BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO
JULY 13, 1961

IN THE MATTER OF:

CASE 2012 In the matter of the application of Max Pray for the establishment of 80-acre oil proration units in the Southwest Gladiola-Devonian Pool, Lea County, New Mexico.

CASE 2135 In the matter of the application of Nearburg & Ingram for the establishment of 80-acre oil proration units in the Southwest Gladiola-Pennsylvanian Pool, Lea County, New Mexico.

TRANSCRIPT OF HEARING

BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO
JULY 15, 1961

IN THE MATTER OF:

CASE 2012 (Reopened): In the matter of the application of Max Pray for the establishment of 80-acre oil proration units in the Southwest Gladiola-Devonian Pool, Lea County, New Mexico.

Case 2012 will be reopened pursuant to Order No. R-1724 to permit operators in the Southwest Gladiola-Devonian Pool, Lea County, New Mexico, to appear and show cause why said pool should not be developed on 40-acre proration units.

CASE 2135 (Reopened): In the matter of the application of Nearburg & Ingram for the establishment of 80-acre oil proration units in the Southwest Gladiola-Pennsylvanian Pool, Lea County, New Mexico.

Case No. 2135 will be reopened pursuant to Order No. R-1836 to permit operators in the Southwest Gladiola-Pennsylvanian Pool, Lea County, New Mexico, to appear and show cause why said pool should not be developed on 40-acre proration units.

BEFORE: Honorable Edwin L. Mechem
Mr. E. S. (Johnny) Walker
Mr. A. L. Porter

TRANSCRIPT OF PROCEEDINGS

MR. PORTER: The hearing will come to order, please. The Commission will take up next Case 2012.

MR. MORRIS: In the matter of the application of Max Pray for the establishment of 80-acre oil proration units in the South-

west Gladiola-Devonian Pool, Lea County, New Mexico.

MR. CAMPBELL: If the Commission please, Jack M. Campbell, Campbell & Russell, Roswell, New Mexico. In this case, I would like to enter an appearance for Max Pray, Cities Service Petroleum Company, Moss Petroleum Company, and Nearburg & Ingram. At this time I would also like to move that Case No. 2012 and Case No 2135 be consolidated for the purpose of hearing only.

MR. PORTER: If there is no objection to the consolidation of the Cases, the Commission will consolidate the two Cases.

MR. CAMPBELL: In regard to Case No. 2135, my appearance is for Nearburg & Ingram only, as they're the only operators involved in that particular case at this time.

MR. PORTER: I would like to call for other appearances in either of the cases at this time.

MR. CHRISTIE: R. S. Christie of Amerada Petroleum. I would like to make a statement at the end of the case.

MR. PORTER: All right. Mr. Campbell,you may proceed.

MR. CAMPBELL: We have three witnesses that can be sworn.

(Witnesses sworn)

MR. CAMPBELL: I will call Mr. Pickering first.

WARREN PICKERING,

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

DIRECT EXAMINATION

BY MR. CAMPBELL:

Q Will you state your name, please?

A My name is Warren Pickering.

Q Where do you live, Mr. Pickering?

A I reside in Oklahoma City, Oklahoma.

Q What is your profession?

A I'm a consulting geologist in the employ of Mr. Max Pray.

Q You testified previously in Case No. 2012 before an Examiner for this Commission, did you not?

A Yes, sir, that is correct. I believe I was the only witness that day.

Q Will you please briefly recite for the Commission your educational and professional background?

A I was schooled at the University of Minnesota, where I finished with a Master's degree in 1941. I have been in the employ of the Pure Oil Company, and the Standard Oil Company of California, namely, the California Company. The last seven years I have been an independent consulting geologist, and for the last five years representing Mr. Pray.

Q In connection with your representation of Mr. Pray, you are acquainted, I assume, with the development in the Southwest Gladiola-Devonian Pool, are you not?

A Yes, sir, that is correct.

Q Did Mr. Pray drill the first or discovery well in that Pool?

A The well drilled by Mr. Pray, known as Zealon Pray No. 1

was considered at the time of the hearing as the discovery well. However, there was another Devonian producer at that time, the Moss No. 3 Peck.

(Whereupon, Applicant's Exhibits 1,2,3 were marked for identification).

Q I refer you to what has been identified as Exhibit No. 1 in these consolidated cases, and ask you to state to the Commission what that is?

A This map is a plat intended to show all of the Devonian wells drilled in the area,whether they be producers or not, so that we might be brought up to date as to development in this area.

Q Will you point out on Exhibit 1 the wells again, the locations of the wells that were Devonian wells at the time of the original hearing on this matter one year ago?

A Yes, sir. The first well producing from the Devonian was drilled by the Moss Petroleum Company, their No. 3 Peck,located in the northwest, southwest of Section 26, Township 12 South, Range 37 East. That was completed in the Devonian in February of 1960. Therefore, subsequent to that, the Max Pray No. 1 Zealon Craig, located in the northeast of the southwest of Section 27, same Township, was completed in June. Those were the two wells producing at the time of the last hearing.

Q Your testimony at that hearing was confined primarily, was it not, to the completion data on the Max Pray Zealon Craig well?

A Yes, sir, that is correct.

Q Will you point out to the Commission, using Exhibit No. 1, the Devonian wells, whether producing wells or dry holes, that have been drilled during the approximate year that has elapsed since the last hearing?

A Yes, sir. I'd be glad to. As an introductory, I might say that there have been four completions in the Devonian and four dry holes, with one well now drilling. If the Commission please, and you'll follow with me, I will locate each of these wells in the order of their completion. Some were drilled simultaneously, but we will use the date of completion as chronological order.

Well No. 1 was drilled by Nearburg & Ingram, No. 1 Midhurst, located in the northwest, northwest of Section 35. I might say that all of these refer to the same Township. That was drilled to 12,228 feet. It was a successful Devonian producer, completed in September 30, 1960.

The next well drilled in the area was the Skelly No. 2 Foster, located in the northeast, southeast of Section 27. This was a dry hole at a total depth, 12,328, and completed as a dry hole on October 2, 1960.

The next was the Max Pray No. 1 Rufus R. Craig, located in the northeast, southwest of Section 27. This was a dry hole in the Devonian, one of the deepest in the area, drilled to 12,566 feet, abandoned on December 4th of 1960.

The fourth well drilled was Moss Petroleum No. 4 Peck, located in the southeast of the southwest of Section 26. This was a Devonian

producer at a total depth of 12,225, completed on December 28, 1960.

Cities Service then drilled the No. 1 Turner "D" located in the southeast, southwest of Section 27. This was a successful Devonian producer at a total depth, 12,288, completed on February 14, 1960.

Nearburg & Ingram, on their No. 1 Keating, located in the southeast of the northeast of Section 34, was dry in the Devonian, and a total depth of 12,263 abandoned on March 1st, 1961.

Nearburg & Ingram drilled their No. 2 Midhurst, located in the southeast, northwest of Section 35. This was a successful Devonian completion at a total depth of 12,230 feet, completed on June 1st, 1961. The most recent completion was a dry hole drilled by Moss Petroleum Company on their No. 5 Peck, located in the southwest of the northwest of Section 26. This well was abandoned on the 10th day of July this month, 1961 at a total depth of 12,274. You will note that that is given credit as a drilling well. Actually, the abandonment was so recent we haven't had a chance to put the spokes on the map. We are now in the process of drilling, I say we, Amerada Pray No. 1 Grady Lowe now drilling in the northeast of the northwest of Section 34, drilling below 8,000 feet this morning. Again, in summary, since our last hearing, there has been four producers, four dry holes, one well drilling.

Q What is the approximate cost of a dry hole to the Devonian in this Pool?

A My best figures come from our Rufus R. Craig where we did extensive drill stem testing. The figure there was $198,000.

Q If this figure is fairly representative of a cost of the dry hole to the Devonian, then there has been spent on dry holes in this area since the last hearing in the neighborhood of three-quarters of a million dollars, is that correct?

A Yes, sir. If you were to include the geophysical work and the exploratory figure, I imagine it would be close to a million dollars of expenditure.

Q What is the approximate cost of a well, a single completion to the Devonian?

A I believe the cost of $250,000 to $260,000 is appropriate.

Q So that insofar as the four producing wells are concerned, there has been approximately a million dollars spent in the area in the past year on producing Devonian wells, is that correct?

A That is correct.

Q Would you say, then, that the entry of the order for temporary 80-acre spacing has had any effect in delaying development or definition of this Pool?

A No, sir, on the contrary. We think that 80 acres would be permissible, it has encouraged drilling.

Q Would you point out to the Commission what this drilling has done with regards to defining the limits of this Devonian Pool?

A Actually, I think it's rather obvious that progressing to the north by virtue of the Rufus Craig drilled by Max Pray, the Foster well drilled by Skelly, and the now dry Moss No. 5 Peck well that we have very definitely limited the well to the north.

We know from geophysical effort that the west dip is very severe to the west, and, therefore, we believe that we are limited on the west. The east has no dry holes unless you go to the Mc Allister Fuel location, which is to the northeast. However, there is a well on the Midhurst that's running low, and although we haven't actually drilled a dry hole, we are quite nervous about going any further to the east. This leaves only the south available for future expansion.

Q Is there any limitation with regard to the south on dry holes to the Devonian?

A Yes, sir. We have used these several dry holes to the Devonian that are rather expanded from the field, but you notice one drilled by the Lawton Oil Company in Section 3 at a location in the southeast, southeast of the northwest, which is a definite dry hole in the Devonian, so that most certainly will be the southern limit, if it doesn't occur before that point.

Q Are there not also dry holes delineating this field to the southeast in the Nearburg-Ingram area?

A Yes, sir. That is true. However, that is a condition that is unique to that particular well being a faulted well. It is dry in the Devonian, and we are counting it as a dry hole, but we are considering it a faulted well.

Q Considering the development that has taken place in the four Sections around 27, 26, 34 and 35, and referring to the Devonian only, how many dry holes have been drilled to the Devonian in

that area?

A There have been seven dry holes drilled in the area you described.

Q So that that would represent an investment of approximately a million and a quarter dollars in the dry Devonian holes in the entire four-section area, is that correct?

A Yes, sir, that would a conservative figure.

Q How many producing wells have been drilled to the Devonian in that area?

A There have been six producers in that four-section area.

Q So, your percentages of taking production from the Devonian in that area have been less than 50/50, is that correct?

A Yes, sir, at the present time.

Q At the last hearing, you testified with regard to the general geological situation in this particular area, as to the Devonian formation. Will you state whether or not the additional development has to any great extent clarified the geological situation in this area, or does it still remain as you testified previously in a considerably complicated situation, to say the least?

