BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
April 19, 1962

REGULAR HEARING

IN THE MATTER OF: Application of the Oil Conservation Commission on its own motion to reconsider the special rules and regulations for the Angels Peak-Gallup Oil Pool, San Juan County, New Mexico. Case 1641 will be reopened pursuant to Order No. R-1410-C to permit interested parties to appeal and present testimony relative to the effectiveness of the special rules and regulations for the Angels Peak-Gallup Pool.	Case 1641 (Reopened)

BEFORE: Honorable Edwin L. Mechem
A. L. "Pete" Porter
E. S. "Johnny" Walker

TRANSCRIPT OF HEARING

MR. MORRIS: Before we proceed with the testimony of Mr. Utz, the attorney for Pan American, Mr. Buell, would like to make a motion in connection with Case 2049 and 1641. Mr. Buell.

MR. BUELL: May it please the Commission, with respect to both of those cases and considering the lateness of the hour and the day of the week and the fact that we are at the present

time at about the half-way mark in the Basin-Dakota case, I would like to respectfully move that both of these cases be continued until the regular May hearing.

MR. PORTER: Mr. Kellahin.

MR. KELLAHIN: Jason Kellahin, Kellahin & Fox for Val Reese and Associates. We join in Mr. Buell's motion.

MR. BRATTON: Howard Bratton for Redfern & Herd. We join in the motion.

MR. MORRIS: Before the concurrences proceed, may I ask if the Commission wants to consider these cases at the May regular or defer them to the June regular when it will be heard here in Santa Fe, inasmuch as the Commission hearing in May will be in Hobbs?

MR. PORTER: Mr. Morris, the Commission is concerned, it appears that we'll have a short hearing in Hobbs next month. Probably the cases which we anticipate which we advertised will not cause us to run past noon. So it seems that May would be a good time to have them. Mr. Howell.

MR. HOWELL: El Paso Natural Gas Company would concur in the request for continuance.

MR. PORTER: Are there any objections to the counsel's motion? Mr. Cooley?

MR. COOLEY: William J. Cooley for Great American

Associates. We would strongly urge that it be continued to the June hearing due to the geography involved. That's about eight hundred miles round trip.

MR. PORTER: Mr. Buell, would you care to express yourself as to the date?

MR. BUELL: May it please the Commission, on behalf of Pan American, we would have no objection to a continuance to either date. It is the consensus of the operators that the present rules will be recommended to be continued for another year, so I do not see that a two-month delay will hurt anyone at all.

MR. PORTER: Mr. Morris, do you anticipate any cases for the June docket that might be time consuming other than these two?

MR. MORRIS: No, sir, I do not.

MR. PORTER: The June hearing will be heard on Thursday, which is one day later in the week. How would the June date suit you, Mr. Kellahin?

MR. KELLAHIN: I think that will be satisfactory.

MR. PORTER: Mr. Howell?

MR. HOWELL: Completely satisfactory.

MR. PORTER: In that case, Cases 2049 and 1641 will be continued until the June regular hearing date. The orders are

such that the rules will remain in effect until further orders are issued.

Back to Case 2504.

STATE OF NEW MEXICO)
) SS
COUNTY OF BERNALILLO)

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

IN WITNESS WHEREOF I have affixed my hand and notarial seal this 9th day of May, 1962.

Ada Dearnley
Notary Public-Court Reporter

My Commission Expires:

June 19, 1963.

BEFORE THE
OIL CONSERVATION COMMISSION
Mabry Hall
Santa Fe, New Mexico
July 13, 1960

REGULAR HEARING

IN THE MATTER OF:

Application of W. R. Weaver for the promulgation of special rules and regulations governing the Angels Peak-Gallup Oil Pool. Applicant, in the above-styled cause, seeks an order promulgating special rules and regulations governing the drilling, spacing and production of oil and gas wells in the Angels Peak-Gallup Oil Pool in San Juan County, New Mexico. Special rules and regulations governing said pool were promulgated on a temporary basis (one year) by the Commission in Case No. 1641, Order No. R-1410-A, entered August 11, 1959.

CASE 1641

BEFORE:

Mr. A. L. Porter, Jr., Secretary-Director
Mr. Murray Morgan

TRANSCRIPT OF HEARING

MR. PORTER: We will proceed with Case 1641. Before we get underway, I would like to call for appearances in the case, and I would also like for you to indicate whether or not you intend to present testimony.

MR. ERREBO: Burns Errebo, Modrall, Seymour, Sperling, Roehl and Harris, and I am appearing on behalf of W. R. Weaver. W. R. Weaver was the Applicant in this case, as originally stated and heard last year, and as the Commission knows, the matter should be

brought up for reconsideration this month. We are aware of the general nature of testimony to be presented by two other parties in this matter, and I understand they are the El Paso and Pan American. And, in view of the orderly presentation of evidence, we believe that probably W. R. Weaver's testimony should be second and, possibly, third in order of presentation. We will have one witness.

MR. PORTER: One witness.

MR. NEWMAN: Kirk Newman of Atwood and Malone, Roswell, New Mexico, and Guy Buell, a member of the Texas Bar, representing Pan American Petroleum Corporation. We have one witness.

MR. SETH: Oliver Seth and Ben Howell of El Paso Natural Gas Company, and we will have two witnesses.

MR. PORTER: Anyone else desire to present testimony in this case? Any other appearances to be admitted? Mr. Errebo has expressed a desire to present his testimony either second or third, anywhere but first.

MR. ERREBO: I think that would be best.

MR. PORTER: Mr. Buell, would you like to proceed first?

MR. BUELL: Yes, sir, we are ready and would like to proceed.

MR. PAYNE: Let's swear in all the witnesses at one time.

(Witnesses sworn.)

GEORGE EATON

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

DIRECT EXAMINATION

BY MR. BUELL:

Q Would you state your full name, by whom you are employed, in what capacity, and at what location, please?

A George W. Eaton, Jr., Senior Petroleum Engineer at Pan American Corporation, Farmington, New Mexico.

Q Mr. Eaton, have you testified at prior Commission hearings?

A I have.

Q Are your qualifications of petroleum engineer a matter of public record?

A They are.

Q Mr. Eaton, in order that the Commission may follow and evaluate your testimony, it might be well that we should summarize, briefly, at the outset, your recommendation, what will be your recommendation with respect to oil proration units?

A It will be our recommendation that the 80 now in effect in the Angels Peak-Gallup field be continued.

Q All right, sir. Would you recommend that the allowable for these eight wells be set?

A Our recommendation will be that the allowables be set for these oil wells on the basis of the normal unit allowable for Northwest New Mexico in accordance with the Statewide Rule 505.

Q Do you have a recommendation with respect to the limiting gas-oil ratio for oil wells?

A Our recommendation is that the limiting gas-oil ratio now

in effect, being 4,000 cubic feet per barrel, be continued.

Q All right, sir. Do you have a recommendation with respect to assignment of acreage to gas wells in this Pool?

A Our recommendation is that up to 320 acres be permitted for assignment to gas wells.

Q What is your recommendation with respect to proration of the gas wells in this associated oil and gas reservoir?

A My recommendation with regard to proration of gas wells is that the allowable for gas wells be established on the basis of market demand and allocated among wells and between wells on the basis of the normal Northwest New Mexico allocation formula of 75 percent acre deliverability plus 25 percent acreage with the top gas allowable being equal to no more than four times the daily gas limit of an oil well.

Q All right, sir. That would be for 320 acre gas wells, is that correct?

A That is correct.

Q All right, 160 gas wells, that would be the ceiling or the maximum would be twice?

A That is correct.

Q In the 80 acre oil well?

A Correct.

Q Is that classified as a gas pool?

A Yes, sir.

Q Do you have a recommendation to the Commission as to the

breakover point, or how would you define an oil well and a gas well in this pool?

A We recommend that any well having a gas-oil ratio less than 30,000 cubic feet per barrel be classified as an oil well. Any well producing with a gas-liquid ratio greater than 30,000 cubic feet per, would be classified as a gas well.

Q All right, Mr. Eaton, does that complete your recommendations that you are making to the Commission today?

A Yes, sir.

Q Let me direct your attention to what has been marked as Pan American Exhibit Number 1, what is that Exhibit, Mr. Eaton?

A Exhibit Number 1 is an isopach map of the Angels Peak-Gallup Pool contoured to a ten foot net pay beneath a sand interval.

Q Where is the gas-oil contact located in this Pool, Mr. Eaton?

A The gas-oil contact is located at an elevation of plus 430 feet.

Q Have you designated the oil area and gas area in any particular manner on this Exhibit?

A On Exhibit 1 the oil area is shown in green. The gas area is shown in red.

Q How have you determined the different type oils in the field?

A The oil wells are colored brown, the gas wells are colored yellow.

Q What is the significance, I see two gas wells that have a larger blue circle around them, what is the significance of that, Mr. Eaton?

A These are two wells on which data will be presented in later Exhibits.

Q All right, sir. Now, the last time that data on this Pool was presented to the Commission was in July of 1959. At that time, at that hearing, how many gas wells did we have data on?

A Nine gas wells.

Q How many oil wells were there in the Pool?

A Four oil wells.

Q Have you additional development since that time?

A Yes, there has been additional development since that time.

Q How many oil wells and gas wells are there?

A At the present time, the Pool contains seven oil wells and twelve gas wells.

Q All right, sir. Directing your attention back to Exhibit 1, and from the standpoint of this hearing, Mr. Eaton, to adopt the proper rules for this Pool, what is the significance of that Exhibit?

A Exhibit Number 1 simply shows the relative size of the oil and gas accumulations. It shows that while the Angels Peak-Gallup Pool is predominantly a gas pool, with an oil accumulation on the Northeast rim.

Q On a surface acreage basis, Mr. Eaton, would you compare the two?

A The gas areas are approximately four times as large as the oil area.

Q In your opinion, do you have an oil accumulation here that is worth conserving and producing in the proper manner?

A Yes.

Q We should practice conservation of this oil, and as you state, a large gas area?

A That is right.

Q Do you feel it should be prorated in such a manner that an owner of interest in that gas area would have the opportunity to protect their correlative rights?

A It should be prorated in such a manner as to both protect conservation and protect all parties' correlative rights.

Q Do you feel that the rules you have recommended at the outset of your testimony will serve that dual purpose?

A Those rules will afford such an opportunity.

Q Let's discuss those recommendations a little closer, Mr. Eaton. Do you recommend a limiting ratio of 4,000 to 1? Why do you make that recommendation?

A I see no need to change the present rule in that respect. All of the oil wells in this field are producing with gas-oil ratios greater than 4,000 cubic feet per day now.

Q Now, what is the lowest producing gas-oil ratio well, do you know?

A According to my information, 5,372.

Q Mr. Eaton, you have observed performances in this field, have you not, since the hearing in '59?

A Yes, sir.

Q Have you noticed a tendency of the gas-oil ratios of the oil wells in this Pool to increase?

A Without exception, they have increased.

Q To what do you attribute that, Mr. Eaton?

A The increase in gas-oil ratios are due to two things. One is normal depletion, which has occurred in the oil zone itself, and the other is slight expansion of the gas-cap into the oil area. This we detect by a fact that while some increase in gas-oil ratio has accounted for the depletion, it is not possible to account for the entire increase in gas-oil ratio by application of depletion qualifications alone.

Q So, we have that expansion of the gas-cap into the oil area?

A I believe we have.

Q And, after all one of the concerns of the Commission, as well as to the operators, both gas and oil, was that the Pool should not be produced in such a manner that oil would migrate up into the dry gas area and be loose and wasting?

A Yes.

Q Such is certainly not occurring in the field at this time?

A No, sir.

Q Do you feel that that would occur under your recommended

rules?

A No, sir, I do not.

Q Do you think, if there is movement in either direction, that it will be a tendency for the gas-cap to expand into the oil area?

A These are rules that would tend to favor the oil areas a little bit, slightly.

Q So, the doubt, if any, is really involved in favor of not wasting any oil?

A That is correct.

Q But yet giving the gas operators an opportunity to protect their correlative rights?

A Yes, sir.

Q All right. Why do you recommend 30,000 to 1 ratio as the breakover point, or as how you would define a gas and oil well in this Pool?

A The breakover point of 30,000 cubic feet per barrel was actually based on two considerations. One of those considerations is that it is at about that point where the value of gas produced with a barrel of oil exceeds the value of the oil, the gas at that point, at about that point, the value of the gas exceeds the value of the oil. The other consideration is that in this field the oil wells have gas-oil ratios considerably less than 30,000 cubic feet per barrel, whereas, the lowest gas-oil ratio on a gas well is somewhat more than 30,000 cubic feet per barrel.

Q Do you think either the operators or the Commission would have any trouble in being able to ascertain whether a well is gas or oil under your recommended breakover point?

A I don't think there would be any difficulty.

Q Has there ever been any question as to whether or not a well is gas or oil?

A No, sir.

Q You might want to make one reservation on that recently completed El Paso Well, would you not, Mr. Eaton?

A There was recently completed an El Paso Well which has a low gas-oil ratio, and it is in the gas area.

Q To what do you attribute that anomaly, shall we say?

A That well has a Gallup section open other than the main pay zone, which we have an isopach in Exhibit 1.

Q So it's your opinion that other zones, other than the Gallup pay, are considered to have fluids, too, this well making it be non-representative?

A That is my opinion.

Q All right, sir. You recommended that the Commission continue with 80 acre proration units, is that correct?

A Yes, sir.

Q Do you feel that is the proper size unit for oil wells in this Pool?

A Yes, sir, I feel the finding on those lines, made at the previous hearing, was correct that an oil well would definitely drain

in excess of 80 acres.

Q Has any data, that you have examined in the intervening period since the last hearing, indicated in any way that 80 acres is not the proper unit for oil wells?

A Wells, no, sir.

Q All data, that is indicated unit?

A Yes, sir.

Q With respect to gas wells, you have recommended proration units of 320 acres. Let me ask you right now, are you of the opinion that a well completed in the gas area of this Pool will effectively and efficiently drain in excess of 320 acres?

A It is my opinion that a well will drain considerably in excess of 320 in a gas area.

Q Are you aware, Mr. Eaton, that a subsequent witness is going to discuss drainage through a comparison of initial pressures of subsequently completed wells, comparing that initial pressure to original pressure?

A That is my understanding, yes.

Q Have you examined the data in that regard?

A I am familiar with the data which he will use.

Q Do you feel that the data that you have examined, which he will cover in his testimony, conclusively shows that one well in the gas area will effectively and efficiently drain in excess of 320 acres?

A Yes, sir.

Q I direct your attention, now, Mr. Eaton, to what has been marked as Pan American Exhibit Number 2. What is that Exhibit?

A Exhibit Number 2 is a geographical illustration of the theoretical performance of pressure cumulative for the Huerfano No. 99. The blue lines on Exhibit Number 2, showing the pressure, cumulative performance which would result if that well would drain 80 percent, 160 acres, 320 acres, 640 acres.

Q Would you explain and point out where that well is, Mr. Eaton?

A Our Huerfano No. 99 is located in the N. W. 1/4 of Section 2, Township 26 North, Range 10 West.

Q Exhibit 2, or rather the data reflected thereon is just an engineering method of ascertaining the area that a well is draining?

A Yes, sir.

Q What you have done there, you have calculated the reserve under this well for 80 acres, 160, 320 and 640?

A That is right.

