BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
November 10, 1959

EXAMINER HEARING

IN THE MATTER OF:

Application of Franklin, Aston & Fair, Inc., for a water flood project. Applicant, in the above-styled cause, seeks an order authorizing it to institute a water flood project in the Grayburg-Jackson Pool in Eddy County, New Mexico, by the injection of water into the Grayburg formation through 6 wells located in Sections 25 and 26, Township 17 South, Range 30 East. Applicant further seeks the establishment of an administrative procedure whereby capacity allowables may be assigned to wells in said project without notice and hearing. Case 1806

BEFORE:
Elvis A. Utz, Examiner

TRANSCRIPT OF HEARING

MR. UTZ: The next case will be Case 1806.

MR. PAYNE: Application of Franklin, Aston & Fair, Inc., for a water flood project.

MR. KELLAHIN: If the Commission please, Jason Kellahin, Kellahin and Fox, Santa Fe, representing the Applicant. Associated with me is Mr. Curtis McBroom, a member of the Texas Bar, who will handle the presentation of this case.

MR. McBROOM: On October 1st, Franklin, Aston & Fair filed an application with the Commission which will be of record

in the case and the Commission has a copy of it, requesting permission to institute a water flood on certain of their leases in the Grayburg-Jackson Field in Eddy County, New Mexico. The plat was attached to that and we wish to have it as part of the record of this case. However, we will introduce as an exhibit a larger plat which may help the Commission in its looking at the matter. The application was made under the rules which were in effect at that time. We understand that yesterday the Commission issued a new rule. We have not had an opportunity to study that rule except those phases of it which had previously been presented. We understand that there are some changes made over the recommendations of the rule that was proposed, so our presentation of this case is based on the information that we presumed that we would need under the previous rule. If we have not assembled sufficient data to meet the requirements of the new rule, if we come under the new rule, we will get that information for the Commission as readily as possible.

We would like to go ahead and present everything we have. We believe we have everything that will be needed.

MR. UTZ: All right, sir, you may proceed. Are there other appearances to be made in this case? If not, you may continue.

MR. McBROOM: I want to call the attention and get in the record that the application did request the right to put water

in the Applicant's Arnold No. 2, Brigham J. No. 1, Stevens No. 1, Stevens No. 2, Stevens No. 3 and Stevens No. 6 and Stevens No. 7. I would like to call Mr. H. C. Porter to the witness stand.

MR. PAYNE: Would you stand and be sworn, please?

(Witness sworn.)

HAROLD PORTER

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

DIRECT EXAMINATION

BY MR. McBROOM:

Q Mr. Porter, I will ask you to state your full name, address and your technical qualifications to appear as a technical witness in this case.

A My name is Harold Porter. I live at Artesia, New Mexico. I attended college and graduated from the West Point Military Academy in 1943. I am a graduate of the Engineering Reservoir School at Texas A. and M. I have worked for Delhi-Taylor Oil Corporation as a production engineer from 1953 until 1956 where I went through their training program and was field engineer in charge of a water flood project for them. Subsequent to that I worked for the Kewanee Oil Company on a water flood project in Oklahoma. I've worked for Ambassador Oil Corporation and Water Flood Associates, Incorporated of Ft. Worth. I have been in direct charge of the engineering and the operations of four major water flood projects. I'm a registered

professional engineer in the State of Texas.

Q And you are presently associated with Water Flood Associates?

A Yes, I am.

Q Mr. Porter, I hand you herewith this large plat that we mentioned and ask you to identify it.

A This plat shows the ownership and well status of the leases and the field under consideration and will be marked as Exhibit No. 1. It shows the well location on the Franklin, Aston & Fair properties, and also offset wells.

MR. UTZ: Just a moment, do you have copies of this exhibit?

Q Do you have extra copies of this exhibit?

A Yes, I do. Would you like for me to pass this down?

MR. UTZ: Yes, we would like to follow it as you testify.

(Marked Applicant's Exhibit No. 1, for identification.)

Q (By Mr. McBroom) Mr. Porter, have you made a field study and a study particularly pertaining to these leases?

A Our company has made a study of this field. The study was made by Bert Murphy of Ft. Worth. However, I helped him and am familiar with the study. This field was discovered in 1930 with production from Zone 6 of the Grayburg formation at approximately 3100 feet deep. The formation produces 36 degree API

gravity oil. The cumulative primary production from the subject Franklin, Aston, Fair lease has been on the order of 338,000 barrels. Exhibit No. 2 will show --

Q I'll hand you this and ask you to identify it.