A The area was presented initially based on the two wells drilled, and the outlying dry holes coupled with geophysics, it was characterized as an extremely complex faulted Devonian area. We at that time presented a map showing numerous faults, which was the best interpretation we could derive at that time. These nine wells -- eight wells drilled, one now drilling, have tended to

very strong well. Its allowable was made on each of the first four months. However, in the month of October, it was reported, and we gauged 282 barrels of salt water along with our production. This was during the time that the north 40-acre offset, the Rufus Craig

compliment the complexity of this area. I wouldn't say that it has defined it a great deal more as regards to the position of faulting. We know very definitely that faults are there. As a matter of fact, we found additional small faults we knew not of when the first hearing was held. I feel that the area is not beyond contouring. On the contrary, each of us could make a geologic contour map on top of the Devonian. I dare say that no two of them would be alike. As a matter of fact, we have tried, the several companies in the area, to combine our efforts for geologic purposes, and make a common map. This cannot be done and honor all of the information presented by each of the several companies. It's an extremely complex geologic problem.

Q Now, since the last hearing, of course, you have had some production history for the Max Pray Zealon Craig well in the northeast quarter of the southeast quarter of Section 27, have you not?

A Yes, sir, that is correct.

Q Will you explain to the Commission what has occurred with regard to production from that well during this period of time?

A The Max Pray Zealon Craig well began producing in July of 1960, and looked for the first three months for all the world like it was going to make its allowable; water-free production, a very strong well. Its allowable was made on each of the first four months. However, in the month of October, it was reported, and we gauged 282 barrels of salt water along with our production. This was during the time that the north 40-acre offset, the Rufus Craig

was in the process of drilling, and needless to say, we were greatly concerned about the propriety of going ahead with the Craig well at that time because it was intended to be so much structurally lower. Back to the Zealon Craig. Then, the well continued to increase in its water content until the month of January, this year, when the water increased to the point where it would not flow of its own accord. We then put it on a Kobe pump on the 10th day of January, and also reduced forcibly and reduced by our own requirements the amount of production because of the water being produced, you might say, selfishly, too, because we own a half interest with the Cities Service to the south, and we weren't in a position to pull the water in, if that was being done. Therefore, we did curtail voluntarily our own production. It now makes 46 percent water per month with 4,000 barrels of net oil, which is well below its allowable.

Q In your opinion, if this well continues to act as it has been, will that well pay out, as far as an investment is concerned?

A For the last six months it's been holding rather constantly between 36 and 45 percent water production on the rate of pump that we have introduced. We feel, if this continues, it will pay out, but it's still a great question whether we can hold that water or not.

Q Would it be an over-all pay-out if it is considered in conjunction with the dry hole you have drilled to the north?

A No, sir, it will not pay for the dry hole we drilled.

Q You have stated, or indicated, that, in your opinion, this water situation has not been or was not the result of coning or pulling water into the well. What do you think has caused that water to come into this well?

A Indications are, and our reasoning is based entirely on the core analysis that we obtained from the Zealon Craig well. The method of completion included the drilling of the top 15 feet of the Devonian, at which time we ran a drill stem test to find that oil was present, and it was a commercial well. We then cut a 10-foot core on the bottom and had it carefully analyzed. There were 8 feet worthy of analysis, and the permeabilities ranged from 70, from as low as 73 to as high as 1966 millidarcies. Of the 8 feet, there were 3 feet that were very pronounced in high millidarcy feet, high permeability. It is my feeling, and the engineers seem to concur that this is not a coning effect by virtue of production, but it is actually depletion of these highly permeable zones; depletion of the oil first, and thence allowing avenue for water to encroach from the peripheral edge of the reservoir.

Q Now, at the last hearing you presented, as I recall it, the core analysis on this well, and you have recited here some of the permeabilities that were found in the core. Are you generally acquainted with the completion data on the wells that have been drilled to the Devonian since that time?

A Yes, generally speaking.

Q Has anything occurred to change the opinion that you ex-

pressed at the time of the last hearing, that, in your opinion, a well here in the Devonian with this type of core that you found, would drain 80 acres?

A No, sir. I still believe the permeability is sufficient to drain the 80 acres.

MR. CAMPBELL: I would like to offer Exhibit No. 1 in evidence, and that's all the questions I have of this particular witness at this time.

MR. PORTER: Without objection, Exhibit No. 1 will be admitted.

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

MR. PORTER: Does anyone have a question of the witness? Mr. Nutter.

MR. NUTTER: Mr. Campbell, what aspects of this will the other two witnesses go into?

MR. CAMPBELL: The bottom hole pressure comparisons as the field has been developed. There will be one witness that will testify in connection with the core taken from the field.

MR. NUTTER: This is your only geologist?

MR. CAMPBELL: Yes. I have another one, but he's not going to testify to the geological features of the matter.

CROSS-EXAMINATION

BY MR. NUTTER:

Q As I understand it, now, there are two producing wells on

the west side of the field, and four producing wells on the east side of the field; is that correct?

A Mr. Nutter, in the beginning, we prefer to call them two fields. It now appears that this is one extremely complex area, all producing from the Devonian.

Q Well, I said two on the east side,or two on the west side of the field, and four on the east side of the field, --

A That is correct.

Q -- referring to it as a single field?

A That is correct.

Q In the middle of the field there have been three dry holes drilled, is that correct?

A That is correct.

Q Do you believe there is any actual communication from the east side to the west side of the structure?

A I believe the engineers' evidence of bottom hole pressure indicate a similiarity. Geologically, it looks as though there should be a dissimiliarity. The only indication that we have geologically is perhaps a different water-oil contact in the two blocks. They seem to have a similar Genesis of evolution as regards commercial production, however.

Q Is there one main faulty block that has dropped in the center of the field, and you find these wells lower structurally than the wells to the east and west of it?

A Mr. Nutter, I wish I could answer that and be sure of it.

I cannot answer it with certainty. The well pattern would seem to indicate that. The disposition of the wells would seem to be like that, in that some of the geophysics and particularly the Skelly Oil Company do not trend their faults north-south at all; they prefer to trend them east-west, which gives you a mild evidence of the extreme complexity that we have introduced here in this picture.

Q Has any well that you know of actually cut a fault?

A Yes, sir. The well in the northwest of the northeast of 34, drilled on the Grady Lowe, actually cut a fault at the top of the Devonian. It also had some 3200 feet of clean oil on a drill stem test, but did not appear to be worthy of completion at its early date.

Q I see.

A May I proceed?

Q Yes, sir.

A There are other small faults. Our Rufus Craig, which you will find in the southeast of the northwest of 27, cut a fault of some 90 feet of throw which introduced an extra section of new Mississippian on top of that particular bed.

Q Which wasn't encountered in any other well?

A No, sir. We have not found the faults to be in any particular position in the lithologic column.

Q Now, how about your Lowe No. 1 in the northeast of the northwest of Section 34, which is drilling at the present time?

How is that running structurally?

A I have said we're below 8,000 feet, and the markers to that depth are unimportant, and you cannot depend on them, so we have no markers at the present time. I can tell you, though, that from the geophysical evidence, and the fact that the No. 1 Turner is higher than the Max Pray Zealon Craig, we are hoping with everything we have that it will be a high well, at least as high as the Turner 1 "D."

Q In going through the dry holes that have been drilled in there since the last hearing, you mentioned four, and it would appear from the map that Nearburg-Ingram Keating No. 1 was completed in March of '61. Was that a dry hole to the Devonian that was drilled since the last hearing, or did you mention that well?

A I mentioned it, and it was drilled since the last hearing. That was one of the four.

Q I have marked the four as being the No. 5 Moss Well up in Section 26, --

A Yes, sir.

Q -- the Skelly Well in 27, --

A Yes, sir.

Q -- the Max Pray Well in the northwest corner of 27, --

A Yes, sir.

Q -- and Nearburg-Ingram's No. 1 Well in the northwest of the northeast of 34?

A No, sir. The fourth well is the Keating No. 1, which is

in the southeast of the northeast of 34. The Nearburg & Ingram No. 2, and the Keating No. 1, which is located in the northwest of the northeast is an old hole drilled by Moss Petroleum Company, the No. 1 Lowe, it's date is correct, it was completed there on 4/5/54. It is the old hole in which we encountered a Devonian fault and was not completed.

Q It is dry in the Devonian?

A Yes, sir.

Q You haven't constructed any cross-section of this reservoir running from east to west to show the continuity or discontinuity of the formation, is that correct?

A No, sir. We have constructed such cross-sections, but we had not intended to present them.

Q And the engineering witness will have data to substantiate the claim that this is one field, is that correct?

A We think so, yes.

MR. NUTTER: I believe that's all. Thank you.

MR. PORTER: Mr. Morris.

BY MR. MORRIS:

Q Mr. Pickering, in the previous hearing of this case, considerable concern was expressed due to the faulting of the area, that possibly you are going to have a lot of unproductive acreage dedicated to wells if we went to 80-acre spacing. I was wondering if you would care to comment if whether the subsequent development justified that concern?

A I think the concern we had then would still be appropriate. Unfortunately, with this number of wells drilled, we have not pinpointed the bearing throw of these faults to the point of being able to set up a number of reservoirs.

Q You would be unable to say at this time that the actual dedication to the wells in existence now is proper?

A I believe the wells now are proper, simply because there are no wells that show specific faulting; for instance, to the west. Therefore, I think we're safe in assuming that we can go at least another 40 west since there's nothing to belie that assumption. We have nothing to the contrary to point up the fact that we might be contributing non-productive acreage.

MR. MORRIS: Thank you.

REDIRECT EXAMINATION

BY MR. CAMPBELL:

Q Isn't that same situation true as to the present wells on the eastern portion, the Moss 3 and 4, and the Nearburg & Ingram 1 and 2 there in Sections 26 and 35?

A Yes, sir. It's even more appropriate there because if you notice the staggered 80-acre pattern of development is there, indicating the common source of supply and productive well.

MR. CAMPBELL: That's all.

MR. PORTER: Anyone else have a question of the witness? He may be excused.

(Witness excused)

MR. PORTER: Mr. Campbell, we will recess the hearing until 1:15.

AFTERNOON SESSION

MR. PORTER: The hearing will come to order, please. Mr. Campbell, are you ready to call your next witness?

MR. CAMPBELL: Yes, sir. Mr. Motter.

E. F. MOTTER,

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

DIRECT EXAMINATION

BY MR. CAMPBELL:

Q Will you state your name, please?

A E. F. Motter.

Q Where do you live, Mr. Motter?

