in this manner was extrapolated to 27 MCF per day flow rate.

Q Now, that is based largely on the permeability of the zones in which this well is drilled, isn't it?

A That's right. This method would take into account indirectly, the permeability or the flow capacity of the formation from which this well is producing.

Q And that has no relation to the acreage dedicated to the well, does it?

A This has a relation to the ability of this formation to give up gas in economic flow rates.

Q I'm relating it to the 320 acres under the tract dedicated to the well, Mr. Cleveland. Does permeability have any relationship to that factor?

A The permeability, or the flow capacity of this formation into this well bore of this gas that is deposited under the 320 acres, this permeability does control the ability of this well to produce that gas in economic rates of flow, in economic amounts of gas.

Q Now, the same factor of permeability determines whether the well will drain 160 or 640 acres, does it not?

A That is correct; but in this field where you have approximately 90 percent of the wells that are completed, or developed on 320-acres, it's reasonable to understand that you have

counter-drainage by offsetting wells, which are also developed on 320-acre spacing.

Q Well, now, Mr. Cleveland, are the permeabilities uniform throughout this pool?

A I would say that they vary all over the place.

Q And a well with high deliverability and good permeability, will drain a larger area than one with low permeability, would it not?

A Well, I would say that you could drain the gas attributable to that well under its 320-acres, more easily than you can for a well that has a lot lower deliverability.

Q That drainage is not going to stop at 320 necessarily, is it?

A Well, you are protected by counter-drainage by offset wells that are completed on 320-acres, so it should.

Q Doesn't your answer assume that the permeabilities of both wells are the same?

A Well, if a well, if a low deliverability well, which would indicate low permeability at the well bore, if it is unable to produce that gas through that well bore, another well offsetting it which might have a higher deliverability, has very little chance of draining that gas from that well.

Q That assumes that the permeability is uniform throughout the tract, doesn't it?

A No, this would assume that -- I'm saying that if the

permeability under the low deliverability tract is smaller than the permeability under the tract having a higher deliverability.

Q Well, isn't the ability of the well to give up gas really a function of time, and not a matter relating to the reserves in place on the well?

A You could produce those wells indefinitely, and you could eventually reduce the pressure to the abandonment pressure of a high deliverability well. But, in my study I have defined what I mean by initial recoverable reserve, and to me this is what has some significance.

Q Well, your initial recoverable reserves is not the reserves under a 320-acre tract though, is it?

A Well, it's computed for a 320-acre tract, or whatever acreage--

Q Well--

A --is in the tract.

Q --to get back to your abandonment formula, what's the P sub a again, in that formula, how did you arrive at it?

A Well, I have already explained to you, Mr. Kellahin, the study that I made of the flow characteristics of the key wells across the field, by studying the flow characteristics of these wells and relating this to the ability of the well to flow, taking this in with an economic rate of flow.

Q Well, that only relates to the rate, doesn't it? Just the rate of flow, has nothing to do with the reserves, does it?

A Well, this is the ability of the well to flow. And at this abandonment pressure, or this P sub a, as you referred to, it's at that point that well will have a static bottom-hole pressure, or a static pressure that below which this, the reservoir under this well is incapable of yielding economic flow rates of gas. And this economic rate is 27 MCF, as I defined before.

Q Now, we have already agreed, I believe, that this is a function of permeability, to a large extent; at least, permeability affects the rate of flow, of course.

A That is correct.

Q And is permeability a factor used in determining reserves in place?

A Well, for this volumetric method that I have used here, the permeability has been indirectly considered. I think it has to be considered in a volumetric estimate of recoverable gas, and it has been considered through the use of this abandonment pressure that was estimated to be equivalent to the reservoir condition at which time the reservoir cannot yield more than 27 MCF per day.

Q But, there again, do we come back to the point, Mr. Cleveland, that that relates directly to the area being drained by the well, and not to the tract dedicated to the well, insofar as the reserves are concerned?

A Well, there again, as I have stated before, Mr. Kellahin, you are protected by counter-drainage. With your field being developed on 320-acre spacing, and if the well across the lease

line from you, from a high deliverability well, has poor drawdown characteristics, indicating a low permeability, and if you can't produce that gas through that well bore, the well offsetting it has very little chance of getting that gas.

Q Mr. Cleveland, you can produce it, given time enough, can't you?

A If you wanted to produce it out a thousand years, if you wanted to attempt to stay in business that long, you could get this--

Q We don't have to talk about a thousand years in this pool, do we? We can talk about another ten years, or fifteen, can't you?

A I don't know. I would suspect that it could be quite a bit longer, but I would have no way to make--

Q How many wells did you determine your characteristics on?

A I made a study of about 42 wells, that were scattered throughout the field.

Q And how many points did you have on each well?

A I set out to determine it, to make this determination on those wells that had at least three points.

Q At least three.

A In other words, anything below that was, oh, I didn't feel I could make a reliable prediction on.

MR. KELLAHIN: Thank you, Mr. Cleveland.

MR. PORTER: The hearing will recess.

MR. KELEHER: May I ask the witness two questions, please, and I think we can excuse him.

MR. PORTER: Two questions, Mr. Keleher, all right.

MR. KELEHER: Thank you, Mr. Chairman.

REDIRECT EXAMINATION

BY MR. KELEHER:

Q Mr. Cleveland, going back to the "A, B, C" of this, without permeability, does any well have any recoverable reserves?

A No, sir. It would not. It's necessary for that well to have permeability before it can have recoverable reserves.

Q Therefore, permeability must be considered in estimating recoverable reserves?

A I feel that it has to be considered, Mr. Keleher.

MR. KELEHER: That's all. I kept my word.

MR. PORTER: Thank you. The hearing will recess until 8:30 in the morning. Remember, that's 8:30, instead of 9:00 o'clock.

MORNING SESSION
FRIDAY, FEBRUARY 15, 1963 -- 8:30 A.M.

MR. PORTER: The hearing will come to order, please. Mr. Cleveland, will you take the stand, please?

Mr. Kellahin, were you through with your Cross-Examination?

MR. KELLAHIN: Yes, Mr. Porter, thank you.

MR. PORTER: Does anyone else have a question of this witness?

MR. HOWELL: Ben Howell, El Paso Natural Gas.

MR. PORTER: Mr. Howell.

CROSS-EXAMINATION

BY MR. HOWELL:

Q Mr. Cleveland, will you refer, please, to your Exhibits R-2, R-3, and R-4.

A R-2, R-3, and R-4?

Q Yes, Mr. Cleveland.

A All right.

Q Now, you have plotted on a graph, points which you have marked a number of wells represented by each point on R-2. I believe the first point says 44. There seems to be some confusion about the manner in which the reserves were calculated. Do I understand correctly that in determining the reserves, you allocated to each of those wells the acreage which is allocated to it under the State Rules?

A Yes, sir, that's absolutely correct; it's the tract

acreage.

Q And as to each point that appears on this graph, you have, in determining the reserves for the well, limited those reserves to the acreage attributable to that well?

A That's correct.

Q So that possibly your exhibit might more accurately be entitled, the reserves for tracts attributable to 382 wells?

A That's correct.

Q And is the same thing true as to your Exhibit Number R-3?

A Yes, sir, it is.

Q And as to R-4?

A That's correct.

Q So my understanding is correct then, that each of these exhibits uses a reserve figure for the well that is actually the reserves for the tract upon which the well is located?

A That's correct, Mr. Howell.

Q I believe that may clear up some misunderstanding that seemed to exist here yesterday. Now, Mr. Cleveland, I notice that you have on your Exhibit R-2, you have plotted points, your second point, for example, is 59 wells; do I correctly understand that those, that the average as shown, the average reserve for the tract upon which the well is located for those 59 wells, is approximately three-quarters of a billion cubic feet?

A For the second point there, the average would be

slightly less than one and a half.

Q One and a half. I beg your pardon. For the first point then, the 44 wells, the average is approximately a half billion, for the second point the average is approximately a billion and a half as to reserves, for the third point it's approximately two and a half billion, is that correct?

A Yes, sir, that's right.

Q Now, I believe that the testimony shows in this case, that estimating reserves is an estimate which is subject to error, and subject to constant corrections as more factors become known, more information becomes available, is that correct?

A That's right, Mr. Howell.

Q Now, would the possible errors, in just making estimates, in your opinion, exceed any error resulting from grouping in one group, say, these 57 wells whose reserves lie between two billion and three billion?

A Yes, sir, I think the possibility does exist; and the averaging method that we have used here, I would feel would tend to normalize the possible large area that you might have on an individual well basis, by grouping these and by taking an overall average of all wells, that you have a tendency to normalize this amount of error to a minimum.

Q And in your opinion, is this two and a half billion for these 57 wells, a reasonably good figure of reserves?

A I would think that it would represent a good reasonable

average reserve.

Q And the error that any individual in calculating the reserves attributable to the tract upon which any one of these wells was situated, might be greater in magnitude than the difference between two and a half billion, which is the average point, and the estimate that was assigned to it?

A I would say that that is a good assumption.

MR. HOWELL: Thank you, Mr. Cleveland.

MR. PORTER: Mr. Stockmar.

CROSS-EXAMINATION

BY MR. STOCKMAR:

Q If the Commission please -- Mr. Cleveland, would the same thing be true as to deliverabilities as you have averaged for these wells?

A You have a variation in deliverabilities, and I would feel that the same thing would apply for the deliverabilities.

Q That is, that the average of all of the wells in the particular group is within the range of accuracy of measuring deliverabilities in the first place, is that what you are saying?

A Well, certainly over the field you have some wells in the measurement of the deliverability that perhaps you have a large margin of error. Now, I don't know what magnitude this might be, but I would suspect you would find this error to be on the anomalous wells in the field.

Q But if you take all the wells in any particular reserve

grouping as you have done, and average their deliverability, the variation between the measured deliverability and that average is within the range of accuracy of determining the deliverability, is that your statement?

A I would think so.

Q Do you still have your work sheets with you, Mr. Cleveland? I would like to know the ranges of deliverability for the first group of 44 wells.

Mr. Cleveland, I will also wish to know the range for the second group of 59, and the third group of 57, if that will aid in speeding up the hearing, as you go through here.

A You want a minimum and maximum, is that in your range, is that it?

Q Yes, sir.

A It would appear, Mr. Stockmar, that on the basis of my tabulation here, that the minimum and maximum, unless I have overlooked something here, from zero to one billion was for a well that had 29 MCF per day deliverability, up to about 900; and on the one billion to two billion, it was about 200 to a thousand; and on the two to three billion, it was 138 to 1400. Now, in the minimum ranges here, there were--

MR. UTZ: What was the last one, two to three billion? Isn't that a little different than the figure you gave us yesterday?

A Beg your pardon?

MR. UTZ: Isn't that a little different than the figure you gave us yesterday?

A Well, it was 139 to 1400; I don't know, in looking through here yesterday--

MR. UTZ: That was from two to three?

A Two to three.

MR. STOCKMAR: I think that's all the questions I have.

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

CROSS-EXAMINATION

BY MR. UTZ:

Q Mr. Cleveland, I would like to clarify your method of determining your abandonment pressure. As I understood yesterday, you plotted the difference of squares between P sub a and P sub w, against the rate of flow, is that correct?

A That's correct.

Q And how did you establish the slope of that curve?

A Well, the slope of that curve, Mr. Utz, was established by those three points that I had.

Q You had three different pressure and flow points--

A That's correct.

Q --to plot. Then that established your slope, and you followed the slope down to 27 MCF per day, was it?

A That's correct.

Q And then calculated your abandonment pressure, or

reservoir pressure at that particular point?

A That's correct.

Q Now, how did you arrive at your P sub w, at that point?

A Well, the P sub w at that point was assumed in all cases to be approximately 120 pounds.

Q You just used an arbitrary figure, 120 pounds?

A That's correct.

Q Now, that gave you considerable variances, did it not, in your abandonment pressure, as between tracts?

A It did. Well, I should say it did not for the larger wells, for the larger deliverability wells. For the lower deliverability wells, there was a considerable variation in abandonment pressure, static abandonment pressure that would result.

Q Do you have at hand there some of the ranges of abandonment pressures, that you could give us? In other words, let's take -- Well, what was the range of abandonment pressures for the 382 wells? Can you get that without too much trouble? When you find your minimum or maximum abandonment pressures, I would also be interested in the deliverability of the well.

A Mr. Utz, it would appear that the maximum abandonment pressure would be 1560 pounds of this group of 382 wells, and the deliverability was 27 MCF per day. The minimum pressure was about 140 pounds. It would appear that for most of the wells having

deliverabilities above 2,000 MCF, approximately, well, then, the abandonment pressure would be about 140 pounds. One particular case here of 140 pounds for a well that had a deliverability of 4,937. Now, it would appear that the minimum deliverability would be for 140 pounds, abandonment pressure would be in the neighborhood of 2,000.

Q So that your abandonment pressures were substantially higher for your smaller wells?

A That's correct.

Q Which would tend, of course, to make the reserves much smaller on the smaller wells?

A Well, that's right. You can just only -- an operator can only take a well so far, and still operate at a profit. And although these pressures would represent static abandonment pressures, if you would allow the well to be shut-in long enough, it would achieve this abandonment pressure, but as soon as you open that well, then it would drop off immediately to such a level that the reservoir at the well bore would not yield an economic rate of flow.

Q So that on the smaller well, with an abandonment pressure of 1560 pounds, the initial pressure was something around 2,000, wasn't it? You only get about 25 percent of your reserves out of that well, reserves in place, that you would consider to be producible?

A Well, that's probably about right, yes.

Q Referring to your Exhibit Number R-2, you gave some ranges of deliverabilities for about three groups. I believe your first group had 44 wells, the next group 59, the next group 57. I wonder if you could readily tell me what the range of reserves, calculated reserves was in those groups?

A In all three of those ranges?

Q Well, if it is not too much trouble, and not going to take too much time.

A Mr. Utz, I'm sorry it took so much time here, but for that first group, it would appear that the reserve range would be 300,000 MCF to about 742,000 MCF; for the second group, about one million MCF to 1,982,000 MCF; and then in the third group, 2,106,000 up to 2,778,000 MCF.

Q Then from that could we say that the range of reserves within each group was substantially less than the range of deliverabilities in each group?

A The percentage difference?

Q Yes.

A Yes.

Q Now, did you at any time during your study, turn this situation around a little bit and group your deliverabilities, your wells into deliverability groups, rather, and see how your reserves for those groups of wells fit a curve?

A Yes, sir. I looked at it briefly. Of course, the reason I didn't do that from the start is because it's only

logical to me that the grouping would have to be on reserves. But I looked at that briefly, and compared the share of a well's participation of the allowable, compared to its percent of the total reserves, and compared this to the ideal line that was represented on Exhibit -- starting with Exhibit 5 and 6, and it would appear that the 75-25 formula would closely approximate that line for about 95 percent of the wells that I studied.

And out at the -- or up in the upper regions of the curve, you had about five percent of the wells that were scattered, that were probably defined as anomalous wells, which I realize there are anomalous wells in this study.

Q But you would agree, would you not, that there are other ways of analyzing the reserve deliverability ratio, other than the way you accomplished it here on Exhibit R-2?

A Well, Mr. Utz--

Q It could be a matter of judgment as to which is the best way to do it?

A I think that from one engineer to another, I think you do have differences in judgment, and it was my feeling right from the start that this was the correct way to do it.

Q Do you intend to offer the Commission any reserves by tracts on your 382 wells?

A That would be entirely up to counsel. I presume so, I don't know.

MR. UTZ: Is that true?

MR. GORHAM: We'll do it on the map.

MR. UTZ: Will you give us any individual tract reserves, will the map show the location--

MR. GORHAM: Yes.

MR. UTZ: --and the deliverability?

MR. GORHAM: Yes.

MR. UTZ: That's all I have.

MR. PORTER: Any further questions of this witness? You may be excused.

(Witness excused.)

MR. PORTER: Call your next witness.

MR. KELEHER: Mr. Gorham.

*****

F R A N K D. G O R H A M, J R., a Witness, called by Pubco Petroleum Corporation, having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. KELEHER:

Q State your name, please.

A Frank D. Gorham, Junior.

Q Mr. Gorham, what is your profession?

A I'm a petroleum geologist.

Q You have previously testified in this case, have you not?

A Yes, I have, sir.

Q And are qualified as a witness before the Commission in this and other cases?

A Yes, sir.

Q What, if any, is your official position with the Pubco Petroleum?

A I'm executive vice-president of Pubco Corporation in Albuquerque, New Mexico.

Q This particular hearing, are you testifying as executive vice-president, or as a geologist?

A As a petroleum geologist, sir.

Q Mr. Gorman, you have heard the testimony of Mr. Trueblood, have you not--

A Yes, sir.

Q --testifying for Consolidated Oil and Gas, Inc. Were you present when he testified and the Commission allowed to be introduced what is known as Exhibit 4--

A Yes, sir.

Q --which related to a statistical study, involving acreage factors, deliverability, reserves, and other factors to which he testified?

A Yes, sir.

Q Directing your attention to that Exhibit 4, which contains 70 pages, and in which there are 40 individual items on each page, or a total of 2,800 items, I'll ask you to discuss that Exhibit 4, and give the Commission your opinion as to its validity and value to the Commission in this particular hearing.

A In my opinion, sir, the tabulation as presented, run

through an I.B.M. machine, showing the various relationships of reserves, deliverability, proration factors, formulas, et cetera, is one that is entirely based on, I believe, what was called exhibit Number 3, and still posted on the bulletin board on my right, which was Consolidated's reserve evaluation of the Basin-Dakota Pool.

This reserve evaluation involved the calculations of El Paso Natural Gas Company at a previous hearing, and although there were some two to three hundred additional wells drilled where information to some large degree was available, this information was not utilized and they used the technique which is to some degree acceptable in the industry of extrapolating reserves over a broad area through control points, which specific information could have been obtained, and it was not obtained.

And, in my opinion, the reserve map as presented by Consolidated does not reflect the true picture of recoverable reserves in the pool. Therefore, in my opinion, Exhibit Number 4 can have no bearing in the case.

Q Mr. Gorham, Mr. Cleveland has testified that he had computed the recoverable reserves by volumetric means on some 382 wells in the Basin-Dakota Pool. My recollection is that he further stated that his recoverable reserves estimates were based on porosity determinations, water saturation determinations, and net pay determinations prepared by the Geological Department of Pubco.

Now, would you please summarize for the Commission briefly the methods of determination used?

A Yes, sir. We took two of our senior geologists off of their other duties, beginning some two months ago, and had them determine the basic factors of porosities, water saturation, and net pay thickness on all of the wells in the entire Basin-Dakota Pool.

Now, in addition to that, that information was turned over to our Reservoir Engineering Section, where it was further processed. And, following that, it was rechecked and computed by our Accounting Department insofar as the arithmetic was concerned. Of the total wells in the pool some -- in excess of 600 -- we found that some 382 wells either had sufficient number of logs or sufficient information as to core analyses that we could make what we believe to be a reasonable volumetric estimate of reserves.

Now, of that 382 wells, there are only approximately 300 which had the absolute criteria that we deem necessary for a reserve estimate, namely, the gamma ray log, the sonic log, and the induction log. Of the 382, all but 82 had that criteria. Some 82, approximate number of wells, had most of that information. And based on adjacent wells, we were able to, in our opinion, establish the additional information necessary for reserve estimates.

Insofar as porosities are concerned, porosities were determined by the use of some 29 core analyses and by the use of the sonic logs which were available from the 382 wells studied. Now, we actually utilized a total of 60 core analyses made available to

us by the industry, some of which were either cores in dry holes, some of which did not have sonic logs, and as a consequence only 29 of the cores were utilized for water saturations primarily; although, in the case of almost all of them, we used them for porosity determinations.

The calculations of porosity readings were made directly from a sonic log only as compared to the porosities as measured by the core analysis methods compared very favorably and on an over-all average differed by approximately 1 percent porosity, which, in our opinion, is well within probability error. When both a sonic log and a core analysis were available, core analysis porosity was used in preference to sonic calculation. For those wells for which core analyses were not available, porosity was determined by obtaining a direct reading from the sonic log, and in conjunction with the gamma ray log, which provided a shale correction were introduced into the Schlumberger porosity chart from which a reading was made of net effective porosity. This method and technique has been fully accepted by the industry.

I might also add at this point that Pubco used in its porosity determinations a minimum of four percent cut-off, or in other words, those porosities which fell below the four percent range were not included as effective net pay.

Water saturations were obtained from direct readings of induction logs and with the adjusted porosity previously determined and again using the gamma ray log, water saturations were again read

directly from the Schlumberger charts after correcting, in certain instances, for the difference in water salinities, known by specific samples taken.

I might say here that the industry is somewhat divided in coming to a determination of water saturation. Some will utilize the water saturation as given by core analyses. The core analysis provides total waters, which in our opinion reflects the invasion of drilling fluids, and in most cases your core analyses companies prefer not to give a true or connate water situation, unless they have had a large amount of experience in the area and have a correcting factor for total waters.