Q When you know the reserves you can predict pressure performance that would occur in the event the well was only draining those of acreage?

A You can predict what the pressure at any cumulative production point is.

Q Then you have taken actual observed performance of that well and plotted that on Exhibit 2?

A Yes, sir.

Q What that does show, that is, the red line?

A The red line on Exhibit 2 shows the actual performance of the Huerfano No. 99.

Q What does it show with respect to the area that the well is draining?

A It shows our Huerfano No. 99 is draining 466 acres minimum..

Q To the minimum amount?

A Acreage, a minimum.

Q Let me direct your attention to Exhibit Number 3, was that Exhibit prepared for the similar matter, but on another well?

A Yes, sir.

Q Would you locate that well on Exhibit 3?

A Exhibit Number 3 shows the pressure cumulative for the Huerfano Unit No. 106, which is located in the Southeast 1/4 of Section 33, Township 27 North, Range 10 West.

Q As an engineering method that you have used and show on Exhibit Number 3, and make your comparison, what do we see that actual performance shows us this well is draining?

A Actual performance data shows this well is draining 584 acres as a minimum.

Q As a minimum?

A Yes, sir.

Q So you feel that this data, Mr. Eaton, as well as data that will be presented by the witnesses, which you have examined and analyzed, so you feel this data shows, conclusively, that a gas well

in this Pool will drain in excess of 320 acres?

A It is my opinion this data are conclusive in showing that gas wells will drain considerably in excess of 320 acres.

Q And, you feel that the rules you have recommended are a practical reason that they will prevent waste and adequately protect the correlative rights of all owners of interest, whether either a gas interest or an oil interest?

A I believe these rules will promote conservation and protect correlative rights of all operators of oil.

Q Do you have anything you would like to add, Mr. Eaton?

A I believe not.

MR. BUELL: That is all we have at this time. May I formally offer Pan American's Exhibits 1 through 3 inclusive.

MR. PORTER: Without objection, the Exhibits will be admitted into the record.

CROSS EXAMINATION

BY MR. PORTER:

Q Mr. Eaton, your proposed rule, I notice you recommend that the gas allowable, the allowable for gas wells be limited to twice the daily casing head gas for an oil well in this Pool?

A No, sir, up to four times.

Q Up to four times?

A Which would be applicable to 320 acres.

Q My next question was why. Also, I notice that there are now seven oil wells in the Pool.

A Yes, sir.

Q Under your definition?

A Yes, sir.

Q And, did you testify that the highest ratio of those wells, or the lowest, was 5372?

A That is the lowest.

Q The lowest ratio. What is the highest among those seven wells?

A 20,543.

Q 20,543. Do you anticipate that any, or all, of these wells might become gas wells, under your definition, at some later time?

A I could anticipate. It is quite likely some of these wells, at least, would become gas wells. I don't anticipate that any of the gas wells will become oil wells.

Q You don't think that will go back that way?

A I don't think that will go back that way.

Q Under this conjecture, the royalty owner might suddenly find himself splitting his royalty four directions. In other words, if he had an 80 acre unit, or suddenly became a gas well, he would share that royalty with, possibly, people in four other 80 acre units, three of them?

A Certainly if a well went from an oil well to a gas well class, it would require filing Form CA-18, which would return them a re-division of the entire working interest, perhaps, and royalty interest.

Q Royalty. I mean, under those circumstances you would still be producing exactly the same kind of oil or the same kind of gas. The royalty owner might have to share with three other owners?

A Yes, sir. However, that is somewhat taken care of in our recommended proration formula, in that the well would then be permitted to produce on the acreage basis up to four times what it had been producing as an oil well.

Q As far as gas is concerned?

A Yes, sir, as far as gas is concerned.

MR. PORTER: Anyone else have any questions of Mr. Eaton?

MR. EATON: May I add one thing? At the point where a well would be an oil well to a gas well, the present nominal value of the products involved are in gas.

MR. PORTER: At that time, it is gas.

CROSS EXAMINATION

BY MR. ERREBO:

Q Mr. Eaton, this green area on your Exhibit Number 1, does that represent the oil saturated area, or does that represent the area in which you think that you can probably complete a commercial well?

A It is the original oil saturated area, it does not, necessarily, represent the oil saturated area at this time. Even it is certainly not indicative of what might be called a commercial limits.

Q Actually, then, a commercial limits of the oil area must be considerably smaller as of this time, you show as a green area on

this Exhibit.

A Exhibit 1 isn't intended as indication of what the commercial limits are. It's simply indicative of the oil saturated portion and the gas saturated portion.

Q Actually, now, you show the Weaver-McAdams lease as being right on the line which represents the contact between the oil and gas area, don't you?

A The portion of the base is an oil area, and a portion in the gas area.

Q I believe you testified there is a slight expansion of the gas-cap over the past year?

A Yes.

Q And, that has been during the production of this Pool under the present rules?

A Yes, sir.

Q And, actually, if the present rules are kept in effect by this Commission, wouldn't you expect that expansion to continue on?

A Based on past performance, that would be a normal expectation.

Q And, then, based on what you have shown there, actually, then, would it be likely that if gas from a Weaver lease is not already being produced from the offset leases in the direction of the oil area, then you might reasonably expect that it would be at some time in the future, might you not?

A If the gas-cap expands from the Weaver lease down-dip,

that would be the result.

Q So, then, actually, do you feel that the rules which you are offering here today, would bring this reservoir into balance so that you wouldn't have a movement either of the oil into the gas-cap or gas into the oil area?

A These recommended rules approach very closely the volumetric equivalent, approach it from the simplified manner.

Q What you are saying, it is your conclusion then, there would be little, if any, in either direction?

A Little, if any, change.

MR. ERREBO: That is all I have.

MR. PORTER: Mr. Nutter.

CROSS EXAMINATION

BY MR. NUTTER:

Q Mr. Eaton, as near as I can tell of the many Orders that have been entered into the Commission in this particular case for this Pool Order, No. 1410-A, is the one that governs the operation of the Pool at the present time, is that correct?

A I don't have that with me, Mr. Nutter.

Q Well, now, you do propose some rules here today for the operation of the Pool, and comparing your rules with the rules that you have been proposing, actually Order No. 1410-A, what is the advantage of adopting new rules over the presently existing rules?

A Primarily these new rules would establish a standard proration of 320 acres for gas wells, which we have shown, I think con-

clusively, as a proper spacing unit for gas wells, in this well, and thereby prevent waste and unnecessary wells.

Q How about the oil pool, have you made a substantial change in your proposal there, to differ from the existing rules as to the oil pool?

A No, sir, no substantial change.

Q So, you suggest a GOR of 4,000 to 1?

A Yes, sir.

Q Is the gas-oil ratio limitation presently in effect?

A Yes, sir.

Q What do you base your 30,000 to 1 dividing line for the base calculation for oil wells and gas wells on?

A It is approximately that point where the value of the gas produced with barrels of oil exceeds the value of the oil itself.

Q So, you go to an economic definition of the gas well as compared with an oil well, rather than any reservoir conditions or production characteristics of the well?

A We considered actual field conditions too, in that the oil wells have considerably less than 20,000 gas-oil ratio, where the gas wells are somewhat above 30,000 gas-oil ratio.

Q You mentioned that your lowest gas-oil ratio was--

A 5,000.

Q In the neighborhood of 5,372 to 1?

A Yes, sir.

Q The highest gas-oil ratio oil well?

A 20,543.

Q That is approaching the point that you reclassified that well as a gas well, is it not?

A This well has an original oil content.

Q Is that well in Section 29, in the S. E. 1/4?

A Huerfano Unit 105, that is correct. It's in Section 29, S. E. 1/4.

Q According to the Exhibit, that is actually completed on the south side of the line dividing the oil area and gas area?

A That is correct. According to my picture of the pay, there is about three feet of the upper portion of the sand in that well that is in the gas-cap, and the rest of it is in the oil zone with that well. The gas-oil contact is approximately 430 feet, this seems to be comparable to the gas-oil contact that was figured about a year ago.

Q Has the gas-oil ratio in this changed?

A I didn't intend to illustrate this as a gas-oil contact at the present time, it is original conditions.

Q You don't think the gas-oil contact has changed, then?

A Oh, yes. I agree it has changed, this map was drawn to show the relative size to the oil zone, and the original size of the gas zone.

Q So, where is the gas-oil contact at the present time?

A I don't know. At present, the gas-oil contact is a constant--it's due to disturbance of the reservoir by production of both

gas and oil. It's probably a wavy line that cuts in and out among the producing wells in the vicinity of the gas-oil contact.

Q Do you think it will go straight?

A No, it went the other way, the gas-cap expanded.

Q So, that the gas-oil contact should be lower than a year ago?

A Yes, generally, except again I want to emphasize, I don't think it's constant, I don't think you can pick a gas-oil contact today. It must be 420 feet lower, because it varies with respect to how close a well is producing to the original gas-oil contact. It would be lower in the vicinity of a well, than it would be away from a well somewhere.

Q It would be lower if the well in the oil zone has been producing at a higher rate than it would be, higher about the well in the gas section, had it been producing at the higher rate, would it not?

A I don't think it would be constant anymore. Just exactly what it is would be very difficult to determine.

Q Do you think limitation should be applied to gas wells in this area?

A Yes, sir, we recommended limitation.

Q Do you think limitation would protect, you might say, the oil sections?

A Yes, sir.

Q You are in favor of some protection from the oil pay?

A Yes, sir.

Q Well, now, what is the actual limitation you would recommend for the gas wells in the red area of your Exhibit Number 1?

A The limitation that we recommended in our rules is that no gas well shall have an allowable greater than four times the daily gas limit of an 80 acre oil well.

Q In other words, you primarily would go to the market demand for oil production for the San Juan Basin, then fix the allocation for the oil wells?

A Right.

Q And, then you take 4,000 to 1 ratio and multiply that 4,000 times the top allowable for an oil well in the Pool?

A Yes, sir. Then restrict a gas well that is on 320 acres to four times that amount of gas, that would be the absolute top limit. It would also be restricted by market demand. In other words, it would--the gas allowable would actually have two limits on it. The lesser of the market demand, or four times the daily gas limit rule.

Q In other words, four times the oil wells gas production allowable, subject to market demand for gas, is that it?

A That is correct, yes. It would be the lower of those two.

Q I see. And, have you made any study as to the actual solution of gas-oil ratio in this reservoir insofar as the oil reservoir is concerned?

A We hadn't last year, which we have not been able to improve

upon. I indicated that the initial solution gas-oil ratio was in the range of 550 to 600 cubic feet per barrel. Actually, the number we used was 558 cubic feet per barrel.

Q Then your experience in the San Juan Basin, Mr. Eaton, is this rather typical solution gas-oil ratio for Gallup production?

A It's typical of the Gallup production in the San Juan Basin with the exception of oil that is provided from the Mesaverde-Gallup field and Horseshoe.

Q Which are lower than usual?

A Which are lower than usual. Notwithstanding the fact that the solution gas-oil ratio is in the neighborhood from 550 to 1, to 600 to 1.

Q You would recommend the limiting ratio of 4,000 to 1?

A The reason being oil wells in the Pool now have a gas-oil ratio considerably in excess of 4,000 cubic feet per barrel. To set a lower gas-oil ratio would unduly restrict the wells, in view of their high gas-oil ratio at the present time.

Q Now, I noticed Mr. Buell, in his direct examination, mentioned that an El Paso Well has a low gas ratio, do you consider that an anomaly?

A It certainly did not compete with the gas-oil ratios that I had expected. I expected that it would be a typical gas well in this Pool and, actually, its completion ratio was in the range we would normally call an oil well. It is anomalous in that respect.

Q You explain the anomaly by saying they perforate in the

different sections than the other wells had been perforated, is that correct?

A It is in another section also open. It is also completed in this same main sand zone in which the other wells were completed, but in addition it has other material open above that, too.

Q Do you have any other areas producing or not?

A In other wells?

Q No, in this well, this upper section?

A No, sir, I can't, I don't have any selective test to show this other portion is producing, but on the basis that it is open and that well had different producing characteristics from what would normally be expected, the conclusion was reached it must be producing.

Q The most convenient thing, then, would be to attribute it to this anomalous production, to this other section then?

A Yes.

Q I see. You stated, Mr. Eaton, that there were approximately seven oil wells and twelve gas wells in the area, is that correct?

A Yes, sir.

Q Is that your definition of an oil well and gas well in your determination there are seven and twelve based on your definition of an oil well, and 30,000 to 1?

A Yes, sir.

MR. NUTTER: I see. I believe that is all.

MR. PORTER: Mr. Payne.

CROSS EXAMINATION

BY MR. PAYNE:

Q Mr. Eaton, insofar as to prevent waste and protect correlative rights is concerned, what you attempt to do in the reservoir of this type, is to keep the gas-oil contact relatively constant, is that right?

A That would be preferable.

Q From the standpoint of preventing waste by preventing limitation of oil under the dry gas sands?

A That has been under our situation.

Q That has not occurred under the present Order, as I understand your testimony?

A No.

Q So that the expansion of the gas-cap now does not cause waste, but it might impair correlative rights of the gas zone?

A Yes, sir.

Q Now, if you had to have one of the two, assuming you did, it is preferable to have the gas-cap expanding rather than the oil rim expanding, is it not?

A Yes, it would permit the oil rim to expand to unsaturated, you know, oil saturated portion would result in waste.

Q I believe you testified that one of your reasons for proposing 320 acre spacing for the gas wells is to prevent the unnecessary drilling of a gas well?

A Yes, sir.

Q Now, since the present order has been in effect, do you know of any gas well that has been drilled in this well that is unnecessary from the standpoint of drainage?

A No, no, sir. We drilled in this Pool on the 80 acre basis.

Q So that the gas wells that are there do have 80 acres dedicated to them at the present time, are actually draining in excess of 80 acres?

A Yes, sir. Generally, the spacing pattern in this Pool insofar as gas is concerned is on 320 basis now, which also ties back into our original recommendations.

Q I believe you testified your data up to the present, insofar as the gas liquid ratio in this Pool was concerned, you haven't been able to approach it since the last hearing?

A That is correct.

Q Why, then, do you feel the Pan American witnesses evidence in the previous case, that 2,000 to 1, the gas-oil ratio limit could cause less than 4,000 to 1 limitation?

A At the time we didn't have the benefit of the past year's performance history on the Pool, and we did not expect, then, that the gas-oil ratios for the oil portion would increase quite as rapidly as they have. Now, that all the gas-oil ratios are in excess of 4,000 cubic feet per barrel, there is relatively no basis, no good basis, to recommend that change in the present rule within that respect.

Q Well, 2,000 to 1, your oil withdrawals would be less,

wouldn't they?

A Yes, sir.

Q Now, I am still not quite sure how this gas proration ties into the oil proration, you're going to have the purchasers nominate for gas, are you not?

A Yes, sir.

Q You aren't if nominations are in excess of four times the gas allowed to the oil wells?

A Then the allowable would be set at four times the gas limit of an oil well.

Q So, you are really not prorating the gas wells to market demand, you might not be?

A Might not be prorated to market demand with ceiling, that ceiling being equal to four times the gas limit of an oil well.

CROSS EXAMINATION

BY MR. NUTTER:

Q Why is it necessary for complete gas purchasing to make a nomination in this area?

A It is quite conceivable that market demand might not be equal to the four times the daily gas limit of an oil well.