A Hobbs, New Mexico.

Q By whom are you employed and in what capacity?

A Cities Service Petroleum Company, Division Engineer.

Q How long have you been Division Engineer?

A About four years.

Q Have you previously testified before the New Mexico Oil Conservation Commission in your capacity as a petroleum engineer?

A Yes, sir, numerous times.

Q Referring to Exhibit 1, which has been introduced in this case, will you point out to the Commission the well in which Cities

Service Petroleum Company has an interest?

A Yes. That's the Cities Service Turner "D" No. 1. We don't have the "D" on there, but it's located in the southeast, southwest quarter of Section 27, 12 South, 37 East. The well is held jointly by Cities Service and Max Pray.

Q When was that well completed?

A February 14, 1961.

Q When was the Max Pray discovery well, or the well immediately to the north completed?

A On June 15, 1960.

Q Have you made any studies to compare the bottom hole pressures in those two wells?

A Yes, sir, I have.

Q I hand you what has been identified as Applicant's Exhibit 2, and ask you to state what that is?

A This is a curve plotting bottom hole pressure versus cumulative production for the Max Pray Zealon Craig No. 1, and the Cities Service Turner No. 1. I used cumulative production between those two wells because we feel that although there is a complexity of the structure in this area, we feel that those two are producing from the same reservoir.

Q Will you refer to that, where necessary, and point out to the Commission what the comparative bottom hole pressures were with relation to the time that the tests were taken?

A Well, the first pressure was taken on the Pray Well June

26, 1960, shortly after completing. I think they had only produced some 2500 barrels of oil at that time. The next pressure plotted on that curve is March 9, 1961, that is shortly after the completion of the Cities Service well. The next two pressures were both taken on the Cities Service well just this past month, on July 20 -- excuse me -- June 20, '61, and June 28, '61. The last one being a pressure buildup test.

I would also like to point out that there has only been one bomb test other than drill stem bottom hole pressure data on the wells that Mr. Nutter referred to as the east. I would like to point out that that bottom hole pressure was taken on April 28, 1961, on the Moss Peck No. 4, and it was 4494 pounds. And if you would plot that on a time scale close to the March 9th, 1961 survey, of course, you would find out that the pressures were almost identical in the reservoir, or were at that time.

Q What does this data indicate to you, as a reservoir engineer, in connection with the drainage that is taking place in this reservoir?

A Well, to me, it appears that at least in the vicinity of our two wells, that there was certainly drainage occurring up until the time our well was drilled, and a bottom hole pressure run on it.

Q Would it appear by reason of the comparable bottom hole pressure data on the Moss well that at least there is a possibility that drainage is occurring throughout a single reservoir here?

A Yes, I would say that.

Q Now, what other work have you done in connection with your well which will indicate a drainage area or movement of oil in this particular reservoir?

A Well, we have performed pressure buildup tests and resulting calculations, which are a engineer's tool to determine the effective permeability, the drainage radius, and several other factors.

Q Is this pressure buildup calculation a procedure that is commonly used in the oil and gas industry to indicate the well performance and so forth?

A Yes, it is.

Q Will you refer to what has been identified as Applicant's Exhibit No. 3, and advise the Commission whether this is the complete pressure buildup calculation based upon your well?

A Yes, it is. This is a pressure buildup calculation taken from data obtained June 28, 1961, as indicated on Exhibit No. 2. I would like to go through this and point out a few of the highlights that I think are important to this hearing.

Q Without going through the whole calculation with regards to the factors that are important in this hearing, such as permeability, drainage area, and production efficiency index, will you refer to this Exhibit and advise the Commission what it reflects to you?

A Yes. Item No. 6 is the average effective permeability of the formation, 324 millidarcies, which I consider good for this

Devonian reservoir.

Item 26, the calculation drainage radius, 1280 feet, which, in effect, would drain probably some 160 acres.

Item 29 is the PI with no skin effects, which is 10.8 barrels per pound drop.

Going back to this skin, Item 15, that is a positive number, indicating that the permeability immediately around the well bore is probably less than the average formation. This is due probably to some drilling fluids still around the well bore. This well was completed, naturally, it was never acidized.

Q Do you consider that an average permeability of 324 millidarcies is a relatively high permeability?

A Yes, for this type reservoir.

Q What does it indicate to you with regard to the movement of fluids within the area of this well?

A Well, I think that it would indicate to me that we could easily drain 80 acres, and, of course, that is further pointed out by the drainage radius, which is affected by the average permeability calculation.

Q You used that permeability calculation in order to ultimately determine the drainage radius mathematically, did you not?

A That is correct.

Q Are you acquainted with the core analysis in the Pray well that was introduced at the last hearing?

A Yes. I have a copy of it.

Q Will you refer to that and state what the permeability range was in the core analysis on that particular well?

A Well, on the 8 feet cored there were eight samples, and the permeability ranged from a low of 73 to a high of 1966 millidarcies. I might point out also that there was another interval where two permeabilities have different plugs, but right adjoining each other was 1233 and 1340 millidarcies, extremely high for this reservoir.

Q Using those actual core analyses and the ranges there, your figure of 324 millidarcies on your calculated permeability is a fairly conservative figure, is it not?

A That's right. It's a little bit less than the average of the core analysis.

Q Are you acquainted with the average permeabilities on the core, which will be referred to later by another witness, that was taken on one of the Nearburg-Ingram wells?

A I have been told that the permeabilities are in the same range as the one that I have available.

Q In your opinion, as a reservoir engineer, does the permeability range here, and the calculated drainage radius, as indicated on Exhibit No. 3, indicate to you that a well may reasonably be presumed to drain at least 80 acres efficiently?

A Yes.

Q Now, what other data do you have available with regard to the production history of this reservoir?

A We have made rate time curves on all the wells producing from the Devonian reservoir.

Q Mr. Motter, I've handed you what has been identified as Applicant's Exhibit No. 4, and ask you to state what these are?

A Well, these are decline curves, barrels per month versus rate, or excuse me, time, for each well completed in the Southwest Gladiola-Devonian Pool. I might correct these. These are identified as West Gladiola. I think the production is appearing in the Oil and Gas Engineering Committee reports as West Gladiola, and my engineers put it down as such, but it is Southwest.

Q I refer you to the second page, which is the data on the Max Pray Zealon Craig No. 1, which is to the north of your well, --

A Yes.

Q -- you will note there that there has been a substantial increase in water production from that well after it initially produced only oil. As a petroleum engineer, and particularly with reference to your knowledge of the core analysis of that well, will you state what, in your opinion, has been the cause for the water production from that well?

A Well, I agree with the previous testimony, that this is water coming from the edge of the water aquifer, and it is normally termed by engineers as an unequal advance due to permeability variations in the formation. In other words, on the more permeable streaks, the oil is produced out first, and then the water follows.

The well will probably continue to produce oil from the less permeable streaks along with considerable water.

Q What relationship, if any, do you think that this increased water production may have with the rate of production?

A I don't think it has too much effect on rate. I think that the oil has been produced in these higher permeable streaks. If we had taken a year to do it, or a month to produce it, the water would still have come along in the permeable streaks whenever so many barrels of oil had preceded it. I don't think that any under-expected normal unit allowables that we may foresee that we would see any danger from any rates that we may expect.

Q Based upon your knowledge of the bottom hole pressure comparisons in the wells in this reservoir, and upon your knowledge of the core data, and upon your knowledge of the pressure buildup calculations that you have made, what is your opinion with regard to the drainage area of a Devonian well in this Pool?

A Well, I think that we have shown here quite feasibly that it's in excess of 80 acres. I don't know if I can pin it down any greater than that. I think that following our calculations, it's somewhere around 160 acres.

Q One other question on the Exhibit No. 4, which is the series of Exhibits on the production time data. Your well, which is the first one shown there, shows a considerable decline in production in the last month or two. Will you state to the Commission what accounts for that considerable drop?

A Well, yes. That was in the last months we had available production. There have been no pressures taken since the initial pressure taken in June of 1960. That's when we were running all our pressure buildup curves and bottom hole pressures. In other words, we sacrificed 1500 barrels of oil to get this information. I might also add, at the time we were drilling and about ready do complete our well, was about the time that the practice well started marking large water cuts, and we were a little dubious to go ahead and cut a core, run bottom hole pressure, or bottom hole fuild analyses, et cetera, that is needed for real good information, due to the fact that we were skeptical whether we could make water from the well ourselves, so we tried to complete it in the most economic manner possible.

Q Have you experienced water production from your well?

A None whatsoever.

Q Has it produced, except for the last month when you were running the test, at top allowable?

A Yes. It is capable of producing at a higher rate. If you notice, the pressure buildup rate was 303 barrels a day.

MR. CAMPBELL: That's all the questions I have from this witness.

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

CROSS-EXAMINATION

BY MR. NUTTER:

Q Mr. Motter, in this group of Exhibits here, I notice that several of these wells had experienced a decline, the productivity

or production, at any rate, and then a buildup. On the third sheet it would appear that Midhurst reached a low point in January, and built back up again. Can you explain those fluctuations?

A No, I can't. We have another witness that will testify on his own well. I would assume, from looking at that, it was probably an artificial lift put on at that time.

MR. CAMPBELL: The next witness will be qualified to testify on that, and answer your question.

Q (By Mr. Nutter) How many of the wells in this Pool are flowing?

A I think, if that is not an artificial lift, they are all flowing, with the exception of the Max Pray Well.

Q Is that the one that makes considerable water cut?

A Yes, that's correct.

Q Now, these pressures on your first Exhibit here, how many of them are from the Max Pray?

A The very first pressure.

Q The first pressure is the Craig. And the other three pressures are all from the Turner Well?

A From the Cities Service Petroleum Turner.

Q Were any pressures taken on the Craig Well that would show what the bottom hole pressure would be with relation to the Turner Well at the same time the Turner pressures were taken?

A There have been no pressures taken since the initial pressure taken in June of 1960.

Q Now, on the pressure buildup calculations, Mr. Motter, the important thing to determine the effective radius of drainage, one of the important things is the thickness of the pay, is it not?

A That's correct. We normally use the perforated interval or the exposed interval. In this case we used the open hole, 25 feet.

Q Is all of that effective pay?

A Yes, it is.

Q Is there any other effective pay in there that you haven't perforated?

A Yes, there is. In our interpretation, we think it's some 40 or 50 feet on down to the oil water contact.

Q But in the calculation you have used the 25 feet, is that correct?

A That's correct.

Q And if you had more effective pay than you actually used, that would tend to cause the effective radius of drainage to be larger than it actually would be, would it not, or given amount of production from 25 feet?