Finally, net pay was determined by including only (1) those apparently productive zones which were physically open to the well bore, and (2) those zones having four percent or greater porosity, and (3) those zones having 55 percent or less water saturation.

Q Mr. Gorham, was this work that you have described done by you or under your direction?

A Yes, sir.

Q And are you satisfied that it correctly reflects and represents the findings?

A Yes, sir.

Q Mr. Gorham, Pubco's studies are directly related, according to your testimony, to some 382 wells out of a total of 769 wells actually present in the field. Can you state, for the

benefit of the Commission, the reason why not all 769 wells were completely evaluated?

A I believe I have already covered that, sir, but briefly, it was believed by Pubco, in order to make a reasonable estimate of recoverable reserves on an individual well basis that the requirements for the study would include gamma ray, sonic, and induction logs. Those wells which had core information are, for the most part, included in the number of wells studied, although even some of these wells were dry holes or lacked the additional logging tools to determine an accurate water saturation.

Q In connection with the work, have you prepared a map of the Basin-Dakota Pool, showing areas of equal reserves?

A Yes, I have, sir.

Q Will you please ask the Reporter to mark it for identification, Exhibit R-9, and then place it on the wall so that all may see it?

(Whereupon, Pubco's Exhibit No. R-9 marked for identification.)

Q Mr. Gorham, directing your attention to what has been identified as R-9 Exhibit, please state what that is, and what it purports to show?

A Yes, sir. This exhibit shows the initial recoverable reserves of the Dakota formation in the Basin-Dakota Gas Field Pool, located in San Juan Basin, New Mexico and Colorado. Iso lines have been drawn on 500 MMCF per acre reserve intervals through 20 MMCF.

On the map, the Dakota gas wells are shown by the conventional gas well symbol, below which, in those wells where we believe to have an accurate, or a reasonable volumetric estimate of reserves, are the reserves in MMCF per acre.

We also used the conventional symbol for a Dakota gas well, which differs from a gas well in that it is filled in with the symbol, the Dakota well with a conventional symbol, the dry hole conventional symbol circled with four ticks; and in addition thereto, we have circled all of those wells, some 60 odd wells, I believe, that core information was available.

Each one of the wells, as previously stated, was computed by using the conventional volumetric formula where sufficient information was available. Those numbers were placed adjacent to the well, and Iso lines were drawn connecting those areas, or tracts of equal reserves.

In addition to those Iso lines, we colored those areas with initial recoverable reserves in MMCF per acre, from 5.0 to 10.0 in green; those areas from 10.0 to 15.0 MMCF per acre, in yellow; and those areas in red which were 15.0 MMCF per acre and up.

I would further like to call your attention to the fact that in doing this Iso line, or contour work, that we freely used dashed lines around certain of the areas, which obviously will be changed in the event new wells are drilled or where new wells provide sufficient information to justify that change.

In other words, although at first glance it would appear that each one of those smaller areas, or for that matter the larger areas, is fully developed or has been pinpointed, is certainly not the case. We also confined our Iso lines, generally speaking, to only those areas in which we believe there was sufficient development to make such an interpretation. We certainly did not believe that there was any justification for making any reserve estimates whatsoever out in these great white voids, where quite obviously other developments of reserves, thick sands, low water saturations, and high porosities will perhaps develop new economic areas.

Q Mr. Gorham, you also prepared a map purporting to show areas of equal deliverability in the Basin-Dakota Pool for the benefit of the Commission?

A Yes, sir, I have.

MR. KELEHER: I'll ask at this time that the Reporter mark that map, Pubco Exhibit R-10.

(Whereupon, Pubco's Exhibit No. R-10 marked for identification.)

Q (By Mr. Keleher) I'll ask that you place it alongside Exhibit R-9. Now, Mr. Gorham, please discuss for the Commission Exhibit R-10, what it purports to show, and other details?

A Yes, sir. To the left of the initial recoverable reserve map previously discussed, we have placed on the board the map showing the initial deliverability of all of the Basin-

Dakota Gas field, or pool wells. In the same identical area, Iso lines were drawn on 500 MCF deliverability intervals through 2,500 MCF deliverability, and the map shows all wells drilled through the Dakota formation to December of 1962.

Again, the legend, or the symbols used on the map are comparable to the map previously described, with the exception that the number which appears below each individual well is the actual deliverability as reported to the Commission in MCF, in initial deliverability in MCF.

Also, on this map we drew the Iso lines which connected those areas which, in our opinion, had comparable deliverabilities. Again, as in the previous map, although there is the inference by the character and appearance of the map that different deliverabilities could or would not perhaps be obtained outside the area of studies, we certainly wish to point out at this time that in the area of white within the area of the Basin-Dakota Pool, that small and large deliverabilities may be obtained, but they have not been postulated in this study. We have only confined the deliverability Iso line area to those areas where deliverabilities were generally or approximately available.

I would like to call your attention to the fact that also on the map, we colored in green those areas of equal deliverability, which had deliverability ranges from 500 to 1,000 MCF; those areas in yellow with comparable deliverabilities from 1,000

to 1500 MCF; and those areas in red which were 1500 MCF or above.

I would like to call the Commission's attention to the similarity, or almost the exact replica in the two maps, which on a specific well basis, in our opinion, shows the direct relationship between calculated volumetric reserves in the San Juan Basin-Dakota Pool, and deliverability.

Q Have you prepared, Mr. Gorham, a transparent overlay of the areas of equal deliverabilities in the Basin-Dakota Pool which may be placed on the map showing areas of equal reserves so that a direct comparison can be made?

A Yes, I have.

MR. KELEHER: I would like to have that identified as Pubco's Exhibit R-11.

(Whereupon, Pubco's Exhibit R-11 marked for identification.)

A The third exhibit, which we are showing here is again the initial deliverability map, the same map previously discussed, only the contour lines are placed on a transparency; for the benefit of those who perhaps may not see the general correlation between the two areas, the deliverability and reserves, we have taken the deliverability study and placed it on a transparency.

We have, at this particular time, we are placing the transparency on the deliverability map previously shown, to show that the two maps are one and the same. We will now take this transparency, and superimpose the transparency on the volumetric estimate of recoverable reserves.

Q On what exhibit, what number, on 9?

A On Exhibit Number R-9. I would like to point out to the Commission that in the primary areas of Dakota development, that there is an increasing, proportionate increase of deliverability in direct accordance with the increase in recoverable reserves. This holds true also in all of the outlying areas currently developed.

Now, using this technique, we obviously exposed ourselves to certain areas which we think are minor areas which do not show that specific direct relationship. I would like to call your attention to one such area in Section 24 of Township 26 North, Range 10 West. We are showing relatively high reserves with apparent relatively low deliverabilities. In our opinion, this particular anomaly is because it is our understanding that the well in the Northwest Quarter of Section 24 is an old well where they utilized nitroglycerine in order to complete the well. And, had that well been completed by modern means, the deliverability would probably be in line with the recoverable reserves.

I would like to also call your attention to the fact that there apparently is a slight misfit, to some degree at least, in the northern portion of Township 29 North, Ranges 10, 11 and 12 West. This area generally shows higher deliverabilities, I believe, versus lower reserves. In our opinion, this area represents an area that has probably different water salinities. Based on information that we have seen from one well, which if it were

found to be true by additional information, we believe by correcting those water salinities to the proper salinities, that we would bring the deliverability and reserve again into line, which is certainly shown through the preponderance of the entire Basin-Dakota Pool.

Q At this time, I wonder, Mr. Cleveland, if you would straighten that overlay a little bit. It's a little out of gear there.

A I might make one further comment, that insofar as individual well deliverabilities are concerned or individual tract reserves are concerned, they are posted on these maps for ready reference for any specific interrogation of any particular area, which was one of the earlier questions, I believe.

MR. KELEHER: At this time, we would like to offer in evidence, Pubco's Exhibits R-9, R-10 and R-11.

MR. PORTER: R-11 is the overlay?

MR. KELEHER: Yes, sir.

MR. PORTER: Are there any objections to the admission?

MR. STOCKMAR: May we have just a moment to discuss that, if the Commission please?

If the Commmission please, Consolidated would like to object to the admission of the Exhibit R-9, and just Exhibit R-9, on the basis that there has been no appropriate foundation whatsoever laid for the data which appears thereon. There has been no testimony whatsoever with respect to the individual reserves attribut-

able to each tract. There's a simple statement that they appear on here. On reading the legend, it speaks of some per acre reserve that might exist at that point. There is nothing on it that shows the reserves for any tract. For these reasons, we would like to object to the admissibility.

MR. KELEHER: If the Commission please, we believe that a proper foundation has been laid by the witness, Dan Cleveland, and also by the testimony of this one, a hundred percent.

MR. STOCKMAR: Mr. Cleveland only testified with respect to one well, the one which is asserted to have 16 billion cubic feet of reserves. That is the only well as to which he was willing to give individual reserves, or did give.

MR. KELEHER: Well, that's the only well you asked him about.

MR. KELLAHIN: We submitted an objection to Mr. Cleveland's testimony, on the basis that no figures had been given on the reserves for the individual tracts, or for the field as a whole. We were assured that that would be tied up; I assume that this purports to tie it up. There are no figures on here for many, many of the tracts, and by the testimony of the witness, Mr. Gorham, they disregarded the productive areas in a large portion of the field, as he referred to the great white area, and yet Mr. Cleveland has given a reserve figure for the pool as a whole, and we have nothing by which we can test that figure.

MR. KELEHER: Well, it is unfortunate if you have nothing

by which you can test it. By rebuttal, we believe we have established a proper foundation, both by the witness Cleveland and the witness Gorham, and that these are certainly admissible in evidence.

MR. PORTER: The objection will be overruled. The Commission will admit the exhibits, and the Commission will determine what value to place on the exhibits.

(Whereupon, Pubco's Exhibits R-9, R-10 and R-11 admitted in evidence.)

MR. KELLAHIN: At this time, I would like to renew my motion to strike the exhibits and testimony submitted by Mr. Cleveland.

MR. PORTER: Just a minute. I think he wants a ruling on his objection at this time, or his motion to strike the testimony and not to accept the exhibits.

Mr. Kellahin, the Commission denies your motion. Mr. Keleher, will you proceed?

Q (By Mr. Keleher) Mr. Gorham, at this time, will you briefly summarize for the benefit of the Commission your testimony and your view in regard to this?

A Yes, sir. In summary, Pubco believes that the proration formula for the Basin-Dakota Pool should be that formula which insofar as practicable gives each individual well its fair share of the market in direct relation to the individual well's recoverable reserves as related to the recoverable reserves of the entire pool. Pubco's studies have positively shown that such a formula should be 100 percent deliverability and should incorporate acreage

only where necessary to make minor adjustments for the few wells having less or more than 320 acres in their respective drill sites.

MR. KELEHER: You may have the witness.

MR. PORTER: Any questions of the witness? Mr. Kellahin.

CROSS-EXAMINATION

BY MR. KELLAHIN:

Q Mr. Gorham, on your deliverability map, on the coloring there, as I understood your testimony, you cut off the coloring at the point of 1500 MCF, is that correct?

A I believe that's correct.

Q Now, how many wells are there in the pool with deliverabilities in excess of 1500?

A I haven't the slightest idea, sir.

Q How many in excess of 4,000?

A I don't know.

Q You didn't make any study of those wells at all?

A Yes, we did, yes, sir. Those wells with their higher deliverabilities which you are requesting are located on the map, and the contour lines go up to 2,000 MCF, I believe; and you'll also be able to determine on the map, if you wish to count them, all of the wells that have these various ranges. If you wish, I would be glad to try, if that is the request.

Q Had you, Mr. Gorham, colored your map to show the ranges between deliverabilities by per thousand, it would substantially have changed your approach, would it not?

A I don't believe so.

Q Do you know, is it unreasonable to you to say there are 46 wells with deliverabilities in excess of 4,000?

A That may be so, I don't know whether that is true or not.

Q Is it your testimony that a well with deliverability in excess of 4,000 has four times the -- or two times the reserves of a well with 2,000 deliverability?

A I believe that is our testimony, yes.

Q You say it is a direct mathematical relationship?

A No, I don't believe that you can say that it's a direct mathematical relationship, or that certainly would have been employed. We do believe, however, that our studies have shown, whether that can be determined by mathematics or not, that such a relationship does exist.

Q What is the relationship?

A As we say, a direct relationship.

Q Well, it's not a direct mathematical relationship?

A It may be; I don't know what that formula would be, however.

Q You don't know what the relationship is in mathematical terms, is that correct?

A Well, on a mathematical basis, if you want to get into the details of that, the association we have here between deliver-

ability and reserves is that in both deliverability and reserves, in order to have deliverability you have to have porosity; in order to have reserves, you have to have effective porosity. In order to have reserves, you have to have a porosity that is occupied by a certain portion of gas; in order to have a deliverability, you have got to have the same function. When you have a greater deliverability, and when you have greater reserves, you usually have a greater net pay thickness, so I would say that all of the functions incorporated in a deliverability, as well as in reserves, are present and are comparable.

Q Now, your maps, as I understand, are both based on initial deliverabilities and initial reserves?

A That is correct.

Q Would an annual change in deliverabilities, in your opinion, accurately reflect the changes in the remaining recoverable reserves?

A I believe so; in most part our studies have shown that as the field is depleted, and lower reserves remain to be recovered, that we are showing lower corresponding deliverability.

Q Now, in using the term "recoverable reserves", would you define that for me in the sense that you are using it?

A Yes. Recoverable reserves are those reserves which will be recovered, or a percentage of reserves which will be recovered from the calculated initial recoverable, or reserves in place.

Q Now, in place where?

A Within the tract of 320 acres, which is the unit used throughout the entire Basin.

Q That is, your initial recoverable reserves is within the tract. Does deliverability have any relationship to reserves within the tract dedicated to the well?

A It certainly does.

Q What is that relationship?

A Well, as we said earlier, it's a direct relationship. Now, we have used individual well points in both our Iso line work for the deliverability map and the reserve map, as a matter of necessity, because those are the sources of our information. We have been able, therefore, to utilize wells outside of the tract to more accurately determine the reserves under the specific tract. The same thing has been done on our deliverability map.

Q Now, permeability is not confined to the boundaries of a 320-acre tract, is it?

A Rephrase that question.

Q Your permeability available through a well bore is not confined to a 320-acre tract necessarily, is it?

A I would say that neither is porosity, thickness, or any of the other parameters, since it is all a common reservoir.

MR. KELLAHIN: Thank you, sir. That's all I have.

MR. PORTER: Mr. Stockmar, do you have a question?

BY MR. STOCKMAR:

Q Mr. Gorham, you have equated, at least by color, all of the points in space having in excess of 2500 MCF, have you not, on your Exhibit R-9? I'm speaking of the initial reserve map, which I believe to be R-9.

A You mean, as far as our contouring of those Iso reserve areas?

Q Yes. They have been given the same color, without respect to their size, as long as the point was in excess of 2500 MCF?

A I believe it's 15 MMCF; I believe that's correct.

Q All right, sir. Then without respect to the variation above that point, it will all show in red on your map, is that correct?

A That is correct.

Q And as to your Exhibit R-10, you have shown in red every well having a deliverability in excess of 2500 MCF, without respect to how close to, or far above that it is?

A In excess of 1500 MCF.

Q Yes, sir. May I direct your attention to several wells in the southwest corner of Township 29, and 11; do you find there a well with a, the number 52.7 after it? I believe that would be in Section 30.

A Which map are you referring to, sir?

Q I'm speaking of your Exhibit R-9, the reserve map.

A Please refer to the well again.

Q I believe it to be in Section 30.

A 31.

Q Is that 31? And 29-11?

A Yes, sir.

Q And what is the number written beside it?

A 52.7.

Q And what does that mean?

A That is the recoverable reserves in MMCF per acre.

Q At that point?

A I don't believe you can say at that point. It's as calculated at that well, but as far as our Iso lines are concerned, it would generally include most of the South Half of Section 31, or the tract upon which it is located.

Q About a mile south of that is another well, with 16.1 written beside it.

A That is correct.

Q What does that mean?

A That shows that the recoverable reserves as estimated are 16.1 MMCF per acre.

Q Now, what color band do each of those fall in?

A They come in the color band of all of those wells that are red, in excess of 15.0 MMCF per acre.

Q What is the actual ratio between the recoverable reserves at those points?

A Apparently about four to one, I believe; I'm not sure what you mean by ratio.

Q What is the average reserves for the wells in the field, according to your calculations, Mr. Gorham?

A I did not average the reserves in the field. These maps portray individual tract reserves.

Q Do you recall what Mr. Cleveland testified to as to the total reserves in the field?

A Yes, sir.

Q Do you recall how many wells there are in the field?

A I believe I testified earlier, something in the neighborhood of 769, is it? I have forgotten the exact number, but certainly in excess of 700. As I also explained earlier, we used something in the neighborhood of 382 wells for our calculations.

Q Based on the total reserves that you are submitting, and the number of wells that you are relating it to, could you give me an average figure per well?

A No, I don't believe I can. I'm not certain of the exact number of wells, and it would also depend upon what stage of reserve estimates you are interested in. For example, I have put on in the lower right-hand corner of Exhibit R-9, the total developed pool reserves minus the production attributable to the tracts as of November 1st, 1962, which is some 2,791,638,000 MCF.

Q If we have approximately 700 wells, may we then divide seven into 28 and come out with about three and a half billion per well, as an average?

A I suppose we may.

Q Where would such an average well appear on your exhibit, according to your color scheme?

A Again referring to R-9?

Q Yes, sir.

A I believe that would probably be in the yellow area, which has the range from 10.0 to 15.0 MMCF per acre.

Q Mr. Gorham, how far does the minimum reserve per acre, which might appear in the red, vary from the average per well that we were just speaking of?

A Now, you are talking about the smallest reserve in what we have categorized as the higher reserve area?

Q Right.

A To what, again, sir?

Q To the average well.

A It would appear that the preponderance of these reserves are in the area of 25.0. However, as pointed out in the actual legend, the red area begins with a 15.0 and up, at the moment I don't see any 15.0's; I do see a well located in the Northwest Quarter of Section 3, 29 North, Range 12 West, that has a 15.7 MMCF per acre.

MR. STOCKMAR: I think that's all the questions I have

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

MR. KELLY: Mr. Porter, I would like to ask some questions on behalf of Sunray DX.

MR. PORTER: I have already recognized Mr. Utz. Mr. Kelly, you can go next.

BY MR. UTZ:

Q Mr. Gorham, the reserve figures and data that was on your Exhibit R-9 -- is it?

A Yes, sir.

Q --was calculated, those are posted in regard to the calculations that Mr. Cleveland made, are they not?

A Well, sir, they represent the final compilation of the volumetric reserve estimate, which includes the work of the Geological Department in establishing porosity, net pay thickness, and water saturations, which were then passed on to Mr. Cleveland's staff, who computed the exact reserves for the tracts, and those were pointed or superimposed on the map adjacent to the well from which the information was obtained.

Q So those represent the correct reserve figures that were calculated on the basis of abandonment pressure of 27 MCF per day, is that true?

A Yes, sir, they were.

Q Now--

MR. STOCKMAR: Pressure or volume?

Q (By Mr. Utz) Rate of flow of 27 MCF per day.

A Rate of flow of 27 MCF per day.

Q So that that 27 MCF per day was arrived at on the basis of your low, your operating rate of $1130.00 a year, was that true?

A Yes, sir. We debated as to whether or not to carry this rate on down to zero rate per day, and we certainly concluded in a hurry that the difference in the amount of reserves that would be produced from 27 per day down to zero was so insignificant that we thought, as any prudent operator would do, that you would cut off the recoverable reserves at that lowest possible point which you could possibly produce the well and at a break-even basis relative to operating costs, with no overhead or anything applied.

Q Then, I think you anticipated my question. Then what you are saying is that if you had carried your abandonment pressure on down to a zero rate of flow, your reserve picture wouldn't have been any different, as I understand it?

A No, sir.

MR. UTZ: That's all.

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

BY MR. KELLY:

Q Mr. Gorham, excuse me for my ground covered, but I just want to get a couple of questions straight. Your Exhibit Number R-9, you have attempted to show the initial recoverable reserves, is that correct?

A That is correct.

Q And you have arrived at the figures in the areas by various individual -- by using 382 wells where you had individual data on those wells, is that right? In other words, you had core analyses and you had sonic logs and other information that allowed you to evaluate the reserves on that particular well?

A Yes, that's substantially correct.

Q And then on the wells that you did not have information on, you used a process of extrapolating the information to these other wells?

A Only on a very, very limited basis. In most cases, not more than one drill site beyond good well control; and we certainly did not carry our Iso lines of equal reserve areas very far beyond actually developed wells either, because we do not believe that such reserve estimates could possibly be made at this time, in the absence of any information whatsoever.