Q If you have a flare order and set the limitation on the gas wells in accordance with the oil well demand, they wouldn't be producing the gas anyway, would they?

A If the purchasers couldn't handle the gas and you had no flare order, I cannot see the necessity for the purchasers nominating for the gas.

Q I don't think it would be purchased anyway, would it?

A Well, I am not a purchaser, it appears to me he would need to make his nominations so he can fit that pool into his schedule of gas takes for the whole San Juan Basin area.

MR. PAYNE: He is taking gas from the Pool now, he is not nominating.

MR. EATON: I realize--

MR. NUTTER: Mr. Buell, would you explain?

MR. BUELL: I want to apologize, we did not submit an Exhibit informing you of our rules because El Paso is going to submit such an Exhibit and I thought I would avoid confusion by not having two Exhibits. I see we have caused more than we saved. Actually, the main purpose of nominations, and under the rules, as El Paso will submit, they provide for the normal balancing rule for these gas wells and under the balancing rule, and under market demand type proration, we feel this will probably adjust quite readily to market demand. I should have introduced an Exhibit. I apologize for not doing it.

MR. NUTTER: I still don't understand.

MR. HOWELL: I would suggest that a good many of these questions are in the field of Mr. Rainey. He can answer the problem asked of the witness, and he will appear as a witness later on.

MR. PORTER: Will you hold those questions?

MR. NUTTER: Yes, sir, we will wait 'til Mr. Rainey is on the stand.

CROSS EXAMINATION

BY MR. UTZ:

Q Are you familiar with productivity of the gas wells in this field?

A Yes, sir.

Q How many of the twelve gas wells that you have make the limit that you have recommended?

A According to my information, there are two of these gas wells which will make this top limit readily and the possibility of one additional well.

Q As I recall, the limit you have recommended would be approximately to that of the present oil allowable, would be approximately 1.6 MCF a day for 320 acres?

A I believe that turned out to be about twice that.

Q The allowable is 94 barrels.

A That is on 80 acres.

Q What is your allowable for this Pool this month?

A 194 barrels.

Q 194?

A Yes, sir.

Q Over three million cubic feet a day?

A Yes, sir, that would be the ceiling.

Q In other words, on your ceiling, with all the wells, all the twelve wells, would that make the ceiling if it were 400 MCF that

would come out of these twelve wells?

A No, 36 million cubic feet.

Q I am sorry, 40 million cubic feet a day?

A Yes.

Q Now, you did recommend that much, this 25-75?

A Yes, sir.

Q The reason for recommendation on the gas wells?

A Yes, sir.

MR. UTZ: I believe that is all I have.

MR. PORTER: Anyone else have a question of Mr. Eaton?

(Whereupon, a short recess was taken.)

MR. PORTER: The meeting will come to order.

Mr. Seth, would you like to proceed at this time?

MR. WHITWORTH: We have a witness that wasn't sworn initially, he should be sworn now.

(Whereupon, witness was sworn.)

R. F. LEMON

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

DIRECT EXAMINATION

BY MR. WHITWORTH:

Q Will you state your name, what capacity and whom you are employed by?

A Richard Lemon, in El Paso Company, and presently assistant manager of the Reservoir Engineering Department.

Q You have previously testified before this Commission?

A Yes, sir.

Q In an expert capacity, have you not, Mr. Lemon?

A Yes, sir.

MR. WHITWORTH: Are the witness' qualifications acceptable?

MR. PORTER: They are.

Q (BY MR. WHITWORTH) Mr. Lemon, have you made a study of the reservoir characteristics in the Angels Peak-Gallup field with respect to whether or not one well in this field will efficiently and economically drain 320 acres?

A Yes, sir.

Q In making this study, have you prepared any Exhibits or data to reflect your opinion?

A Yes.

Q We have a plat marked as El Paso's Exhibit Number 1, what does that Exhibit reflect to you?

A Exhibit Number 1 has been prepared to show the subsequent wells completed in the field after the initial completions have indicated a loss in initial pressure.

Q Does it also indicate distances between wells in this field?

A Distances between wells are indicated on here to obtain some idea of the drainage area that such communication would support.

Q What wells are indicated on this Exhibit, all wells in the

field?

A Yes, sir, that is correct.

Q What is the greatest distance between wells that you have in this field?

A The distance I have shown here would be the greatest, 11,800.

Q What is the shortest distance?

A 2,000 feet.

Q Now, what indicates to you that there is communication between wells drilled in the Angels Peak-Gallup field?

A Comparing initial pressures on subsequent wells that have had no production, we find that those pressures are different, less than the initial pressure. Therefore, production of other wells surrounding these wells have accounted for the pressure loss, in the wells that I have indicated on here by showing the loss in pressure.

Q In other words, there has been a draw-down of initial pressure?

A That is right.

Q Can you cite some specific instances from this Exhibit?

A Yes, sir. I call your attention to Huerfano Unit No. 99, which is located in Section 2, of 26 and 10. The initial pressure on that well was 1265, which the computed bottom-hole conditions were calculated to be 1512. I assume that the initial pressure in the field was 1620, which was based on McAdams, excuse me, Weaver-McAdams No. 1 in Section 34, which showed an initial surface pressure of

1356 per square inch, indicated an initial pressure of 1620, comparing the initial pressure on 99 to that initial pressure of 1620, we find there is 108 pounds difference, the distance between the closest well at the time the 99 was completed, was the Weaver-Brown-McAdams No. 2, which is located 3250 feet to the Northeast. Just based on that distance alone, the minimum drainage area would be 760 acres. Of course, if you can assume you have that much communication, that is 3250. In effect, you can probably support twice that distance since you can assume that the well on the other side of the diagonal, say, would be able to drain that same distance.

Q From this you concluded that there is communication between those wells and that they will drain in excess of 320 acres?

A That is right.

Q Now, what other data have you compiled, Mr. Lemon, to indicate to you that a well will drain at least 320 acres sufficiently and economically? Have you compiled gas-oil ratios on the wells in the Angels Peak-Gallup field?

A Yes.

Q That is El Paso Exhibit Number 2?

A Yes, sir.

Q Would you explain to the Commission what this Exhibit reflects with respect to gas-oil ratio performance?

A Yes, sir. On Exhibit 2, I have indicated the gas-oil ratios based on the January and April, 1960, Surveys. This Exhibit demonstrates or represents, at least, the distribution of the gas-

oil ratios through the field, that is through the gas area. The ratios vary from, oh, let's say up to 32,000 to in excess of 144,000. The 144,000 ratio being the highest that was reported. There is another well which is 111, that is in the Huerfano Unit which has a gas allowable so, in effect, its gas-oil ratio would be in the finished unit.

Q Now, it has been indicated that since the last hearing, last July, on this matter, there have been nine wells drilled, do you have the gas-oil ratios on those wells?

A Since July, which was the last hearing, there have been seven wells, I believe, completed.

Q Do you have the gas-oil ratios on those wells?

A Yes, sir. Would it be satisfactory just to read ratios on those wells as based on the April, 1960, Survey?

Q I think that will be all right.

A McAdams, Weaver-McAdams No. 5 was the subsequent completion, that well, in April, showed a 15,132 ratio, that well, of course, is in what would be classified as an oil area based on the 30,000 to 1 breaking point. The next well is the Huerfano Unit 108 which, in April, showed a 32,454 ratio. Another well, the Huerfano Unit 109, which showed a gas-oil ratio of 76,915 in April, and the Huerfano Unit 110 showed a ratio 6,978. The 111, which also is a subsequent completion, was carried as a gas allowable, which would make it go on quite high. The last well would be the Pan American "B" No. 1 which, in April, the ratio was 18,899.

Q These gas-oil ratios have been increasing?

A Yes, comparing the ratios in April with the ratios which were used back in March of '59, there have been quite a number of increases. In fact, I believe there, all of the wells have increased, except one, which was the Weaver-McAdams No. 1, which showed a slight decrease, those ratios are 88,055 in March of '59 and 74,741 in April, both quite high. In comparing the range of increases in the Huerfano Unit No. 99 in March of '59 was 55,506 and in April, 1960, was 144,163. Considering one of the wells in the oil pool, the Huerfano 107 had a ratio in March of '59 of 2,573. That well ratio in April of '60, was 8,015.

Q Now, Mr. Eaton has previously testified that the lowest gas-oil ratio for an oil well was 5,372, and the highest was 20,543 in this field. Do you concur in that data?

A Yes, sir, based on the April gas-oil ratios, I would concur.

Q On the gas wells that you have here, using the 30,000 to 1 ratio, what is the gas-oil ratio, the lowest with respect to gas wells?

A I believe the lowest is on the Huerfano Unit 108, which is 32,454.

Q Do you have any data for the highest gas-oil ratio?

A Two wells that reported 144,000. One of those wells is Weaver-McAdams No. 2, which shows a ratio of 144,846 and the other well, the Huerfano Unit 99, which shows a ratio of 144,163.

Q Mr. Lemon, does the study of those gas-oil ratios indicate to you that this field should be classified as a gas pool?

A Yes.

Q It is, essentially, a gas pool?

A Yes.

Q Do you think classification of this field as a gas pool would prevent waste and protect correlative rights in the field?

A Yes, sir.

Q Can you think of anything you would like to add to your testimony?

A No, I believe that completes it.

MR. WHITWORTH: That is all we have.

MR. PORTER: Any questions of Mr. Lemon? Mr. Payne.

CROSS EXAMINATION

BY MR. PAYNE:

Q Mr. Lemon, how much acreage will the well that you consider an oil well of 20,000 to 1 ratio, how much acreage will that well drain?

A I presume you are referring to the Huerfano Unit 105?

Q Yes, sir, the one that has a ratio of approximately 20,000 to 1.

A All right, sir.

Q What I am getting at, doesn't it seem anomalous a well with the 29,999 ratio can only drain 80 acres, and the 30,000 to 1 would drain 320 acres?

A Actually the rise of drainage would not depend on the gas-oil ratio.

Q Yet, you propose oil wells of 80 and gas wells of 320 dedicated to them?

A I believe that is what the proposed rules would be, say, yes, sir.

Q And that determination as to what would be dedicated is based on the 30,000 to 1 ratio?

A That is correct as I understand it.

Q Now, I believe you testified that you feel this is primarily a gas pool, however, do you have any reason to believe that the oil section doesn't extend perhaps as much as five miles to the Northwest?

A I doubt, rather seriously, if it would extend as a continuous section. You say, now, to the Northwest?

Q Well, in any direction, it hasn't really been defined, the oil section.

A Not completely on the ends, that is right.

Q So, that we could have a considerable number more of oil wells drilled in this oil section?

A Well, based on this particular area here, the volume of gas that has been uncovered has been considerably greater than the oil, but it is possible that along the rim there you would find oil. However, I point out this Frontier - Evensen Well No. 2, North Well, didn't report any hike on initial completion, which would mean any

oil there must be Northeast of there.

CROSS EXAMINATION

BY MR. NUTTER:

Q Mr. Lemon, you stated, in your opinion, this was a gas pool. What, in your definition, is a gas pool?

A I would conclude that if a gas area is large, with respect to the oil area on the order that we have here, that would constitute a gas reservoir. That is, I would say, if the oil area, in volume, which was on ten percent or so, certainly you would have a gas reservoir classification.

Q Well, what kind of liquids do these so-called oil wells in this gas reservoir produce?

A From what they report, they are down in the 40 gravities.

Q Is it clear distillate, or black oil?

A I have not seen a sample of it.

Q Assuming that it's a dark-color oil, with relative gravity, it would still be your opinion this would be a gas reservoir?

A I think it should be produced as a gas pool. The oil on the oil rim is oil, I didn't mean that.

Q The gas-cap on the oil rim, rather than the gas reservoir?

A That is correct.

Q Mr. Lemon, I noticed here on your Exhibit that one well, the El Paso, you note 103 DA decrease in gas-oil ratio, to what do you attribute that?

A Comparing the two tests, the first test, which is the

January of 1960 test, the well produced 16 barrels of oil and DA ratio of 125,443. In April the well produced 14 barrels with 108,888, which was a slight decrease. There, as far as the reason for it, it appears to just be a normal fluctuation. It depends on a lot of factors, various conditions and so forth, frankly, I don't know.

Q I see. The average over-all is, you don't have a ratio on this Frontier-Evensen Well?

A To my knowledge, that well is not produced. All we have is the initial completion which indicated only gas and no liquid.

Q They didn't report the liquids that were produced on that?

A That is correct.

Q How about this well way down there in the Southeast end of the trend, the Huerfano No. 111, any liquids encountered on that test?

A To my knowledge, they have all been reporting gas with no oil, in April, they have been reporting through the month of May of 1960.

Q Does that mean that the well isn't making any liquids, or just not reporting any liquids?

A I assume if they were making it, they would report them.

Q Do you only have one gas-oil ratio on the Huerfano 108?

A I have a ratio which was taken in March of 1960. At that time that well indicated a ratio of 8,884. The reason I didn't show that was because it was past the January period. So it has an in-

crease from 8.000 to 8,432, 254.

Q This is pretty nearly the gas-oil contact as depicted by Pan American?

A It would appear so.

Q Mr. Lemon, you have made reference to the amount of acreage that a well would drain, based on interference tests or bottom-hole pressure tests. Now, in your amount of acreage, it was based on what radial? That is, do you drain acreage in this Pool where the Pool is lying on the Northwest, Southwest trend?

A When you have a pattern spacing like this I have you don't have the radial drainage, radial to a certain extent; however, you fit into the square pattern, or rectangular pattern.

Q Radial anomaly in a trend of this type, a pool such as we have here, regardless of the pattern?

A The qualification for radial drainage, the formations exist all the way around the well, otherwise it wouldn't be radial anyhow.

MR. NUTTER: I see, thank you very much.

MR. PORTER: Mr. Utz.

CROSS EXAMINATION

BY MR. UTZ:

Q Mr. Lemon, have you made reserve studies in the gas area of this pool?

A No, sir.

Q Has your Company made such studies?

A I might add, I made a sort of material balance calculation

based on all of the area, not just the gas-cap area.

Q Would that give us some reserve figures for the gas area?

A Probably a combination-type calculation.

Q Your Company must have some reserve estimate?

A We have made a reserve estimate on a portion of it.

Q On the acreage that you hold?

A Yes, we have under contract.

Q Do you have knowledge of what those reserves were?

A I don't, with me.

Q How were they calculated, on the tract basis or an average basis?

A It was based on the tract basis.

Q Do you recall whether the reserves were fairly even on the tract basis?

A At that time, we were calculating the reserve just on the Section 34, there, which was Weaver-McAdams lease, just one tract involved.

Q Have you made a study of this reservoir, of the unit?

A To what extent, now?

Q Well, to the extent of reading logs and determining net pays?

A No, sir.

Q Pressures?

A I have not made a volume estimate on it.

Q Would your Company have, as to reserves as to net pays?

A We do not have any prepared for the entire reservoir.

Q Generally speaking, do reserves vary much in the gas area, do they vary much between tracts in the gas area, to the best of your knowledge?

A Having not made the depiction in the various wells, I wouldn't really know. The only one I looked at was the Huerfano Unit 106, which was cored, I believe, from the core analysis, that well indicated 22 feet.

Q Do you consider that average, or above average, or below average?

A I would say, on the over-all average, I would say it was about average, it's in the gas-cap area there.