A This is Exhibit No. 2. It shows the monthly production rate from the leases of Franklin, Aston, Fair in question, or under consideration. It shows the oil production rate in barrels per month and in barrels per day per well over the past two years.

Q What does that show?

A Well, it shows a completely depleted reservoir.

Q What is the average well production?

A The average well production is less than 2 barrels per well per day.

MR. McBROOM: I present this as Exhibit No. 2.

Q In the course of your field study you assembled the data on the wells that was available. I hand you here what will be Exhibit No. 3. Will you identify that?

A Yes, sir, Exhibit No. 3 shows geologic data for the whole Premier field, shows the top of the Grayburg, top of the San Andres, size and depth of the loose casing, oil pay thickness and a total depth, initial potential, and other completion data.

Q Let me ask you a question. I notice this is marked Premier Field. I'm sure the Commission knows, but for the record will you tell about this changeover from Grayburg-Jackson to Premier?

A This was originally carried as the Premier Field, I believe in 1957, for keeping data for the New Mexico Engineering Committee, it was all classified as Grayburg-Jackson. However, this is what was previously known as the Premier Field.

Q The pay from these wells is not typical of the pay in the whole Grayburg-Jackson Field?

A No, the whole Grayburg-Jackson Field produces from many zones, the Queen, San Andres and Grayburg. This field produces from Zone 6, which is one of the Grayburg series.

MR. McBROOM: In order to get as much of the preliminary information before the Commission, we'll go ahead with the exhibits.

Q I hand you what will be Exhibit No. 4 and ask you to identify it.

A Exhibit No. 4 shows the productive limits of the Premier Field.

Q That's of this Zone 6?

A Yes, this is of the Zone 6. The reservoir is a true sand lens with permeability pinchouts occurring around all flanks. The principal primary reservoir energy source were the expansion from solution or solution gas drive reservoir.

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

Q I hand you what will be Exhibit No. 5 and ask you to

identify it.

A Exhibit No. 5 is a map showing the recovery in thousands of barrels per well and also the net productive interval in each well. The significance of this is that it does verify the Exhibit No. 4 that was just submitted defining the limits of the field.

Q These figures on here are what's indicated as the net feet of sand and the original I.P.?

A No, that's Iso recovery. That is the thousands of barrels recovered from each well.

MR. McBROOM: The top number is in thousands of barrels, that 57,000, and that's what the log showed to be nine feet of pay.

Q At this point, in connection with that, let me ask if you have any core analysis or electric logs, anything other than just the old driller's logs to back up this data?

A No, sir. This data was all taken from driller's logs, there are no electric logs or gamma ray neutron logs or core data available on any of these wells.

MR. UTZ: So your pay was taken from samples?

A Yes, sir, driller's logs samples.

Q I hand you Exhibit No. 6 and ask you to identify it.

A Exhibit No. 6 is an Iso initial potential map of the Premier Field showing the number of barrels per day for which each well was initially potentialed, it correlates very well with that Iso recovery map, by the way.

Q In other words, the wells that made high initial potentials made the most oil?

A As a rule, that's true.

Q I'll ask you to identify what appears to be a cross section to be identified as Exhibit No. 7.

A This is a cross section of the Grayburg-Jackson and Premier Fields running north and south. It will serve to show the continuity of Zone No. 6 across the Premier Field.

MR. McBROOM: I believe we only have one copy of this, but we will furnish you additional copies. We just don't have them with us.

MR. UTZ: Well, that won't be necessary after the hearing is over.

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

A I have one here, I can take it off this report.

MR. McBROOM: Here's an extra copy.

Q (By Mr. McBroom) I hand you what will be identified as Exhibit No. 8 and ask you to explain that.

A Exhibit No. 8 is a table showing the well data; included in that is the elevations, the present well status, completion dates, any stimulations, all the casing data, size and depths and number of sacks of cement and so forth, cumulative production from each well and geologic data such as the tops of the Grayburg,

producing zones, and zone thickness. You'll notice in each case that the surface casing has been cemented to below 500 feet with 50 sacks of cement. The long strings have been 5½ inch or 7 inch cemented with 100 sacks of cement on top of the productive interval, and the completion has been an open hole. Several of the wells have been shot with nitroglycerin and several of them have also been subsequently fractured with sand-oil treatment.

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

Q You have analyzed the present condition of the lease as far as equipment and usability and operation, you say it's only producing an average of about 2 barrels a day but is the lease in an operative condition?