Q But you do feel, in your expert opinion, that the information you were able to show on Exhibit 9 is a reasonably accurate estimate of reserves, initial reserves?

A We believe that it is reasonably accurate determination of recoverable reserves within the developed portion of the Basin-Dakota Pool. Now, the only area that was brought out by counsel that would possibly be argumentative in the deliverability and the recoverable reserve relationship, is in the area of permeability, and we believe that the development on the standard

320-acre spacing basis has provided the counter-drainage to offset the permeability problem; and we also believe that as a result of some of our earlier studies in other horizons in Northwestern New Mexico and the San Juan Basin areas, for example, the Mesaverde and Pictured Cliffs producing zones which are also of cretaceous age and similarly deposited reservoirs, we have made the only other approach relative to this drainage-permeability problem in those sequences, the Mesaverde and Pictured Cliffs, and we found that by examining the shut-in pressures throughout the field in those horizons, that there was a general conformance of pressure gradient.

Relative to depth, as would be expected, there are certainly anomalous areas which we specifically investigated in regard to the high permeability and low permeability areas, and the high permeability or high deliverability areas, as some would look at it. We wound that the pressures were actually higher in those areas, indicating drainage from the high deliverability tract areas to the low deliverability tract areas.

Q Well, let me try once again. Does you exhibit -- I believe this one is Exhibit Number 9, is that correct?

A That's correct.

Q Does your Exhibit Number 9, in your opinion, reasonably accurately reflect the initial recoverable reserves in the Dakota formation?

A In the developed portion of the Basin-Dakota Pool.

Q All right.

A Yes.

Q Now, you used the other attempt, I take it, to estimate reserves, and that was shown on Exhibit Number 10?

A That is not correct.

Q What are you trying to show by deliverability?

A We are showing a direct relationship between the volumetric method accepted by the industry of estimating initial recoverable reserves with the initial deliverability of the similar well or tract throughout the Basin-Dakota Pool.

Q But you stated, I believe, that deliverability has a direct relationship to reserves?

A We believe that is correct, yes, sir. And, if what you are saying is, that in this area, if we come up with a deliverability reading, or findings, would we possibly be able to estimate reserves? I feel this, we would have a very strong equation of those reserves, and I feel it would probably be directly proportional to the reserves as actually calculated by accepted means.

Q But the most accurate way to estimate reserves is the way you used on Exhibit Number 9, isn't that correct?

A That is correct.

Q Well, then, don't you feel that the best way to achieve correlative rights and prevent waste would be to assign your individual allowables on the basis of reserves in relationship to their total of the total pool estimate?

A No, I do not, sir. And the reason for that is, in estimating reserves, you employ the use of the volumetric formula, a tool or a method which the industry feels is relatively inaccurate, and one which requires continuous adjustment,up or down, based on additional information as it is received.

On the other hand, the deliverabilities can be directly measured, and will facilitate, in our opinion, a proportionate share of the market between the pools, directly on the basis of reserves, as we see it today.

Q Well, I don't understand why you even bother with an estimate of reserves then.

A We estimated the reserves because that was the subject of the hearing. And we found that there was a direct relationship between reserves and deliverability.

MR. KELLY: Thank you.

MR. STOCKMAR: I have a few more questions, if you please.

MR. PORTER: I have one first. Mr. Gorham, in your statement there a moment ago, do you think the little wells are draining the big ones up here (indicating)?

A I'm not certain of that. There are some very peculiar pressure relationships, relative to establishing possibility of drainage; and the ones that we investigated particularly, there was just as many indications that the little fellow was draining the big fellow, as the converse.

BY MR. [illegible]:

Q Mr. Gorham, what was the range of water saturations, that your Geological Department delivered to Mr. Cleveland for his investigations?

A I believe the highest, as stated, was 55 percent, above which we did not believe to be effective net pay.

Q 55 percent what, water saturation?

A Correct. The lowest water saturation, I would have to take a long look here. I believe the lowest is probably in the range of 12 percent, which is certainly very low.

Q Can you give me some idea of the average for all of the wells that you were able to determine this for?

A We found that the water saturations, as calculated by conventional means, were lower in those areas colored in red, as compared to the higher water saturations toward the periphery of the pool. I don't know that I could come up with an overall average. I would imagine the average, just for the sake of discussion, may be in the area of 20 to 30 percent water saturation.

Q Now, Mr. Gorham, would you do me a favor, and step up to your Exhibit R-9?

A Yes.

Q And would you simply designate a Township which seems to have an artistic sprinkling of red and green and yellow?

A (Witness indicates.)

Q Which Township was that?

A All right, we'll use 29 North, Range 11 West.

MR. STOCKMAR: Thank you. Excuse me, that's all the questions I had.

MR. PORTER: Mr. Howell.

MR. HOWELL: Ben Howell, El Paso Natural Gas.

BY MR. HOWELL:

Q Mr. Gorham, I have a little trouble. Some of these things, you can explain them to me, but you can't understand them for me, and so I might go back over one or two points to see if I understand your correctly.

In your testimony as to the studies that you have made, I assume that you have attempted to estimate the initial recoverable reserves in place?

A That is correct.

Q Is that always the same figure as the initial reserves in place?

A In place?

Q Yes.

A No, sir. It's usually less.

Q And if I understand your testimony, then, in your computations you have on an individual tract basis, as to the wells that you have studied, in effect determined for each tract the proportion of the initial reserves in place that can be produced before

you abandoned the well because the well would no longer pay operating expenses, and have in that manner determined the initial recoverable reserves?

A That is correct, sir.

MR. HOWELL: Thank you.

MR. PORTER: Anyone else have a question of this witness? Mr. Utz.

BY MR. UTZ:

Q Mr. Gorham, would Pubco abandon the well with 1500 pounds pressure?

A We would, sir, if it wouldn't produce any gas.

Q You would no doubt give it some pretty heavy frac jobs before you abandoned it, wouldn't you?

A We certainly would. Now, that problem relative to abandonment pressure is very involved, but we have run into situations where in the early days over in the Twin Mounds area, located, I believe, in Township 30 North, Range 13 West, where we completed an early Dakota well, which had an abandonment pressure of some 800 pounds, which we re-fracked several times, as you suggested, and the only thing we could get was water, no more gas came out. That had a very high bottom-hole pressure, abandonment pressure.

Q That well probably had a serious fluid problem though, didn't it?

A Yes, sir.

Q But in an area where you didn't have a fluid problem, you probably wouldn't have had that--

A I don't believe you are going to find an area without a fluid problem, when you lower your reservoir pressure down to the point you are speaking of.

Q If you did frac a well through some later work-over, and raised its rate of flow to where it was an economic rate of flow, then those reserves would then become recoverable reserves?

A We would then convert reserves in place to recoverable reserves, yes.

MR. UTZ: Thank you.

MR. PORTER: Any further questions of Mr. Gorham? The witness may be excused.

(Witness excused.)

MR. PORTER: Anyone else have testimony?

MR. KELEHER: We rest, as far as Pubco is concerned.

MR. PORTER: Mr. Howell of El Paso.

MR. HOWELL: El Paso will have one witness.

MR. PORTER: We'll have a 15-minute recess.

(Whereupon, a short recess was taken.)

MR. PORTER: The hearing will come to order, please. Mr. Howell.

MR. HOWELL: Before we go on the record, I can give you an estimate of the testimony time. I notice Mr. Rainey has four pipes for his testimony.

MR. PORTER: Has a bunch of pipe cleaners, too.

MR. HOWELL: El Paso Natural Gas would waive any opening statement. We would like the privilege of making a closing statement after the testimony is all in.

(Witness sworn.)

DAVID H. RAINEY

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

DIRECT EXAMINATION

BY MR. HOWELL:

Q Please state your name for the record.

A David H. Rainey.

Q Are you the same David H. Rainey who testified in the original hearing of this case?

A Yes, sir, I am.

Q Mr. Rainey, have you made any study of Consolidated Exhibits 3 and 4 since they were introduced into evidence?

A Yes, sir, we made a rather hurried study last night as to the validity of some of the figures on those exhibits, in light of El Paso's current reserve estimates of the Basin-Dakota

Pool.

Q Now referring to Consolidated Exhibit No. 4, what is the factor which Consolidated used for reserves? Is that the initial estimate of recoverable reserves in place?

A Yes, sir, that's my understanding, based on figures that have been furnished to them from studies that El Paso had made as of April of 1962.

Q And those were the initial recoverable reserves?

A That's correct. That's my understanding.

Q What deliverabilities were used by Consolidated?

A As near as we can determine, they've used current deliverabilities in every case.

Q Would that have the effect of using the current deliverability of a well that has been producing for three or four years against its initial recoverable reserves in place?

A Yes, sir, that's true, and it would relate initial reserves of wells that were completed eight or ten years ago to initial reserves of wells that were completed last year.

Q But using the deliverability as of 1962?

A Yes, sir, that's correct.

Q Is that a reasonable method of determing the relationship of deliverability to recoverable reserves?

A No, sir, I don't believe so. It's sort of like mixing apples and oranges, I think. In attempting to establish a relationship between recoverable reserves and deliverability, we should

either use initial recoverable reserves and initial deliverability or determine current recoverable reserves to use against current deliverability.

Q What effect would using the current deliverabilities against initial reserves, such as Consolidated's Exhibits 4 through 7 or 8, I believe it is, have with reference to discrepancies as to wells with lower deliverabilities?

A It would tend to increase those discrepancies in that you are relating the current allowables, based on current reserves, as a percentage factor of initial --

Q Let me correct you.

A Excuse me, current deliverability. Current allowables based on current deliverabilities as a percentage relationship to initial reserves. Those wells with small deliverabilities which in many instances, which may be wells that have been drilled and producing for a number of years, would not bear the same percentage relationship if current reserves were used.

Q Passing to your study of Consolidated Exhibit No. 3, I believe that the testimony showed that this exhibit was constructed by Consolidated by posting on a plat El Paso's estimates as they were in April of 1962, of the initial reserves in place on certain wells, is that correct?

A It's initial recoverable reserves, Mr. Howell; yes, sir, that's correct.

Q How many wells was that, 460 wells?

A I think the exact figure was 457 wells at that time, which was on our exhibit as of the April hearing.

Q Then as to the 237 or '39, '40, some figure in that vicinity, approximately 240 wells that have been drilled since then, the recoverable reserves as determined on Consolidated's Exhibit 3 were determined by them as the result of extrapolating isopacous contours?

A Well, iso-reserve contours, yes, sir. That's my understanding of Mr. Trueblood's testimony.

Q Have you available some of the volumetric initial recoverable reserve calculations which we have made on those recently drilled wells?

A Yes, sir. We've studied a few last night to illustrate the differences between the current estimate of reserves as El Paso is looking at them, and the estimate which was furnished to Consolidated. At this point, I might add that those figures were given to Consolidated not in response to the subpoena but as I understood it, the subpoena duces tecum required only the furnishing of certain core analyses. We gave those figures to Consolidated to use as they saw fit, with the specific understanding at the time that we gave them to them, which was in about September or October of 1962, that they had been superseded and that to the best of my knowledge, no reserves shown on those lists were identical to the reserves as El Paso was contemplating them at the present time.

Q Before we get to the variances between the figures on Exhibit 3 as compared with the reserve estimates which we had in 1962, let's look at some of the comparisons that you made between the reserves allocated to certain tracts by Consolidated on Exhibit 3 where they used this iso-reserve map, and the volumetric estimates which we have made on some of the same wells.

A If we may refer to Consolidated Exhibit No. 4, which is the tabulation of the reserves as picked off of the map, as I understand it, we picked a number of wells off of, which were in the so-called 240 or 239 classification, in other words, wells that we had not specifically given Consolidated figures for, even though those figures had been changed, and on the basis of the contour lines drawn on that map they had extrapolated a reserve for the wells that they did not have specific data from El Paso on. We picked about ten or twelve of those wells. In the interest of time, I'll just pick out three or four right now to show the deviation from the figure that Consolidated is showing on Exhibit 4 and Exhibit 3, and the calculations of those reserves as El Paso presently looks at them.

We'll turn to page 5 of the Consolidated Exhibit 4, look at the seventh well on that page which is labeled Consolidated Oil and Gas 1-N, I presume that's a Well No. 1 and Location "N" of Section 2 of 30, 12. The reserves shown there by Consolidated is 1,800,000,000 cubic feet. El Paso's current determination, and I think Consolidated may be happy to hear this, is 3,057,000,000

cubic feet on that particular well. This changes the relationship, of course, as to the percentage relationship of allowables and reserves. Unless the Commission desires that I read all those figures, it merely shows that the percentage relationship to reserves of allowable on Point Number One, their 100 percent deliverability line changes from .33 to .19. The second one was 75-25 formula, changes it from .68 to .40. It's pretty obvious that we didn't pick this to prove that 75-25 was the most valid formula on this particular well; because skipping down to the 10 percent deliverability factor in the formula, we still only have a .94 relationship, and only when we get to a straight acreage does that well get a percentage allowable in relationship to its total percentage reserve within the pool.

I might add at this point that even though we changed some of these reserves fairly substantially to arrive at these percentages, we still used the 2,159,000,000,000 cubic foot total reserve that Consolidated used. We didn't attempt to re-add and subtract all the wells we had worked on. If we may turn to page 8 now, the third well on the page, Consolidated reserve is 2,900,000,000 cubic feet. El Paso's current calculation on the reserves is 5,055,000,000 cubic feet. That percentage relationship then arrived at in the same manner that Consolidated did it shows that even on 100 percent deliverability formula that well only has a .93 relationship of allowables to reserves; in other words, that well could be granted an allowable commensurate with its

reserve as a percentage of the total pool reserve, should get something in excess of 100 percent deliverability in its allowable.

One more well on that same page, the 8 well, which is the third well from the bottom, the reserve picked by Consolidated from their map shows 3 billion cubic feet of reserves on that well. El Paso's current reserve calculations are 1,903,000,000 cubic feet, which changes the percentage relationships as shown by Consolidated at 100 percent deliverability. Based on the new reserve, the relationship between percentage of allowable to percentage of reserve will be .93 at 100 percent deliverability; and on the 75-25 formula would be 1.10 as a percentage relationship.

We made those calculations now on, as I say, about 12 or 13 wells, and if it's desired, I can go through the whole group that we picked, but we merely used this to show the fact that, as I testified to at some length in the original hearing in this case, the determination of reserves in the Dakota Pool, as far as El Paso is concerned, is a continuing and continuous thing; and as new information becomes available through new logs, new cores, new wells, our township factors which we have discussed before are changed. The Reservoir Department advises me at this time that they have about 10 or 15 cores that only came in to the Department last week that are not included in our present studies; and it's quite probable that a number of the township factors which

I may testify to today will be changed within the next month or so when the Reservoir Department gets around to revising figures, based on new information.

Q Now, Mr. Rainey, do you conclude from that that any attempt to use volumetric calculations as an exact proportion of the total pool's recoverable reserves as applied to the individual tracts is a matter that by necessity is full of error and subject to constant change?

A Yes, sir. I think Mr. Trueblood testified to that specific point yesterday, that in attempting to use a tract factor, as he called it, every time a new well came into the pool and new reserves were proven up, those factors would have to be changed and revised.

In addition, I think it was pointed out quite clearly, and El Paso is of the same opinion, in Pubco's testimony, that because of the lack of specific detailed information on a great number of individual wells, it's extremely difficult to calculate accurately, for purposes of allocating allowables, individual well reserves.

Q By individual well reserves, do you mean the recoverable reserves underlying the tract which is applicable to that well?

A Yes, sir.

Q There was some discussion about the accuracy or errors in the deliverability tests?

A Yes, sir.

Q I don't believe there is in the record any statement at the present time generally covering the manner of deliverability tests and the validity of the deliverability tests as applicable to the Basin-Dakota Pool under the rules of this Commission. Would you please comment on those tests?

A Yes, sir. There is established in the entire San Juan Basin a procedure for taking deliverability tests, which was established, as I recall, in 1954. At a hearing just a few months ago that specific procedure was revised in the light of approximately nine years experience in testing wells for deliverability in the San Juan Basin area. It's my opinion that the deliverability testswhich we're now obtaining in the San Juan Basin are reasonably accurate, I'll put it. There are individual well cases where it is difficult to obtain a deliverability test, but in general, the deliverabilities are accurate and as will be shown later, is an accurate reflection of the recoverable reserves of that well.

In our experience in re-evaluating and re-examining the reserves in the light of new information and new data as it becomes available, I am of the opinion that if there is a discrepancy between reserves and deliverability as a direct relationship, that the deliverability test is a more accurate reflection of the actual recoverable reserves than the volumetric calculations which may be made on the basis of, many times, inadequate

data.

Q By your use of reserves in your testimony, am I correct in assuming that in each instance you mean the recoverable reserves underlying any particular tract attributable to a well?

A I am always referring to the recoverable reserves underlying the tract.

Q Before we leave the deliverability formula, does the deliverability formula work better in areas where the pressures, the reservoir pressures are high or in areas of lower reservoir pressures?

A As a general thing, I would say that probably the mechanism used by the New Mexico Commission in determining deliverability values is probably more accurate in reservoirs like the Dakota and in possibly reservoirs such as the Pictured Cliffs or even the Mesaverde, where there may be considerable amount of liquid problems involved with the wells, and consequently some doubt on occasion in specific individual cases as to the validity of shutin pressures. I think probably the deliverability tests in the Dakota are as accurate as tests can be made.

Q You testified at some length on the original hearing as to the method which El Paso used in estimating recoverable reserves in the Basin-Dakota Pool. Would you please briefly summarize, without going into great detail, the work that El Paso performs as a continuous and continuing study?

A Yes, sir. Our Reservoir Department obtains whatever

information can be obtained in an effort to analyze individual well characteristics. It has been testified to at some length here, in many instances that information is not available. We take what information is available, and by averaging on a township basis the most accurate information which can be obtained as to porosity, interstitial water, pressures, net pay -- we don't average net pay, excuse me -- as to any other factors which may be pertinent to the calculation of reserves, we then arrive at a factor which we term a township factor, which is the MCF per acre foot recoverable reserve for that township. We then take logs and analyze them and sometimes in the light of new information, old logs may be re-analyzed to determine net pay thickness for an individual well, which we feel represents as near as can be determined to any fashion the net pay thickness of the tract upon which that well is drilled. We then determine the individual reserves for those wells.

Now admittedly, many times in the averaging method that is used by El Paso, our reserve calculations as to specific wells may not be the ultimate actual recoverable reserves of that well, because of the averaging factor. As a practical matter, I think the method that Mr.Cleveland used for Pubco in extrapolating the productivity of the well down to an economic limit will give more accurate individual well reserves than the method that El Paso uses.

Q What pressure do we use as an abandonment point?

A We use a constant abandonment pressure of 600 pounds bottom hole pressure, which is approximately 500 pounds wellhead pressure. It's a constant abandonment for every well. Recognizing the fact that many wells with high deliverabilities will be produced to pressures considerably lower than 500 pounds wellhead, and, conversely, many wells of low deliverability -- and there are a number of them in the pool that probably under strict economics should be plugged at the present time -- will have to be abandoned at much higher pressures.

Q Have we at the current time made estimates on additional wells since the last hearing?

A Yes, sir. At the April hearing we had made reserve determinations on 457 wells. At the present time on our present Exhibit 1, we have made reserve determinations based on this average means on 729 wells. It's my recollection that I testified at the time of the April hearing that there were 673 wells completed in the Basin-Dakota Pool as of January 1st, 1962. With the best estimate we have today, there were an additional 268 wells drilled in the year 1962, which means that at the present time there are completed -- now these are drilled wells that are completed, some of them may be dry holes that were, of 268 wells, which brings us to a total, if my mental arithmetic is correct, of 941 wells which have been completed in the Basin-Dakota Pool.

Q But our studies are limited to 729?

A 729, of the wells that we had both sufficient data that

we thought we could calculate even on the averaging basis the individual well reserves, and upon which we had deliverabilities. Now I think there are a number of wells actually connected to the pipeline at the present time upon which we did not have deliverabilities, but our study is solely based on the wells that we both calculated the reserves and obtained the deliverability. Our reserve determination and our deliverability determination as shown on our Exhibit 1 are both for initial conditions.

Q Before we leave our method, am I correct in understanding that the purpose of our study is to try to determine the best figures for the pool and not necessarily the best figures for each individual tract?

A Yes, sir, that's correct. I was going to get into that in a little more detail in discussing Exhibit 1; but our method of determining reserves for our Reservoir Department for our purposes is overall pool dedicated reserves. We do not feel that as to an individual well, a particular individual well, our method may be the best method that has been generally used by the industry. But our purpose is a little bit different than that used for many companies, in that our reserves are concerned more with the entire pool reserves rather than specific well reserves.