Q Do you know how the pressures are in the gas-cap area, pretty even throughout the area?

A It depends upon the location of the wells. A Survey was conducted in July of 1960 with the pressures bearing like so: The Huerfano Unit 105, 1446; the Huerfano Unit 106, 1220; the Huerfano Unit 109, 1222; the Huerfano Unit No. 99, 1169.

Q That is not initial pressure?

A No, sir. These are subsequent pressures based on a July Survey.

Q I was really more interested in initial pressures.

A The initial pressures in the gas-cap area, I would say, vary based on the point at which the wells were completed, that is the stage, the date.

MR. UTZ: I guess that is all I have.

Q (BY MR. NUTTER) Mr. Lemon, could you subscribe to the Pool Rules as proposed by Pan American?

A Could I have those read?

MR. PORTER: I don't believe he was here when they presented them.

Q (BY MR. NUTTER) Does El Paso Natural Gas Company subscribe to the proposed Pool Rules, that would define a gas well as being a well with a ratio of 30,000 or more?

A Yes, sir, to that extent.

Q Could you subscribe to the proposed rule that would apply a gas-oil ratio limitation of 4,000 to 1 on the oil wells?

A Could you direct those to Mr. Rainey, those questions?

Q I see, you are not familiar then with the actual rules as proposed?

A As I understand it, the rules would incorporate the 4,000 to 1 limit, yes, sir.

MR. NUTTER: I believe that is all. Thank you.

Q (BY MR. ERREBO) With regard to 4,000 to 1 limitation, Mr. Lemon, I believe you were qualified, were you not, as a reservoir engineer?

A Yes, sir.

Q You are familiar with the fluids in this reservoir, the oil fluids, that is?

A To what extent?

Q Well, you know what kind of oil is down there, don't you?

A As far as gravity?

Q You have some idea as to a solution ratio?

A Yes.

Q In general now, with the type of fluids that we have in the Pool, can you state to the Commission whether having a ratio of 4,000 to 1 would result in any greater efficiency of production of oil than the ratio of 2,000 to 1, or any less?

A Any reduction in oil based on one or the other ratio?

Q Which would be the more efficient ratio, would there be any difference in 4,000 to 1 or 2,000 to 1, taking into consideration the type of ratio mechanism you have here, the type of oil solution, gas-oil ratio and other reservoir factors?

A I believe, under the present conditions there wouldn't be any difference between 2,000 and 4,000.

Q Actually, what you are saying, in order to produce the oil, you must produce so much gas with it, isn't that right?

A Yes, sir.

Q So, actually restricting the proration back to 2,000 to 1, from 4,000 to 1, which we have now, here, we restrict the oil production with no increase in efficiency, is that correct?

A That is correct.

Q With further regard to the gas-oil ratio insofar as the increase is concerned that you have observed over the past year, what significance does it have to you?

A I believe the significance would be that the reservoir is getting gassier.

Q Gassier, does it have any significance to you with regard to the movement of gas within the reservoir toward or away from the oil rim?

A I believe, based on the way the gas-oil ratios have increased in the oil area, that you probably have to assume or conclude, rather, that the gas-cap has moved below the oil area some.

Q Let me ask you, are you familiar with the rules which will be later proposed by El Paso?

A Generally, yes.

Q It is concluded that they would prevent this movement or at least stop it?

A I believe they would tend to reduce it.

Q And, they would more nearly bring the reservoir into balance, then, is that correct, insofar as the movement of fluids as between these two areas is concerned?

A Yes.

MR. ERREBO: That is all.

MR. PORTER: Mr. Ramy.

Q (BY MR. RAMY) Do you agree with Mr. Eaton that the anomalous gas-oil ratio on the Huerfano 107 is due to the fact that there is another sand open up the hole, probably?

A That well has another Section open, that is right.

Q If that sand is open in very many of the wells, wouldn't

it have the effect of making more oil and obscure the true gas-oil ratio in the main producing sand; I mean, it appears to have done so here, doesn't it?

A Generally, I would say, based on the fact that two zones are open in the 107, that certainly the second sand would have a new over-all performance, you couldn't get a clear-cut distinction between each sand performance.

Q This would affect, certainly, the definition, then, between a gas well and an oil well, or might renew it if several different areas in that sand were open?

A I think the situation here, where these zones are open you have to consider the over-all performance of both zones. Just in reviewing the completion technique here on this McAdams 1 B, it appears to be in the upper and lower zones, which is in the oil rim. The 107 would be a comparable type completion, a comparable type completion, and based on the completion type on several of the wells in the gas-cap area, I noticed they are the two zones open, so you have wells in both areas in the same zones.

Q I was under the impression the Huerfano 107 was the only gas-cap which had the upper zone open?

A The gas-cap area, according to the completion information I have here, it would be quite a few wells. Namely, well, the 107, the 108, the 109, the 110, the 111. Wait a minute, strike that last one, just 110.

Q Why do you think that having the upper sand open caused

that particular well to have a lower ratio, just because it maybe didn't make any more than that?

A I didn't make that conclusion.

MR. PORTER: Mr. Payne.

Q (BY MR. PAYNE) Would you draw the conclusion that this gas-oil ratio has gone down because oil has migrated into the gas section?

A No, I don't believe I would.

MR. PAYNE: Thank you.

MR. PORTER: Mr. Nutter.

MR. NUTTER: No questions.

MR. PORTER: Does anyone have a question?

REDIRECT EXAMINATION

BY MR. WHITWORTH:

Q Mr. Lemon, are you familiar with the production history of the wells in the Angels Peak-Gallup Pool?

A Yes.

Q Do you have a comparison of the production of oil with the production of gas in this area?

A Yes.

Q What is that comparison?

A I could say, for the month of April, 1960, the oil production has been 10,860, the gas production is about 313,558, which would give you a gas-oil ratio of about 29,000.

MR. PORTER: That is an old pool?

A Yes, sir.

Q (BY MR. WHITWORTH) Is that cumulative production?

A No, that was just for the month of April.

Q Do you have any data on the cumulative production of this field?

A The latest figures I have are through April, 1960. The cumulative oil production as reported was 134,362 barrels. The gas production was 5,237,229 MCF. That is 15,025, and based on the Engineering Committee's figures, both the monthly's and the annuals.

Q Is it a fact, this field has had 98 percent production or thereabouts?

A I would say, for the month of April, that would probably be a correct representation, yes, sir.

MR. PORTER: 98 percent of what?

MR. WHITWORTH: 98 percent of total production.

A This would be a comparison of reservoir space voidage.

Q Does that indicate to you that the Pool is essentially a gas pool?

A That is what I base my conclusion on, the fact that the performance has been such that the gas production has overshadowed the oil production by a considerable amount. From a practical standpoint, anyhow, the field produces as a gas field.

Q There has been a question that if an oil well would only drain 80 acres, why is it that a gas well will drain 320? Do you have any data that would indicate whether a well would drain in ex-

cess of 80?

A On our Huerfano 107, we had an initial bottom-hole pressure on that particular well, which was subsequent to the initial completion in the field, the decline in the pressure using this 1620 as initial again was 195 pounds. The distance to the nearest well, at that time, was the Weaver-McAdams No. 3, which was located about 2200 feet away, and based on that distance, it indicated that the drainage area would be in excess of 320 acres.

Q Mr. Lemon, were El Paso Exhibits 1 and 2 prepared by you, or under your direct supervision?

A Yes, sir.

MR. WHITWORTH: We ask that the Exhibits be admitted into evidence.

MR. PORTER: Any questions concerning the Exhibits? They will be admitted into the record.

MR. WHITWORTH: That is all we have.

MR. PORTER: Any further questions?

RECROSS EXAMINATION

BY MR. PAYNE:

Q Isn't it true, Mr. Lemon, when you were looking cumulatively at oil reservoirs, or gas, that there were three or four gas wells which led to the discovery of the first oil well?

A That is essentially correct. The field was initially classified as a gas reservoir.

MR. PORTER: Mr. Nutter.

Q (BY MR. NUTTER) Mr. Lemon, I think you stated that in the month of April the producing ratio was some 29,000 to 1 as far as the Pool, as a whole, is concerned?

A That is right.

Q The Pool, as a whole, would be classified as an oil pool then on its production ratio rather than a gas pool under the 30,000 to 1 classification, would it not?

A It does away--the average would be below the 30,000.

Q You also mentioned that No. 107 was drilled with a bottom-hole pressure derived from the original pressure of 195 pounds, and that your calculations on the footage from the nearest well would indicate it would drain some 320 acres?

A In excess of 320.

Q That well is located offsetting a 40 acre tract to the Weaver-Brown No. 3 Well, is it not?

A It appears that it is.

Q So, while you are talking about 320 acres of effective interference, the two wells are adjacent 40 acre tracts, correct?

A Yes, that is right.

MR. NUTTER: Thank you.

MR. PORTER: Mr. Utz.

Q (BY MR. UTZ) Mr. Lemon, does El Paso have any potential or deliverability on the gas wells?

A The last information I have is the results from the gas survey, they were calculated on a basis of an oil well.

Q Your answer, you do not have any deliverability?

A We have deliverability data against the line pressure on just a production standpoint. That is so many MCF for so many days on the line against a certain pressure.

Q Do you have that information with you?

A Yes.

Q I want to be as general as possible on that, I would like to know the range of deliverabilities as near as you can state?

A The wells in the gas area, the lowest one appears to be around 190 MCF per day. The highest is about 3.4 MCF per day.

Q About what was your line pressure?

A On those two, that averaged around 480 pounds.

Q So, would you say that would be a comparable range of deliverabilities?

A At 500 pounds, I believe it probably would.

MR. PORTER: Does anyone else have a question? The witness may be excused.

(Witness excused.)

MR. PORTER: The hearing will recess at this time until 1:15 P.M.

TRANSCRIPT OF HEARING

(Afternoon Session)

MR. PORTER: The Hearing will come to order, please.

MR. WHITWORTH: Our next witness is Mr. David Rainey who has already been sworn.

DAVID RAINEY

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

DIRECT EXAMINATION

BY MR. WHITWORTH:

Q Would you please state your full name, by whom and in what capacity you are employed?

A David H. Rainey, Administrative Assistant, Proration Department of the El Paso Natural Gas Company, El Paso, Texas.

Q Have you previously testified before this Commission as an expert witness?

A Yes, sir.

Q In the capacity you are testifying now?

A Yes, sir.

MR. WHITWORTH: Are the qualifications of this witness acceptable?

MR. PORTER: They are acceptable.

Q (BY MR. WHITWORTH) Mr. Rainey, have you had occasion to prepare suggested rules and regulations pertaining to the production from this well?

A Yes, sir, I have.

Q And, that is marked as El Paso's Exhibit Number 3?

A Yes, sir.

Q Would you tell the Commission, briefly and generally, what these rules cover?

A Yes, sir. Before I get into that, if I might, there appeared to be some confusion on some of the testimony this morning, particularly on the part of some of the lawyers in the case. I thought, for the record, it might be well to straighten the thing out. Mr. Arnold questioned Mr. Lemon at some length on the anomalous condition of the Huerfano No. 107. I think, actually, he was referring to the Huerfano No. 110. There is no anomalous condition on the 107, it's in the oil area and always has been. The 110 Well, as Mr. Eaton brought up in earlier testimony, which is in the South part of the field in the up-dip position, I don't have a plat here, so I can't give you the exact location, but it has a relatively low ratio with respect to other wells in the Gas-Cap area. That well is located in the S. E. 1/4 of Section 3, Township 26 North, Range 10 West, that well which Mr. Eaton testified to as having an anomalous condition and explained by the fact it was open in some upper intervals, and Mr. Lemon further testified on the number of wells in the Gas-Cap area that were open in the upper interval, and he further testified that 110 was one of those wells in that upper interval. I think the record may be a little cloudy, and I thought that I should straighten the situation out before we went any further.

MR. ARNOLD: Thank you for that.

MR. RAINEY: Any other question, Mr. Arnold, so we might digress and get that cleared up?

MR. ARNOLD: I think I was under the impression the 107 was the first well in the pool that was in the upper zone, it did make some oil out of the upper zone.

MR. RAINEY: It is making oil out of the lower zone also, and it also has been considered to be over in that oil rim area. Now, back to the field rules, proposed field rules, and I might state at the outset, these rules are an outgrowth of a meeting between Pan American Petroleum Corporation and El Paso Natural Gas and Weaver and Brown. At the time we called these meetings and discussed some of these rules, I am probably at fault, I was not aware that Frontier had completed a well in what was considered as the defined limits of the pool, so Frontier was not included in this build-up of lease rules. These rules are a joint effort of the three main operators in the present defined limits of the Pool. I think I can probably best discuss these rules if I go down one by one. We have tried, insofar as possible, to frame these rules within the framework of the existing rule, 1670, which consolidated the Special Pool Rules for the seven prorated gas pools in Northwest New Mexico, and these rule numbers I am referring to and discussing, they refer to the same numbers in the Northwest portion of Order R-1670.

Rule Number 1 pertains to Pool wells and wildcat wells, General Rules applicable.

Rule Number 2 pertains to spacing--the General Rule should be applicable there in that it says: Except as provided in the Special Pool Rules. Then have a Special Rule (2) which is as follows: Each well drilled or re-completed within the Angels Peak-Gallup Gas Pool on a standard proration unit, after the effective date of this Rule, shall be drilled not closer than 660 to any boundary line of the tract, nor closer than 330 to a quarter-quarter Section line or subdivision inner boundary line. Any well drilled to and producing from the Angels Peak-Gallup Gas Pool prior to the effective date of this Order, at a location conforming to the spacing requirements in effect at the time said well was drilled, shall be considered to be located in conformance with this Rule.

Now, that rule differs in some respects to standards in the Northwest, but this spacing has been in effect since Rule R-1410A was promulgated at this time a year ago. I don't know of any wells that are so located that they would not fit the general pattern. I hadn't checked this and I saw no particular need to change what we have operated all along.

Rule 3 pertains to exceptions to the spacing provision, administrative approval for non-standard location and that sort of thing. The General Rules are applicable.

Rule 4 pertains to Statewide Rule 104, Paragraph (k), the General Rules are applicable. My recollection is that Statewide Rule 104, Paragraph (k) refers to certain spacing provisions in the said rules and certain designated wells at that time were an

exception to it.

Special Rule 5 (a), 5 (a) is the standard proration unit rule in Order R-1670 and ours deviates in the following respects: The acreage allocated to an oil or gas well for proration purposes shall be known as the oil or gas proration unit for that well. Each well completed, or re-completed, in the Angels Peak-Gallup Gas Pool on a standard proration unit as a gas well shall be located on a proration unit of approximately 320 acres comprising any two contiguous quarter-sections of a single governmental section, being a legal sub-division of the U.S. Public Land Surveys, and each well completed, or re-completed, in the Angels Peak-Gallup Gas Pool on a standard proration unit as an oil well shall be located on a proration unit of approximately 80 acres comprising any two contiguous quarter-quarter sections of a single governmental section being a legal sub-division of the U. S. Public Land Surveys. Any gas proration unit containing between 316 and 324 acres shall be considered to contain the number of acres in a standard unit for the purposes of computing allowables. There again this Rule 5 (a) is a conformation except that we provide 80 for oil wells and 320 for gas wells.

Rule 5 (b) provides for administrative approval for non-standard units, there again the General Rule's applicable.