A Yes, sir, it's producing approximately 2 barrels per well per day. The production equipment is in very good operative shape.

Q In other words, if more oil would come in you would have the equipment there to produce a great deal more oil than the 2 barrels per day?

A Yes, sir, it has very good lifting equipment and can probably, I would say off hand that the present equipment could lift 200 barrels of total fluid per day per well.

Q Now, is it at this depth and under the operating conditions, is it practical to continue to operate this lease as it is presently being operated?

A No, sir, unless production can be stimulated by some secondary recovery method, these wells are at or beyond the economic limits.

Q Have efforts been made to stimulate them by frack and acid?

A Yes, sir, efforts have been made, they have been shot with nitroglycerin and they have been fracked and that sort of stimulation has been tried.

Q As an engineer have you made any recommendations, or are there any recommendations that you would make to stimulate this production where it would make it a commercial operative lease?

A Yes, sir, our study shows that this lease has very good water flood potential. This sand is very similar to other Permian sands being successfully flooded in other portions of the Permian Basin. The reservoir statistics compare very favorably and there's every reason to believe it would respond very well to a pattern water flood.

Q Are there any other floods in this field?

A No.

Q Where is the closest water flood to this field?

A The Newmont Oil Company flood in the Locc Hills is, as far as I know, the closest.

Q About how far away would that be in miles?

A I would say around three miles. I don't know exactly.

Q This is not a part of the same field?

A No, sir, it's a different field.

Q Have you calculated what you could expect by water flooding and how you would plan a water flood on these leases?

A Yes, sir. We have calculated that the primary, cumulated primary recovery from these leases would be 9.2% of the original oil in place, or 2 barrels per acre foot. A pattern water flood should recover something on the order of 205 barrels per acre foot, which would be 844,000 barrels of secondary oil.

Q Have you worked out a pattern or plan?

A Yes, sir. That's Exhibit No. 8 I believe.

MR. McBROOM: No. 9.

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

Q Will you identify this?

A This is Exhibit No. 9, the proposed water flood development program of the Premier Field, which shows the wells which we have applied for to be converted from producing oil wells to injection wells. It shows how the rest of the field could be developed on a cooperative basis by the conversion of other operator's wells to injection wells.

MR. McBROOM: For the benefit of the Commission I would like to make a statement right here which is not a technical statement and Mr. Porter can't testify to. But I want to tell the

Commission that the property shown as Nash, Windfohr and Brown, that our people have had discussions with them. Mr. Windfohr is in Europe right now. Just before he left in September, at which time it was not presumed that it would move quite so fast, he indicated his interest and willingness to cooperate immediately. As I say, he's in Europe and he handles this thing exclusively. It was not possible to get him to join in the application. I cannot tell the Commission that he will make application. I can only say that he has told me that his wells are down to making nothing too and he said, "Well, if you can get this worked out, why we would be interested in going along."

Another offset operator is Ambassador Oil Company, who have been contacted, and I thought would be here today or have some representation here today. They have indicated that they actually acquired this property along with other properties for the purpose of water flood.

The other offsetting property, which is marked as Knox in the North Half of the Northwest Quarter of 26, is now owned by Mrs. Knox, a widow whose husband was a very close friend of mine, and I have been advising with her on that and we have offered to handle it for her on a cooperative basis, and she has said "Well, fine, if you get this thing started I'll let you handle it."

The General American people have already started a flood in the, I believe it's in the Grayburg-Jackson Field in the limestone,

not in the sandstone. That we should correct in your reference, Mr. Porter, to not being any other floods in this field. General American does have a pilot or something in that limestone, am I right?

A Yes, sir, it's in the Grayburg-Jackson Field, but it's not in the Premier sand as such.

Q (By Mr. McBroom) That is still very new, has it had any indications yet of anything?

A Yes, it's responded and is still in a pilot stage, but it's looking very good.

Q So that what I was trying to say in this statement is that although the other offset operators are not here and have not filed or joined in this petition, they have all been contacted and we are prepared to go ahead with this project, which would give us instead of a regular five-spot, would give us a staggered line type of flood until the other people do decide to flood, which is just the way it was originally started in the Artesia Field, just the way it was originally started in the Caprock Field, and is the typical way that small water flood projects are started all over the country. I just wanted to get that statement in to clarify this offset ownership which you couldn't testify on.