Q Would you please point to an exhibit and mark it Exhibit R-1?

(Whereupon, El Paso's Exhibit No. R-1 marked for identification.)

A It has been marked Exhibit R-1. It's this exhibit right here. This exhibit is done in exactly the same fashion as all the previous exhibits that have been presented by El Paso in this category in attempting to establish a relationship between deliverability and reserves in the Basin-Dakota Pool. We have averaged by reserve groups all the wells which fell into that group according to El Paso's current volumetric reserve determinations, based on these average township factors. We have tabulated opposite the reserves of each of those wells the deliverabilities, the initial deliverabilities of each of those wells, and have arithmetically averaged those.

This first point here represents 22 wells in the range between zero and one billion cubic feet of reserves. The average reserve is 770 million cubic feet, and the average deliverability is 477 MCF per day. The second point represents 209 wells; the average reserve is 1,500,000,000 cubic feet. The average deliverability is 977 MCF per day. The third point represents 201 wells, the average reserve is 2,457,000,000 cubic feet, and the average deliverability is 1,344 MCF per day. The fourth point falls below the line and represents 166 wells; the average recoverable reserves of 3,438,000,000 cubic feet, the average deliverability is 1,461 MCF per day. The fifth point represents 78 wells with an average reserve, recoverable reserve of 4,462,000,000 cubic feet and an average deliverability of 1,952 MCF per day. The sixth point represents 33 wells with an average recoverable reserve

of 5,505,000,000 cubic feet, and average deliverability of 2,606 MCF per day. This last point over here at the end represents 20 wells and includes all of those wells upon which El Paso calculated recoverable reserves in excess of six billion cubic feet; in other words, we lumped all the big wells into one because the point was relatively insignificant in the overall picture.

The average recoverable reserves of those 20 wells is 7,066,000,000 cubic feet, and the average deliverability is 1,725 MCF per day.

This line represents the average line, which can be drawn through those points. Coincidentally, and by actual calculation, that line is the 100 percent deliverability line, which means that any well which falls on that line has exactly the same percentage reserves of the total reserves as it has percentage deliverability of the total deliverability. Incidentally, the average recoverable reserves calculated by El Paso, based on these 729 wells, is 2,848,000,000 cubic feet, and the average deliverability is 1,372 MCF, and that point lies on that line.

MR. PORTER: Give me that average reserve figure again.

A Yes, sir, 2,848,000,000. To my way of thinking, this exhibit indicates conclusively that there is a direct and constant relationship between deliverability and recoverable reserves in the Basin-Dakota Pool. Now admittedly, if we plotted all 729 points on that graph, there would be a shotgun effect shown, which is recognized I think by anybody that would attempt to do it. El

Paso's feeling is that the average effect cumulatively of using average township factors and average recoverable reserves and deliverabilities for all of those wells in the magnitude of the number of wells that we have on that curve at the present time tends to reduce any errors which may crop in as to individual well calculations.

Consequently, we believe that this curve as shown here on 272 more wells than we had for the previous hearing in April conclusively proves that there is a direct relationship between the deliverability and recoverable reserves.

Q (By Mr. Howell) Mr. Rainey, as we correct our estimates of recoverable reserves, do we find that the corrected figures fall more nearly in line with the deliverability curve, the 100 percent deliverability curve, than the figures that we started with on initial estimates?

A Yes, sir, that's correct.

Q Mr. Rainey, will you please tell the Commission what you show on Exhibit 2-R and discuss that exhibit?

(Whereupon, El Paso's Exhibit No. R-2 marked for identification.)

A Yes, sir. At the outset, I would like to make it thoroughly understood that I had nothing to do with the picking of the colors on that exhibit. This exhibit is designed to show the relationship of the percentage allocation formula which allocates allowables in the Basin-Dakota Pool in relation to the reserves underlying the tracts, recoverable reserves underlying

the tracts, and the other formulae that have been discussed here and the current formula which is in use in the pool. We took an average well in each of the reserve groups which are shown on Exhibit 1. Using the average reserves and average deliverabilities we calculated the allowables which would be assigned under various types of formulae. Purely as an arbitrary means of arriving at this, we established a market of 10 billion cubic feet for a month, which is roughly what nominations have been running in the Basin-Dakota Pool for the last two or three months. Again, as I testified in a previous case, I don't want to commit the purchasers to take that much gas out of the pool every month, but we used that figure in arriving at this exhibit.

Another thing, 10 billion made it easy to figure the percentages and so forth. We then calculated, on the basis of the average reserve, the allowable which would be assigned to wells in the pool on the basis of 100 percent reserves. That's shown by the red bar.

The allowables actually calculated for that, if you want the figures, the first group was 3,727 M squared CF per month. It's 3 million MCF per month, so it's 3.727 MCF squared per month. The second bar is 7.464, 7 million per month. The third one is 11,831 MCF. I'll go to that. It's easier to read the figures. Am I confusing everybody by changing over?

The fourth bar is 16,554 MCF per month. The fifth one is 21,487 MCF per month.

Q Now, Mr. Rainey, before you go any farther, let's stop and let's identify again the bars in that group.

A The bar that I'm talking about at the present time is the red bar. I'm giving the figures that represent each of the bars individually. The red bar is the reserve allowable that would be assigned to a well based on the average reserve for a well in each of the groups as shown in Exhibit 1.

Q That is the red bar which you've used in all of those --

A All the figures that I have given are figures that represent the red bar.

Q Are figures that you have given.

A In the sixth group, the figure is 26,515 MCF per month. The last one, based on the last reserve group, the allowable would be 34,050 MCF per month.

Now the second bar -- but before I go to that, we then drew a red line through the center of the end of each of the red bars, which represents a line of the percentage formula, if you could actually allocate allowables in direct relationship to the recoverable reserves underlying the tract for each well.

The second column, the orange column is the allowable which would be assigned on the basis of 100 percent deliverability, again using the average deliverability derived from each of the points on Exhibit 1. The figures for the first bar, first orange bar are 4,773 MCF per month. The second group, the bar is 9,770 MCF per month. The third group, the figure is 13,438 MCF per

month. The fourth group, the figure is 14,768 MCF per month. The next group, the figure is 19,513 MCF per month. That's the fifth group. The sixth group, the figure is 26,061 MCF per month; and in the last group, the highest reserve group, the figure is 17,250 MCF per month.

We did not draw a line through the ends of that bar because in looking at it, it's pretty difficult in the first place to draw a line through bars this wide rather than through points. In the second place, we couldn't find any better line than the 100 percent reserve line to draw through the ends of those orange bars. Some of them fall above, some of them fall below; and any line drawn for 100 percent deliverability would be so close to the 100 percent reserve line, in our opinion, that we couldn't determine any other relationship for it.

The third bar, the purple bar, represents the allowable which would be assigned a well of the average deliverability in each of the groups on Exhibit 1 under the present allocation formula of 75 percent acreage times deliverability plus 25 percent acreage. For the purposes of this exhibit, we assume that each of the average wells had a 320-acre unit on it. In the calculation of the individual well reserves on Exhibit 1, we took the actual acreage assigned to that tract to determine that reserve.

The figures for the purple bar, the third one, in the first group is 7,006 MCF per month. The second group is 10,756 MCF per month. The third group, the figure is 13,508 MCF per

month; and the fourth group, the figure is 14,386 MCF per month. The fifth group, the figure is 18,068 MCF per month. The sixth group, the figure is 22,973 MCF per month; and the last group, the figure is 16,366 MCF per month.

It can readily be seen in drawing a line, admittedly an approximate line, it could deviate a little bit one way or the other, the allowables which are assigned to wells of lower reserves are in excess of that allowable which would be assigned to them on 100 percent reserve allocation, and the allowables to wells of higher reserves are considerably less than the allowables which should be assigned to them on the basis of 100 percent reserves.

The next bar, the kind of brownish-orange bar is a bar which represents the allowable which would be assigned to a well in each of the reserve groups with the average deliverability in that group on the basis of the formula advocated by Consolidated, which is 40 percent acreage times deliverability plus 60 percent straight acreage. The figures for the bar in the first group are 10,138 MCF per month; the second group, 12,138 MCF per month; and the third group, 13,606 MCF per month. In the fourth group, the figure is 14,074 MCF per month; and the fifth group, the figure is 16,038 MCF per month. In the sixth group, the figure is 18,653 MCF per month; and the last group, the figure is 15,130 MCF per month.

Now as an illustration and comparison, we also drew a line as near as we could approximate it through the bars representing the allowable which would be assigned to wells on the basis

of the so-called 40-60 formula; and as can be seen, the lower reserve wells depart further even from the percentage reserve allocation line on the high side, and the higher reserve wells are even further from the percentage allocation line on the low side.

The last group is the green bar, which is the allocation which would be assigned a well on the basis of 100 percent acreage; and Consolidated has indicated they feel that the further we go toward acreage, the better we are allocating the allowables in this pool. It's readily apparent that even with great discrepancies in reserves within the pool, the straight acreage allocation would give the same allowable to every well in the pool every month, irrespective of the net thickness, porosity, or what you have underlying the tract. The figure for the straight acreage is the same in every case, and it's 13,717 MCF per month.

Q Before you leave Exhibit R-2, Mr. Rainey, would you comment on why those lines don't intersect at a common point on there?

A Yes, sir. Theoretically, there should be an average well somewhere in the pool that it would make no difference whatsoever what allocation formula was assigned to it. It would get the same allowable under any allocation formula. That point would lie somewhere approximately within this third group, because that's about where the average well in the pool would lie.

In attempting to put these lines on here as closely as

we could in relationship to the length of the bars, it was a little bit difficult to hit one common point there, but thecretically there is one common point for a particular well where no formula would make any difference whatsoever on the allocation assigned to that well.

Q Had you used, instead of a bar a quarter of an inch width or greater, just a straight line, would it have been easier to have connected those points?

A Mr. Howell, it's possible that it wouldn't actually have intersected at a common point on the figures that we have used here, anyway, in that in the third group we have used the averages for the third group which differ somewhat from the average well in the pool. Had we used a group of bars or a group of lines for an average well in the entire pool, those lines would all have intersected at the point representing that one well.

Q Mr. Rainey, what conclusion have you drawn from the studies which you've made and which are reflected by El Paso's Exhibits R-1 and R-2, as to the possibilities of an allowable formula which permits the Commission to, insofar as practical, allocate to each tract in the pool its fair share of gas that can be produced without waste?

A Mr. Howell, I think it's pretty conclusive from our exhibits and from the other testimony that has been put in by Pubco in this case that there is a direct relationship between deliverabilities and recoverable reserves underlying the individual

tracts. There has also been considerable testimony as to the inaccuracies of the determination of individual well reserves in some instances. That's not to say that there are not wells in the pool that we can calculate very accurately the recoverable reserves. Because of the inaccuracy of the specified individual well calculations in some instances, it's particularly impractical for the Commission to attempt to allocate allowables or to allocate market demand on the relationship of reserves. Consequently, with the direct relationship which has been demonstrated between deliverabilities and recoverable reserves, I feel that insofar as practicable, the Commission can allocate the market demand in this pool to the wells in relationship to their deliverabilities and be fulfilling the statutory requirement in regard to allocating them in relationship to their reserves.

It has further been demonstrated both on El Paso's exhibits and Pubco's exhibits the magnitude of deliverability in that formula would begin to approach 100 percent rather than to depart from 100 percent. It's recognized that there are wells in the pool who have very low deliverabilities; and in conformance with the Commission's directions in the statutes to prevent the premature abandonment of wells, El Paso feels that the 25 percent acreage portion of the formula as it's presently constituted is an eminently fair means of preventing premature abandonment of the poorer wells in the pool, most of which are going to be marginal wells anyway.

Q Have you made any studies to determine the effect which the adoption of the 60-40 formula might have on a specific group of wells in the same way that you've looked at the average well as shown on Exhibit No. 2?

A Yes, sir. I think on the average it can be seen very readily that the 60-40 or 40-60 formula as advocated by Consolidated tends to depart more and more from the percentage allocation formula which would be on 100 percent reserves. As a quick check to see what would happen, we ran some figures on a specific group of wells which are operated by Consolidated, and found that under the 60-40 formula as proposed, in comparison to the 75-25 formula, for the month of January, 1963 and for the month of February, 1963, Consolidated would have derived approximately $12,000 per month additional revenue on the wells operated by them, which are the low reserve-low deliverability wells in this pool -- some of them, I mean.

Q Would that amount of money, that 10 or 12 thousand dollars, come from the other operators in the pool with better reserves?

MR. STOCKMAR: I would like to object to this line of interrogation here, speaking of some wells only and attributing great values to Consolidated by changing its allowables for that well, without considering other wells that might be reduced. It does not seem to me to be an appropriate approach, if it's material at all, which I really doubt that this is, to the

determination of reserves in each tract.

MR. HOWELL: If the Commission please, might I clarify one point here that I think the objection created a little confusion.

Q (By Mr. Howell) Did you take all of the wells in which Consolidated was the operator and calculate them as a group?

A Yes, sir.

Q So that that calculation was based upon all of the wells which they operate, and not a particular group of their wells, excluding others of their wells?

MR. PORTER: Objection sustained.

MR. HOWELL: If the Commission please, may I ask a question? If Counsel wishes to object, he may do so before we answer.

Q (By Mr. Howell) Could you testify as to the volumes of gas that would be transferred as a result of such a change, as to all of the wells which are operated by Consolidated?

MR. STOCKMAR: Does the witness know which wells Consolidated has an interest in?

MR. HOWELL: That was not the question. The question was as to the wells which Consolidated is operating.

MR. PORTER: As I understand it, that would consist of the wells that are listed in the Commission's records with Consolidated as the operator?

MR. HOWELL: With Consolidated as the operator.

MR. STOCKMAR: We have no objection to the witness answering that question.

MR. PORTER: You may proceed to answer the question.

A Consolidated would have received under the 60-40 formula, in addition to the volumes they're entitled to under the 75-25 formula which is currently in effect, in the month of January, 95,138,000 cubic feet, and in February, 87,625,000 cubic feet of additional allowable which must, of necessity, in the absence of a change in the market for the pool in that month, have come from some other operator.

Q (By Mr. Howell) Were these Exhibits R-1 and R-2 prepared under your general supervision?

A Yes, sir, except the coloring kind of got out of hand.

Q Do they correctly reflect the matters which you have testified to?

A Yes, sir.

MR. HOWELL: El Paso offers its Exhibits R-1 and R-2.

MR. PORTER: Are there any objections to the admission?

MR. STOCKMAR: Consolidated would like to object to the admission of both exhibits on the basis that nowhere on either of them is any indication of the recoverable reserves under any given tract in the field, or any indication of the recoverable reserves in the entire pool, or any indication of the ratio of the first to the second. This was the purpose of the hearing. We've tried to be rather quiet and allow some latitude as to this

discussion, but except for the three wells to which Mr. Rainey did testify, there has been no evidence presented that's responsive to the Commission's limitation on what should come here.

MR. PORTER: Mr. Kellahin.

MR. KELLAHIN: Southern Union joins in that objection.

MR. PORTER: The Commission will overrule the objection. The exhibits will be admitted. The Commission will determine what value to place on the exhibits.

(Whereupon, El Paso's Exhibits R-1 and R-2 admitted in evidence.)

MR. STOCKMAR: Are we still operating under the same ground rules, that we have an automatic exception to the overruling of our objection?

MR. PORTER: You can register an exception if you would like to.

MR. STOCKMAR: I would like to register an exception to this and every other time that Consolidated may have been overruled.

MR. PORTER: The record may so show.

MR. HOWELL: That concludes our direct testimony.

MR. PORTER: That concludes your direct examination. Any questions of Mr. Rainey? Mr. Stockmar.

CROSS EXAMINATION

BY MR. STOCKMAR:

Q Mr. Rainey, you have testified that deliverabilities can be measured quite accurately?

A Yes, sir.

Q You have testified that reserves can be measured but not quite so accurately; is that what I infer from your testimony?

A I think in many instances reserves can be measured with reasonable degrees of accuracy. There are a number of cored wells in this pool. It's my understanding in talking to the Reservoir Department that there's something like 120 core analyses --

Q As between the two, looking at the entire pool, which factor can be measured more accurately?

A On the pool as a whole, it's my opinion that deliverability can be measured more accurately on an individual well basis.

Q On your curve, you have averaged by reserve groups, you've averaged deliverabilities and reserves by reserve groupings once again as you did last year, have you not?

A Yes, sir.

Q If deliverabilities are more accurately measured for large groups such as the 220, 209 groups that you have there, would it not have been more valid to average by deliverability groups and thus plot your points and draw a curve?

A No, sir. I disagree with you completely there. We are attemping here not to prorate deliverabilities but to prorate reserves. Consequently, we have averaged them within reserve groups in an effort to establish the relationship of reserves to deliverabilities.

Q Are you not, by drawing the line, simply trying to show that there is an apparent relationship between deliverabilities and reserves?

A I think it's considerably more than an apparent relationship. I think it's a direct relationship.

Q Would you derive that from the line?

A Yes, sir, and from the general relationship of individual well reserves and deliverabilities throughout the pool.

Q You do not deny that we could average the same data by deliverability groups and draw another line on the chart, do you?

A You can draw another line, but I don't think it would be anywhere near as valid as a line broken down by reserve groups.

Q Is it from this study that you draw the conclusion that there is a relationship between the deliverability and reserves?

A Yes, sir.

Q It's an age-old type of arguing that if you assume a premise, then you are able to argue from that and prove your premise. Does this thing have any validity whatsoever if the premise is not correct to begin with?

A Mr. Stockmar, we didn't start with a premise, we started with an investigation a number of years ago in an attempt to determine whether or not there was a relationship between deliverability and reserves in the Basin-Dakota Pool and in some of the

other pools in the San Juan Basin area. Based on the statistical facts we derived the premise there was a direct relationship between deliverability and reserves.

Q And these are those facts?

A Yes, sir.

MR. STOCKMAR: That's all the questions I have at the moment.

MR. PORTER: Mr. Kellahin.

BY MR. KELLAHIN:

Q If you did average your well groupings by deliverabilities, and since there is a direct relationship between deliverability and reserve, the end result would be a straight line if your premise is correct?

A Mr. Kellahin, we went into this in great detail in the previous hearing, as you recall.

Q Yes, sir.

A We have investigated that particular point on a number of occasions. There are wells which tend to throw the curve out of line. For approximately 90 percent of the wells, your statement is exactly correct; if you average them by deliverability groupings for about 90 percent of the wells, you'll derive a straight line.

Q But you didn't do that?

A No, sir. I didn't do it for the purposes of an exhibit. We have run some rough calculations. I don't have them

with me.

Q You gave some figures on the volume of gas to be gained by Consolidated to the wells operated by Consolidated if the order before the Commission is adopted?

A Yes, sir.

Q Have you made a calculation on the volume of gas that would be gained or lost by Southern Union Gas Company?

A No, sir. It's my recollection just offhand, and I have not checked these figures, that Southern Union has some of the higher deliverability wells in the pool, and it's quite possible that they would derive a loss from the establishment of the formula.

Q How about Aztec Oil and Gas Company?

A No, sir. I have made no specific studies other than the one quick look at the Consolidated wells.

Q In other words, all you were concerned with is what would happen to Consolidated, and not where the gas might come from?

A Yes, but it obviously came from somebody else.

Q That's one reason we are here, Mr. Rainey.

A I'm glad we have got it out on the table, then.

Q Taking your groupings in Exhibit No. 1-R, give me the ranges of deliverabilities in each group.

A Yes, sir. In group one consisting of 22 wells, the deliverabilities ranged from two to 1477, bearing in mind that

these are initial deliverabilities. That two deliverability well, I am sure, has since been plugged and abandoned. The over-all range is extreme. However, there are only about four or five wells out of the entire 22 that are in the extreme ranges.

Q Go on to group two.

A All right, sir. The deliverabilities in group two, which consists of 209 wells, I believe, range from -- well, offhand, Mr. Kellahin, the lowest one I see is 25; the highest one would range up to around 4,000 MCF per day. Again there are extremes, but they're in the minority.

Q I want to know the extremes.

A That's 25 and 4,000, approximately.

Q Would you give me group three now?

A Yes, sir. Group three, in just eyeballing it, runs from approximately 84 -- let me retract that, it's not approximately 84, it's 84. The highest one is, offhand, is 4,235.

Q Group four, please.

A Group four is the range between 3 billion and 3,999,000,000, consisting of 166 wells. The lowest deliverability is, offhand, is 194 MCF per day, and the highest one is 8,663 MCF per day. Again, those extremes are in the minority.

The next group, 78 wells between 4 billion and 4,999,000,000 reserves. The lowest deliverability I see is 119 MCF per day, and the highest is 7,378 MCF per day. Again those extremes are in the minority.