Rule 6 (a) provides for preliminary nominations, General Rule is applicable.

Rule 6 (b) defines the term "gas purchasers", General Rule is applicable.

Rule 7 (a) provides for supplemental nominations, General Rules applicable.

Rule 7 (b) provides that wells shall be listed on a proration schedule, General Rules applicable.

Rule 8 (a) provides that total allowable of the Pool shall be equal to the preliminary or supplemental nominations with any adjustments which the Commission deems advisable--General Rules applicable.

Rule 8 (b) (1) provides no gas well to be given an allowable until certain forms have been filed--General Rules applicable. (2) provides that deliverability test must be taken--General Rules applicable.

Rule 8 (b) (3) is a Special Rule. No oil well shall be given an allowable until Form C-104 and Form C-110 have been filed, together with a plat (Form C-128) showing acreage attributed to said well and the location of all wells on the lease.

Rule 8 (c) provides when allowables to newly completed gas wells shall commence, General Rules are applicable.

We have added a Special Rule 8 (d): Allowables to wells whose classification has changed from oil to gas, based on the results of a gas-oil ratio test, will commence on the effective date of the new gas-oil ratio as provided in Special Rule 28; provided that: (1) A deliverability test is taken in conformance with the provisions of Order R-333-C and D, as amended by Order R-333-E and is submitted to the Commission within forty-five days of the effec-

tive date of reclassification. In no event will a gas allowable be granted for a date more than forty-five days prior to the date the well's initial deliverability and shut-in pressure test is reported to the Commission on Form C-122-A, in conformance with the provisions of Orders R-333-C and D, as amended by Order R-333-E; (2) a plat, Form C-128, showing the acreage attributed to said gas well and the location of all wells on the lease, and a new Form C-104 and Form C-110 has been filed. That is a standard provision with respect to allowables to gas wells except that in this pool we contemplate that quite a number of these oil wells will be classed as gas wells. We should write some rule for that specification.

Rule 9 (a) provides method for calculating AD factor. The General Rules are applicable.

Rule 9 (b) provides for allowable which shall be assigned to marginal wells, the General Rules are applicable.

Rule 9 (c) 1 and 2 provides for specific method of calculating allowables, General Rules applicable. That is the rule that sets out that 75% of the total allowables to the Pool shall be on the acreage times the deliverability factor and 25% to the straight acreage factor.

Rule 9 (d) provides that deliverability tests become effective on February 1st of the year following the year in which test is taken, General Rules are applicable.

Special Rule 9 (e): 1: Oil wells in the Angels Peak-Gallup Gas Pool on an 80 acre standard proration unit shall be permit-

ted to produce a gas limit based on the normal unit allowable for Northwestern New Mexico times a prorational factor of 2.77 times the limiting gas-oil ratio for the Angels Peak-Gallup Gas Pool. The 2.77 is the factor provided for in the Statewide rules for 80 acre gas wells at this depth. 2: Gas wells in the Angels Peak-Gallup Gas Pool shall be permitted to produce, subject to market demand fluctuations, up to four times the permitted 80 acre gas limit over a six month's proration period as determined above, based on a ratio--the numerator of which is the number of acres dedicated to the particular gas well, and the denominator of which is 80.

Rule 10 (a) provides for procedures in case acreage assigned to a well is increased--General Rules are applicable.

Rule 10 (b) provides for effective date of a new allowable due to change in deliverability after re-test or after re-completion of work over--General Rules are applicable.

Rule 10 (c) provides that deliverability be determined in accordance with the provisions of Order R-333-C and D, as amended by R-333-E, and provides for exceptions to annual deliverability test requirements. General Rules are applicable.

Special Rule 10 (c): Gas wells in the Angels Peak-Gallup Gas Pool shall have deliverability tests taken in conformance with the procedure outlined in Section B (procedure pertaining to the Mesa Verde formation of Order R-333-C and D, as amended by Order R-333-E). Now, there is a provision for Order R-333-C and D, the provision for testing the Mesa Verde, Pictured, Dakota-Farmington,

and Fruitland. I have no provision for Gallup, so we had to add that rule in to include the Gallup under the terms of that Order.

Rule 11 provides that the Commission may assign minimum allowables in order to prevent premature abandonment--General Rules are applicable.

Rule 12 provides that all production shall be charged against the well's allowable--General Rules are applicable.

Rule 13 provides for balancing dates and proration periods. General Rules are applicable.

Rule 14 (a): provides that underproduction accrued in one proration period may be carried forward into the next proration period before cancellation--General Rules applicable.

Rule 14 (b): provides for method of making up underproduction--General Rules are applicable.

In the interest of time, Rule 15 (a), Rule 15 (b), 15 (c), 15 (d), 15 (e), Rule 16 (a), 16 (b), Rule 17, Rule 18, 19, 20, Rules 21 (a), (b), (c) and (d), and Rule 22 and Rule 23 and Rule 24 all are applicable. The General Rule is applicable in each one of the proposed Orders and I see no need to go into them further, unless the Commission requires.

Special Rule 25: The vertical limits of the Angels Peak-Gallup Gas Pool shall be the Gallup Formation.

Special Rule 26: A gas well in the Angels Peak-Gallup Gas Pool shall be any well producing with a gas-oil ratio of 30,000 cubic feet of gas per barrel of oil, or more.

Special Rule 27: An oil well in the Angels Peak-Gallup Gas Pool shall be a well producing with a gas-oil ratio of less than 30,000 cubic feet of gas per barrel of oil.

Special Rule 28 was copied verbatim from the existing rule in Order R-1610-A, I believe it is, R-1410-A. It is the current rule except where it provides in that Order that the gas-oil ratio survey shall be taken the last fifteen days of the month. I have changed that to read "the first fifteen days of the month in the months of January, April, July and October". The purpose for that is in an effort to make the new gas-oil ratio effective on the first of the month following the month in which the tests were taken. Now, it may be that because of the time element that wouldn't be possible in the gas-oil ratios after the end of the test period and get it put on the schedule as effective gas-oil ratio, that was the intent of that change. We have no particular feeling, one way or the other, and if you would rather make it, or make it effective the whole month afterwards, we have no quarrel with that.

Special Rule 29: No acreage shall be simultaneously dedicated to an oil well and to a gas well in the Angels Peak-Gallup Gas Pool.

Special Rule 30: In order to prevent waste, the gas-oil ratio limitation for the Angels Peak-Gallup Gas Pool shall be 4,000 cubic feet of gas per barrel of oil produced. That concludes the proposed Rules here. As mentioned previously, Pan American and Weaver and Brown had concurred in these Rules, and there was con-

siderable discussion this morning as to the reason for market demand proration in these Pools, and before the question comes up I will go ahead and answer it. Under the terms of the existing order, if a well fails to produce as much as the gas limit in any given month because of market demand fluctuations, or what have you, there is no method by which that well can make up any of that underproduction, and as a consequence probably a portion of the estimated migration of the gas cap into the oil zone has been caused because during certain periods of time some of those gas wells have not produced a full gas limit in the given month. And, due to market demand fluctuation from month to month, it was felt that market demand proration should be instituted in these Pools, which provides that a well may accrue underproduction and make it up in subsequent months, or subsequent proration periods; and that was the main reason for proposing the market demand proration so these wells which in given months can't produce their gas limit because of the market demand can come up to the subsequent date and come fairly close to the administrative allowable. The reservoir withdrawal proposition for this Pool could be kept in reasonable balance and the line between the oil area and the gas area would remain static, or as near static as possible, whereas it has been demonstrated this morning, I think very definitely, that line has not remained static and it is progressing down dip into the oil zone.

Q Will you point out in what respects these proposed Special Rules differ from the Special Rules in effect at the present time

with respect to this Pool?

A Yes, sir. At the present time the Pool rules provide for 80 acre spacing to both oil wells and gas wells. Mr. Lemon testified here, today, and it is the opinion of the Engineers, and I have made a little study of it, and it is also my opinion from the data that have been furnished to me, that one well in the gas area in particular, can very adequately drain considerably in excess of 320 acres, and there is evidence to substantiate the contention that one well will drain in excess of 80 in the oil zone. I think there is actually evidence that a well in the oil zone will even drain in the neighborhood of 320 acres, and for that reason we are proposing that gas wells be permitted to be dedicated up to 320 acres. A question also arose this morning as to the drilling of unnecessary wells, if we maintain the 80 acre spacing and, it will be recalled in the previous Hearing in this case that I testified in, that the U. S. G. S. put us on notice that if there were 80 acre spacing in this Pool we will be required to drill at least three offsets under the Pool rules, as it was constituted when this Order was written, this Order 1410-A was written, and was made a Term Order for one year's duration. The U. S. G. S. agreed to waive the provision to avoid drilling extra and completely unnecessary gas wells. Now, we had not contacted U. S. G. S. as to what their position will be if this Pool comes on 80 acres after this Hearing today. But the unit agreement does provide that the unit should be protected from drainage around the borders of the unit, and this Section 34 of 27 N., 10 W.,

is not within the unit, so it still protects the wells on the unit from drainage without the additional wells, which I think is completely and totally unnecessary, and very expensive, I might add. The next difference between what we are proposing here and what we have at the present time, is market demand proration. I think I have adequately explained that. Let me see, I believe, actually that is basically about all it amounts to, the difference of what we have and what we are asking for. The 320 spacing, with the privilege of dedicating up to 320.

Q We will commence right here with the gas limit, because of the gas agreement, respectively. Isn't it true these Rules you have proposed as to market demand are applicable to gas wells only?

A That is correct.

Q Not applicable to oil wells?

A That is correct. And up to the limit as was expressed by Mr. Eaton, up to the limit of four times the gas limit of 80 acres to a 320 acre gas well. That should be pointed out, of course, that it is intended to be on the current allowable basis, and if these wells have accrued underproduction, the production of this would be net allowable, which would be in excess of the permitted gas limit, but that is because of the previous underproduction, there is no advantage gained to the gas wells by allowing them to make up that difference, no distinct advantage or disadvantage to the gas wells, they're not permitted that privilege.

Q Do you feel that these Rules that you have proposed, or

differences you have incorporated, more nearly achieve volumetric withdrawal from the Pool of both oil and gas?

A Unquestionably.

Q Do you have anything you would like to add to your testimony?

A No, sir, I think not. If I have left anything out, I am sure it will be brought out.

Q You helped prepare these Rules, Mr. Rainey, with Pan American Petroleum Corporation and Weaver and Brown. We ask that El Paso's Exhibit Number 3 be admitted into evidence.

MR. PORTER: Without objection, it will be admitted.

MR. WHITWORTH: That is all I have of this witness.

CROSS EXAMINATION

BY MR. PAYNE:

Q Mr. Rainey, as I understand your testimony, the allowable for oil wells wouldn't change?

A No, sir, that is correct.

Q And, so all oil wells will be allowed to produce 4,000 times the top unit allowable for gas?

A Yes, sir.

Q Now, isn't it possible under your system of market demand proration for the gas wells that the oil wells would be actually ending up with a greater gas allowable than the gas wells, plus whatever oil they make?

A Any given month that is possible. That is why I put these

balancing prorations in there, so the gas well can catch up in periods of high demand.

Q Isn't it underproduction that has to be made up and has to be cancelled?

A On gas wells?

Q Yes, sir.

A It sometimes happens, yes, sir, but within the limits and ability to produce, El Paso, who is the purchaser in this Pool, as well as the operator, makes every effort to take the allowable, within the realm of human error and, say, the ability of the well to produce, where it's possible.

Q Yet it never would be cancelled for the oil well?

A That is correct. However, there are some oil wells in the Pools also that are incapable of producing top gas limit, so I think the two factors compensate themselves.

Q Now, Mr. Rainey, do you have any evidence that you intend to present, or personal opinions, as to why, if this Pool is prorated as a gas pool, that deliverability should be a factor in the formula?

A I don't have any specific evidence, Mr. Payne, I have got some opinions in that regard, which I will be glad to express. It has been amply testified to on numerous occasions before this Commission, both in respect to Northwestern and Southeast New Mexico, that there is a reasonable relationship between deliverability and recoverable gas. From that standpoint, it appears appropriate to

us in one respect, from another respect it must be remembered that as long as deliverability tests are taken in the same manner on each well, then it is not a true indication of the well's ability to deliver to the pipeline and it is still a relative indication of that ability, and in the formula that is incorporated in all the pools in which we had deliverability, it's merely a means of allocating the total market demand to the individual wells. I don't know whether 75% deliverability is nearly correct, or 50% deliverability that is incorporated in here. It's a standard in the Northwestern part of the State. It is admittedly, and also has been testified to, that deliverability as required by Order R-333-C and D is not always a true indication of the well's ability to produce into the pipeline. Nevertheless, it's still a relative figure between one well and another, so that you get the allowable in reasonable fashion with respect to the recoverable reserves.

Q Well, inasmuch as you are really attempting to protect correlative rights by keeping the gas-oil ratio relatively constant, is it really necessary to have a deliverability factor in the formula unless a definite or reasonable relationship between deliverability and recoverable gas is established in this reservoir? I believe one of the witnesses testified this morning that the pressures are fairly uniform throughout the Pool.

A It is my recollection, that is, he may have made that statement. It was my recollection he read the pressures and it was some two or three hundred pounds on one well and the other one, I

don't have the figures here. I am not sure, that was my recollection, just listening to him, which would not make a considerable difference in reserves.

Q Do you feel there is a more reasonable correlation between pressures and recoverable gas than there is between deliverabilities and recoverable gas?

A Not necessarily, pressures are a factor that enters into the deliverability and calculation of reserves. It's only one factor, however.

Q Is it somewhat easier to measure pressure than deliverability?

A I don't know if it's particularly easier to measure deliverability. It's been outlined in some three to four Orders and I don't want to quarrel with it, except on one or two specific questions.

Q Mr. Rainey, what allowable is the well going to get with 29,000 to 1 ratio?

A It will permit it to produce the top allowable times the limiting gas-oil ratio of 4,000 to 1 times the 2.77 depth and acreage factor. I haven't actually figured out what the specific allowable is, I would be glad to do it if you want me to. It would be in the neighborhood of 700 MCF a day.

Q If I follow you, then each oil well has the same allowable?

A That is correct. Same gas allowable, plus whatever oil it produces, and in volumetric equation, the amount of oil produced con-

verted to the equivalent volume of gas, it is relatively insignificant. It's a factor over a period of time and it's relatively insignificant on a day to day allowable. In essence you can talk about the allowable to oil wells being the gas allowable and also the allowables to gas wells being the gas allowable for purposes of reservoir voidage.

Q You don't think, in your opinion, that deliverability or MER factors enter insofar as wells are concerned?

A No, sir, in that respect, if the well is not producing the gas limit, deliverability, of necessity, has automatically entered into the thing.

Q Mr. Rainey, will the operators of these wells make any efforts at all toward unitization?

A I can't answer that, Mr. Payne, that would be within the prerogative of our Land Department. I am not aware of what steps El Paso have taken, and I have no knowledge of what these operators do.

Q Is this one good way of handling gas-cap reservoirs or associated oil and gas pools?

A It's one way to handle it, Mr. Payne, it's unwieldy when a pool becomes too Northwest and Southeast, as it appears to begin to involve twenty-five or thirty operators, and you've got, also, this existing Huerfano unit Federal I, which Federal unit I doubt seriously if it would provide for communitization outside the unit.