A Yes, sir, to finish answering your question, this pattern which is shown on Exhibit 9 will effectively recover the secondary reserves of this field and at the same time will protect the

correlative rights of royalty owners and operators. From this pattern I can see no adverse effect to other operators or royalty owners other than, well, no adverse effect to operators or royalty owners, period.

Q Where will you get the water to inject in these wells?

A Arrangements have been made with the Caprock Water Company of Artesia, New Mexico to sell us water. I have a letter which was written to Franklin, Aston, Fair, Incorporated dated November 6, 1959. It says, "Gentlemen: In reply to your inquiry, the Caprock Water Company is pleased to offer 4,000 barrels of water per day to you for water flooding purposes to be used on your leases in Sections 25 and 26, Township 17 South, Range 30 East, Eddy County, New Mexico. Our main 6 inch line runs approximately 5,000 feet north of your property line. The water will be made available to you at this point at the price quoted in our letter to you: this starting at 3 3/4 cents per barrel and graduating down to 2 1/2 cents per barrel as total accumulated water increases. This water is available at present and will be kept available for six months from this date and, if purchase is begun within this six months, for as long thereafter as your demands may require. Very truly yours, CAPROCK WATER COMPANY, Harold N. Morgan."

MR. McBROOM: I didn't think it necessary to put that in as an exhibit since you read it. Do you think it's a necessary

item for an exhibit?

MR. UTZ: Not unless you care to put it in it won't be, it's in the record.

A To finish answering your question, the anticipated injection rate for the six wells is 2,000 barrels per day or 333 barrels per well per day, and it is anticipated that this will be at approximately 1200 pounds per square inch after fillup. The total amount of water which will be used over the anticipated seven and a half year life of this project will be 5,480,000 barrels.

Q Now, Mr. Porter --

MR. UTZ: Excuse me just a minute. That 5,280,000 is just for the area that you have outlined here?

A Yes, just for the leases Franklin, Aston, Fair which is outlined there.

MR. IRBY: Is that figure five, two, eight, 5,280,000?

A 5,480,000.

Q (By Mr. McBroom) Now, Mr. Porter, in connection with this programming of a water flood and the injection of water, you've already testified that you have an expected potential of 844,000 barrels from these wells. Have you planned to the point where you can tell the Commission how this will happen?

A Would you restate that question?

A Well, have you made a study in connection with preparing your program and recommendations which will show the Commission

how you would expect this program to react over the period of time, the production in barrels and time?

A Yes, sir. From empirical curves which have been made of other water flood projects in Permian sands, it is known the percentage of oil which will be recovered in each increment of percentage of total time of the flood. That empirical curve has been applied here, and Exhibit No. 10, which will be entered, shows a projected production curve for the project.

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

Q Will you explain to the Commission this curve and how you expect it to happen on this production, why it would work that way?

A Well, beginning with injection say on the first of 1960, the production would increase to a point which would be equal to 42 barrels per day, by the end of 1960 or the beginning of 1961. During this period of time 58,500 barrels of oil would have been produced. The allowable, had it been 42 barrels a day for that period, would be 262,800 barrels, or we would have underproduced 204,300 barrels.

Q Let me ask you right there, Mr. Porter, could you hurry that production up any faster than you have it outlined there by your injection, or is this a maximum?

A This injection is a maximum adequate rate.

Q Why do you predict your curves here based on injection at a maximum rate?

A In order to recover the most primary reserves and not to do any bypassing from not having the greatest amount of water entering the stands possible, still staying beneath the breakdown pressure. You understand that in my opinion the oil production is directly proportionate to the pressure drop across the water flood front, and in order to maintain that pressure drop at the maximum it is necessary to inject the maximum pressure, and therefore you have to inject the maximum quality of water you can, any slowdown of injection would necessarily bypass water in the tight zones.

Q You think from your curves here that by putting the maximum, your study of this field, of these leases, that putting in the maximum amount of water that this actually is what you would expect to happen as represented by the curve on this Exhibit 10?

A Yes, sir, that's true. That's what we would expect the production curve to look like.

Q And that is based on actual experience in other floods, Mr. Porter?

A Yes, sir, this curve is drawn from an empirical curve from actual field data from other Permian Basin water floods.

Q Let me ask you if in light of the allowable limitations which have been indicated, if you were to attempt to water flood

this project knowing that you could not produce more than the average of 42 barrels on the unit, would you still put in your maximum amount of water at the beginning?

A Yes, sir, I would.

Q Then how would you stop your production when it reached the 42 barrel average?

A The only way, of course you can't produce the oil if you can't sell it, therefore you have to limit the production from your well. If you have to do that you also have to limit the injection into your injection wells.