In the range between 5 billion and 5,999,000,000 reserves, consisting of 33 wells, the lowest deliverability I see is 183 MCF per day; and the highest, 12,063 MCF per day. The next highest is 8,000 MCF per day. And the last grouping, which consists of 20 wells with reserves in excess of 6 billion cubic feet of reserves, the lowest deliverability is 216 MCF per day and the highest is 4,202, I believe, MCF per day.

Q Now it's your testimony that the well with 183,000 MCF per day for the purposes of your exhibit has the same reserves as the well with the 12,063,000?

A No, sir.

Q You grouped it in the same reserve group?

A Bearing in mind -- yes, sir, they are in the same group, but our reserve calculations are based on a constant abandonment. I have no idea of what the pressure of the 300 well is. I would venture to say it's in the neighborhood of 1500 to 2,000 pounds of pressure. That well will probably be abandoned sometime in the next year or two unless that deliverability levels out pretty abruptly. That 12,000 per day deliverability well will probably produce for a great number of years. The recoverable reserves on an individual well basis may differ markedly from the individual well calculations that we have used, but by averaging them as we have, we felt that the relationship that we have established on Exhibit 1 is a valid relationship.

Q Then you are averaging 119 against 3,338 MCF

and saying there is a direct relationship?

A Yes, sir.

Q What is that relationship; between those two wells, for example?

A Well, the 119 MCF per day well is probably going to be abandoned next year, and its recoverable reserve is substantially less than we have calculated on the basis of a fixed abandonment pressure.

Q You have them in the same reserve bracket?

A That is correct.

Q Your calculation is that they have the same recoverable reserves?

A For the purposes of our study and the basis that we calculated the reserves.

Q But you admit they do not have the same recoverable reserves?

A That's right, as a practical matter, and as was demonstrated by Mr. Cleveland of Pubco.

MR. KELLAHIN: That's all. Thank you.

MR. STOCKMAR: I have two more questions, please.

MR. PORTER: Mr. Stockmar.

BY MR. STOCKMAR:

Q Can I assume that you have before you certain data sheets that describe these wells and show the reserve calculations for each well?

A You may assume that if you want to.

Q Is the answer yes?

A Yes, sir, I do.

Q Are you willing and do you intend to put these into evidence as exhibits?

A I'll have to have a ruling from my Counsel and a subsequent ruling from the Commission.

MR. HOWELL: If the Commission please, we do not intend to put them into evidence. We do not intend to clutter the record with that individual data.

MR. STOCKMAR: Those are my two questions. Thank you.

MR. PORTER: The hearing will recess until 1:15.

(Whereupon, the hearing was recessed until 1:15 o'clock P.M.)

AFTERNOON SESSION

MR. PORTER: The hearing will come to order, please. Are there any more questions of Mr. Rainey? Anyone have any more questions of Mr. Rainey? He may be excused.

(Witness excused.)

MR. HOWELL: That concludes the testimony to be presented by El Paso.

MR. PORTER: Anyone else desire to present testimony? Mr. Swanson.

MR. SWANSON: Yes, sir. Aztec has one witness.

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

MR. DURRETT: Will you stand to be sworn, please?

(Witness sworn.)

L. M. STEVENS

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

DIRECT EXAMINATION

BY MR. SWANSON:

Q Would you state your full name, please?

A L. M. Stevens.

Q Are you the same L. M. Stevens who has testified at this Commission at a previous hearing after having been qualified as an expert witness?

A Yes, I am.

Q Mr. Stevens, have you made a study of the effect on correlative rights in the Basin-Dakota Pool of various proration formulas, including the existing formula and that proposed by Consolidated?

A Yes, sir.

Q What was your conclusion as to the best manner in which such a comparison could be made?

A Well, it was my conclusion that the best manner in which this comparison could be made was by considering the effect of the various formulas on average deliverability and reserve data developed from a study of all or practically all of the wells in the pool. I knew that El Paso had such a study which

was more nearly complete in this regard than any other study that I know of. I know how El Paso determined their reserve values and I agree in principle with their techniques. I also know how they have grouped their wells, how they arrived at the different averages within the groups, and I agree with this method.

A check of their reserve values showed that they compare favorably with reserves developed by Aztec for wells which we operate and others in which we have an interest. I knew that El Paso had kept their reserve study up to date, and I requested that they supply me with average reserve values with their corresponding deliverability values as developed by their latest study on 729 wells. This they did, and I made the comparison by using their values developed by this study, which to my knowledge is the most nearly complete and up to date study that there is for the Basin-Dakota.

Q Have you prepared an exhibit from this data demonstrating the effect on correlative rights of various participation formulas?

A Yes, sir, I have.

Q Would you refer to it, please? Mr. Stevens, would you explain your exhibit, please?

A Yes, sir. This exhibit was prepared from the use of the data supplied me by El Paso. There are seven different reserve groups with averages including 729 wells. The effect on

correlative rights by prorating on a 40-60 formula and on the current 75-25 formula, and on 100 percent "A" times "D" formula can be determined from this exhibit. The blue line illustrates yearly allowables which would be granted the average well by prorating on a 40-60 formula; the red line shows the same thing for the current formula; and the green line shows it for the 100 percent "A" times "D" formula.

The number next on each point indicates the number of wells in that reserve group, and the number in parentheses indicates the range of reserves in each group.

The yearly allowable for the average of each of these groups was determined through the use of factors which were taken from the 1962 proration schedules. Each point shows this yearly allowable for the average of that point, and this allowable is expressed as a percentage of the average reserve for that well. This allowable so expressed is plotted against the average deliverability of each group.

Now the red point at the extreme right of the exhibit shows that the high reserve wells would be granted annual allowables equal to about four percent of their reserve under the present formula. At this rate it would, of course, take them about 25 years to deplete their allowable, and during this time the low reserve wells would be granted allowables equal to about 10 percent of their reserves and could deplete this reserve in about 10 years.

Adopting a 40-60 formula would cut the high reserve well allowables from four percent to a little less than three and a half percent, as indicated by the blue point, and would increase the low reserve well allowables from 10 percent to about 14 percent. Now under this formula, the low reserve wells could now deplete their reserves in about seven years, after which time they would recover reserves in excess of the reserves properly attributable to the tracts where they produce. In doing this, correlative rights would of course be violated.

Now the position of the blue line as related to the position of the red line here would indicate that considering acreage in the allocation formula would tend to cause violation of correlative lights, and the degree of that violation would vary directly with the weight given acreage in the formula.

The green line shows that a 100 percent "A" times "D" formula would be desirable if there were no need for an automatic minimum allowable as provided for by the present formula. The green line shows that under this formula the 100 percent "A" times "D" allowables would vary only by slightly over two percent between high and low reserve wells. The low reserve wells as indicated would still be favored slightly even under this formula. The relative position of this green line would indicate that any change in the formula should be in the direction of giving deliverability more weight in the formula.

Now the points in the rectangle below all three lines

and located between the three to four billion and the four to five billion reserve groups are for 21 wells in a six billion or better reserve group. These 21 wells represent about three percent of the total wells studied, and the points in that rectangle indicate that changes in the formula wouldn't affect their allowable too much. Therefore, since this is true, they weren't considered in this comparison.

Q Mr. Stevens, in summary, what conclusion would you draw from this exhibit?

A I would conclude that deliverability should be emphasized in the proration formula.

Q It would appear that a straight deliverability formula would be the most equitable of the three illustrated here?

A It would appear so, yes.

Q To your knowledge, would Aztec object to the continuation of the existing formula even in spite of that?

A No, sir, we would not.

Q Mr. Stevens, was this exhibit prepared by you or under your supervision?

A Yes, it was.

MR. SWANSON: At this time we would like to introduce Aztec's Exhibit No. 1 in evidence.

MR. PORTER: Is there any objection to the admission of the exhibit?

MR. STOCKMAR: Consolidated would like to object to the

admission of the exhibit on the grounds that it does not in and of itself contain any reserve figures for any given tract. It does not contain reserve figures for the entire pool. It does not contain any ratio of one to two, and is not responsive to the hearing as called.

MR. KELLAHIN: Southern Union joins in that objection.

MR. SWANSON: The exhibit is designed to make certain conclusions with regard to data that has been entered into this hearing and data that was available to him and that he has checked to the best of his information as to its accuracy, and it is.

MR. STOCKMAR: It is my recollection that just before lunch I asked if this data was going to be made available, made indirectly. The answer was no.

MR. HOWELL: The question was if we were going to introduce it in evidence, and the answer was no, we were not going to introduce it in evidence.

MR. STOCKMAR: Mr. Swanson has just stated that the data was available to us, and it was not available to us.

MR. SWANSON: I think the data is also on El Paso's Exhibit No. 1 and 2, which are in public view at the moment.

MR. PORTER: Mr. Stockmar, you were referring to reserves on an individual tract basis and total reserves in the pool and the ratio of the proportion of one to two. The objections are overruled. The Commission will permit the exhibit and determine what weight to be given to it, and the record will show

exception, if you would like, Mr. Stockmar.

(Whereupon, Aztec's Exhibit No. 1 admitted in evidence.)

MR. STOCKMAR: Thank you.

MR. PORTER: Does anyone have a question of Mr. Stevens?

MR. SWANSON: I'm not quite through with my direct examination.

MR. PORTER: Oh, I see.

Q (By Mr. Swanson) Mr. Stevens, in arriving at the best possible proration formula for this pool, in your opinion would one big objective be to limit the number of wells receiving allocations in excess of the ideal allocations for those wells? By ideal, I mean that allocation which directly relates its share of the allowable to its share of the recoverable pool reserves.

A Yes, I believe that would be true.

Q Why would you think this would be important?

A Well, any well which is consistently granted an allowable that is greater than its proper or ideal allowable will sooner or later be allowed to produce somebody else's gas, and this obviously would violate correlative rights.

Q For a moment, if you will, assume that you are in complete agreement with the reserve data that has been presented to the Commission by Consolidated, with the manner in which the data was fed into the IBM machine, and the calculations that machine was required to make. From the data that Consolidated has presented, in your opinion, is it possible to tell what weighting

of deliverability would be most desirable in determining a formula which will limit the number of wells receiving allocations in excess of the ideal allocations?

A Yes, sir, that would be possible. We refer to their Consolidated Exhibit No. 5. They show under the 100 percent weighting and deliverability weighting and opposite the 100 and to 109 percent of proper allowable, 35 wells are shown. Now the number of wells getting exactly 100 percent of their proper allowable is not indicated, but we can assume that all of these 35 wells would receive exactly 100 percent of their proper allowable. Now at the bottom of this column, it's indicated that 247 wells received 100 percent or better of their proper allowable or ideal allowable. Then, subtracting the 35 wells which we assume received 100 percent of their proper allowable leaves 212 wells that produce in excess of, or that are granted allowables in excess of their proper or ideal allowable under the 100 percent deliverability formula.

Going through the same procedure with the 75 percent deliverability formula, we find that this would be increased to 245 wells that would be granted allowables in excess of their proper or ideal allowable.

Under the 50 percent deliverability weighting, there would be 284 wells in this category. Under the 40 percent weighting, 316 wells. This would increase to 338 wells under the 30 percent; 347 wells under the 20 percent; 365 wells under the 10

percent; and 361 wells under straight acreage prorationing would be granted allowables in excess of their proper or ideal allowable.

Now the range of wells in this category, those that would be granted allowables in excess of their proper allowable, ranges from a low of 212 wells to a high of 365 wells. It's apparent from this exhibit that as the weight of deliverability in the formula is decreased, as the weight of deliverability is decreased it increases the number of wells which would receive allowables greater than their ideal or proper allowable.

Q Mr. Stevens, these wells which you've testified to that would be producing in excess of the ideal rate for each well are the minimum number of wells that would be in that category, would they not?

A Yes, sir.

Q Not being able to determine how many wells from this data are producing at their exact ideal rate, you have assumed that all producing in the range of 100 percent to 109 percent of that rate are producing at their exact ideal rate?

A Yes, sir, so this would be the minimum number of wells in those certain categories. This exhibit supports our conclusion that to better protect correlative rights, deliverability should be given heavy emphasis in the proration formula.

Q Would you refer to Consolidated's Exhibit 6? This apparently is a plot of the number of wells receiving the various

percentages of proper allowables under four different proration formulas. These include the 100 percent, the 65 percent, 40 percent, and 20 percent of the deliverability values. Which formula according to this data would most effectively limit the wells receiving in excess of their fair share?

A The 100 percent deliverability formula represented by the curve constructed through the open dots, the wide dots. Under this formula, in all ranges above the ideal or the 100 percent line here, there are fewer wells which receive allowables in excess of their fair share under the 100 percent deliverability proration.

Q In this regard, what would be the next most desirable formula that's illustrated on that exhibit?

A The next most desirable would be the 75-25 as indicated by the black dots on this next curve. This formula would tend to restrict the number of wells receiving allowables above the ideal, very nearly to the same degree that the 100 percent deliverability formula tends to restrict. It certainly is nearer to the 100 percent deliverability formula than the other two formulas are. This exhibit will demonstrate again that giving deliverability maximum consideration in the allocation formula will give better protection of correlative rights.

Q Would you refer to Consolidated Exhibit No. 7?

As I recall, this is designed to illustrate the number of abuses of correlative rights caused by various deliverability

values in the formula. These abuses are limited to those falling outside the 70 percent to 130 percent range in reserve estimates. According to the data on this exhibit, how many abuses of correlative rights would occur should the Commission adopt the 40-60 percent formula requested by Consolidated?

A About 350 abuses.

Q Do you know how many wells are included in Consolidated's data?

A I think there were 699, say 700.

Q Of that 700, 350 abuses of correlative rights would occur?

A Yes, sir, about 50 percent of the wells.

Q Of these 350 abuses, can you tell from their data how many are caused by wells receiving allowables in excess of their ideal allowables?

A It can be determined from the Exhibit No. 5 again that 204 wells would receive more than 130 percent of their ideal allowable.

Q Using the same 70 to 130 percent allowance, can you determine how many of the 350 abuses due to 100 percent deliverability formula are caused by wells receiving in excess of their ideal allowable?

A Yes, sir, that can be determined in the same manner from the same exhibit. We have determined it to be 172 wells which would receive more than 130 percent of their ideal allowable

under the 100 percent formula. This compares with 204 wells in this category under the 40-60 formula.

Q Does Exhibit 7 tend to mask the number of excessive allowable wells?

A Yes, sir, it would, more or less, because it would mask actually the actual number of excess allowables because it's indicated on this exhibit that it disregards wells falling in the 100 to 130 percent of ideal allowable range. Actually, according to this data, under the 40-60 formula at least 316 wells would receive more allowable than their ideal, as compared to 212 wells in this category under the 100 percent deliverability formula.

Q In your opinion, which is a greater impairment of correlative rights, allowing a well to produce at an excessive rate, that is, at a rate in excess of its ideal rate, or restricting a well's production at a rate below its ideal rate?

A When you first think about these things, they are both pretty serious impairments of correlative rights. However, when you think about it further, it's obvious that a well which consistently receives more than its fair share of the allowable will sooner or later produce somebody else's reserve. After this reserve is produced and sold, the rightful owner of that reserve has no second chance, so to speak, to produce that reserve himself because it's already gone. It's sold.

But restricting a well's allowable to less than its fair share, it might not completely destroy its correlative rights

because this allowable could remain in the reservoir to be produced by the well later, depending on certain circumstances. Circumstances favorable to this type of thing would exist for a well located in a relatively isolated area, or a well surrounded by other wells which have their allowable restricted in the same way, or a well which would have drainage barriers which would be locally around its lease. Under such circumstances, the true effect may be just a prolonging of the time for the well to produce its share of the pool reserve.

Q Mr. Stevens, would you summarize the conclusions you have drawn from Consolidated's exhibits?

A Yes, sir. Again, under the assumption that their data is correct, all three of their exhibits, Nos. 5, 6, and 7, demonstrate that as deliverability receives less weight in the formula there would be an increase in the number of wells receiving allowables in excess of their fair share of these pool allowables. This is, of course, an impairment of correlative rights; and for this reason, deliverability should be emphasized in the proration formula.

Q Forgetting now the assumption that you are in complete agreement with Consolidated's data and methods, have you any comments you would like to make with respect to their data and the procedures they followed?

A Yes, sir. I would make this comment. They started with reserves on 457 wells, which by now is outdated and have been

revised. Any errors that were inherent in these 457 wells will be carried to other wells by their extrapolation. I don't believe that they have determined as closely as has become possible their reserves since early 1962, the development of additional data which is generally available. Any change in reserves would change the relationships as indicated by their exhibits, because their exhibits are based upon their reserves. I think their reserves need to be refined, and I do not believe that their reserves are the best estimates now available to the Commission.

Even so, even with this, their exhibits still support our conclusion that deliverability should be emphasized in the proration formula. In my opinion, the number of wells receiving a greater or less than their ideal allowable as indicated by these exhibits, it might be decreased, this number of wells which are in this category might be decreased if their study had been based on their reserve data comparable to that developed by El Paso Natural Gas and Pubco, if their reserve study would have been as intensive and as detailed as these reserve studies have been.

MR. SWANSON: I have no further questions.

MR. PORTER: Does anyone have a question of the witness? Mr. Stockmar.

CROSS EXAMINATION

BY MR. STOCKMAR:

Q Mr. Stevens, I didn't object to the line of interrogation while it was going on, but you made repeated references to

Consolidated's Exhibits 5, 6, and 7, and were drawing certain conclusions therefrom. Do I understand that it was those exhibits as modified by you, after arbitrarily eliminating certain categories of wells from it?

A No, sir. That wasn't the case at all. My conclusions drawn from these exhibits were taken from your own data that you submitted to this Commission.

Q You said something about there being one category under which 204 wells would be in excess of 100 percent, or something like that. I don't find the number 204 on here.

A That's a calculated number. I can tell you how I got it if you would like me to go through it.

Q What's this about your crossing out all the wells in the 100 to 109 percent category?

A Well, I didn't cross them out, actually I just subtracted them from the total in that particular group because I wanted to arrive at the number of wells which were receiving allowables in excess of their percent of proper allowable as you have shown here. I wanted to arrive at the number of wells that were receiving allowables in excess of their proper allowable.

Q Well, isn't a well which is receiving 101 percent of its proper allowable receiving in excess of it?

A That is correct, but I think I made the statement that the wells receiving exactly 100 percent are not indicated on this exhibit. The wells from 100 percent to 109 percent are lumped

together and under the 100 percent formula there are 35 wells in that range.

Q So you subtracted everything in that line to arrive at a new set of data?

A I subtracted it from the data that you have here on your exhibit.

Q So as to one formula, you subtracted 35; to another, you subtracted 71. All your work is a different total of wells, is it?

A It is under a different total, but it's still under the 100 to 109 percent range.

Q Why did you knock out the 90 to 99 percent?

A Because I was trying to arrive at the number of wells which were receiving an allowable in excess of their proper allowable. The 90 to 99 percent range would obviously be knocking out a well that was receiving less.

Q Why didn't you knock all the wells over a hundred out, then, the whole bottom half of the exhibit?

A That would have left me with zero wells producing over their excess allowable, and obviously that isn't true. There are 212.

Q Isn't it correct that all of your testimony and your conclusions are based upon your calculations as you have remodeled our exhibits?

A Well, basically, I suppose that's true.

MR. PORTER: Any further questions? The witness may be excused.

(Witness excused.)

MR. PORTER: Does anyone else have testimony to present in the case?

MR. STOCKMAR: I would like to present Consolidated Exhibit 6 as so marked.

MR. KELLAHIN: If the proponents are through, we do have some rebuttal testimony.

MR. FEDERICI: If the Commission please, I have a statement for one of the parties.

MR. KELLAHIN: You want to make it now?

MR. FEDERICI: I think I will make it at this point.

MR. PORTER: Mr. Federici.

MR. FEDERICI: For Calkins Oil Company. We agree with the conclusions stated and proven by the witnesses and the exhibits presented by El Paso Natural Gas Company, by Pubco, and by Aztec; and we affirm and support those views.

The Commission will recall that in April, Calkins presented evidence that deliverability should be the predominant factor in the allowable formula. The evidence introduced by other operators at this hearing further clearly supports this position. It is, therefore, our recommendation to the Commission that the present 75-25 formula be continued for the Basin-Dakota Pool. If the Commission please, that will be all at the present

time.

MR. PORTER: Mr. Kellahin, you say Consolidated has one rebuttal witness; is that what you said?

MR. KELLAHIN: Southern Union does and Consolidated does, also. I think it would be rather brief, however.

MR. PORTER: Which one do you want to call first?

MR. KELLAHIN: I would like to call Mr. Oren Haseltine, for Southern Union.

(Witness sworn.)

OREN HASELTINE

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

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q Would you state your name, please?

A Oren Haseltine.

Q By whom are you employed and in what position?

A Southern Union Gas Company, Executive Assistant.

Q Are you the same Mr. Haseltine who testified in the case before the Commission at the April hearing?