A I don't think so, because we don't have a homogeneous reservoir, and our vertical permeabilities vary as we run from one barrier to the other horizontal barriers.

Q There would be some vertical permeability?

A Yes, but not nearly as much as the horizontal permeability.

Q In other words, you don't anticipate recovering the additional 15 feet of --

A Yes. As the water aquifer moves in, it will push the oil up, but it will be over the entire drainage radius.

Q You will have vertical permeability?

A Yes, but it's not as great as the horizontal permeability.

Q Did you make a test, using 40 feet of pay to determine what the effective radius of drainage would be?

A No. I might point out that the 40 feet of pay would be hard to make that determination. You would have to calculate the permeability, and if you don't know what your producing rate was with 40 feet, I don't see what value it would be because it would be strictly an assumption. We know that 25 feet gives us a certain producing rate at a certain pressure.

Q You are also assuming that only the 25 feet is contributing oil to this well during this test, aren't you?

A That's correct.

MR. NUTTER: That's all. Thank you.

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

(Witness excused)

MR. CAMPBELL: Mr. Ingram.

TOM L. INGRAM,

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

DIRECT EXAMINATION

BY MR. CAMPBELL:

Q Will you state your name, please?

A Tom L. Ingram.

Q Where do you live, Mr. Ingram?

A Roswell, New Mexico.

Q With whom are you associated?

A Nearburg & Ingram.

Q You are a partner in that organization?

A Yes.

Q What is your profession?

A Geological engineer.

Q How long have you been engaged in that?

A Since 1947.

Q You have previously qualified before the New Mexico Oil Conservation Commission in that professional capacity, have you not?

A I have.

Q Are you acquainted with the application, I'm speaking now of the Devonian formation only, the application in this case?

A Yes, I am.

Q Has your company drilled any Devonian wells in this area since the time of the original hearing?

A We have drilled three wells in the immediate area since that time.

Q Will you refer to Exhibit 1,and advise the Commission

where those wells are situated?

A The first well that we drilled is the Nearburg & Ingram No. 1 Midhurst, located in the northwest of the northwest of Section 35, which was a Devonian producer. The second well, the No. 1 Fred Keating, in the southeast of the northeast of Section 34, which was dry in the Devonian. The third well, the No.2 Midhurst, in the southeast of the northwest of Section 35, which was also a Devonian producer.

Q Have you taken any cores -- do you have any core analysis of any of those wells, as far as Devonian producers are concerned?

A We took a core in the original well, the No. 1 Midhurst, from 12,211 feet to 12,222 feet.

Q Go ahead.

A The permeabilities in this 11-foot core ranged from one-tenth to one-thousandth and ten withan average permeability over the 11 feet of 334.

Q Do you consider that to be a fairly high average permeability for the reservoir?

A Yes, we do.

Q Does that compare with the permeability based upon the pressure buildup calculations made by Mr. Motter on the Cities Service well in the western portion of the field?

A It is within five to ten, I believe, of his estimate.

Q What is your opinion, based upon the information that you have, and upon the core analysis, and upon the test that has been

given with regard to bottom hole pressures, what is your opinion with regard as to whether or not a well in the Devonian reservoir here will efficiently and economically drain at least 80 acres?

A Well, from the data presented, and the information that we have, it certainly appears that a well will drain at least 80 acres.

Q I notice that the dry hole you drilled to the Devonian, the Keating Well, is drilled upon a diagonal offset pattern, is it not?

A That is correct.

Q Do you still believe that the order of the Commission entered as a temporary order in this case, with the right to drill in either 40-acre tract, is the appropriate type of order to encourage development in this reservoir?

A I do, and I might offer as an explanation, particularly as to the reason that we drilled our third well in the location that we did, rather than moving up directly offsetting it was, the old hole that was there, and we felt fairly certain as to the geological information there. However, due to the highly faulted nature, we were, well, we felt much safer drilling in this particular location than we did maybe in offsetting.

Q Do you concur with the testimony of Mr. Pickering that this is an extremely complicated area, geologically?

A Geologically, I think it's highly complex. It appears, from our engineering data, that,at least the drainage in the area,

that there must be some communication with it. Now, there may be minor faults. However, the separation is probably not definite, in any case.

MR. CAMPBELL: This is all the questions I have of this witness with regard to the Devonian portion of this reservoir. He will also testify in the consolidated case with reference to the Atoka-Pennsylvanian.

MR. PORTER: Does anyone have any questions of Mr. Ingram concerning his testimony on the Devonian reservoir? Mr. Nutter.

CROSS-EXAMINATION

BY MR. NUTTER:

Q As I understand it, the Midhurst 1 "B" was an old well that was drilled back in 1955; is that correct?

A That is correct. It was drilled by Lawton Oil Corporation.

Q That recovered, according to the legend, 49 barrels of oil, and 408 barrels of salt water?

A That's the information we have, yes, sir.

Q When you drilled the No. 2 Well, did you use any special techniques to cause the bottom of that hole to drift away from the bottom of the old well?

A No, sir.

Q In other words, was there any directional drilling or anything like that?

A We attempted to drill a straight hole.

Q And you recovered 480 barrels of oil in twenty-four hours?

A That is correct.

Q Do you have any indication that there was any fault or anything separating the two wells, the old one and the new one?

A No, sir.

Q To what do you attribute the difference in productivity of those two wells?

A Fifty feet less hole.

Q You completed higher?

A That is correct.

Q What is the top of the Devonian in your No. 2 Well? It's not given on the legend there.

A The top of the Devonian in the No. 2 Midhurst was 12,218 feet.

Q Do you have a subsea depth for that?

A Subsea minus 8315.

Q Is this the top of the Devonian on the 1 "B" that's minus 8317?

A That is correct, yes, sir.

Q But you completed up higher in the formation in this other well?

MR. CAMPBELL: Just a second. Was your answer yes?

A Yes.

Q (By Mr. Nutter) Mr. Ingram, could you state what is the

reason for the fluctuation of the production that's shown on the group Exhibit that Mr. Motter presented, particularly on the third page, your Midhurst No. 1?

A During December and January we had the extremely heavy snows, and the pipeline gauger at that time was unable to get in and out. Subsequent to that, we installed a LACT unit, and we had excessive rains, and the electricity was off, so during December, January and February we were down because of bad weather, installation of LACT unit, and the power failure.

MR. CAMPBELL: Unchartered reefs, is that right?

A Yes.

Q (By Mr. Nutter) So these, then, would be surface conditions rather than bottom hole conditions that caused this fluctuation?

A That's right. We have had no difficulty bottom holewise.

Q Are all of your wells in the Devonian flowing?

A They are, yes, sir.

Q Do you have at the present time any plans for drilling in the west half of the northeast quarter of Section 35?

A The west half of the northeast quarter of Section 35? We are planning to do some geophysical work to help us ascertain whether or not it would be economical to drill in that particular location.

Q How about the west half of the southeast quarter of Section 26? Do you have any plans there?

A Well, the same thing. We were waiting particularly until Moss' well was dual, to see if he planned to dual prior to doing our exploratory work.

Q Has any attempt ever been made other than the initial completion to make a completion in the Devonian in the Keating No. 1 Well, in the northeast quarter of Section 34? Have you made any recent attempts on that?

A To recomplete in the Devonian?

Q Yes, sir.

A No, sir, we have not. We penetrated approximately 5 feet of Devonian on the initial test, and recovered considerable quantities of water out of it.

Q Do you think that those two wells are drilled in a fault block that has dropped down below the portions of the structure that lie to the east and to the west? Is the Devonian low in that area?

A The two wells you were referring to in the northeast quarter of Section 34?

Q Yes, sir.

A Of course, the well in the northwest of the northeast actually penetrated a fault. The well, the Keating Well, that we drilled, may or may not be in a fault. I mean, it is not an abnormally low well. Structurally, it is about three feet higher than the old Moss hole that was drilled in the northwest portion. However, we had an entire Mississippian section above, and they had none.

MR. NUTTER: Thank you.

MR. PORTER: Does anyone else have a question of the witness? He may be excused as far as this case is concerned and the Devonian is concerned.

REDIRECT EXAMINATION

BY MR. CAMPBELL:

Q Mr. Ingram, referring you, now, to the matter before the Commission to reopen the hearing by which Nearburg & Ingram were granted 80-acre spacing authority on temporary basis coextensive with the Devonian order, will you refer to Exhibit No. 1 in this consolidated case first, and point out to the Commission which of your wells are completed in the Atoka-Pennsylvanian formation?

A The Nearburg & Ingram No. 1 Midhurst and No. 2 Midhurst, located in the northwest quarter of Section 35, are both dually completed from the Pennsylvanian and the Devonian. The Nearburg & Ingram No. 1 Keating in the southeast of the northeast of Section 34 is completed only in the Pennsylvanian. The Moss No. 4 Peck in the southeast quarter of the southwest quarter of Section 26 has been perforated in the Pennsylvanian and packer leakage tests have been run, but to my knowledge it is not on production at this time.

Q Then, there are four wells in that immediate area which at least have found some production in the Atoka-Pennsylvanian formation, is that correct?

A That is true.

MR. CAMPBELL: Mark this Exhibit 5 in both cases.

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

Q (By Mr. Campbell) Mr. Ingram, refer hereafter to this reservoir as the Southwest Gladiola-Pennsylvanian, to avoid confusion with another Pool. I refer you to what has been identified as Applicant's Exhibit No. 5 in the consolidated cases, and ask you to state what that is?

A Exhibit No. 5 is a subsurface structure map contoured on the top of the Atoka sand of Pennsylvanian age in the Southwest Gladiola area. It shows the location of the wells that have been drilled, that have -- well, that had been drilled in the area. The Wolfcamp producers are indicated with a single black dot, the Devonian producers with a black dot with a circle around it, and Atoka sand producers in which the large circle has been colored in half black.

Q Which of the wells have been completed since the original hearing in this case, which I believe was in December of 1960?

A The wells that have been completed since that time are the Nearburg & Ingram No. 1 Keating, the Nearburg & Ingram No. 2 Midhurst, and the actual perforation and completion attempt in the Moss No. 4 Peck.

Q As a result of the completion of those additional wells since the last hearing some six months ago, have you made any substantial changes in your contour as it appears on Exhibit 5 here, as compared to the contour which was offered in the other hearing?

A The contouring is essentially the same. The aerial extent of the enclosure that we have is somewhat smaller now. In other words, the reservoir appears to be somewhat smaller in the Atoka-Pennsylvanian than we had previously estimated.