Q Now, these wells, as you have indicated it, what do you

contemplate the wells will be, gas or oil?

A It's extended two miles Northwest down this frontier to Evensen No. 2, and it's a gas well, and it's my recollection from looking at some of the maps that there is a possibility there is some more oil further than that one. It would depend whether they fall within the relationship of this apparent gas-oil contact.

Q Do you have any opinion as to whether this pool actually might extend to such a point that it joins the Devil's Fork?

A I have made no study in that regard. I seriously doubt it.

Q Are the reservoir conditions similar?

A Somewhat similar, yes, sir.

Q You intend to get in the so-called volumetric equivalent over the process of time?

A Yes, sir, by allowing the wells to accrue under-production and make up subsequent months.

MR. PAYNE: That is all, thank you.

MR. PORTER: Any other questions of the witness?

CROSS EXAMINATION

BY MR. NUTTER:

Q Mr. Rainey, have you had the occasion to look over Pan American's Exhibit Number 1?

A Not other than when it was put on the board, I haven't looked at it in detail.

Q You are probably familiar, however, with the potential of

these Gallup wells that are making casinghead gas, are you not?

A Only vaguely. Some of them, on initial potential, have relatively high oil potential and, at the present time, I don't think that there are one or two wells in the oil zone that are making as much as 50 barrels a day.

Q Referring to the potential of casinghead gas?

A The volumes of gas. All the information I have as far as potential of casinghead gas would be volumes that are reported on gas-oil ratio. I don't have any volume that would be comparable to deliverability volume.

Q I am wondering if the deliverability factors were introduced into the formula for the distribution of gas in this area and what effect it would have on the amount of gas production that each well would be entitled to produce. Referring to Pan American Exhibit 1, it appears that some of the higher potentials of gas are close to the gas-cap, not to the gas-cap, the gas-oil contact, and I am wondering what effect this would have?

A Mr. Nutter, our Rules also restrict those wells to the top gas allowable of 4 times the 80 acre oil well allowable on the 320 acre unit. The wells you are referring to, which are in this Section 34, are only on the 160 acre units and only permit the gas limit up to twice what the well is permitted to produce.

Q Mr. Eaton stated there were twelve high-ratio wells and seven lower ratio wells. What would you do, would you take 4,000 times the lower allowable times 4 for the acreage factor and deter-

mine that as the amount of gas that would be produced from the twelve wells, and then divvy that up on the basis of their deliverability?

A If I understand your question correctly, I think that is correct, yes, sir.

Q But the amount of gas that any particular well would be entitled to produce would be subject to this top ceiling?

A That is correct, and subject to the ability of the well to produce. It is contemplated these wells are marginal wells. In this well, the wells under production go through two proration periods and then you will be able to calculate the gas limit or the volume which would be assigned to the marginal formula.

Q Do you anticipate your Rules would work to protect correlative rights?

A Yes, sir, a whole lot more than the existing rules.

Q Supposing a well should be permitted to produce a large amount of gas by virtue of high deliverability of gas, and an offset oil well that doesn't produce a large amount of gas, how are correlative rights protected in that instance? We don't have deliverability in the oil well formula, do we?

A I think the condition itself is purely theoretical. I don't know of any gas--any oil wells that are very close to this so-called gas-oil contact that do not produce approximately the same volume of gas as any gas well at gas-oil contact. It doesn't seem reasonable to me, at this time, that there would be, because this

gas cap is migrating somewhat in the oil zone, and those wells that are close to that contact are getting more gas all the time.

Q You say theoretically the problem could exist. Suppose it did exist, the gas well of high deliverability is entitled to produce a large amount and the oil well of low deliverability in the formula is restricted, it may be theoretical, but what would happen in that?

A That gas well is still restricted to the top gas limit times the number of units, assuming 80 acres times the number of units assigned to that well.

Q I appreciate that fact. That gas well would have 320 dedicated to it and maybe a direct offset to the oil well, which is only 80 acres, a top ceiling of four times what the oil well is?

A It is entitled to four times the 80 acres dedicated to it.

Q Under the correlative rights proposition it would appear to me that it is entitled to four times as much, in the matter of correlative rights. Why do you need deliverability in the formula, then?

A Purely as a means of allocating the allowable back to the individual wells and because, as I say, we tried to fit these rules into the framework of the existing rules up there.

Q I see. Mr. Rainey, if the gas well doesn't make its allowable production given to it, can it make it up later?

A Yes, sir.

Q So the gas well, theoretically, would never fall short?

A Yes, sir.

Q What if an oil well has occasional periods that it can't make its allowable, could you get a period of balancing its production also?

A There is a provision in the statutes of New Mexico for making up back allowable.

Q Under one circumstance, I believe.

A That is correct.

Q Purchaser prorationing?

A Purchaser failing to take from the well. Of course, there are going to be occasions when both gas wells and oil wells are shut-in for one reason or another, there is no question about that. These oil wells are permitted to produce a certain volume per day based on, in this case, their ability to produce and if the wells fail to make it in the given day, and are capable of making a little more oil some other time, they can make it up subject to 125% of their daily allowable, but if they are falling behind so far, then there needs to be a balancing provision put in there. It's possible that the oil wells might lose a little allowable. It should be remembered that the oil well is always going to produce the top gas limit, whereas gas wells are subject to market demand fluctuation, and many months, the summer months in particular, many of the allowables are considerably less than that. That is the reason we put in this, in that reason, to make it up in the winter months when the demand is higher. All the operators in this Pool, Pan American, I say all the three that are concerned, particularly Pan American, El Paso and

Weaver and Brown own both gas wells and oil wells.

Q El Paso is the gas purchaser in the area, isn't it?

A Yes, sir.

Q Is El Paso in a position to guarantee what the amount of the gas take will be from these gas wells, even though in the summer months it will not be high enough, and in the winter months when gas takes--when the gas and oil wells are equal?

A I can't say, taken from any of these wells. We can take that, subject to the market demand fluctuation, and we will make every effort to take all the gas we are permitted to take off of that well. And, the operators, of which El Paso is one, recognize the fact there is a possibility that there should be, and the gas operators just might recognize the fact there is a possibility that during some periods, as much as six months, there may be some inequity in withdrawals between the gas and oil area. It has been contemplated, and we assure you that El Paso will make every effort to do so, so that the thing will balance out over a period of time.

Q El Paso, in this market demand, would make sure that the gas wells are taken first, is that correct?

A Casinghead gas, that has always been our policy, casinghead gas is taken first. I might point out that I haven't discussed this in detail with Pan American, Weaver and Brown, but El Paso would have no objection, if the Commission sees fit to make this Order that we are proposing here today another Temporary Order for a year, if you want to try that again, we can come back and take an-

other look at it.

Q What is the significance?

A An operator, to name factors, one oil well in effect today will probably require the drilling of some very costly, unnecessary wells because it's on an 80 acre spacing; and the second factor under the Order to an operator is there is unquestionably some migration of the gas cap or expansion of the gas cap into the oil area.

Q Isn't this an ideal way to produce the oil from the gas cap--

A It's increasing the cost to the owners of gas wells, this is my opinion.

Q So far as the prevention of waste is concerned?

A That is true and if you think that the ideal situation could be realized by unitizing the whole area, then that would be the way to do it. Under the existing conditions, although there may be less waste in the oil zone, correlative rights are being violated, and I don't feel that if some measure were taken to stabilize that so-called gas-oil contact, that there would be any violation of correlative rights, or any waste.

Q Mr. Rainey, this bothers me a little, you are counting on time in balancing to equalize this?

A Yes, sir.

Q When your gas withdrawals are very high in the wintertime, we will assume the oil allowables go down, so the gas takes are under limit high in that relation to the oil well production?

A Yes, sir.

Q Then, you have some oil migrating into the dry gas sands?

A No, sir.

Q Why not?

A You're only producing in the winter. It has periodically changed producing, those oil wells were producing the previous summer, that is only balancing the thing out. The oil wells have already produced it.

Q You don't think there is any migration?

A I think there is a very, very remote possibility of any migration of oil into the gas zone, but if there is that eventuality, that is why I made the statement that we have no objection to putting the proposed Rules in effect for a year, like we have had for the past year, and then come back and take another look at it.

Q Do you think the withdrawals, so to speak, for a period of time would reach higher from the gas area than from the oil area?

A Why, certainly. Because there is some oil, to my thought, which couldn't come, and if it will migrate, you are going to the dry gas sands, there is no question about it, and it was testified to here, that what we are calling the dry gas is higher, and that has a certain amount of gas space in it anyway.

Q Mr. Rainey, do you regard this situation as somewhat similar to the small gas pool where you have a larger area that is productive of gas surrounding the oil producing area?

A I think it has been just kind of overlooked in the Jalmat

area and I don't think we will let it go by down there for another thirty years.

Q What is the Jalmat situation if the gas and oil allowables are together?

A I don't know, Mr. Nutter, what the relationship is between the oil allowables and gas, there are many factors that enter into that.

Q It might not be unreasonable to, if you did it here, is that correct?

A It's conceivable we will take a very long, detailed reservoir study as to what effect it would have on the area.

Q Have you made a long, detailed study to determine this?

A I have not. There have been some studies made on this area. The thing that is apparent to me, it is just the flat fact that the gas and the oil wells have doubled in a three month period of time, which is very indicative of the fact that the gas cap is expanding into the oil zone. The royalty interests, the unit interests, and that sort of thing are not common in some instances in the gas zone and in the oil zone. The correlative rights of the gas operators, particularly with respect to the Huerfano unit, are being violated by allowing the migration of the gas cap into the oil zone; that has been apparent under the rules we have got. I think it's time to change and try something else. The rules we have got are not working, the idea of these rules, now, was to keep that gas-oil contact from moving, and it's obvious that hasn't

worked, and I think this new set of rules will work.

Q They will stop this migration into the oil area?

A Yes, sir, it will, a whole lot nearer than what we have got now.

Q Exactly what is going to happen?

A It's hard to tell, we feel these proposed rules will come a whole lot nearer to doing it and giving you approximately equal reservoir withdrawals than the existing rules do.

Q Well, Mr. Rainey, you submitted some proposed rules about a year ago.

A Yes, sir.

Q These rules you offered today are similar to a year ago?

A Yes, sir.

Q With certain exceptions?

A Yes, sir.

Q What is the suggested gas-oil ratio limit for the Pool, what is the change?

A It has partly been testified to here, today, but at the present time it is a bit ridiculous to impose a 2,000 to 1 limit on the Pool, not assuming El Paso has 2,000 to 1. Therefore, I think three or four of the wells have ratios less than, or very close to, 2,000 to 1, and that was our only basis for doing that. The 2,000 to 1 limiting gas-oil ratio, without a lot of detailed calculations and an awful lot of difficulties to determine what would be most effective, that is about as arbitrary as 30,000 to 1. It is a good

breaking point between the gas wells and oil wells, and there is a reasonable basis for it, as Mr. Eaton has testified to, and we concur completely 30,000 to 1 is the point where the value of the gas produced from the well begins to exceed the round figure. If you figure down to the penny, it might be 28,000 to 1, something like that, and it's a reasonable approach, you've got to have some figure in there. The same figured in the 2,000 to 1 a year ago, and it appeared that there was going to be sufficient oil production and gas production to offset, sufficient gas produced with the oil wells to offset the thing. It appears, because of the migration of the gas into the oil zone, that maybe 2,000 to 1 would have been more appropriate. The ratio of 29,995 to 1 was classified as a gas well, and it's a little short. It has come in because of that dedicated 320 acre unit of it.

Q Would that figure hold on the 80?

A It's 29,995, and will go 'way over thirty if we can get that extra acreage. I would like for the record to show that at the time of the Hearing a year ago there wasn't a well in this area at 2,000 to 1 or less. It was my impression that we should go and get into a Hearing, and it is my impression that one of these Pan American-McAdams Wells and the Froze Well, and I think Weaver and Brown Well, did have a 2100 to 1 ratio at that time. It was a relatively low ratio anyway.

MR. PORTER: Who offered the Exhibit?

MR. NUTTER: This is a Pan American Exhibit, I believe,

yes, sir.

MR. PORTER: In a case a year ago this month?

MR. NUTTER: I think it was actually a year ago, June.

MR. PORTER: Would you identify the Exhibit Number?

MR. NUTTER: This is Pan American Exhibit 1. I don't know the date of it. The fact is, the Froze Well at that time was in the final stages of completion and the lowest range that is indicated would be the well in the N. W. 1/4 of Section 35, 2500 to 71, 42 and 10, and 10173 as indicated by this Exhibit.

A When I made that statement I had the impression in the back of my mind from that Hearing a year ago that that well in there had a 1500 to 1 ratio, I may be in error.

Q (BY MR. NUTTER) You stated there had been considerable testimony presented to the Commission on numerous occasions that there was a correlation between deliverability and the amount of recoverable gas?

A Yes, sir.

Q There has been testimony to the other side of that question also, has there not?

A The Commission saw fit to agree with the testimony, in relationship, however.

MR. NUTTER: I believe that is all, thank you.

MR. PORTER: Any other questions?

Q (BY MR. UTZ) Mr. Rainey, do you have any knowledge of the reserves in this section of this Pool?

A No, sir, I sure don't. I have no indication in that regard at all.

Q You don't?

A I won't even hazard a guess. I think if I recall correctly, here again I am just pulling it out of the back of my mind from something testified to, that the reserves were about four times as much in the gas area as in the oil area. The areas themselves were in about that relationship, and I think somebody testified in one of the previous hearings to approximately that same relationship. The reserves, that is purely an offhand recollection and I wouldn't want to swear to that.

Q Do you have any deliverability from gas wells?

A No, sir, at the present time there are no gas wells in this Pool, under the definition of the Rules we are operating under right now, although we have a lot of gas appear here.

Q Would you agree with Mr. Lemon's testimony this morning as to the deliverability of the wells into a 400 pipeline magnitude of 190 to 3.4 million cubic feet?

A I have seen no figures and, as I say, all I have seen is the volume of gas that was produced, gas-oil ratio tests in the months of January and April of this year, and I don't have copies of those tests with me, so I have no knowledge whatever of it.

Q In other words, Mr. Rainey, you have no knowledge or El Paso has no testimony as to the range of reserves in the gas area, as to the deliverability of the gas area?

A No, sir, and I didn't feel that it was absolutely necessary to establish it in this particular pool. There was a relationship between recoverable gas and deliverability. If the Commission desires, we can certainly make those calculations, I don't have them with me.

Q Well, I think I would like them.

MR. PORTER: What pool calculations is it you want, Mr. Utz?

MR. UTZ: It would be the individual tract's reserves throughout the gas-cap area, as well as the deliverability of each of those tracts.

A If I may make one remark in this regard, it would appear to me it's obvious that the imposition of a deliverability formula would be much more advantageous than using straight acreage to allocate this allowable back to these individual wells and tracts. As I say, we are trying to fit these rules into the framework of the existing rules, and the whole San Juan Basin area has, since the institution of proration, been prorated and had the deliverability type formula, and we did not bring any evidence to substantiate this in this particular pool. However, it appears that it is obvious it is going to be more accurate than the same straight acreage. For that reason, if for no other, I think it would be a valid formula to try in here.

Q Wouldn't that depend on the range of reserves? In other words, in the reserves you can take, the deliverability formula wouldn't fit in?