A Yes, sir.

Q Are your qualifications as a petroleum engineer a matter of record before this Commission?

A They are.

MR. KELLAHIN: We submit the witness as a qualified

engineer.

MR. PORTER: His qualifications are accepted.

Q (By Mr. Kellahin) Mr. Haseltine, in connection with some of the testimony that has been presented before the Commission today, there has been some statements made that deliverability is a more certain figure, in fact, a relatively certain figure in testing wells in the Basin-Dakota Pool; do you recall that testimony?

A Yes, sir, I believe that's been affirmed a few times, that deliverability is a very determinable thing and subject to practically no error; that it is a parameter easily measured, and therefore has a very good reliability and good use in any kind of a proration formula.

Q Have you had any experience in the taking of deliverability tests in the Basin-Dakota Pool?

A Yes, sir, I have run a few myself, and as an employee of one of the pipeline companies in the area we have a great deal of interest in the deliverability tests and the manner in which they're taken.

Q Do you find that any wide variations occur in deliverabilities on any given well?

A We find that, first of all, deliverabilities -- and this has been testified to I believe by Mr. Gorham -- deliverabilities will increase and can be made to increase in the case of a number of wells through the use of modern or improved completion or

stimulation techniques. It is a well known fact, and we need to recognize that when we speak of an initial deliverability that at some future time that well may have a higher deliverability. If we subscribe to the testimony or to the concept that deliverability is directly related to reserves, we have to say that those wells so stimulated have shown a corresponding increase in reserves.

Q Now do you believe that to be true?

A No, sir.

Q Other than the factor of time, would an increase in deliverability increase the recoverable reserves under a given tract of land, in your opinion?

A Pardon me?

Q Other than the factor of time --

A Right.

Q -- does the increase in deliverability increase the recoverable reserves under that tract?

A The increase in deliverability may serve to extend the economic life of a well. Now then, we have seen evidence offered that recoverable reserves is created by certain rock parameters, none of which include deliverability or permeability. This is a good volumetric formula and I'm sure that the staff of the Commission recognizes what I'm getting at, that a volumetric formula is one thing but it does not recognize, does not include any parameters that you can arbitrarily enlarge when the stimulation

is successful and results in an increase in deliverability. Therefore, any imagined correlation or direct relation between this volumetric calculation falls down when you are successful in stimulating a well and getting an increase in deliverability; there's no factor in that volumetric formula which you can increase. You can't increase "H", you can't increase fee; you can't increase gas saturation; you can't increase any of those parameters, so it's, the imagined relation between volumetric reserves and deliverability simply isn't there, once a well has been stimulated.

Q Are there factors which would affect the accuracy of the deliverability test in the Basin-Dakota Pool?

A Yes, there are. The seven-day shut-in pressure which is required by statute is subject to a great deal of mis-observance and maybe some boiler housing. Let me put it this way. We have one operator who is connected to our system and he has turned in deliverability tests which have been accepted by the Commission, and he shows a seven-day static shut-in approximately half his original reservoir pressure. This is on the initial deliverability test turned in on these wells. Now the fact that he can turn in a seven-day shut-in approximately 50 percent of his original static serves to increase his deliverability approximately 60 percent. This is just arithmetic.

Q Do fluids in the well bore have any bearing on it?

A Right. I wouldn't want to infer that this operator

is boiler housing his data, he probably has fluid in the hole.

Q That would be the answer to that particular situation?

A I think that is probably right. The Dakota is going to be characterized by that kind of situation in more cases than not.

Q Does the manner in which the well has been produced prior to the taking of deliverability tests have any effect on the deliverability test?

A It has a very great effect. I think probably most of the engineers here will admit that deliverability tests are in some measure rate sensitive. That is to say that if one well has been shut in for four or five months or even seven or eight months prior to its deliverability test, it will show a higher deliverability than it would have shown had it made its monthly allowable each month prior to that test. That's just an observed fact in the Basin-Dakota Pool.

Q Now you heard the testimony submitted by Pubco Petroleum Company to the effect that they calculated some of their wells down to an abandonment pressure of 140 pounds. Do you agree that they can be produced to that point?

A No, sir. I don't think that any Dakota well is ever going to produce to 140 pounds. In the first place, that infers that the gathering system would be operating at probably 50 pounds and it also infers that there is no fluid in the hole to drown out that pressure. Actually, two barrels of fluid in two-inch tubing would kill a 140-pound well.

Q Would that be a possibility in the Basin-Dakota Pool?

A I think it would be a probability.

Q Now you were present this morning and heard the testimony of Mr. Cleveland and saw the graphs which he submitted to this Commission?

A Yes, sir.

Q Have you examined those graphs?

A Yes, sir, I have.

Q Do you have any comments to make in connection with them?

A The graphs that Mr. Cleveland produced show several points through which he has drawn a straight line, and to the appearance of the eye they fit the points very well. However, we need to recognize that some of those points represent 50 or 60 wells, and some of the points which have equal amount of bearing on the position of that line represent only one well. In addition, I don't have a copy of that curve in front of me but I believe above the 3 million reserve range he had 61 wells represented above the line and 29 below. This is referring to Pubco's Exhibit R-2. Above the 6 billion foot recoverable reserve range, he had some, oh, if I remember my addition correctly, there were about 60 wells above the line represented by four points; and some 20 or 30 wells below the line represented by four points. The position of his line gives somewhat more weight to those 20 or 30 wells below the line, one of which, one point of which represents

only one well, than it gives to the 60 or 70 wells above the line.

Now here again, I feel confident that the staff is aware of things that can be done with graphs of groups and graphs of averages. That has been apparent through some of the questions that have been asked, but I feel that this thing can't go unchallenged by Southern Union, since we have an interest in this case that's before the Commission; and it's simply a matter of arithmetic and analytical geometry that you can average in almost any direction you want to go. You can group wells in almost any direction you want to go. The point, the extreme point on this Exhibit R-2 by Pubco shows a deliverability of some 4600 plus MCF per day. I believe, if I'm not mistaken, there are 40 or more wells in the Basin-Dakota Pool that have deliverabilities higher than that point, and yet they are not even in appearance on the graph, unless they have been averaged into these lower reserve groups.

So the point I'm making is that we've got to recognize the fallacy in plotting one well and giving it equal weight with 59, as has occurred here on this graph.

Q Do you recall the two exhibits of Pubco, R-9 and R-10, being the iso-reserve map and the initial deliverability map?

A Yes, sir.

Q Do you have any comments in connection with that?

A Well, here again, it's a case of art work taking predominance in our eye over the facts of the case. I direct your

attention to a well in which I have particular interest and to which Mr. Cleveland testified, we got 16 billion feet of reserves. This well on Exhibit R-9 is located in fractional Section 8 -- no, it's in Section 17, 28 North, 11 West. No,-- I'll get it right here. It's the one north of that. It's in Section 31, 29, 11. This well, according to the exhibit by Pubco, has approximately 53 million feet per acre of recoverable gas. The well directly south there with a figure on it of 16.1 million, then, has a recoverable reserve less than a third. In other words, the ratio there is about three to one between the reserves of this well to the south and our Newlander No. 1, ratio about three to one in the reserves.

Now on the other map, he has shown the deliverabilities of those wells, on the one hand it's 4600, the other one it's 2900. The ratio there is about 30 percent greater, about 30 to 40 percent greater deliverability in a well that has almost four times the reserves, according to his calculations. Now I recognize that this is an anomaly. Nevertheless, the red paint makes all these anomalies. They are all grouped together in a big red blotch.

Q Are there other anomalies of the same type in the red area that you referred to?

A I'm sure there are a lot of them. The only other one I looked at was the Angel Peak 23-A Well of ours, which has a recoverable figure there of 28.1 million feet per acre. 28.1 is

nearly twice the lower limit at which they begin to color the map red, 15 point omitted. In other words, here's a well that has twice the value represented by the contour between the red and the yellow areas, and yet it's painted over red. The effect of this is just like the effect of averaging this other data. It serves to mask what is probably pretty valid work in determining reserves.

I wouldn't take any issue at this time with the figures that they have put on their map. The issue that I take is the fact that the picture presented, due to a wide area of red paint, does not represent the anomalous situations that exist throughout the Basin, so we get a distorted picture of what's actually the case.

Q Mr. Haseltine, where you have a deliverability ranging from 183 to 12,063, grouped in the same reserve group, would you call that a valid grouping by reserves, assuming that there is a direct relationship between the reserves and deliverability?

A Well, if the reserve calculations are correct, it's a valid group by reserves, but it certainly shows no relationship whatsoever between the deliverability applicable to those wells to which the reserves have been attributed.

Q Would that indicate that there was a direct relationship between reserves and deliverability?

A I never have thought so, and I don't think so now and no one has shown us that such a thing exists.

Q In the event the proposal of Consolidated is adopted by the Commission would, in your opinion, Southern Union stand to gain or lose gas production?

A This is a point that we didn't figure bringing up, but since the other people brought it up, all right, let me get this into the record. Southern Union wells, either the ones we operate or the ones in which we own an interest, all are above average in deliverability, and we would sustain a marked reduction in current income if the proposal which we are supporting is adopted.

Q In your opinion, will you sustain a marked reduction in ultimate recovery?

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

Q Do you have anything else to add to your testimony?

A I believe that's all I have.

MR. KELLAHIN: That's all the questions I have of the witness.

MR. PORTER: Does anyone have a question of the witness? Mr. Keleher.

CROSS EXAMINATION

BY MR. KELEHER:

Q Mr. Haseltine, you say you are an Executive Assistant with Southern Union Gas Company?

A Yes, sir, that's correct.

Q You stated in your testimony that Southern Union had an interest in the case before the Commission?

A That is right.

Q Would you state to the Commission what that interest may be?

A I'll be glad to. In order to serve a market with gas, you need two things. You have to have reserves and you have to have deliverability. We feel that we have got the reserves, but we feel it's entirely possible that that deliverability will be gutted before we get those reserves out of the ground and we will be serving Albuquerque with Texas gas.

Q Well, then, it's purely a selfish interest, is it not?

A If you wish to term it selfish, it is; we are all in the business to make money.

Q You stated that if the Commission did not adopt the formula -- or if the Commission did adopt the formula petitioned here by Consolidated, that Southern Union would lose money?

A I said we'd lose current income, yes, sir.

Q I understand that, my recollection is that you said that you would sustain a loss.

A I believe that the record will show --

Q You now want to correct it to say that you would sustain current income loss?

A If you like, we can check back, but I think I said current income.

Q Now the Southern Union isn't a particularly philanthropic interest?

A None of us are.

Q You are here looking out for the interest of Southern Union Gas Company?

A Right; yes, sir.

Q You mentioned that you had some association or some employment with one of the pipeline companies?

A Yes.

Q What's the name of that company?

A Southern Union Gas Company.

Q Southern Union Gas Company is also a pipeline company?

A Yes, sir.

Q Do you have any affiliate or subsidiary corporation operating in the San Juan Basin?

A We have two affiliated companies.

Q What are their names?

A Southern Union Production Company and Southern Union Gathering Company.

Q Why do you not operate as a unit in the name of the Southern Union Gas Company? Why do you have three corporations operating?

MR. KELLAHIN: I submit this cross examination is immaterial. It has nothing to do with the direct testimony of this witness.

MR. KELEHER: The witness said he has an interest, and we want to disclose the interest if we can.

A The three corporations were set up before I ever heard of Southern Union, and as an Executive Assistant in the Gas Supply Department, I don't know why they have three corporations.

MR. PORTER: The Commission sustains the objection.

MR. KELEHER: Let the record show an exception.

MR. PORTER: The record will show an exception.

Q (By Mr. Keleher) Now while Southern Union might sustain a loss of current income, you are looking down the road, that's what you testified to?

A I beg your pardon?

Q While Southern Union may sustain a temporary loss, you are looking down the road for eventual income, is that right?

A That is right.

Q And you don't want any Texas gas brought into New Mexico?

A We don't mind selling Texas gas. In fact, we peak out with it right now, but I believe every one of us who operate in the San Juan Basin would prefer to sell San Juan gas to Albuquerque and Santa Fe.

Q You own an interest in some wells, do you not?

A Yes, sir.

Q You have others that you operate?

A Yes.

Q How will those people fair, assuming that your petition or theory is adopted by the Commission?

A Our participants?

Q Yes.

A I don't really know. As a matter of fact, most of our wells are 100 percent working interest owned by Southern Union.

Q But as to those in which you do not own a hundred percent working interest, how will they fair? Have you considered them?

A No, I don't really know how the splinter interests will shape up.

Q You have no consideration for them and it's immaterial to you what happens to them, is that right?

A Why, no, we expect them to make money.

Q You mentioned fracturing; by the use of hydraulic fracturing is it possible to open up to the well bore reserves under the tract which prior to fracturing were not opened to the well bore and would never be recovered?

A Yes, it is.

Q You admit that?

A I certainly do.

MR. KELEHER: That's all.

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

(Witness excused.)

MR. PORTER: Mr. Stockmar, do you have any further

testimony?

MR. STOCKMAR: I would like to call Mr. Harry Trueblood for rebuttal testimony.

HARRY TRUEBLOOD, JR.

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

DIRECT EXAMINATION

BY MR. STOCKMAR:

Q Mr. Trueblood, you are the same Mr. Trueblood that previously testified here?

A I am.

Q Have you been present in this hearing during the testimony of all the witnesses that followed you?

A Throughout.

Q Do you have any comments in the nature of rebuttal testimony that you care to make concerning the evidence presented by others?

A If the Commission please, first of all, in response to Mr. Rainey's testimony concerning the fact that his Exhibit No. R-1, if it were presented, would look like somebody shot it with some buckshot; so it just so happens that we have got our Exhibit No. 9 that purports to show the buckshot.

MR. HOWELL: If the Commission please, Ben Howell on behalf of El Paso. Before this witness testifies, I would like to inquire as to the basis with which he grouped his wells within

reserve groups. How did you determine that you put a particular well between the three billion and four billion?

A Mr. Howell, this is a plot of every single well, 460 wells which we had information and access to, of El Paso. This is an actual plot.

MR. HOWELL: Is it based upon the data which was furnished to you in April?

A It's based upon the data on your Exhibit No. 2, which I believe listed all the wells by township, the wells, the initial reserves, the initial deliverability; and this is a plot of initial deliverability and initial reserves for the 460 wells.

MR. HOWELL: Based upon that April reserve study?

A Yes, I presume that is correct.

MR. HOWELL: Then El Paso moves to exclude this testimony because it is based upon evidence which the people who did the work, namely, El Paso, say is out of date, has been revised, and has been replaced by other and new estimates as to the reserves for the particular wells shown on there. We move to exclude testimony relating to such an exhibit.

MR. STOCKMAR: It is not being offered to show what a shotgun blast today might look like. It's being offered to show what a shotgun blast appearance might look like. It has nothing to do with the present situation. It's demonstrative of what has been for years concealed in those eight or nine points that appear on the deliverability versus reserve curves.

MR. PORTER: The Commission will overrule the objection. It will determine the weight to be given to the testimony and the exhibit.

A If the Commission please, this is an exact replica, and for some reason there seems to be a discrepancy between 457 and 460 wells, and the data that we got in response that was listed by township, we wound up with 460. They may not have meant to give us the other three, but these are the 460 dots which represent the original reserve calculated by the El Paso Natural Gas presented in the April testimony, and the original deliverability.

The Commission will recall that what was termed "high jinks" or otherwise by our opposition, that we turned the curve around by grouping these reserve groups together, averaging reserves within the deliverability groups. Now this is, if we had the April line here on this graph, this, what they drew their line from, there is a simple mathematical relationship as to why they keep coming up with this straight line, and it was the answer when they started and it's the answer when they end. This could just as well read apples versus oranges. This is a plot of "X" and "Y" in which the slope of that line or that line or that line or any other line or groups of lines originating from a point can be measured, where "Y" is equal to "AQ", where "A" is the slope of the line, or "BX" or "DX" or "CD"; and every time you have a point here, you can draw that many lines.

Now for any given one single point, a line, let's take this one since I haven't already marked it, a line drawn from the center to that point, to that well, is a defined slope which can be measured; and all it says is that the only relation that that slope really has is time. If you had one well in the reservoir and it had a certain deliverability and it had a certain reserve, that under a given length of time it would be reduced to zero. That's what it says. Well, that's fine for one well. And that is the relationship between deliverability and reserves.

Assuming that a pressure decline versus cumulative production were a straight line, and in all cases we have all found that it comes down in a fairly straight line and then begins to tail off through the later stages of the life of a well, because the theoretical decline of pressure versus cumulative production, theoretically, this is why this is true. Now similarly, any other point on that line will reduce its reserves in an equal amount of time, and as long as you stay on that line and you only had wells on that line, you would be reduced to zero and correlative rights would all be protected on that line. Everything would come out at the same time, which is what is encumbent upon the Commission.

However, when you take series of lines, 560 possible lines, or maybe some of the wells fall on the same line and begin to push them altogether and group them into one, you are saying

that when they come out with a line which is similar to this one, that everything over on this side of the line is getting its reserves out in the same length of time that everything on this side of the line is.

Now obviously, when you get out to the points of low deliverability with low reserves, it's impossible. It's even impossible in the average range. So what happens when you assign an allowable formula, which allowable is nothing but time, it's the length of time you are going to allow or require a well to produce its reserves, when you start assigning an allowable based on a premise that starts out in this direction, nothing can happen but that all wells in this lower range have got to go over to that range, that the reserves have got to go over to the higher deliverability side, and it's drained.

What we're saying is that all of the testimony that's come before this Commission since time one on this concept that there is a general correlation between deliverability and reserves is based first upon the false premise that every single well in the San Juan Basin falls on a given line. If it doesn't, then you don't protect correlative rights. So much for the scatter shot graph. This is the mechanical part of it.

Now frankly, I can average this group of wells in a deliverability range and then I can switch it to averaging all the deliverabilities in another range, and I imagine I would get a sign curve of some type. I could go the other direction and average

all the reserves in a given deliverability range. The last time in the previous hearing we came up with this type of thing. Now quite frankly, going back to -- forgetting deliverability versus reserves and saying "X" and "Y", if you put certain restrictions on the preparation of a graph from scatter points, you can come out with a circle or a duck or anything else, if you put the proper restrictions going in. It has to do with mathematics and has nothing to do with the problem at hand, the problem at hand before this Commission, what are the total reserves in the field, what are the reserves under each tract, what are the reserves as between tracts and the comparison thereof; and that's what Consolidated attempted to present in its original testimony. We presented an Exhibit 4 --

MR. HOWELL: If the Commission please, I object to the witness arguing.This is not rebuttal testimony. There's nothing of rebuttal in here. It's purely argument that the witness is making at this time. I object to the witness arguing his case during the time that he's supposed to be submitting rebuttal testimony. All the rebuttal that he's submitted so far has been rebuttal directed to the original case that probably would have been rebuttal possibly at the end of that case; and certainly was available to him if he desired to make rebuttal to the exhibit in the original case. He should have made it as a part of his direct testimony. We object to this line of testimony which is nothing but argument and is not a rebuttal of facts in the case.

MR. STOCKMAR: As to the last sentence that Mr. Trueblood gave, I join in the objection because I was planning to make that myself.

Q (By Mr. Stockmar) However, Mr. Trueblood, so you don't leave me without anything to say, will you confine yourself a little more closely to rebuttal?

A Attempting to stay with rebuttal, and referring to my Exhibit 4, which I believe that El Paso, Pubco, and Aztec have each attacked as stating that we have shown original reserves versus current deliverability, we did this purposely, not in an attempt to in any way falsify the rightful percentage of reserves appearing under the percent "R" because deliverability had nothing to do with their rightful percentage of reserves under the whole.

You recall that I said we could stop right there. However, to show what is happening in the Basin today as a result of the use of the present formula, we use current deliverabilities. Now if they had preferred, and we could do it and present it to the Commission, we could redo it on an original reserve with an original deliverability and re-present it and it would come out substantially the same, in my opinion. We could redo it by taking the percentage drop in deliverability that it has from original deliverability to now, and whatever that percentage drop, multiply that percentage times the original reserves and take that off; since deliverability apparently in their testimony is directly proportional to reserves, we could have subtracted that or we could

subtract the actual production to date, which has been relatively insignificant throughout the field on a whole from the produced reserves and presented on that basis.

Just as well, if we had El Paso's 723 wells that they have now studied, we could have run it through the machine in the same way, using, as they used, original reserves and original deliverability.

Now there is one other thing which we could have done with this, but it's immaterial at this time, apparently would not be rebuttal so I can't get into that; but I would point out that with respect to our Exhibit 3, that El Paso under their study found that the average reserve in the field now is 2.84 billion, which compares very favorably, that was on 723 wells and that compares very favorably with my previous testimony of 3.03. There's been less than a five percent change on 743 wells from their original work. From this I would assume there would only be a five percent change in our work if it were redone.