Q Since the last hearing, do you have some data that you can present to the Commission with regard to bottom hole pressures in the well that was then completed, as compared to the wells which have since been completed in that area?

A Yes. The bottom hole pressure in the Nearburg & Ingram No. 1 Midhurst, at a datum of minus 7221, was 3565, and this was taken in September of 1960. Two months later, Moss, in drilling his No. 4 Peck, ran a test in which the bottom hole pressure at the same datum was reported at 3540, so that even though these are both drill stem test data, we believe that they are close enough together that they fairly well represent the original bottom hole pressure that we've had.

Then, we had the hearing requesting permission to dually complete the well, and upon approval, we began producing the No. 1 Midhurst. In February, we were drilling the No. 1 Keating, and the bottom hole pressure in it at the same datum was 3445, indicating a pressure drop of approximately 100 pounds with the production that had been taken out of the Midhurst No. 1. Then, in April of this year the No. 2 Midhurst penetrated the same sand, and we had a bottom hole pressure of 3490. While that was not quite as low as that in the Keating well, it did indicate that we had had drain-

age also in this area. Now, the Midhurst No. 1 is some 1866 feet away from both the Keating No. 1 and the Midhurst No. 2. Well, using this as a radius of drainage, we would have an area much larger than 80 acres.

Q Do you have available logs on your Midhurst No. 2 and your Keating Well?

A I do have.

(Whereupon, Applicant's Exhibits Nos. 6 & 7 were marked for identification).

Q (By Mr. Campbell) I refer you to what has been identified as Applicant's Exhibits Nos. 6 and 7 in these cases, and ask you to refer to them, first to Exhibit No. 6, which is the log on the Midhurst No. 2, and then to the Keating Well, and point out to the Commission your interpretation of those logs with regard to the thickness of the Pennsylvanian section there.

A Both Exhibits 6 and 7 are gamma ray neutron logs on the two wells made by the Schlumberger Corporation, and on these Exhibits we have indicated the completion data, the perforations, and the tops of the various horizons. Originally, from the Midhurst No. 1 we had estimated at the time sand pay thickness was approximately 6 feet, and based all of our reserve estimates on that particular thickness. On Exhibit No. 6, the No. 2 Midhurst in the detailed section, you will note that the entire sand section is only 4 feet thick with approximately 2 feet of that being pay, or maybe 3 feet of it being pay. The perforated interval was at 11,134 feet

to 138 feet. That, we feel, covers the entire sand thickness in this particular well. In Exhibit No. 7, it shows also 4 feet of sand pay with approximately 2 feet of net pay, the perforations being from 11,134 feet to 38 feet.

Q At the time of the last hearing, I believe that you made some calculations of reserves under a tract, I forget whether it was 40 or 80-acre tract in this reservoir. What have the drilling of the additional wells established with regard to the reserves?

A Well, originally, based on the 6 feet of pay that we were using in the Midhurst No. 1, we had calculated reserves of approximately 60,000 barrels for an 80-acre tract. Now, with the reduction in net pay to 2 or possibly 4 feet, our reserves will have to be reduced from 30 to 60 percent, thereby leaving us recoverable reserves of from 24,000 to 40,000 barrels per 80 acres.

Q What is the cost of a well drilled to this depth only?

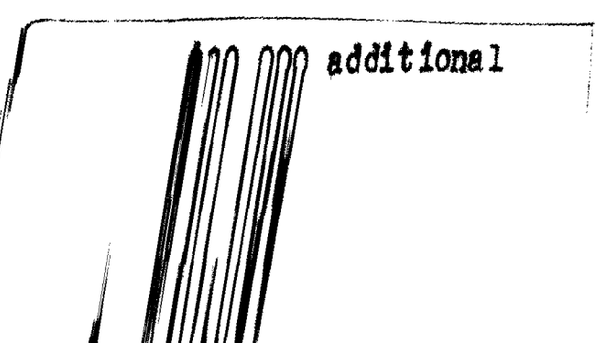
A The cost of drilling a well solely for Atoka-Pennsylvanian would be approximately $200,000.

Q Then, it is obviously uneconomical to drill a well just to that zone, either on 40 or 80 acres, is it not?

A That is correct.

Q Is this dual completion in order to recover the oil in this particular zone purely a salvage operation, so far as you are concerned?

A It is. It's a salvage operation. The cost, I believe,


additional

that I reported last time was approximately $30,000 additional expenditure.

Q In order to recover the reserves that are available in this reservoir?

A That is correct. Now, the $30,000 is additional expenditure if the well is being completed in the Devonian.

MR. CAMPBELL: That's all the questions I have of this witness. Before I forget it, I would like to offer the Exhibits 1 through 7 in evidence, and I would also like to correct a statement that I made. The Moss properties are owned, of record, by H. S. Moss individually, rather than by the Petroleum Company. That's all the questions I have.

MR. PORTER: Any questions concerning the Exhibits? Did you have a question concerning the admission of the Exhibits?

MR. NUTTER: Oh, no.

MR. PORTER: They will be admitted.

(Whereupon, Applicant's Exhibits Nos. 1 through 7 were received in evidence).

MR. PORTER: Did you have a question of the witness now?

MR. NUTTER: Yes.

RECROSS-EXAMINATION

BY MR. NUTTER:

Q Mr. Ingram, you have logs on two of these Pennsylvanian wells. Does the sand thickness in the other two Pennsylvanian wells compare pretty favorably with these two?

A We submitted the log on the No. 1 Midhurst at the original hearing, and the sand thickness was slightly greater. We estimated the 6 feet of net pay from the logs on the No. 1 Midhurst.

Q At the original hearing, were detailed calculations as to the estimate of 60,000 barrels of oil per acre tract submitted based on the porosity and water saturation and all that?

A We gave the entire information as to the porosity estimate, the recovery factor and all that information.

Q Does everything stay the same except you have re-evaluated the net sand thickness?

A Everything is essentially the same. The porosity,now, in the last two wells is slightly less, which, of course, might reduce the reserves somewhat more.

Q Now, on your Exhibit, I notice that you have one fault line to the west side of the Pennsylvanian structure. Is there any indication that there is a fault on the east side of this structure, or does that fault, if present at all, occur only in the Devonian?

A By fault on the east side of the structure, do you have reference to the separation between Gladiola and Southwest Gladiola, or within the Southwest Gladiola Field?

Q I was talking about separation within the Southwest Gladiola.

A Within the Southwest Gladiola in the Atoka, we find no definite evidence of any faulting.

Q Has an attempt been made unsuccessfully to complete any

A We submitted the log on the No. 1 Midhurst at the original hearing, and the sand thickness was slightly greater. We estimated the 6 feet of net pay from the logs on the No. 1 Midhurst.

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Q I was talking about separation within the Southwest Gladiola.

A Within the Southwest Gladiola in the Atoka, we find no definite evidence of any faulting.

Q Has an attempt been made unsuccessfully to complete any

other wells in the Pennsylvanian in this Pool except the four wells, which are producing?

A No attempt has been made in the -- now, drill stem tests were taken in Moss' No. 5 Peck, and were, as I recall, they recovered nothing, and then Max Pray's north well, his Z Craig, a drill stem test was run in it and recovered water.

Q So, the only actual attempts at completion are these four wells, which are productive from the Pennsylvanian?

A Insofar as I know. I mean these are the only four wells that they have run pipe on, and actually perforated, yes, sir.

Q The four pressures that you gave us being Midhurst No. 1, Moss Peck No. 4, No. 1 Keating, and No. 2 Midhurst. Are all of those drill stem test pressures?

A They are all drill stem test pressures.

Q Have any bottom hole pressures been run since the drill stem test on any of these wells in the Pennsylvanian?

A We ran a drill -- bottom hole pressure test in the Midhurst No. 1 as a discovery well of a new field. However, the tubing was filled with gas for the most part, and we were unable to get what we considered as a pressure.

Q Was that run at about the time of initial completion?

A That's correct.

Q No subsequent pressures have been taken on that well?

A We attempted to run another one last week, and it was of the same caliber as the first one.

Q No pressure at all, or what?

A Well, there was a pressure in it which was -- the man running it felt that it was very unreliable because he could not establish a good gradient on it. If you recall, in this particular well, we were forced to go to heavier casing in the bottom, and, therefore, were unable to run our tubing all the way down opposite the perforations on it, so that we are some 2400 feet or so above the pay, and we're unable to get our bottom hole pressure tool down at that point. But the bottom hole pressure that we obtained the other day, which I feel is unreliable, was 1601.

Q What depth was the bomb?

A Well, that is corrected down to this minus 7221, but it was 2400 feet above that datum.

Q That's the corrected pressure to the datum?

A Right, using the limited gradient that he had.

MR. NUTTER: I believe that's all. Thank you.

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

(Witness excused)

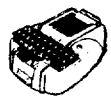
MR. CAMPBELL: That's all the witnesses.

MR. PORTER: This concludes your testimony?

MR. CAMPBELL: Yes, sir.

MR. PORTER: Anyone else desire to present testimony? Anyone have any statement to make in the case?

MR. LITTLE: John M. Little, Jr., with H. S. Moss,



Dallas, Texas. We concur with the recommendation of the operators here that the Commission order 80-acre spacing for the Devonian and Pennsylvanian reservoirs. Thank you.

MR. PORTER: Mr. Christie.

MR. CHRISTIE: R. S. Christie, Amerada Petroleum. We are now drilling in the northeast of the northwest of Section 34. We hope it will be a producer in both zones. Based on the evidence that has been presented here today, we believe that one well will efficiently drain 80 acres in either one of the reservoirs, and, therefore, recommend that a permanent order be adopted.

MR. PORTER: Mr. Campbell, did you have any statement?

MR. CAMPBELL: No, sir.

MR. PORTER: The Commission will take the cases under advisement.

STATE OF NEW MEXICO)
) ss
COUNTY OF BERNALILLO)

I, ADA DEARNLEY, Court Reporter, in and for the County of Bernalillo, State of New Mexico, do hereby certify that the foregoing and attached Transcript of Proceedings before the New Mexico Oil Conservation Commission was reported by me in machine shorthand and reduced to typewritten transcript under my personal supervision, and that the same is a true and correct record, to the best of my knowledge, skill and ability.

WITNESS my Hand and Seal this, the 16th day of July, 1961, in the City of Albuquerque, County of Bernalillo, State of New Mexico.