A From a technical standpoint you are right, yes, sir.

MR. UTZ: That is all I have.

MR. PORTER: Anyone else?

Q (BY MR. ERREBO) The so-called gas areas are greater than it is in the flank areas?

A Mr. Errebo, I have not said that.

Q What sand quality is better, I am sure there are differences throughout this Pool?

A We don't have any on the area in the Gallup, and I have looked at some of the others in a little more detail and I got perfect uniform thickness throughout the Pool area.

Q If the thickness did happen to be thicker, assuming that it was thicker in the gas area, then, actually, you would be prorating on the basis of reserves more nearly by using the deliverability formula than the straight?

A The thickness factor calculation of reserves and pressures, Mr. Nutter or Mr. Payne mentioned it, I mentioned a moment ago many factors came within reserves and that it was the basis on which a lot of the testimony previously heard has been given because the same factors are used in both types of calculations, and those factors do not vary. In the deliverability formula and in the reserve calculation formula, there has got to be a reasonable relationship between the two things.

Q You are aware, of course, that the Weaver Wells are drilled at a lesser density than 320 acres?

A Yes, sir.

Q How do you contemplate that they would be taken care of under the Rules, insofar as whether or not they would have two special exceptions, or administrative exceptions, or be recognized by the Order as being unorthodox?

A The wells already drilled under the existing Orders say that they shall be considered to be located in conformance with this Order.

Q What Section is that in?

A It is in Special Rule Number 2, the second sentence "any well drilled". It gives the location provisions and then the facts that Special Rule 9 (e), Paragraph 2 provides that gas wells in the Angels Peak-Gallup Gas Pool shall be permitted to produce, subject to market demand fluctuations, up to four times the permitted 80 acre gas limit as determined above, based on a ratio--the numerator of which is the number of acres dedicated to the particular gas well, and the denominator of which is 80.

MR. NUTTER: So, in effect, Mr. Rainey, those gas wells on 160 acre tracts would have an acreage factor of 100 of what the remainder in the Pool would be?

A Yes.

MR. ERREBO: That is all.

MR. PORTER: Mr. Kendrick.

Q (BY MR. KENDRICK) Your Special Rules provide for purchaser nominations for gas, for wells in the gas-cap area?

A Yes, sir.

Q What effect will it have if your purchasers from the oil area or from the gas-cap area, purchasers of gas, nominate sufficient gas that their gas allowable will be equivalent to the gas allowable of an oil well?

A None whatsoever, other than the fact El Paso makes every effort to abide by the rules and regulations and not violate any correlative rights, and, also, it may be borne in mind, that everybody in the gas area is also in the oil area.

Q At the present time?

A Yes, sir.

Q By what means would El Paso, primarily purchasers, participate in the oil allowable which is to be established at the hearing which will be later than the El Paso nominations for the gas?

A El Paso makes a statement every month on the basis of volume of casinghead gas and they anticipate they will get that in before they start making their gas nominations in the first place, and in the second place, as far as this particular Pool is concerned, if he makes a barrel or two, it doesn't make any difference, we have got a balancing provision for the gas well.

Q You have also a limit, the same limit as the maximum for the allowable, as the top gas allowable for an oil well?

A Yes, sir.

Q So, that if you under-nominate any particular month, or any particular series of months, the allowable cannot be high enough

during those particular months, or ever, to make up any under-nomination, that, as a purchasing company, you may subsequently inure?

A I don't think I follow you.

Q If you anticipate an allowable to be 60 barrels, you nominate for an equivalent amount of the gas-cap and the late oil nominations cause the oil allowable to go up to 70 barrels, which would raise the gas allowable for the wells in the oil zone, but there is no way to raise the gas allowable in the gas zone.

A That is correct.

Q And, during succeeding months your top limit would prevent you from over-nominating to make restitution for under-nominating during that one particular month?

A Yes, sir, through the balancing provisions, these wells can't over-produce their allowable. There is going to be a certain figure, and these wells can't over-produce, and can also accrue underproduction. The particular problem that you are talking about hadn't even occurred to me, and it's inherent in all gas prorationings you are going to miss it a little bit, sometimes quite frequently. The compensation factor will provide and we will make every effort to stay as close to the known factors with the change in your marketing area. Between the time we make the nomination at the beginning of one month and start to produce the allowables, there may be distribution, and what we have actually estimated we are going to produce.

MR. PORTER: Mr. Kendrick, the point you are trying to es-

tablish is, that regardless of how much they might be underproduced the purchaser cannot nominate above the limit established by whatever Order we issue.

MR. KENDRICK: The nomination, the top limit, would hold you back to the same top limit for an oil well for that particular month. Should they subsequently under-nominate, the people in the gas-cap would have their correlative rights impaired because they could not get the same gas limit for that month as in the oil period.

MR. HOWELL: Mr. Kendrick, I think you misunderstood Mr. Rainey's testimony. Mr. Rainey very definitely testified earlier in the hearing that the accumulation of underproduction would permit the nomination in any given month when there was underproduction to make it up, and the production during that month of amounts of gas in excess of that limit; that the limit is primarily over a period of time. I think you must have overlooked that point from Mr. Rainey's testimony.

MR. KENDRICK: The limit is on a six-months basis and not on a monthly basis.

A It's contemplated that limit is over a period of time, that is true. It's also contemplated that the current allowable will not be in excess of that limit in any one month. Here is the factor there, there is a considerable misgiving on the part of the Commission that there may be migration back from the oil zone into the gas zone, this is sort of backhanded and an additional safeguard in that respect, in that the oil wells are always going to be permitted to

produce enough to balance and there is not going to be back-migration. I will grant you there is a possibility in a period, long extended period of very low demand, maybe there will not be an exact balance. However, under the existing Order there is no possibility of balance.

MR. KENDRICK: Your top limit is on a six-month basis.

A It's in individual months, it's going to have an average, it's the market demand fluctuation over your underproduction on those wells.

Q How can it be if in an average month, you are under-nominated, and the next month you are controlled by top limit?

A Well, let me put it this way, the nominations can control the thing as far as controlling that limit or receiving the production above that limit. However, I feel pretty confident that the production in the Pool is going to be such that it is going to be an approximately equal situation because of the gas limit. Now, it is contemplated under the specific terms of the Rule, that no well shall be assigned an allowable in excess of four times the 80 acre gas limit, that is true, that is on the current basis. And, I don't think that there is going to be enough missing of the estimated gas limit, or estimated oil allowable, that there is going to be any significant affect in that regard.

MR. KENDRICK: With the chance that that could occur, would it not be more inclined to protect the correlative rights to let the gas allowable be determined by the oil allowable in such a way that the people in the gas-cap area will be assured of getting

the same gas allowable as one in another area?

A Other than the fact that El Paso's market fluctuates very widely, as you know, that might work out; that is because of the market fluctuation, and I don't see that you can exactly handle it. In other words, assign a top gas limit every month to every gas well and there is going to be some accrued underproduction, they're not going to be able to be made up, because in the summer months you've got a low market demand and you can't produce it, and in the winter months it's conceivable there will be periods when it's not going to be, when we are not going to be able to produce, and, as I say, El Paso is going to make every effort, as far as we are permitted to do, on market demand fluctuations and allowable in this Pool to try to maintain and keep the situation in balance. And that is the only assurance, I can't go any further than that.

Q You agree that El Paso, either the Gas Company or Oil Company, controls the oil purchase to develop the allowable?

A That is correct.

Q It is quite possible that the gas nominations can be underestimated, not intentionally, but accidentally, by not being fully informed of the late market conditions for oil?

A That is correct, and as a further safeguard, in respect to the fact there may be gas production from the gas-cap, and with respect to gas production from the oil rim as has been testified to here today; and as I recall, there are also some oil wells in the capable top gas limit. All these things, because of these specific

conditions in this Pool, or these factors and tests, balance themselves out, and I feel pretty confident we are going to have a reasonably equitable reservoir withdrawal here, a whole lot more reasonable than we've got here now.

Q (BY MR. PAYNE) Could you achieve the same purpose--actually every operator in the Commission has the same desire in mind and that is to keep the gas-oil contact relative--your proposed Rules hope to achieve, by 80 acre spacing for oil, 320 spacing for gas, and then by utilizing the gas-oil ratio make it 2, 3, or 4,000, whatever it worked out to, with an additional provision that the underproduction could be made up at a future date?

A That is, in effect, what we've got here, only here, nomination to determine the gas allowable.

Q Looking at it from the administrative standpoint, and I am wondering--since it appears to me much easier, what I just proposed--if your Rule is a distinct advantage to us over the other.

A I don't think a distinct advantage, I don't see any more administrative burden on the Commission, you've got your staff, all your machines are primarily new, you fit it in and print it out and that is exactly the same procedure that you used in the San Juan Basin.

Q Under my procedure, there would be no necessity for taking deliverability tests.

A You still have got to keep the records, the over and underproduction.

Q That is correct.

A You are not going to be able to determine--without some allocation formula, how are you going to determine how long those wells have to make that gas up, and how it's going to be re-allocated in case of cancellation, and things like that.

Q When production records hit their high there is no deliverability test taken on them now.

A As I say, you propose at the time there is a cancellation of underproduction, how you propose to allocate it back, and that is one of the main reasons why you need an allocation formula, as I see it.

MR. PAYNE: Thank you.

MR. PORTER: Anyone else?

Q (BY MR. UTZ) During the periods of high demand, it's quite easily conceivable to me you would have to calculate an allowable in excess of the limitation suggested here. The difference of an allowable on those wells, and the limit, what would you suggest be done with that volume of allowable?

A Under this proposed method, it's the lesser of the calculated allowable, or this gas limit, forget the rest of it.

Q In other words, lower your market demand?

A From this particular Pool, yes, sir. This, to our way of thinking, is about the only way you can achieve an approximate volumetric withdrawal if you allow, in periods of extreme high demand, you allow the gas wells to get very far ahead of the oil wells, you

have no way to catch up.

Q In line with Mr. Kendrick's questioning, any variance in an allowable on a monthly basis can cause these wells in this category to lose and you apply your limiting ratio on a six-month basis rather than a monthly basis?

A We have no objection to that, a six-month limitation would be fine. These particular Rules were a joint effort between us and Pan American, and Weaver and Brown, and I have not discussed the matter with them, but I feel if you asked them the same question they would not object, El Paso has no objection to this procedure.

MR. UTZ: Mr. Buell, do you happen to have an answer to that question?

MR. BUELL: Just what was your proposal?

MR. PORTER: That you apply the gas-oil limitation on the six-month's basis, rather than on the monthly basis. He asked whether or not--if you would go along with that?

MR. BUELL: In other words, in computing your gas allowables, whether it be a six-month or monthly basis?

MR. UTZ: No, sir, that wasn't it. Apply the limitation on a six-month basis in order to allow a well that has an allowable calculated in excess of limitation. You have proposed, here, to produce that allowable and receive credit in the form of an allowable, and would you, after you produced six months, would you not lose an allowable when the allowable was less than the limitation?

A You don't provide the gas well can over-produce, the limi-

tation of underproduction comes down the line.

MR. HOWELL: Which is the reverse of the reserves theory; in the summer, underproduce, and in the wintertime you can make it up.

MR. PORTER: I think there are about three different trends of thought here.

MR. HOWELL: Could we recess and get our heads together?

(Whereupon, an off the record discussion was had.)

MR. PORTER: We will come to order.

MR. RAINEY: Mr. Porter, after consultation with all parties concerned, I find that it was everybody's understanding, except me, anyway, this thing was to be applied over a six-month period. If you refer to Special Rule 9 (e) (2) on Page 4 of these proposed rules: The gas wells in the Angels Peak-Gallup Gas Pool shall be permitted to produce, subject to market demand fluctuation, up to 4 times the permitted 80 acre gas limit as determined above, and so forth. It was everybody's understanding that meant over a six-month proration period. If I could clarify that, we can amend that by adding after "80 acre gas limit" the phrase "over a six-month proration period", which would cover the thing. As I say, I was erroneous in my understanding, and that is the understanding we had when we first went through it. It was intended to be an average over six months, under-nominate the gas limit at a given month and over-nominate some to balance.

MR. PORTER: Would you like to make that official amend-

ment on your Exhibit?

MR. RAINEY: Yes, sir, I will add it in over here.

MR. UTZ: It's your proposal that it should be subject to the usual balancing rules?

MR. RAINEY: Yes, sir.

MR. PORTER: Anyone have anything further? Anyone else have a question? The witness may be excused.

(Witness excused.)

MR. PORTER: Mr. Errebo.

MR. ERREBO: My name is Burns Errebo from Modrall, Seymour, Sperling, Roehl and Harris. We will have one witness. I would like to call Mr. Jay Harris.

JAY J. HARRIS

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

DIRECT EXAMINATION

BY MR. ERREBO:

Q Will you state your name, please?

A Jay J. Harris.

Q You were sworn in this morning, I believe, is that correct?

A That is correct.

Q Will you state what is your business, and by whom you are employed and where you live?

A I am a consulting geologist, I live in Albuquerque, and I

am employed by, in this case, with Weaver.

Q Did you give testimony in the previous hearing in this matter last year as an expert witness, as a geologist?

A Yes.

Q Now, with regard to your experience, which you expressed last year, concerning whether or not this Pool should be treated as a gas pool and produced as such, or as an oil pool, what was your recommendation at that time.

A Last year, if I recall correctly, we recommended that it be treated as a gas pool at that time.

Q Have you changed your opinion in that regard?

A Not in the least.

Q And, what is the opinion that you expressed to the Commission with regard to spacing for gas wells?

A I believe we requested 160 acre spacing at that time, which is normal spacing for all gas wells in the State, unless it was specified.

Q And, since that time, have you had an opportunity to give further study to the data from a pool which has been made available to you?

A Yes, at this time, if we had to do it over again, I would drill, they will, on wider spacing units.

Q Namely, what?

A Namely, 320 acres.

Q Will you please refer to your Exhibit A on the board and

explain to the Commission what that shows?

A Part of this Exhibit is actually repetitive of what has preceded it before. I have indicated the so-called oil rim in irregular red color, and the gas in green. I also indicated in the dark ledger the July or the April, 1960, gas-oil ratio on each well as they were given to me; and in red, the gas-oil ratios that were available at the last hearing, which was July of '59. And it seems to show this irregular line, which is arbitrary. I brought it up as the gas-oil ratios have increased going toward the oil rim, and it shows your regular encroachment of the gas into this oil, through expansion probably.

Q Expansion of the gas cap?

A Probably that.

Q Now, do you have any basis for comparison with what you show there as to what you showed the Commission last year?

A Well, this is one of the copies of one of the Exhibits.

Q You are referring, now, to your Exhibit B, is that correct?

A B was made from the same film which was used in the hearing last year. We indicated, at that time, to the best of our abilities and beliefs, this was the oil area in red, which was fairly even at that time. I have determined it, we had no production history even though the gas areas were quite a lot larger then. So, it's merely prepared for different purposes; this is a half scale compared to this map here, (indicating) which makes this red area look larger. If you double this, it would be considerably smaller

at this time; the oil, rather, would be smaller.

Q Now, in order that the Commission may be able to determine, by looking at the Exhibit, what migration, could you state approximately on that map, show them where the southernmost part of the oil rim was at the time of the last hearing as depicted on your Exhibit B?