With respect to the Pubco reserves themselves, I wish to point out to the Commission that there are three factors in determining recoverable reserves under a 320-acre tract, any one of which is substantially altered, or if substantially different from the average would change recoverable reserves underlying that tract. One would be the abandonment pressure which Pubco showed as from 140 pounds to 1560 pounds. The second and of equal weight, approximately, not exact but almost, approximately, it's a little

variation, but would be the water saturation variance. The third thing would be the porosity pick itself.

Now I believe it was testified by Mr. Gorham that they had water saturations as low as 16 percent. He further testified in anticipation of problems of interpretation of core analyses that core analyses in general tend to show higher total water saturations than actual interstitial water. This is generally true in areas and in sandstones of high permeability. It's very difficult for me to anticipate very much invasion, if any, in a core that has less than one-tenth of one percent -- excuse me, less than one-tenth of a millidarcy permeability to air; and furthermore, when the expansion of gas within the core is allowed by coming from the bottom of the hole to the top of the ground, it's generally a fact that probably water will be spilled from the core itself. Therefore, it's interesting to note that the ranges of the core analyses which Consolidated was able to get its hands on were in the order of 35 to 65 percent, and that the average was on the order of 40 to 50 percent, which happens to be in the same range that El Paso had previously testified as to how they arrived at their reserve figures and that we subscribe to.

It is our opinion that the water saturations are on the order of 40 to 50 percent in the productive zones of the Dakota formation in the Basin-Dakota Field. It's easy to see that a change of water saturation of 15 or 20 percent could make

it an extreme change in reserves or in recoverable reserves.

MR. KELEHER: I would like to object. The witness is again arguing. I understand rebuttal, this is not rebuttal. I object to it. If they want to ask something specific in answer to questions that have been asked on the witness stand by witnesses or something of that sort, or in regard to a particular exhibit, that is something. To have this witness go on interminably arguing his theory of the case, that's up to his attorney to argue.

MR. STOCKMAR: I could draw the proceedings out a little by interrogating the witness. He is simply describing what he believes to be an error by Pubco people in using water saturation in arriving at their reserves.

MR. KELEHER: Well, he's free-wheeling and arguing as he goes along, and we object to it.

MR. PORTER: Mr. Stockmar, would you ask the witness specific questions so that he may give you a simple and direct answer to the questions that you ask?

Q (By Mr. Stockmar) Mr. Trueblood, is it your opinion as an expert petroleum engineer that the range of water saturations from 12 percent minimum to 55 percent maximum that Mr. Gorham said had been used is correct for use in determining reserves in this field?

A It is not.

Q What do you believe to be an appropriate range of percentages to be used?

A From a minimum of 35 to a maximum of 65.

Q Did you hear Mr. Gorham say that his average of the information his department submitted to Mr. Cleveland was 20 to 30 percent?

A I did hear that.

Q Is it your testimony that this will cause a substantial difference in the reserve calculations if these different figures are used?

A It would in any instance as from well to well or the field as a whole.

Q Would the particular deliverability of a well enter into the accuracy of the reserve determination on a particular water saturation?

A Ask that again.

Q Let me come back to that when I'm better organized here. You stated that abandonment pressure was also a major factor in the determination of reserves. Do you believe that the abandonment pressure as high as 1560 pounds is a reasonable point at which to cut off reserves in certain wells in this field?

A For all wells above complete marginal status at this time, I think it's completely unrealistic.

Q Is this an economic function?

A This is an economic function, and to allow abandonment at 1560 pounds would cause waste.

Q Would some improvement in the allowable awarded to low

deliverability wells improve this situation?

A It certainly would. It would allow them to utilize their pressure underlying their tract to a maximum during the overall period of withdrawal of gas from the total field as a whole.

Q Do you believe that larger weighting of acreage in the allocation formula would accomplish this; that is, driving down the abandonment pressure for low deliverability wells?

A It wouldn't be the final answer, but it would certainly be a step in the right direction.

Q Would this then prevent waste in your judgment?

MR. HOWELL: Is this rebuttal or is this just going over the same position that these people have taken all along, that they want more acreage in the formula? If they will direct the rebuttal testimony to some testimony that was put on at this hearing, we'll sit here and be quiet, but if the witness and his counsel are going to merely restate and take all of our time to re-argue the position and the testimony, by the greatest stretch of the imagination it cannot be called rebuttal; and we are going to have to object to it and we do object to it as being not in the nature of rebuttal but being part of the direct case, having been covered by this witness in the direct case and not being directed in rebuttal to any specific testimony.

MR. STOCKMAR: I'm trying to do the best I can to ask questions. We are definitely attempting to rebut witness Cleveland's testimony that 1560 pounds is an appropriate abandonment pressure.

I don't know how better to get at it except one way, which is to turn my witness loose again.

MR. HOWELL: Maybe you and the witness had better have a conference.

MR. STOCKMAR: Well, I will do that. Thank you for the rather unusual privilege.

MR. HOWELL: I have a better one, Counsel. I just suggest that you change places.

MR. STOCKMAR: I would like for the record to show that I was not telling him what to say. I was asking him what to ask.

MR. PORTER: I want to overrule. The Commission will overrule this objection because we think this question was pertinent. Be sure and confine your rebuttal to something that has been previously testified to in this case.

MR. STOCKMAR: Yes, sir.

Q (By Mr. Stockmar) Mr. Trueblood, do you have any further rebuttal with respect to the abandonment pressure testimony that the opposition presented?

A We concur wholeheartedly with the El Paso abandonment pressure of 600 pounds as being one realistic which will aid and help in unloading the fluids which would undoubtedly climb up as the pressure is withdrawn from the reservoir. We think that 140 pound abandonment pressure is completely unrealistic. Furthermore, we think that 27 MCFDA deliverability is completely unrealistic as being unable to carry the liquids out of the well bore, having

insufficient velocity at that kind of pressure.

Q Mr. Trueblood, do you recall Aztec's Exhibit No. 1?

A Yes, sir, I do.

Q Do you have any comments to make in the way of rebuttal with respect to the testimony relating to it?

A Aztec's Exhibit No. 1 was again based on the average concept of reserve groups, disregarding the reserves within deliverability groups, and had it have been drawn on exactly the opposite basis within ranges of deliverability which could actually have been measured, it would have shown the opposite results.

Q Do you have any further statements which are clearly rebuttal?

A One other with respect to Aztec and their comments on our Exhibit 5. I would like to point out to the Commission that they did eliminate the 100 to 109 wells in their comments; and within the confines of Exhibit 4, had they have taken the time they could have found the exact number of wells in each deliverability range which were one, and to arbitrarily take out all wells in that group, they could take out all wells in all groups and I think the Commission would find, as we found, that practically no wells under any deliverability formula, any formula which included deliverability, hit exactly one; and that our original testimony was that the only way to accomplish one throughout would be on a tract factor basis, assuming you can arrive at proper reserves underlying the tracts.

MR. STOCKMAR: Thank you, Mr. Trueblood. I would like to offer in evidence Consolidated Exhibit No. 9.

MR. HOWELL: If the Commission please, in addition to the former objection, El Paso Natural Gas Company objects to admission at this time in rebuttal testimony of Consolidated Exhibit No. 9, for the reason that it is not in rebuttal to any testimony offered at this rehearing, but is directed entirely to testimony that was offered at the original hearing; and if offered in rebuttal should have been offered in rebuttal at that time.

MR. STOCKMAR: I think it is clear that the thing was offered as demonstrative of what does happen in this reservoir. The witness clearly testified that the same thing would be true if we were to use all of the present information that El Paso has. I think this connects it up very adequately.

MR. PORTER: The record will show your objection, Mr. Howell, but we ruled that we would accept the testimony and the exhibits and would assign them whatever value the Commission wants.

(Whereupon, Consolidated Exhibit No. 9 admitted in evidence.)

MR. HOWELL: Note our exception.

MR. PORTER: Your exception will be noted. Does anyone have a question of Mr. Trueblood? He may be excused.

MR. FEDERICI: Could we have a few moments and ask the witness to stay? Bill Federici for Calkins Oil.

CROSS EXAMINATION

BY MR. FEDERICI:

Q Why didn't you plot reserves against acreage? You show this plot up here but you don't show a plot of reserves versus acreage.

A I don't understand your question, Mr. Federici. Why didn't I do something?

Q You don't show a plot up there of reserves versus acreage. You just show the deliverability versus acreage.

A In answer to your question, Mr. Federici, this is a plot of the 460 wells that were presented of deliverability versus acreage of El Paso.

Q If you showed acreage versus reserves, could you state what kind of a plot you'd show there?

A I plotted --

Q If you plotted acreage as against reserves --

A Under what parameters; what recoverable reserves?

Q Recoverable reserves against those particular wells.

A If I plotted acreage against it?

Q Yes.

A Plotted it out in a square around this thing?

Q Showing the same type of a shotgun pattern or whatever pattern you would get if you plotted acreage against reserves.

A Since practically all the wells have 320 acres, I presume I would plot 320 acres over here and reserves over here and everything would fall along the line, wherever it fell.

Q It would fall along a straight line?

A Right, whichever direction I put the acreage on.

Q What bearing does acreage have as far as reserves is concerned?

A I believe it's been testified all the way through by everyone, inclusive of myself, that acreage is a part of a volumetric formula for recoverable reserves. 320 acres has been assigned by the Commission. It is in the formula and it's there. I mean deliverability isn't, but it's in the formula.

MR. FEDERICI: That's all.

MR. PORTER: Any further questions of the witness? He may be excused.

(Witness excused.)

MR. PORTER: Are there any other witnesses to be offered? At this time we'll have a 15-minute recess, after which we will hear the closing statements.

(Whereupon, a short recess was taken.)

MR. PORTER: The hearing will come to order, and the Commission will hear closing statements.

MR. STOCKMAR: May I commence?

MR. PORTER: Mr. Stockmar.

MR. STOCKMAR: I will be very brief. I do wish to reiterate and urge most strongly now that the Commission recall our position that the present order governing allocation in this field is void; that whatever your judgment may be, we hope that it is based on such findings as will produce a valid order.

Now insofar as practicable, we have brought before you valid evidence of the reserves in each tract in the field, and in the total field we have shown you the proportion that each tract should have. We have shown you that our formula can be adopted without waste. We have shown you a way to prove to yourself at any time through the same IBM mechanisms that we have used what the proper relationship between reserves and deliverability in the formula should be. It may be that from time to time it should be changed as more and better reserve data is brought before you.

Our figures show that there is some utility in having some deliverability in the formula. We are not afraid of facts and we've brought them here and we have made vigorous efforts to get them for you. As reserve facts, I do not now wish to include Pubco's reserve figures. We state that they are incomplete and I think that they have been discredited by Mr. Haseltine and Mr. Trueblood on the basis of very important factors of abandonment pressure, water saturation, and so on. Enough of that.

I would like to refresh your recollection on one small point. In my opening statement in April I said that we had combed the journals and textbooks and treatises for authoritative and impartial statements as to whether or not there was a relationship between deliverability and reserves. At that time we found none. I'm happy to state now that we have found one, and I ask that you take administrative notice of it. It's an article in

the January, 1963, Journal of Petroleum Technology, pages 41 to 46, published by the AIME; and I did jump up and anticipate Mr. Guy Buell a minute ago because I thought it fair to him to tell him that two of the authors of this are employed by Pan American.

It clearly states that there is no relationship between deliverability and reserves. I mention this now because I want to get back to something that I was talking to Mr. Rainey about. It is not proper to prove something if part of your proof assumes the proof itself; and if that assumption is not valid, then the proof derived from it is not valid.

If there is, in fact, no relationship between deliverability and reserves, then the apparent statistical relationship they purport to show is not valid.

Beyond that, there was some testimony with respect to the economics; Consolidated might stand to gain a substantial amount of money each month if our order is granted. I hope you will recognize that if it is $12,000 a month, that almost $150,000 has been lost to Consolidated of its rightful share of this reservoir since this hearing began.

But enough. We have carried the burden of proof, I feel sure we have gone beyond showing that 60-40 is the right formula. We've shown that it should have been 75 acreage - 25 percent deliverability. In truth, 60-40 would be a compromise.

MR. PORTER: Mr. Keleher.

MR. KELEHER: May it please the Commission, I'm sure I

speak on behalf of everyone here in expressing appreciation of your patience, fortitude, and endurance displayed by the Commission in hearing this case. The Commission will probably recall that the case was tried originally April 18, 19, 20, and 21, with voluminous testimony, many maps, much expert testimony; and after six weeks or so the Commission entered its order on June 7, 1962, paragraph four of which said that "The evidence presented at the hearing of this case concerning the recoverable gas reserves in the subject pool is insufficient to justify any change in the present allocation formula."

The Commission, upon petition of Consolidated, granted a rehearing, and in granting that rehearing the Commission said specifically that the scope of such rehearing shall be limited to matters concerning gas reserves in the Basin-Dakota Gas Pool. The Commission will probably recall that at the April 18th hearing, Mr. Trueblood, toward the conclusion of his testimony, told the Commission under oath, "We want to get our piece of pie in the Basin-Dakota. We can't do it under the existing formula which in advance declares uneconomic any drilling operations."

The Commission is well aware of and will take judicial notice of the fact that since April, 1962, some 200 wells have been drilled in the Basin-Dakota, indicating that statement made by Mr. Trueblood that it would be uneconomical to drill in the Basin had no basis in fact.

We promised at the outset in our opening statement to

undertake to adhere to the ruling made by the Commission limiting the scope of the testimony, and our case was prepared and submitted on that basis. We tell this Commission in all sincerity that we believe that we have produced here evidence by competent witnesses and by appropriate exhibits to determine the recoverable reserves on a tract basis for each well and tract in the field.

We also offered evidence to show the recoverable reserves under the developed portion of the entire field. Our conclusions from the work done, exhibits and data submitted, demonstrated in our opinion beyond a question of doubt that if each well is to receive its fair share of the market in proportion to the reserves under the tract as related to the whole, that such formula should be left where it is; and if any change is made, it would be in the direction of 100 percent deliverability times acreage.

We would like to submit to the Commission that the burden of proof in this case rests upon Consolidated. In our opinion, that burden of proof has not been sustained, has not been carried forward. No new evidence was introduced before the Commission, in our opinion, to cause it to reverse its June 7th decision. Consolidated brought before this Commission on the rehearing no independent engineering or geology, no evidence of reseearch, but brought before this Commission what I call a hodgepodge of exhibits including Exhibits 3 and 4 made up in part on an IBM machine, casting upon this Commission and on its staff the

burden of trying to ferret out to determine the meaning of such exhibits. It's our position here that such exhibits and the testimony presented by Consolidated have no probative value; that the applicant failed to comply with the order of this Commission.

It is practically admitted by the witnesses for Consolidated that they have not done any new work excepting to rearrange and rescramble some figures which, it developed under cross examination, were obsolete,based on El Paso Natural Gas Company's figures and exhibits presented in April, 1962, overlooking entirely the many new wells and the conditions that have changed in the Basin since that time.

Is it fair to the Commission, to the staff, to assume the burden which Consolidated should rightly assume, and attempt to ferret out and to grant their petition based on such evidence? We think not. We respectfully submit to the Commission that Pubco demonstrated by two witnesses, Dan Cleveland, a petroleum engineer, and Frank Gorham, geologist, by convincing testimony that the existing formula is fair and just. We prepared maps, we furnished engineering data, all at a cost of many thousands of dollars in money, hundreds of man hours in the field and in our offices.

We have contended here that deliverability should be emphasized, we have demonstrated the reasons why the existing formula should be accepted. The Commission has heard the testimony, the staff has heard the testimony. We have sincerely done our best to comply with the order of the Commission. We have

introduced evidence by competent witnesses which survived grilling cross examination. We have submitted plats and graphs and charts honestly and capably made, which we believe will be of aid to the Commission in reaching a fair and just determination of the issues in this case, and we submit it to you respectfully. Thank you.

MR. PORTER: Mr. Buell.

MR. BUELL: May it please the Commission, for Pan American Petroleum Corporation. First I would like to remark on the article that Mr. Stockmar mentioned, and I would like to assure him that his mentioning of that article did not embarrass me in the least. I have read the article, I think it's an excellent article and I would recommend to everyone in the room that they read it. I would go further and freely admit that we have engineers with Pan American other than the two gentlemen who were the co-authors of that paper who would also say if you asked them academically, they would say there is no relationship between deliverability and reserves. We also have other engineers who would tell you, based on a specific study they have made of a gas pool, that in some gas pools there is a direct relationship between deliverability and reserves. An engineer, to come to work for Pan American, he does not have to sign a pro-deliverability affidavit or an anti-deliverability affidavit. Our management actually encourages differences of opinion among its engineers and technical people. It's only in that way that we can ever make progress. If we had no differences of engineering opinion, all of

us here today would still be reciting the old dogma, "More wells, more oil; more wells, more gas." That has been discredited. It has been discredited by people who made specific studies to prove the people who were perpetuating that were wrong.

Actually, Pan American is in a very unique position here. We are probably one of the few operators of any consequence in the Basin-Dakota Pool whose position is such that there is very little the Commission can do with regard to an allocation formula that will hurt us or help us. Actually, the majority of our wells would fall in group three or group four on the technicolored El Paso exhibit, and you can see by that exhibit that allocation and reserves, 100 percent acreage, 75-25, or Consolidated's formula, would make very little if any difference in our current income.

For that reason we feel that possibly in this case we can be extremely objective in that our current income is not affected. We are also unique, as Mr. Stockmar referred to in that article, we are not a pro-deliverability company. As this Commission knows, in the Jalmat case we opposed a change to deliverability. We opposed the change there because the current formula, in our opinion, was doing an excellent job of equitably distributing the reserves in the pool.

We feel here in the Basin-Dakota that this current formula is doing a good job of equitably distributing the reserves in the Basin-Dakota Pool. For that reason, we support this formula and oppose any change. It's, I suppose, in the American tradition

to always feel sorry for the unfortunate. Actually, I have some sympathy for Consolidated. I wish that they had more allowable than they have, but I would recommend to this Commission that in seeing that Consolidated gets additional allowable they do not do violence to correlative rights of the other operators in the pool; and it is my firm conviction that if you adopt their proposed amendment you would do violence to the correlative rights of other operators. Also my sympathy for Consolidated is tempered, to a great extent, by my knowledge of the fact that a lot of the wells that Consolidated is operating with low allowables, they knew when they were drilling those wells and completing those wells that they were drilling in an area that was marginal both from a standpoint of Dakota reserves and Dakota deliverability.

Actually, we have farmed out some tracts to Consolidated and they have developed in those tracts which were below our standards both as to reserves and deliverability.

I have also critically looked at the New Mexico statutes. I have read the Jalmat case very carefully, and I find nothing in the statutes, nothing in the Jalmat case decision, and nothing in the Commission rules that says the Commission can play Robin Hood and take from large reserve tracts and give to small reserve tracts; and that's exactly what Consolidated is requesting.

MR. PORTER: Mr. Verity.

MR. VERITY: May it please the Commission, I'm a little bit surprised at this point to hear counsel for Consolidated speak

about the fact that the present rules are void. It's my understanding about the present rule with regard to Basin-Dakota gas that it was established by this Commission after such time as they had a hearing upon the matter, after an order was promulgated and when no appeal was taken. Certainly any attack upon the validity of that order at this time would be a collateral attack which could not be countenanced in the law.

Counsel might argue that possibly there wasn't as wide an evidence base in arriving at that order as could have been had; nonetheless, it was properly arrived at upon proper judicial determination. We do not think it can be attacked collaterally. We have a valid order that was properly arrived at.

Counsel for Consolidated at this juncture would like to have it changed. It strikes me as somewhat peculiar that the formula they suggested should be used in changing the one that we have got. I believe that everyone has admitted that acreage bears no relation to reserves, and a pure acreage formula would assume that every acre under every well in the entire pool had exactly the same reserve.

Now there is a difference of opinion as to whether or not deliverability does or does not bear a relationship to reserves, but Southwest Production Company feels that there's been some very fine proof that it does bear a very direct relationship to reserves and that in this pool it's the only factor that we have that can be used as a relationship to reserves in establishing an allowable,

and I think that this fact and this truth is borne out in testimony by Consolidated in this case, when although they come forth and say that deliverability is not a proper factor of relation to reserves, they say "We still want to use it. The only thing," they say, "is that we don't want to use 75 percent, we want to use 60 percent of something that everyone admits has no relation whatsoever to reserves,"and I think that this is single testimony to the fact that the present formula is correct and that we must keep a deliverability factor here so that we do have a relationship to reserve in proper fashion.