Ada Dearnley
NOTARY PUBLIC

My Commission expires:
June 19, 1963

BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO
NOVEMBER 30, 1960

IN THE MATTER OF:

CASE 2134 Application of Nearburg & Ingram for a dual completion, for permission to commingle the production from two separate pools, and for an automatic custody transfer system. Applicant, in the above-styled cause, seeks an order authorizing the dual completion of its Midhurst Well No. 1, located in the NW/4 NW/4 of Section 35, Township 12 South, Range 37 East, Lea County, New Mexico, in such a manner as to permit the production of oil from an undesignated Pennsylvanian Pool and the production of oil from the Southwest Gladiola-Devonian Pool through parallel strings of tubing. Applicant further seeks permission to commingle the production from said two common sources of supply from all wells on its Midhurst Lease consisting of the NW/4 of said Section 35 and for permission to install an automatic custody transfer system to handle said commingled production.

CASE 2135 Application of Nearburg & Ingram for an order creating a new oil pool and for the promulgation of temporary special rules and regulations therefor. Applicant, in the above-styled cause, seeks the creation of a new oil pool for Pennsylvanian production consisting of the NW/4 of Section 35, Township 12 South, Range 37 East, Lea County, New Mexico. Applicant further seeks the promulgation of temporary special rules and regulations governing said pool including a provision for 80-acre proration units.

BEFORE:

Daniel S. Nutter, Examiner.

TRANSCRIPT OF PROCEEDINGS

MR. NUTTER: The hearing will come to order. The next case will be 2134.

MR. MORRIS: Case 2134. Application of Nearburg & Ingram for a dual completion, for permission to commingle the production from two separate pools, and for an automatic custody transfer system.

MR. CAMPBELL: Mr. Examiner, I am Jack M. Campbell, Campbell & Russell, Roswell, New Mexico. I would like to move that Case No. 2134 and Case No. 2135 be consolidated for the purpose of the hearing and that we call Case 2135, if the motion be granted.

MR. NUTTER: They both relate to the same area, Mr. Campbell?

MR. CAMPBELL: They do.

MR. NUTTER: We also call Case 2135 at this time.

MR. MORRIS: Case 2135. Application of Nearburg & Ingram for an order creating a new oil pool and for the promulgation of temporary special rules and regulations therefor.

(Witness sworn)

TOM L. INGRAM,

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

DIRECT EXAMINATION

BY MR. CAMPBELL:

Q Will you state your name, please?

A Tom L. Ingram.

Q What is your business or position?

A Graduate geologist.

Q Have you previously testified before this Commission or its Commissioners in your professional capacity?

A I have.

MR. CAMPBELL: Are the witness' qualifications acceptable?

MR. NUTTER: Yes, sir.

Q (By Mr. Campbell) Are you acquainted with the application of Nearburg & Ingram in Cases 2134 and 2135 now before the Commission?

A I am.

Q Will you state what you are seeking with regard to those two cases, Mr. Ingram?

A We are seeking to establish a new oil pool from the Atoka Pennsylvanian, dually complete the Devonian and the Atoka to commingle the oil and to set an automatic custody battery.

(Whereupon, Applicant's Exhibit No. 1 was marked for identification.)

Q I hand you what has been identified as Exhibit No. 1 in these cases, and ask you to state what that is, please.

A Exhibit No. 1 is a subsurface structural contoured to the top of the Atoka sand which has been designated by the Commission as the Southwest Gladiola area, the Nearburg and No. 1 Midhurst located in the northwest quarter of the northwest quarter of

Section 35, 12 South, 37 East, and was drilled to the Devonian. In the process of drilling the well we encountered shows in the Atoka sand which were drill stem tested and then we drilled to the Devonian, ran pipe to the Devonian and, however, prior to completing in the Devonian, we ran production tests in the Atoka zone.

Q Mr. Ingram, with regard to Exhibit No. 1, what area are you now seeking to have included as a part of the Atoka-Pennsylvanian Pool here?

A We have requested that the northwest quarter of Section 35 be included.

Q You are acquainted, are you not,with the order of the Commission which defined and set up temporary rules for the Southwest Gladiola Pool, are you not?

A I am.

Q In your opinion, and based upon the information you presently have available, are the possible limits of this Atoka-Pennsylvanian zone in this area generally coextensive with the limits of the Southwest Gladiola-Devonian Pool?

A Yes, I believe they will be in addition to the Nearburg and Midhurst No. 1 Moss 4 peak of the northeast dual offset to have drill stem tested the same zone and oil from it. The only other well that has possibly tested it would be the Maxbury No. 1 Rufus Craig. And in Section 27, the reason possibly is that the sand interval is extremely thin and the drill stem test they took covered a very large interval and it did recover water on it.

Q Your No. 1 Well that you have mentioned here is not now within the defined limits of the Southwest Gladiola Pool, is it?

A It is not, other than the fact it is within a mile of the well.

Q You did encounter commercial production in that Pool, did you not?

A We did.

(Whereupon, Applicant's Exhibit No 2 was marked for identification.)

Q Now, I'm going to hand you what has been identified as Exhibit No. 2 and ask you to state what that is.

A Exhibit No. 2 is a log on Nearburg No. 1 Midhurst.

Q Referring to Exhibit No. 2, will you point out to the Examiner the zones that are involved in this application?

A On the lower portion of the regular 2-inch scale in the log, at the 11,119 to 11,124 feet is indicated the perforations in the Atoka sand, on the basil portion of the log at 12,188 to 12,198 we have indicated the Devonian perforations.

Q So you have an interval between the two zones in excess of 1,000 feet?

A That's correct.

Q In your opinion, are these two zones completely segregated by impermeable area zones vertically?

A They are completely separated by the various formations and also with pipe and cement in the well bore.

Q Now, will you state to the Examiner briefly the completion history of the No. 1, which you are now seeking to dually complete?

A Upon drilling to a total depth, 5½-inch casing was set and cemented and then the Atoka sand was perforated at the 11,119 to 11,124. The perforations were washed with 500 barrels of mud acid and the well was placed on production tests. It flowed 358 barrels of oil in seventeen hours on various choke sizes ranging from 1664 to 2464.

Q In the Atoka zone?

A This is in the Atoka zone. The GOR averaged 4,000 to 1. The gravity of the oil was 52 degrees. We do not have bottom hole pressure tests other than that taken on the drill stem test and that pressure, the pressure at that time was 3565.

Q Now, you have stated, as I recall, that the GOR was 4,000 to 1, and the gravity of the oil was 52 in the Atoka zone. Will you give the comparable information with regard to the Devonian zone, please?

A In the Devonian the gravity was also 52 degrees. The GOR was 650 to 1.

Q Do you have any information regarding the flowing and shut-in pressures in the Atoka-Pennsylvanian from your testing?

A The pressures obtained on drill stem test in the Atoka formation are flowing pressure, initial flowing pressure was 2,080, the final flowing pressure was 25, but the initial shut-in -- the

final shut-in pressure, 3565, the significance of this being that we have excellent permeability in the sand.

Q From the information you have available as to the pressure differentiation, do you believe,and considering the relation of that to permeability, do you believe that a well in this Atoka-Pennsylvanian zone will efficiently drain 80 acres?

A I believe it will drain at least 80 acres.

Q Are you, in this application, asking for a temporary spacing which will run consecutively in time with the present order in the Southwest Gladiola Pool?

A Right, for 80-acre spacing along with the specified present order.

Q So you expect if the order is issued, it will have a terminal date which will be identical with the date on which you will have to come before the Commission again for any extension of the 80-acre spacing order in the Southwest Gladiola-Devonian Pool?

A That's correct.

Q Are you also asking that the spacing requirements and well location be the same in this particular pool as in the other Devonian?

A Yes.

Q With regard to the economics of drilling additional wells to this Atoka-Pennsylvanian zone, will you give the Examiner the information you have with regard to computation of reserves and possible payout on the Atoka-Pennsylvanian zone alone, in the event

you were unable to dually complete this well with the Devonian?

A As I have previously stated, we have no core data, only the log data. So by making volumetric calculations from the log, we have a net pay thickness of 6 feet, average porosity of 18 percent, water saturation is 48 percent.

MR. NUTTER: What, 6 feet of pay, 18 percent porosity?

A 48 percent water saturation.

MR. NUTTER: 48 percent water saturation?

A Yes, sir. On the basis of this data, it would appear we will have approximately 125 barrels per acre foot or 750 barrels per acre. This would give you reserves in the order of 30,000 barrels for 40 acres, or 60,000 barrels for 80 acres.

Q What do you estimate the cost of drilling a well would be, drilling and completing a well in the Atoka-Pennsylvanian zone?

A Well, we feel a well, solely for this one particular formation, it would cost approximately two hundred thousand dollars.

Q So then on the basis even of 80-acre spacing this presents a matter of a very questionable investment, is that correct?

A That's correct.

Q If you were called upon to drill wells on the basis of 40-acre spacing, do you believe it would be economically feasible to recommend to your company they drill a well to develop this particular zone?

A I do not.

MR. CAMPBELL: That's all the questions I have of this

witness.

MR. NUTTER: Any questions of the witness?

CROSS-EXAMINATION

BY MR. PAYNE:

Q Mr. Ingram, I believe you testified that you are seeking substantially the same type order as entered in the Southwest Gladiola-Devonian case?

A Yes.

Q I presume you also meant flexible well location pattern so that you can dual these wells?

A Yes, sir, I would want it to go right along with that one.

Q And inasmuch as you have testified the two reservoirs are relatively coextensive at levels you dual the wells, in the area that you drill to dually complete them in both?

A Assuming they are quite productive in both zones.

Q What disposition is being made of the well from the Southwest Gladiola?

A It is going to Service Pipeline Company.

Q It doesn't have to be trucked, then?

A No.

Q Between now and the time the case is heard again for permanent rules, do you propose to gather core data and take interference tests? Do you feel they will be of some benefit?

A Interference tests?

Q One well to the other as additional development in this area takes place?

A We have made no plans to actually shut the well in from the standpoint of running interference tests. The only well, as I say, that is in now is the Nearburg Midhurst, and I assume the Moss Well as soon as it has shown production will probably be quite completed in the similar manner.

Q That's what I'm getting at. The time is going to be excellent to gather additional information on this particular Atoka Pool, inasmuch as the Southwest Gladiola is to be heard again in July, this coming July?

A Right.

Q Do you feel you will have much more additional information as to the drainage in this Pool at that time?

A Well, I feel by the July hearing there will be at least two to four more wells in the area.

MR. NUTTER: In the Atoka?

A Well, in the Southwest Gladiola area, which, to reach the Devonian, they have to go through this formation, they should have that data available.

MR. PAYNE: Thank you.

BY MR. NUTTER:

Q Well, some of the wells in here are Devonian, some of them are Wolfcamp, and some of them Atoka, then one Atoka so far?