A At that time it was very close to Number 3 McAdams Well, which is located in the N. E. 1/4 of Section 34, and that line actually was, we believed, in which it probably was, these wells hadn't, it was an even line across as indicated here.

Q So, actually then, the previous line as it results on your Exhibit A is roughly measured by the thickness of that band shown on Exhibit A?

A Of the oil rim, that is probably right.

Q Will you state again, if you have not already made it clear, what is your basis for thinking that this gas cap has actually expanded or moved?

A The gas cap, the terrific increase in oil and gas ratios, even this well, Pan American, the Froze, I believe, I didn't, we didn't have a gas-oil ratio test at the time this Exhibit was made last year, so I don't have the previous figure. It is a pumping well, with a very low productive capacity; it's going to 18,899 to 1 at the present time, and the McAdams has gone to 10,000, and the El Paso to 285,372 to 1 gallons on the El Paso No. 105, and has almost doubled since the last hearing, gas-oil ratios of that hearing.

Q Have you not heard the previous witnesses in this matter?

A Yes.

Q And, did you hear this testimony, perhaps some of the increase might be due to the coming out of solution, out of solution gas?

A That is normal with the solution drive.

Q Your testimony in that probably, however, represented only a part of the increase?

A That is right.

Q And, are you also in agreement with them, that probably the rest of the increase is due to the movement of gas into the oil area from the gas area?

A I think that is highly probable.

Q Considering the relation of the W. R. Weaver lease with regard to the contact line between the two areas, do you feel that during the past year Mr. Weaver has lost any of the gas to any of the offsetting leases?

A Apparently he has, due to this movement of gas down-dip.

Q Did you drill a well on the McAdams lease after their hearing last year?

A We drilled one well in the N. E. 1/4, Section 34, McAdams No. 5 which has a north offset to the McAdams No. 3.

Q And, did you complete that as a well producing either oil or gas?

A Completed as an oil well of limited, of doubtful commer-

cial value, I will say that.

Q How long has that well been producing?

A It was completed in, I forget, December, or January of this past year.

Q What is its present daily production?

A Its capacity is about 12 barrels per day.

Q Do you have any plan for this well?

A Probably we are going to plug it; it's not economical to produce it.

Q You are stating here, today, that your intentions are to plug it in the near future?

A I feel sure we will before too long.

Q It's not commercial now?

A Yes.

Q Do you feel this is an anomaly, actually put, were you surprised when you got the kind of well you did?

A Yes.

Q You didn't expect it?

A We expected a trend with the Huerfano No. 107 and it's reasonably close to the No. 3 McAdams, Weaver-McAdams, probably the two best oil wells in the area, and we expected that sand to carry at least that far. Apparently the permeability and porosity decreased too rapidly to the north.

Q So, actually, it might be your conclusion that has been stated before, geology is not an exact science, is that right?

A Yes.

Q Anomalies do occur?

A Yes.

Q That perhaps is the fluctuation in the Huerfano No. 103, which also might be anomalous insofar as the fluctuation of the gas-oil ratios are concerned?

A I think that is highly probable. That could be where we had expected a real good sand condition in the No. 5, and didn't get it. They probably had localized real good sand condition in the 103, which would account for higher saturation, which would account for your gas-oil ratio. I expect in two or three months this well will have a comparative ratio on the wells in the gas cap.

Q Now, the ratio on the 103, which you show was 98,987, that is the original ratio which you show in red, is that correct?

A On the 103?

Q Yes.

A Yes, I showed that, that was at the last hearing we had, that record of it in the present one is 108,888.

Q This is the same well, 123,000 as to gas-oil ratio as of the first of the year, is that correct?

A That is right. Since the last hearing it has gone up considerably.

Q Do you have anything further you care to bring out to the Commission with regard to this line of testimony?

A Nothing, except that we speak of producing the gas through

these wells, some of them, to the north of that sand, shales out very rapidly. Any one of the three Pan American Wells here could be considered a commercial oil well, due to their capacity to produce right now.

Q How do you feel about the possibility of losing oil into the gas area in the event the Commission should say, issue rules which, for some reason, might result in the gas area having an unusually, disproportionately large withdrawal?

A Out of the oil area?

Q Yes. With regard to the loss of oil in the gas area.

A I don't think you would lose too much oil into the area, the gas sands are all right. One core we recovered which was there on the two McAdams' was from 14 to 19 percent saturation, not really going into dry gas sand. I didn't think it would migrate under the present rules that are proposed; it would, more or less, saturate.

Q You did examine the gas-oil ratio from the McAdams No. 2?

A That is right.

Q That is a well within the gas area?

A That is right.

Q What type of fluid did you find in that core?

A Residual oil saturation, 14 to 19 percent.

Q What core was it?

A Hard telling the core.

Q The gas has been, heretofore, been designated today as a dry gas cap.

A I associated liquids with it.

Q Is that what led you to believe the oil would enter that area, that it would not be retrievable, a loss?

A It would be lost, it has its maximum saturation right now.

Q Have you had occasion to make a study of the expected return of money from the drilling of gas wells in this area?

A Yes, I have. I have done that for Mr. Weaver, and it's kind of a rough figure. I do have a comparison as to what I know. I have what the wells cost, a couple of them, to the nearest $1,000.00.

Q Why don't you refer to your figures, if you have them, as to the expected return on a well drilled on 80 acres, gas well, I assume, that is only an assumption that the gas area was drilled up to density of 80 acres?

A 80 acre computation. The No. 3 McAdams, which is about half gas and half oil, almost on the dividing line, I used eleven feet of gas sand and eleven feet of oil sand, approximately.

Q What was the drilling cost which you used on that?

A The drilling cost was the cost on the McAdams No. 1, which was a single Gallup completion. The cost on that well was $81,000.00. The tackle equipment on it was $47,000.00. The total cost was $128,000.00 to drill it.

Q And, did you determine what the value of the reserves would be under that 80 acre tract?

A Under the No. 3, now, I came out with using eleven feet of the gas, 22 feet of net pay, the thickest section of sand in the

area.

Q So this is probably one of the most favorable economic figures that you could present?

A I used the standard engineering textbook formula, figuring on the volumetric basis.

Q What difference did you come up with between the value of the reserves and your drilling costs?

A I came out with the cash value I had on the oil, about 82 barrels per eleven feet, with a total cash value of $140,712.00 and eleven feet of net pay on the sand, $49,132.13 per thousand giving an income on the 80 of $189,844.00 less a $28,000.00 drill cost which is a gross income of $6,844.00 over the life of that well.

Q Do you know what the life of that well would be?

A Nobody knows at the present time, but I did not discount it, the money that was involved, nor did I take into consideration any operating cost. I'm afraid we wouldn't have any profit at all.

Q You didn't consider royalty?

A No royalty, that is total income.

Q What is your opinion, then, on the total income to drill a gas well on 80 acres, as is presently contemplated by these rules that are now in effect?

A It's not economic, according to our use.

Q Did you make a similar study that you might give the Commission, the ultimate figures you got, without breaking it down as to the drilling in the 160 acres?

A On the McAdams No. 1, which was drilled on the 160, and is a single completion, the total cost, as I said, was $128,000.00 and I figured the total income was $233,000.00, 272 on both gas and oil off of McAdams No. 1, which gives you a profit of $150,000.00 on a gas well on 160 acres, which is still not very economical when you take your operator costs and count your money.

Q That is one of the figures which led you to state, I assume, awhile ago, if you had it to do over you would definitely put that lease on the 320?

A By which you could expect a reasonable profit then.

Q Then, briefly, for the 320 acres, what did your study show there?

A On 320 acres of cores, your drilling cost would be the same, and your recovery would be $338,544.00, which would be considered a reasonable profit.

Q What do you consider a reasonable profit, what rule of thumb do you use?

A You almost have to have three or four to one to be reasonable at all, and that is not too good a profit.

Q Now, you heard the testimony of the El Paso witness, Mr. Lemon, this morning, did you not, concerning the evidence of drainage of 320 acre tracts?

A Yes.

Q Have you had the opportunity to study that information and other information of your own, since the last hearing?

A Yes, I have, and I have seen theirs, I have had access to their information, which I agree with.

Q Is it your opinion one well will effectively and economically drain 320 acres in the gas area?

A I feel sure it will.

Q In regard to the results of your economic study, it is then your opinion that a well will drain on 320 acres, is only density? Will that well pay out so that you might get a reasonable return upon your money?

A That is right. You couldn't afford to drill them otherwise.

Q You have heard the rules discussed this morning, or this afternoon, by Mr. Rainey?

A Yes.

Q And, what is the position of W. R. Weaver with regard to them?

A We are in accordance, since we were in conference when those rules were decided on, that type of rules, they met with our approval then, and still do.

Q Concerning the study in the testimony which you have previously given, in the study you made and these rules which you assisted in the drafting of, is it your opinion these rules will arrest the migration of gas which you found to be present over the past year?

A I think it's the best answer we have had so far. Under

the present conditions we feel reasonably sure that the gas is migrating down-dip, and our correlative rights are being damaged. I think under those rules it will come nearer to being perfect than any way we have seen so far.

Q Did you prepare those Exhibits?

A These Exhibits, yes.

MR. ERREBO: We would like, at this time, to offer them into evidence.

MR. PORTER: Without objection, Weaver and Brown Exhibits A and B will be admitted into evidence.

You testified you thought these operations under these proposed rules would arrest the movement of gas to the oil zone, do you think it might reverse it?

A I don't believe it will reverse. In case that it did become apparent, I think the Commission could call a hearing and readjust it. I think any volumetric formula is subject to readjustment.

CROSS EXAMINATION

BY MR. PAYNE:

Q Mr. Harris, I believe you testified you feel your Huerfano No. 12 is not a commercial venture, and you may have to plug it, is that right?

A Yes, sir.

Q Do you agree with the previous witnesses that these oil wells are turning into gas wells and in other manners they have become gas wells?

A I think that is highly probable. The gas-oil ratio in this particular well has gone up considerably since it was drilled.

Q Why would you want to plug it?

A We dedicated the acreage to the No. 3, which is a more capable well of producing its allowable.

Q I see, you dedicated the acreage to another gas well?

A To a well in the same quarter-section.

Q These figures, your income figures, they did presume a single completion, is that right?

A That is the actual cost on the Weaver-McAdams No. 1 to the nearest $1,000.00.

Q There are some dual completions in this area, are there not?

A Our No. 1 is not.

Q When you drew up the economic figures relative to 80 acres, you were going by the reserves under the 80 acre tract, were you not?

A That is right.

Q And, do you think a well will drain 320?

A I believe it will.

Q Your wells on 160 spacing are actually draining that 160?

A They're draining that 160.

Q So, perhaps, your figures should be doubled, I mean on the 80 if the well was draining 120.

A We have on the No. 3 and on the 50 and 80 acre units.

Q You mean you only have 80 acres dedicated to them?

A Yes, sir.

Q Oil or gas?

A An oil well, both of them in the north.

Q That is dedicated under the proposed case?

A That is right.

Q Your gas wells of 80 acres are dedicated to them, but actually you are draining 160. As a practical matter you can consider the reserves under the 160, couldn't you?

A I considered my reserves under the 160, you know, the gas wells under the first figure I gave was under the No. 3 McAdams which is an 80 dedicated to an oil and gas well. The other figures were on the No. 1 McAdams, which I figured a 160 acre tract.

Q Actually, the gas area is not entirely built up, is it?

A I don't believe the limit has been established on the gas area to the south and southwest at all.

Q So that each of these gas wells on the 320 acres, each one of these gas wells, no matter how much is dedicated to it, is draining considerably more than what is dedicated to it?

A It's draining more than the 160, ours are, yes.

CROSS EXAMINATION

BY MR. NUTTER:

Q Mr. Harris, there are approximately nineteen wells in this Pool, all told, is that correct?

A Nineteen, I believe, there are eighteen or nineteen.

Q You gave the cost of a completed single completion?

A That is right.

Q The Gallup Formation?

A Yes.

Q Are you aware of how much of the total on the eighteen or nineteen wells in this area are dual completion and go to the Dakota?

A We could count them, they're marked on the Exhibits to the dual completion.

Q Would you give us a quick run down on that, please?

A I count fourteen wells.

Q So on fourteen of the eighteen or nineteen, the $81,000.00 you were talking about to develop the Gallup would not be applicable, would it?

A That is the intangible drilling cost on that one Gallup well, the total was $128,000.00.

Q I see. It wouldn't cost $128,000.00, it didn't cost $128,000.00 to complete the Gallup, has it?

A I don't think you would miss it very far. I don't know, you have our figures. I have the figures on one of the dual completions, .too, if you want them.

Q How have you apportioned your cost to the Dakota Formation in dual completions?

A I don't know how Mr. Weaver has divided it. I have the total cost on the McAdams No. 2, which is a dual completion.

Q What was the total cost?

A $162,000.00.

Q As compared against $128,000.00?

A That is right.

MR. PORTER: Anyone else have a question.

REDIRECT EXAMINATION

BY MR. ERREBO:

Q Just one question. Do you think it will always be possible to make a Dakota completion in this area that we are dealing with here, today?

A I do.

Q You think it will always be possible to. In other words, can you always rely upon getting a dual completion every time you put a hole in the ground?

A No, I might state further that the deliverability and production history of our three Dakota wells, in fact, we have temporarily abandoned one of them already, and two of them are producing less than half a mile feet a day, which you couldn't afford to drill as a single completion.

Q These are present Dakota completions?

A In Section 34.

Q Actually you can't drill more than two Dakota wells on the Section anyhow, can you?

A No.

MR. NUTTER: That is all you want to drill in the Gallup, anyhow.

A It sure is.

MR. PORTER: Any other questions? You may be excused.

(Witness excused.)

MR. PORTER: Anybody wish to make a statement?

MR. ERREBO: If it please the Examiner, the evidence presented here today shows that 98 percent of the voidage of the production from this Pool during the month of April was gas. Two percent of the voidage was oil, so there seems to be a question as to whether or not this is a gas pool. On the basis of those percentages it seems like it would be a gas pool. The undisputed evidence also presented shows that, in fact, three witnesses have testified to that fact, that there is migration under the rules which the Commission now has in effect, from the gas area to the oil area, and that migration will result in the violation of correlative rights if it has not already done so. There has also been conclusive evidence presented as to the drainage of the 320 acres by a gas well drilled in this area. W. R. Weaver recommends to the Commission the adoption of the El Paso proposed rules and that the pool be reclassified as a gas pool.

MR. BUELL: If it please the Commission, I believe Pan American is clear in the record, and I see no reason for a closing statement.

MR. HOWELL: I think we will let the record speak for itself, and I believe Mr. Rainey handled the closing argument very well in his testimony.

MR. PORTER: The Commission will take the case under advisement.

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I N D E X

E X H I B I T S

STATE OF NEW MEXICO)
) ss
COUNTY OF BERNALILLO)

I, LEWELLYN NELSON, Notary Public in and for the County of Bernalillo, State of New Mexico, do hereby certify that the foregoing and attached Transcript of Hearing was reported by me in Stenotype, and that the same was reduced to typewritten transcript under my supervision, and contains a true and correct record of said proceedings, to the best of my knowledge, skill and ability.

DATED this 20 day of August, 1960, in the City of Albuquerque, County of Bernalillo, State of New Mexico.

Lewellyn J. Nelson
NOTARY PUBLIC

My Commission Expires:

June 14, 1964