I want to point this out to the Commission, and then I am through. My client has spent millions of dollars in developing portions of the Basin-Dakota Gas Pool. At the present time they have plans to continue these expenditures and to spend many millions more in development there. They are not doing this with all their own money. This is done with financial institution money, and if this formula of proration is to be changed every time someone sits down and realizes that the wells they've drilled are not giving them the return that they would like, then financing of development of the Basin-Dakota Pool is going to be hazardous indeed; and the development program that my client and other clients have is going to be seriously questioned by their financial institutions.

We think that there has been no demonstration here that this formula should be changed. We think that there is evidence

that it does bear a proper relationship to reserves and that the proponents for changing it tacitly admit this when they don't come forth with anything that they say does make a proper relationship to it. We feel it would do grave injustice to the development of the Basin-Dakota Gas Pool and to the proper allocation of allowables to change this formula.

MR. PORTER: Mr. Howell.

MR. HOWELL: May it please the Commission, the use of acreage in proration formulas, I believe, historically, grew up as a result of small tract drilling, and I think there are a good many people who say, "Oh, yes, acreage has got to be considered; it's the most important factor in reserves." That might be valid, but considering a pool here which had been developed with some wells on 320 acres, some wells on 20 acres, some wells on 40 acres, and a great spread of acreage attributable to the well, obviously, where there are those variances of significant amount in acreage, then acreage does bear a great effect upon the reserves. However, in the Basin-Dakota Pool, the testimony shows that substantially all of the wells are drilled on the same acreage, that the 320-acre spacing extends to approximately 90 percent of the wells; and with exception probably of one well, all of the other wells have a very small plus or minus acreage resulting from irregular survey tracts. So that when we analyze it, the use of acreage in this formula as applied to the Basin-Dakota Field is nothing but the per well allowable which has been so bitterly

and consistently opposed and I think wish some reason opposed in areas in which small tract drilling has, by reason of contributing to a per well allowable, has permitted small tracts to drain a large tract. We don't have that here.

If we went to 100 percent acreage in this field, what you would have would be a per well allowable, for all practical purposes. Now that has some terribly bad features. I think we all realize that the testimony clearly shows great variation in sand thicknesses, great variations in the reserves that underlie these tracts which in this case are practically the same for every well in the field, so that to avoid the impact and the injustice of a per well allowable, it is necessary to move away from the straight acreage concept and try to find some factor which bears a greater relationship to reserves than acreage does, which in this pool is a constant, for all practical purposes, of one.

Now there isn't any testimony as to any other possible formula except a combination of acreage and deliverability. There isn't any testimony as to any other basis upon which an order could be reached.

Now we have the two advocates of change. I shan't comment, I sympathize with Consolidated's situation where the areas that were farmed out to them turned out to have poor reserves and poor deliverability. Insofar as Southern Union's testimony, I want to call attention to the testimony of Mr.

Wiederkehr, to whom I believe Mr. Haseltine is Administrative Assistant, which appeared in the original hearing, in which Mr. Wiederkehr frankly said that as far as Southern Union was concerned, they would just like to leave the gas in the ground. They would like to use it as a storage area there. It may be that their commitments with purchasers are such that they prefer and are willing to take less income from their wells to save themselves on their other obligations that they may have.

I do know that the testimony in this case shows that in order to maintain the balance, that Southern Union depends upon El Paso Natural to take large volumes of gas that are produced from wells to which Southern Union has connections, in order to keep those wells from accumulating a great deal of underproduction. When you have that situation, obviously you want a formula which keeps the gas in the ground.

We're trying to look at this from the standpoint of the operator. One formula or another may be better for the pipeline, but the testimony in this case is directed to producing the reserves from the various tracts.

I think that there's testimony from which an estimate can be made of the total pool reserves. I don't believe there's any credible testimony from which reserves to all of the tracts in the pool could possibly be determined. I'm sure that Consolidated and Southern Union are going to argue that their Exhibit No. 4 constitutes a basis upon which the Commission might

rely. You know, it sure would be fun to get in the Courthouse and have someone whose reserves were shown as two billion feet for the tract, according to the estimates which were made in 1962, and whose proration formula was based upon that allocation, and have available the witnesses who prepared that formula, who have here in this hearing testified that revision of data has resulted in as much magnitude of change as doubling or cutting in half reserves for various tracts as compared with the data which appears on Consolidated Exhibit No. 4.

I think we've shown that Consolidated Exhibit No. 4 cannot be a reliable index; first, because the data upon which they based it is admittedly replaced by more accurate data; second, by a poor method of extrapolation without any consideration of the same factors which El Paso considered in making its reserve estimates, some 200 wells were given a value and a reserve allocated merely by the method of extrapolation. That method of extrapolation and contour lines, the testimony shows, is fairly valid for a broad area in general, in averages, but for particular tracts it just doesn't fit what it's supposed to do.

Now I was a little surprised, and I think everybody that is supporting the present formula was a little surprised when Consolidated closed their testimony, closed their presentation without presenting one bit of data which they had derived from the cores, from the well logs which were dragged in here under subpoenas and about which we had quite a legal hassle, as you

recall.

There isn't a bit of work that's in this record right now other than some calculations made on an erroneous basis that wasn't in the record when the case was closed last April. It seems to me that Consolidated's case in this presentation of their testimony is like setting up a row of dominoes. Exhibits 4, 5, 6, and 7 depend upon calculations which they made in Exhibit 3. Exhibit 5 depends on calculations made in Exhibit 4. Exhibit 6 depends on calculations made in Exhibit 4. Exhibit 7 depends on calculations made in Exhibit 4.

It's been shown that those relationships which were used for those calculations between the reserves and the deliverabilities are not valid; first, for the reason that they used current deliverabilities as against original reserves; second, that they put a block of some 200 wells in on extrapolated data; and, third, that the reserve basis which they used has generally been changed as a result of new studies.

I submit that if you push over Exhibit 3 and Exhibit 4, that all of the other exhibits and their probative force falls just as flat as the row of dominoes.

We believe that the testimony conclusively shows that, while the over-all pool reserves remain somewhat the same, as new data comes in, as wells are drilled, as new sand thicknesses are determined, as new cores become available, as better information is received and evaluated, while it is true that it does not

change the over-all field greatly, it does make changes of great magnitude in the individual well tracts.

I call the Commission's attention to the difficulty that would exist in supporting any formula that was based upon allocation to an individual well tract of a reserve determined from the Exhibit No. 4 in this case, based not upon original work of Consolidated, but based upon taking some studies that were current in April of 1960, extrapolating from them, abusing certain relationships which may or may not exist and coming up with an attempt to specify reserves for each tract. We just believe that the testimony and the proof doesn't show it.

The testimony clearly shows that of all of the known factors, the one which can as far as practicable be determined and be used by the Commission in allocating to the various tracts in the pool the opportunity to produce their fair share of the recoverable reserves is more nearly related to deliverability than to any other single tool which is available for use.

We submit that the proof justifies this, that an order based upon such a finding is adequately and amply supported by the evidence and that the use of the deliverability factor is based upon reserve testimony. We submit that Consolidated has utterly failed to meet the burden of providing any new credible or competent testimony after the close of the preceding hearing.

MR. PORTER: Mr. Federici.

MR. FEDERICI: May the Commission please, Bill Federici

for Calkins Oil and Sunset International. Mr. Keleher and Mr. Howell and the others who have already spoken have covered most of the points that I was going to talk about, at least in part. At this time, however, I want to briefly discuss this burden of proof. I want to state what I have urged and what I have stated throughout all of these many hearings.

The burden of proof is on Consolidated; it is not upon us. They have not met that burden of proof. The evidence presented in this hearing, if the Commission please, by Consolidated, has in fact been no different in any material respect from that which was submitted in the April, 1962 period. It's evident that most of the evidence in this hearing is negative evidence.

Consolidated is asking this Commission to find facts based on what we call speculation and surmise. This Consolidated ought not to ask the Commission, and this the Commission should decline to do.

We have been talking about equities in the case, and Calkins and Sunset International are smaller operators in the field. Any change in the formula will certainly do violence to their rights. The evidence submitted by El Paso and Pubco and Aztec and Calkins and Sunset International in the original hearing and in this rehearing makes it crystal clear to me, and I hope to the Commission, that deliverability is the predominant factor in the allowable formula, and that the present 75-25 formula should remain in effect.

MR. PORTER: Mr. Hampton.

MR. HAMPTON: Ken Hampton, Marathon Oil Company. Marathon Oil Company supports the present allocation formula of 25 percent acreage and 75 percent deliverability. We believe and we think that testimony of Pubco, Aztec, and El Paso have confirmed that such a formula best affords each owner under a proration unit the opportunity to recover his just and equitable share of the pool.

We also believe that there is insufficient data to make an accurate estimate of the reserves under each proration unit. However, where we do have evidence, where there is sufficient data in order to calculate reserves under a proration unit, we think it's been shown that there is, at least in this particular case, that there is a definite relationship between the deliverability of the wells on those units and the estimated reserves from such wells on those units. Therefore, it seems only practical to us, in remembering that both the statute and the Jalmat give heed to the mandate "insofar as is practical," it seems only practical to us that under such circumstances giving a weight of 75 percent deliverability will afford in this instance each owner of a proration unit his just and equitable share of the pool.

Mr. Verity has already brought out that Consolidated itself recognizes that there must be some relationship to deliverability since they themselves have given credit to deliverability to the tune of 40 percent. We subscribe to the present formula.

We think it's reasonable, that it will afford each owner of a proration unit the opportunity to recover his just and equitable share.

MR. PORTER: Mr. Swanson.

MR. SWANSON: Aztec concurs with the views that have already been expressed by those aligning themselves on the defense of the present allowable formula in the Basin-Dakota Pool. There are a few points we feel could be emphasized.

What has Consolidated done to support his assertion that there is a more desirable allocation formula for this pool? They have introduced in evidence a map based on well reserve data that has been shown to be out of date. They have extended that information into areas giving values to wells in spite of independent information they might have which would show that information was not correct. They have developed a series of reserve figures for the various wells. These were fed into an IBM machine with varying deliverability values to, I suppose, develop some relationship between the proper weight that should be given to deliverability in the formula.

They then presented exhibits which I suppose had the purpose of demonstrating what that correct formula was. It was very vague to me how they showed their conclusions from those exhibits. In my opinion, if you will make the assumption that their premise is correct, that their well data is accurate enough to demonstrate these relationships, in examining their data it is

still obvious that any decrease in deliverability in the allowable formula would not serve to protect correlative rights.

Now, the question is, is there a direct correlation between deliverability and recoverable reserves in this gas pool? Witnesses Cleveland, Gorham, Rainey, and Stevens all testified that this relationship did exist. It was demonstrated quite graphically in Pubco's Exhibits R-9 through R-11. It was also shown in El Paso's Exhibit No. 1. This conclusion can be reached from their second exhibit and also it can be reached from Aztec's first exhibit. This testimony and these exhibits are all based on a more detailed, more up to date, in my opinion more accurate approach to what the reserves are in this gas pool.

The Commission is charged under the statute with determining insofar as practicable the recoverable reserves under each developed tract in this pool and under the tract as a whole. Now Consolidated has made a determination of these reserve values and apparently they have made that determination which, insofar as is practicable, they feel should be made. It's been demonstrated, I believe, that there are better studies available from which the Commission can reach a decision in this case. The standard of "insofar as practicable" that Consolidated has applied to this endeavor is not a sufficient standard to meet that which the Commission is required to meet.

Finally, in my opinion, all of the data and exhibits that have been presented either by the proponents of the existing

formula or those who have requested a change show that any change in deliverability weight occurring in a proration formula should be to increase this consideration rather than to reduce it.

MR. PORTER: Mr. Kellahin.

MR. KELLAHIN: If the Commission please, I will attempt to be as brief as possible. Mr. Keleher in his closing statement injected a new issue into the hearing in asking the Commission to take notice of the fact that some 200 new wells had been drilled. The Commission can also take notice of the fact that wells are drilled for many, many reasons, including offset obligations and dual completions, and on account of certain tax considerations which affect an individual company.

Now, the proponents don't seem to be in agreement on whether or not figures have been submitted on a tract basis. Mr. Keleher said that his company had submitted reserve figures for the pool as a whole and reserve facts for each individual tract in the pool. None of the others who have spoken so far seem to agree with that statement and say there aren't any tract figures before the Commission at this time, other than those submitted by Consolidated with which they disagree. We are inclined to agree that Pubco did not submit any figures reflecting reserves for each tract in the pool. Several witnesses gave reserve estimates for the pool as a whole, and Consolidated gave reserve estimates for the pool as a whole; but only Consolidated then divided those estimates to the individual tracts within the pool and showed the

relationship of the reserves under each tract to the reserves under the pool as a whole, and then went one step further and showed the Commission how those reserves and their proportion of the total reserves compared under each proration formula that has been considered.

Now, time and time again it's been stated that Consolidated's work was based on figures which are now obsolete. Witnesses stated it on the witness stand but declined to produce the new figures. We asked for them and they were refused.

MR. HOWELL: If the Commission please, they did not ask for them. They asked if we intended to introduce them and we said we would not. There was no request made that they be given to them.

MR. KELLAHIN: The figures were not offered to this Commission, and on that basis the opponents of Consolidated, Southern Union, and those seeking the change in this proration formula have come forward with the figures that are required by the New Mexico statute.

Now it's rather startling to me, having sat through the Jalmat case when some of the others were here, to see practically the same argument come up again, and Mr. Howell and the others would ask this Commission to make the same error it made in the Jalmat case and prorate the Basin-Dakota Pool on the basis of the relationship between deliverability and reserves, when the Supreme Court of New Mexico clearly stated that that is not

an equivalent of the findings required by the statute. Now the findings required by the statute are clearly stated, and they were discussed and interpreted in the Jalmat case. That is that this Commission must determine insofar as it may be practicably done the reserves in the pool, the reserves under each tract in the pool, the relationship of one to the other; and on that basis see that each operator in the pool gets his fair share of the reserves underlying his tract. He must have the opportunity to produce his share of the allowable based on that computation.

Now in order to show the relationship between deliverability and reserves, both Pubco and El Paso and Aztec have taken figures and grouped wells by reserve computations, the basis of which were not presented to the Commission. They have then placed, on the basis of that computation, a single point on a graph and drawn a straight line. As was shown by Mr. Haseltine, they gave no weight to the fact that there were more wells included in one group than in another, but drew a straight line as if all the groups had equal weight. It's strange to me that they can say a group containing deliverabilities from 25 to 4,000 all have the same reserves for the purpose of their exhibit, and yet admit from the witness stand that the well with 25 deliverability does not have the reserves of the 4000.

They made no effort to group their wells by deliverability figures, and had they done so, they would have reversed their curve as was done by Mr. Trueblood in the hearing in

April.

The Commission full well knows that acreage is a very important factor in the computation of reserves. As stated here in this case, it has no position because all the acreage is the same. That presupposes that there is a direct correlation between reserves and deliverability, if you have twice the reserves, you have twice the deliverability, and yet from the witness stand they admit that isn't true, and then you have to make a net pay computation of your reservoir and acreage comes into play, and it will vary from one well to the next simply because your net pay is going to be different from one well to the next, from one drilling tract to the next; so certainly acreage is an important factor that must be considered by this Commission in prorating the gas in the Basin-Dakota Pool.

Mr. Verity expressed some surprise that we say that the present proration order is invalid and void. We have alleged that before the Commission in the previous hearing. We raised the question in the petition for rehearing, and we assert now that unless the Commission makes the finding required by the statute, then we have no valid proration order. Whether they agree with our presentation or not, an order must come out of this Commission which makes the basic findings required by law; and Consolidated and Southern Union have given the Commission the only information on which such an order can be based.

The Supreme Court clearly stated that a finding of

the general correlation between deliverability and reserves is not

the equivalent of the finding required by the statute, and held that Jalmat order void, not voidable but void; and we assert that is the situation here.

We respectfully submit that the Commission must make a new order regardless of what its decision may be as to the proration formula to be entered in this case; and if they do, that new order must contain findings as to the total reserves in the pool, the reserves under each tract in the pool and the relationship of one to the other, and a finding that the formula will then give each person in the pool an opportunity to produce his just and equitable share, that being the reserves under his tract.

MR. PORTER: Mr. Popp.

MR. POPP: Mr. Don Popp, Sunset International. It is the opinion of Sunset International that the Basin-Dakota proration formula as it is now is a valid means of allocating to each well its fair share of recoverable reserves in relation to the present market.

The evidence as presented indicates to us that if any change is to be made in this formula, that change should be made in the direction of more weight given to deliverability. It is our observation that no engineering data has been presented to support a change as proposed by the applicant.

We would like to point out that we have made an invest-

of the present formula giving 75 percent weight to the deliverability. In making this investment, we have attempted to drill our wells at such locations and to complete in such a manner as to avail ourselves of this 75 percent deliverability factor. We believe that in doing so we have acted according to best engineering practices and also as a prudent operator. Our investment in these wells was made on the basis of the existing formula. We feel that to change this formula to give less weight to deliverability at this time would be very unfair to us and would be unwarranted in view of the evidence presented at this hearing, which shows the present formula to be a proper one.

I might add that the 95,000 MCF for January and the 87,000 MCF for February that Mr. Rainey pointed out that Consolidated would gain if the formula were changed and what Sunset would lose if the formula were changed, compared to some of the other operators we are relatively small, but for this very reason we would suffer most for each dollar if the formula were changed.

MR. STOCKMAR: Is the applicant entitled to a rebuttal?

MR. PORTER: Does anyone else desire to take a position or make a statement in the case?

MR. KELEHER: I would like an opportunity to reply to Mr. Kellahin's recommendations to the Commission as to what their duties are. I didn't know that Mr. Kellahin was still counsel for the Commission, but I would like to say this. This is a motion for a rehearing, a rehearing. The order of June 7, 1962,

said they had not carried the burden, had not proved their case; and it was dismissed. They filed a motion for rehearing; it was given. They came up here and we've had the rehearing. In my humble opinion, all that's necessary for this Commission to do is to say that no testimony has been submitted before the Commission sufficient to change its opinion of June 7, 1962, and it is therefore reaffirmed and confirmed.

MR. PORTER: Mr. Stockmar.

MR. STOCKMAR: Mr. Trueblood has asked me to state that while we would welcome $12,000 additional a month from any source, his records indicate that the average deliverability and the average reserves of the 64 wells in which Consolidated has an interest are very near the average of all the wells in the pool. He doubts that his company's gain, if any, will approach $1,000 a month if our order is approved. He wishes me to reiterate that one of the primary reasons he is here is because this balanced situation is not true of his many participants, and he wishes to aid those who have been put into a 12 or 13 or 15 year payout.

Secondly, I would like to again talk about what the Jalmat case shows. If it says one thing clearly, it says that this is not a Court and that your functions are not judicial, but that you are an arm of the Legislature and that your functions are legislative; and as such, any legislative act can be changed at any time as the Legislature does, notwithstanding periods of

time within which an appeal might be taken from some types of orders. When an order is void from the beginning, based on a jurisdictional deficiency, it can be sawed off just as you'd saw off the limb of a tree if it was dead. In terms of the burden of proof, we say that we have presented the best evidence. There may be more; there may be better evidence, there may be better evidence in Dave Rainey's briefcase. It is not in the record, however. Our evidence is, and we did ask for it in September.

MR. PORTER: I would like to remind at this time of a ruling that the Commission made at the outset of the case, and that is that any interested party will be permitted to file a statement within 20 days. Counsel for the Commission has some correspondence which he will call our attention to at the present time. I don't think it will be necessary to read all of the correspondence, but merely to state the position they take.

MR. DURRETT: If the Commission please, we have received a letter from Pioneer Production Corporation. This letter was received by the Commission on February the 12th, and it states that Pioneer Production Corporation wishes to go on record as opposing any change in the method of allocating production from the wells in this field.

We have received a letter from Continental Oil Company. This letter was received on February 7th, and for the record, I would like to state that Continental Oil Company in this letter states that they desire to be on record supporting the application of

Consolidated Oil and Gas Company. That's all we have.

MR. HOWELL: May I ask one question? Does the permission to file written statements apply to those of us who have offered statements to revise and extend our remarks as is permitted in the Congressional Record?

MR. PORTER: This ruling applies to any interested party. If there is nothing further to be offered in the case, we will take it under advisement and take up Case 2754.

* * * *

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 New Mexico Oil Conservation Commission was reported by us; and that the same is a true and correct record of the said proceedings to the best of our knowledge, skill and ability.

WITNESS our Hands and Seals this 28th day of February, 1963.

Ada Dearnley
NOTARY PUBLIC

My Commission Expires:

June 19, 1963.

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 New Mexico Oil Conservation Commission was reported by us; and that the same is a true and correct record of the said proceedings to the best of our knowledge, skill and ability.

WITNESS our Hands and Seals this 28th day of February, 1963.

Ada Dearnley
NOTARY PUBLIC

My Commission Expires:
June 19, 1963.

Marianna Meier
NOTARY PUBLIC

My Commission Expires:
April 8, 1964.

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