A Right, yes, sir.

Q Are any of the wells which are completed in the Wolfcamp and Devonian dually completed?

A No, sir, there are no duals in the area.

Q No duals here yet?

A No.

Q Mr. Ingram, you gave us the bottom hole on drill stem test in the Atoka as 3565?

A We didn't give a bottom hole pressure test to the Devonian. Bottom hole pressure on the Devonian, 4640.

Q You also stated it would cost two hundred thousand dollars to drill to the Atoka for a completed flowing well?

A That's right.

Q What is the estimated cost of the dual completion, if you've got a well to the Devonian, say?

A Approximately two hundred and seventy-five thousand dollars.

Q I meant for the dual completion itself. If you had a well in the Devonian, if you wanted to dual it?

A Additional would be approximately thirty thousand dollars.

Q Stated that Moss had taken a drill stem test to the Atoka, on the No. 4 Well?

A Yes, sir.

Q Do you know if it is their intention to complete that well in the Atoka or not?

A It's my understanding he plans to.

Q What is the status on your lease in the southeast quarter of the northwest quarter of Section 35?

A It was drilled in 1954 by the Lawton Oil Corporation No. 1. It was drilled to the Devonian and was established as a dry hole. We plan to reenter this hole and attempt to make both the Devonian and the Atoka completion.

Q How do the logs look in the Atoka itself?

A They are rather comparable to what they are here, slightly lower.

Q Do you know of any other wells that had a show in the Atoka in this area besides yours and the Moss No. 4?

A The Arthur Maxbury Well upon which the previous hearing was based is structurally the high well.

Q What is the location of that well, please?

A It is in the northeast of the southwest.

Q Of 27?

A Right, yes, sir. No tests have been taken on it. The only three wells that had tests in them are Midhurst, the Moss No. 4, Peck and the current Maxbury Well. Skelly did take tests in their No. 2 Foster in the northeast quarter of the southeast quarter of Section 27. However, it appeared from the logs that they did not include the sand they set the packer right at the base of the sand. One reason, possibly, that the sand has not been tested previously, it is angular, quite coarse, quite quartz sand, which

drills extremely hard, and the shales, both above and below, drill quite softer than this does,and cores of the high gravity and the hard nature of the sand, that you get no visible staining in your samples on it.

Q So all data you gave us, the 6 foot, 18 percent porosity, the 48 percent water saturation, are all estimates, is that correct? None of these are actual measurements?

A They are taken from --

Q Calculated?

A Off the log, yes, sir.

MR. NUTTER: Mr. Campbell, will someone else test on the mechanical installation here?

MR. CAMPBELL: Yes, sir.

BY MR. PAYNE:

Q Mr. Ingram, in the Southwest Gladiola case, if you recall, there might be a fault between the Maxbury and the Moss Well in the Devonian, andthe Skelly Well between them was drilling at that time. Do you have any information as to what that Skelly Well did?

A Skelly Well was completed as a drill hole. It was lower structurally than either the Moss or the Maxbury Wells.

Q That's the reason you bend your contours, to take care of that low well?

A That's the reason, it's the reason the Devonian is relatively the same, I mean with slightly steeper dip, as the structure

we have shown here.

MR. PAYNE: Thank you.

REDIRECT EXAMINATION

BY MR. CAMPBELL:

Q Mr. Ingram, with regard to the Moss Well No. 4 which is northeast of your well, have you discussed this application with the Moss people?

A I have, and Mr. Little called at noon to state he would be unable to be here when -- Mr. Little is with H. S. Moss, and he was running a drill stem test on this well, then he would be unable to -- however, he would like to enter Moss in favor of the proposal we have made.

Q So that Moss, the Moss people favor all of the requests that you are making here, is that correct?

A They do.

MR. CAMPBELL: That's all the questions I have of this witness.

MR. NUTTER: Any other questions of Mr. Ingram?

RECROSS-EXAMINATION

BY MR. PAYNE:

Q Do you think the Moss Well is completed in the same pool as the Maxbury Well?

A In the --

MR. NUTTER: Devonian.

A Devonian. Until we get a little more information, I

think it is extremely difficult to say. I recall at the last hearing we had all of the maps with 98 faults or 48 faults and what not.

MR. NUTTER: Now, the default goes around the pool?

A This is an extremely simplified verson. However, one I can logically say will fit the Atoka picture as we have it now.

MR. NUTTER: These contours --

A On top of the Atoka sand.

MR. NUTTER: This is Atoka and doesn't reflect the structure in the Devonian necessarily, or do you think the Devonian --

A I feel -- in other words, this reflects the Devonian structure that we have.

MR. NUTTER: I see. Which was, the available information would indicate that the Moss Well and the Maxbury Well would be the same pool?

A Right.

Q And the Skelly merely lower on the same structure?

A Yes.

MR. NUTTER: Any further questions of Mr. Ingram? You may be excused.

(Witness excused)

MR. CAMPBELL: Mr. Gray.

RALPH L. GRAY,

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

DIRECT EXAMINATION

BY MR. CAMPBELL:

Q Will you state your name, please?

A Ralph L. Gray.

Q Where do you live, Mr. Gray?

A Artesia.

Q What is your position and business association?

A I am a petroleum engineering consultant.

Q Have you previously testified before this Examiner or this Commission in your capacity as petroleum engineer?

A Yes, I have.

MR. CAMPBELL: Are the witness' qualifications acceptable?

MR. NUTTER: Yes, sir.

Q (By Mr. Campbell) Have you been employed by Nearburg & Ingram in the consulting capacity for the purpose of supervising the installation of a dual completion in their No. 1 Midhurst Well?

A Yes, sir.

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

Q I hand you what has been identified as Applicant's Exhibit No. 3, and ask you to state what that is, please.

A Exhibit No. 3 is a diagram showing the mechanical aspects of this proposed dual completion installation. As the diagram shows, there will be two blower strings of 2 1/16-inch tubing,

there will be a Baker Model "D" production packer, which will be set between the Devonian and the Pennsylvanian-Atoka sand. The long string of tubing will then be set down into the top of the permanent type packer. Then above the Pennsylvanian-Atoka sand will be a Baker Model "K" retrievable type dual packer, and the short string of tubing will be set in with the top of this packer. Then other equipment will be Garret circulating nipple at the bottom of the short string to facilitate changing fluids in the annulus, if desirable, and then there will be seating nipples in the bottom of each tubing string. That, in essence, is the completion.

Q To your knowledge, is this type of dual completion with the twin tubing one that is in use in New Mexico at this time?

A Yes, it's one that is similar to other installations in the State.

Q Do you believe this type installation can be used without any danger of communication between the two producing zones?

A Yes, sir, I do.

Q Do you believe that it can be completed without any risk of waste of oil from either of the two zones?

A Yes, sir.

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

Q Attached to the application in this case, Mr. Gray, I believe there is a diagrammatic sketch of the Christmas Tree assembly. Are you acquainted with that?

A Yes, I have seen that.

Q Referring to that Exhibit, is that proper representation of the installation that you intend to make if this application is granted?

A Yes. That shows the type of wellhead equipment Christmas Tree installation that is proposed. This is normal installation for dual completions.

MR. CAMPBELL: That's all the questions I have of this witness, Mr. Examiner.

MR. NUTTER: Any questions of Mr. Gray?

CROSS-EXAMINATION

BY MR. PAYNE:

Q Mr. Campbell, did this witness propose to testify on LACT?

MR. CAMPBELL: No, sir. We have another witness to testify on the LACT.

Q (By Mr. Payne) It is possible to efficiently lift post zones, if necessary?

A That's right.

Q And the top of the cement on the long string is 8500 feet, is that correct?

A That's correct.

MR. NUTTER: Any further questions of Mr. Gray? You may be excused.

(Witness excused)

MR. CAMPBELL: Mr. Williams.

GEORGE W. WILLIAMS,

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

DIRECT EXAMINATION

BY MR. CAMPBELL:

Q Will you state your name, please?

A George Williams.

Q Where do you live, Mr. Williams?

A Midland, Texas.

Q By whom are you employed?

A Mid-Continent Supply Company.

Q What capacity?

A Divisional sales engineer.

Q As divisional sales engineer, have you had occasion to consult with Nearburg & Ingram with regard to possible installation of LACT unit in connection with their lease on which the Midhurst No. 1 is now situated?

A That's correct.

Q And have you had thereby prepared, your company prepared sketches of the installation that you contemplate using in the event such a unit is approved by this application?

A We have.

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

Q I refer you to what has been identified as Exhibit No. 4 and ask you to state what that is, please.

A This is a proposed LACT system for the Midhurst Lease.

Q Will you, then, point out to the Examiner how the system would operate with regard to the production from this dually completed well?

A Well, the production from the Pennsylvanian and Devonian would come into headers and then the Pennsylvanian production would go through a treater and the Devonian production will go through a treater. We propose to meter the Pennsylvanian production with a PD type meter basin engineering type 8 5 T. The Devonian oil then, and the Pennsylvanian oil would commingle and go to the shipping tank, and you will notice the shipping tank has three switches in it, the four-foot level is the stopping switch, the twelve-foot level isthe starting switch for the LACT unti itself. In the event of bad oil, a BS&W Montrey probe which will divert the bad oil into the bad oil tank by means of a clay valve which is on top of the tank. Both of these clay valves are energized one of them opened on the shipping tank, the other one closed on the bad oil tank. If the monitor detects bad oil, then it will close the shipping oil valve and open the bad oil tank. We have a bad oil switch in the bad oil tank which would automatically start up a surge pump and recirculate bad oil back to the Devonian treater. For safety purposes, we have a high safety shut-in switch which will be operated automatically. And in the event of malfunc-

tion, it will shut in the two safety shut-in valves back at the header. Of course, the LACT unit itself has the normal safety features incorporated in it, such as allowable shut-in in the meter itself and the detector switch in the meter which, in case you weren't getting any oil from the shipping tank, it would shut down the LACT pump.

Q Are you acquainted with the personal supervision that is intended with regard to this lease availability of personnel to check the operation of the equipment?

A Yes, sir.

Q What is the situation on that?

A There would be a pumper by each day, of course, or at least once a day to check this particular equipment.

Q In view of what you call safety equipment that is available here, do you believe there is any danger of the waste of oil as a result of the operation of this system in the event some malfunction develops?

A No, it would simply shut the wells in.

Q To your knowledge, are there other installations of this type or identical with this in operation in New Mexico which have been approved by the O.C.C.?

A There are a number of these which have been approved by the Commission.

Q Do you know offhand any of them?

A Pan American has several in operation, Abo Field. I be-

lieve Great Western has some of them on Caprock. Hondo Oil & Gas in the Abo Field.

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

Q I hand you what is identified as Applicant's Exhibit 5, and ask you to state what that is.

A This is the LACT unit itself which includes a transfer pump, the strainer, air eliminator, a type T-6 meter with allowable shut-in, a sampler, back pressure injuection valve, and also prover connection for prover tank.

Q That is essentially what's to be installed on the LACT unit on this particular installation?

A That is essentially what is going to be installed. That doesn't show the panel. There is a panel for controls.

Q In your opinion, can this system be installed and operated in connection with the production of oil from these two zones without waste?

A Yes, sir, it would probably save light in -- it's a tightly closed system. Any system that is closed will be an advantage conservationwise, it will not lost light.

Q You heard Mr. Ingram testify the gravity of the oil from each of these two are the same, 52, did you not?

A Yes.

Q The oil under this system from those two zones, if approved by the Commission, will be commingled, will it not?

A Yes, sir.

Q Of course, being the gravity that will not affect the value of the oil, will it?

A No, it would not.

Q Has this installation been discussed with the pipeline purchaser or the purchasing company who is, which is running this oil?

A Yes, sir, I discussed it with Service Pipeline at Lubbock andthe New Mexico office.

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

Q I hand you what has been identified as Exhibit No. 6, and ask if that is a letter directed to Mr. Ingram in connection with the discussion of the installation from the Service Pipeline Company?

A Yes, this is the letter.

Q This letter does approve the installation, does it not?
A Yes, sir.
Q . I notice they have made reference to the necessity for installation of the back pressure ahead of the prover tank connection.

A That's shown on the diagram there, the schemmatic, the back pressure valve is placed in back of the prover connections.

MR. CAMPBELL: I have no further questions of this witness.

MR. NUTTER: Any questions of the witness?

CROSS-EXAMINATION

BY MR. PAYNE:

Q Mr. Williams, if I understand your diagram right, you don't promise to separately meter the production from the Devonian?

A That's correct. We would just simply meter the Pennsyl-

CROSS-EXAMINATION

BY MR. PAYNE:

Q Mr. Williams, if I understand your diagram right, you don't promise to separately meter the production from the Devonian?

A That's correct. We would just simply meter the Pennsylvanian and deduct that from the total from the LACT meter, and that would be the Devonian production.

Q Doesn't that charge all the shrinkage that might occur, if any, to one zone only?

A I don't believe so. I think we have plenty of time in the shipping oil tank to allow that that.

Q How are you going to attribute the shrinkage back to each zone if you only meter one side 50 percent to each?

A I feel they're both the same gravity, probably be the same amount of shrinkage.

Q Do you think there is any shrinkage in the LACT system of this type, or do you consider it negligible?

A Negligible, yes, sir, negligible amount.

Q Do you feel that in a case where an operator only going to use one meter you should use a non-reset type meter and take his allowable as reflected by the meter reading since there isn't going to be any shrinkage, or it's going to be negligible?

A I didn't understand that question.

Q Well, now, usually what you do, say your allowable is

100 barrels, you deliver that one hundred barrels to the tank where you sell it, isn't that right?

A Yes, sir.

Q Now, assuming there were shrinkage, 105 percent might have gone through the meter and be reflected by the meter, might there not?

A That's possible.

Q So that if there is no shrinkage, the meter reading should be actual oil that's sold and should, therefore, reflect the allowable. In other words, you have 100 barrels, you run 100 barrels through the meter?

A Right.

Q And I don't suppose you can speak for the operator in this case, but would such an installation seem reasonable to you?

A Well, it can be easily installed, we are just trying to conserve some money, around five hundred dollars additional cost for that type of meter.

Q What would two meters cost?

A I'd say five hundred each.

Q Five hundred each?

A Yes, sir.

MR. PAYNE: Thank you.

BY MR. NUTTER:

Q Mr. Williams, you mentioned the names of a number of installations similar to this in operation in the State of New

system which the Commission considers essential to properly meter the oil I am sure would be installed by the operator, but it is a matter, as the Commission knows, of economics.

A Yes, sir.

Q Mr. Williams, what make of meter is that? T-6,A O Smith T-6?

A Yes, sir.

Q Now, how much space is available in this 500 barrel shipping tank from the 12-foot high level switch up to the top of the tank where it goes up to the overflow into the bad oil tank?

A Well, this is a 16-foot high tank, so you would have 3 feet.

Q Which would be roughly a fifth of the capacity of the tank or maybe 100 barrels?

A 32 barrels per foot. 16.

Q You've got 100 barrels of capacity above the high level switch then?

A Yes.

Q Normally, the bad oil tank would be empty, would it not?

A That's correct.

Q It has a capacity of 500 barrels?

A Yes, sir, five hundred barrels of available space prior to the time the high level safety shut-in switch is acquiescated. I misunderstood. You want above the high safety shut-in switch there?

Q The high level?

A The 12-foot high level switch.

Q What I'm thinking of, in the event that a malfunction of the equipment should occur, just prior to turning on just when the oil gets up to the 12-foot level, then you have a malfunction and the wells are still producing all right, you've got three foot of available space from the 12-foot high level switch to the high safety switch in equivalence --

A Right.

Q -- would be approximately 100 barrels?

A Yes, sir.

Q And then overflow?

A Actually, you wouldn't have an overflow because your well would shut-in there because the high level switch is below the equalizer line.

Q Good oil would never overflow there into the bad oil tank?

A That's right.

Q [illegible]. In the event of malfunction, 100 barrels of available storage capacity prior to the time the high safety shut-in switch is adequate at this time?

A That's right.

Q Which switches in the header?

A Yes, sir.

Q These are high pressure valves?

A Yes, sir.

Q What accommodation is made for this high pressure on these flow lines while these wells are shut-in?

A These lines will be buried, and there will be pipe for the return of these wells.

Q What is the strength on this type of pipe?

A Sir?

Q What is the test pressure on these flow lines?

A It will show the pipe will carry approximately 4000 pounds per square inch.

Q What are the shut-in pressures on these wells?

MR. WILLIAMS: Do you have that information, Mr. Ingram?

MR. INGRAM: The shut-in pressure on the Devonian is around 900 -- excuse me -- 700 pounds, and on the Pennsylvanian it was 1800 pounds. Surface pressure per specification.

MR. WILLIAMS: Well, both these safety pounds have body of 3000 pounds working pressure. They are normally closed valves and will require pressure to open them, so any malfunction in there we lose our pressure, and they will automatically shut-in, and, of course, if the high safety valve there rises, why, it will send a signal down and relieve the pressure.

Q Is there any known corrosion problem in the Devonian or Atoka in this area?

A Not to my knowledge.

Q And you don't anticipate, then, you will need any kind of corrosive resistance equipment in this automatic custody trans-

for unit?

A That's right.

Q Mr. Ingram, have you encountered corrosion difficulty with regard to the oil from these wells?

MR. INGRAM: We have not.

Q Do you know of anyone producing Devonian who has encountered any corrosion problem?

A No, sir, not in this pool.

BY MR. PAYNE:

Q Have you had any parrafin problems?

MR. INGRAM: No, sir.

MR. NUTTER: Any further questions of the witness?

MR. CAMPBELL: I would like to offer Exhibits 1 through 6.

MR. NUTTER: Nearburg & Ingram's Exhibits 1 through 6 will be entered into evidence.

(Whereupon, Applicant's Exhibits 1 through 6 were received in evidence.)

MR. NUTTER: Do you have anything further?

MR. CAMPBELL: No, I don't believe I do. I'm sure the Examiner understands what we are trying to do here is to have an opportunity to produce this well as a dually completed well and obtain what information we can to present to the Commission in July. I also believe --

MR.INGRAM: I would like to make one remark in regard to

the metering situation. In other words, it's -- I feel it's not a question of just installing one more;if we install more meters we will have to install at least two. My reason on that being we have one on our Pennsylvanian flow line, and then it would also, for this to be accurate, also be necessary to put one on the bad oil line. Any oil that went around our system, the difference between this meter and the one we have would be the amount of oil that is produced by the Pennsylvanian. In other words, if any bad oil is produced by it from the Pennsylvanian or the Devonian, we have it set up to go back through the Devonian treater on it.

MR. NUTTER: Is either one of these wells making water?

A Well, on the drill stem test that we took, we made a slight amount of water. On the limited production test that we ran on the Pennsylvanian we did not make any water. However, we feel that if one of two zones are going to make water, it would probably be the Pennsylvanian zone so that the Devonian meter would have the less amount of work. So, therefore, we ran the bad oil back through it.

MR. NUTTER: Have you actually had to install treaters?

A We have not. As of now, we just have had a separator on the Devonian side.

Q So far separation is handling the production without treating?

A It is, yes, sir.

Q Now, in circulating the system back to the bad oil line,

will that be a manual or an automatic circulator?

A Automatic.

MR. WILLIAMS: The bad oil switch starts that pump.

MR. NUTTER: Starts the bad oil pump and that is activated by the monitor?

MR. WILLIAMS: That's correct.

MR. CAMPBELL: I think, Mr. Examiner, there is another owner of property in the area present that desires to make a statement, enter a proposal in the case.

MR. NUTTER: Do you have anything further, Mr. Campbell?

MR. CAMPBELL: No.

MR. NUTTER: Does anyone have any statement in Case 2134 or 2135?

MR. HARTLEY: I would like to enter an appearance for some mineral owners who are also interested in the drilling of this area.

MR. NUTTER: Would you state your name?

A Earl Hartley, appearing for myself and for Brady Lowe, and Lowe Land Company. And wish to make a further statement. We concur in the request and request that you consider the evidence presented as part of our evidence in the case.

MR. NUTTER: We sure will. Does anyone have anything further for this case? We will take the case under advisement, and the hearing is adjourned.

STATE OF NEW MEXICO)
) ss
COUNTY OF BERNALILLO)

I, LLEWELYN NELSON, Court Reporter, in and for the County of Bernalillo, State of New Mexico, do hereby certify that the foregoing and attached Transcript of Proceedings before the New Mexico Oil Conservation Commission was reported by me in machine shorthand and reduced to typewritten transcript, and that the same is a true and correct record to the best of my knowledge, skill and ability.

WITNESS my Hand and Seal this, the 16 day of Dec, 1961, in the City of Albuquerque, County of Bernalillo, State of New Mexico.

Llewelyn Nelson
NOTARY PUBLIC

My Commission expires:

June 14, 1964

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 2134 and 2135 heard by me on 11/30, 19 61.

....., Examiner
New Mexico Oil Conservation Commission