Q In other words, you are saying that you would push this as hard as you could until you got your production up to 42 barrels a day as indicated on this graph?

A That's right.

Q Then you would reduce your injection?

A Yes, sir.

Q What happens then?

A Well, like I said before, when you reduce your injection and also reduce your production, you necessarily reduce the pressure drop across any flood that currently may have been established and bypass the oil in the tight microscopic pores and also in the, on a larger scale in the tighter sand strata.

Q This graph here indicates that during a two and a half year period you would produce 300, it's a two-year period, you would

produce 362,088 barrels, no, your line is down here, that you would produce 492,000 barrels.

MR. McBROOM: So the Commission understands what this graph is, the bottom two lines here represent the production for two years based on a 42 barrel allowable, or the production for two and a half years if you were on a 35 barrel allowable. So we're now thinking of the 42 barrels, so this 492,000 barrels is the barrels that would be produced during that period if there was no restriction.

Q Under the restriction how many barrels would you produce?

A If you were limited to 42 barrels per day per unit you would have produced during that period of time 362,880 barrels, which means that you would, your allowable would have meant that you would not have produced 129,180 barrels had you been subject to no curtailment. This is average over a two-year period of only 15 barrels per day per well over that two-year period.

Q What we would like to tell the Commission is that by cutting this back where you would produce or try to produce 362,000 barrels which you would be allowed instead of the 492,000, you would not produce this 129,000, what do you think you would to your flood in terms of ultimate recovery?

A Well, based on my experience, and I have had an experience very similar to this in a flood in Texas, your flood when you start out would respond very similar to this. When you curtail

your production, curtailed your injection, your water cut would immediately increase, I mean your percentage water cut would immediately increase, even though as you started lifting more total fluid, I mean more water with your oil and increased your injection later, you still would never recover your oil production that you would have had.

Q In other words, it's your thought then that, as I understand it, that probably when you cut this back that you wouldn't even be able to produce your 362,000 of oil because of your increased water cut?

A Yes, sir, that's what I believe and that has been my experience.

Q How much of this total cumulative of 884,000 barrels would you estimate would be lost by this cutback?

A I'd estimate somewhere around half of it would be lost.

Q That you would lose actually more than 362,000?

A Yes, that's true.

Q You would actually lose some of the additional?

A Yes, one, the water has established a high saturation through a highly permeable zone, a greater percentage of your water will be going through this zone.

Q Now, Mr. Porter, your graph shows that during the first two years, the first year and a half, that you would produce only 58,500 barrels, but under your allowable up here of 42 barrels

you would be allowed to produce 262,800 barrels, is that right?

A Yes, sir, in that case had you been assigned 42 barrels a day for this initial period of a little over a year, you would have been underproduced 131,100 barrels. Pardon me, the wrong number. 204,300 barrels.

Q Now, if there were some way under the regulation to be allocated this allowable from the beginning of water flood, this 204,000 barrels that you are underproduced during this initial period, would more than offset the 129,000 barrels that you would be overproduced during this peak period, is that right?

A Yes, sir, if there was some way that you could accrue this 42 barrels per day over your initial period when your production was low and waiting for response, it would more than offset any peak production that you had over and above the 42 barrels a day allowable.

Q Now, in order to get a flood like this started you have shown that you have water here that will be furnished at a beginning rate of over three cents, almost four cents a barrel. What other expenses go into this first year or so before you start getting any oil?

A Well, you have a terrific expense of operating plant, and your technical services, your engineering costs and so forth and your outlay as far as equipment is concerned is just as great as if you had a capacity allowable or whether you are limited

capacity, because you are putting the maximum amount of water in the ground that you possibly can, because there's no depreciable investment on plant and equipment.

Q From the very beginning you are water flooding, even though you aren't producing the oil yet?

A Yes.

Q You have all those expenses and all that outlay?

A Yes, sir.

Q As a consultant and engineer on this particular project, Mr. Porter, without in any way binding your principals, without in any way binding Franklin, Aston & Fair or anyone else that's involved on this program, if you are limited to 42 barrels a day at the time this starts to peak out without any credit given for previous production or anything, if you just have to cut your production back to 42 barrels a day, would you be willing to take the responsibility to program that for them?

A No, sir, I wouldn't recommend that this project be flooded. I feel that it would be a waste of a natural resource to do so if it were necessary to curtail this production as limited by this 42 barrels a day.

Q Now, they can make some money out of it even if they cut back, can't they, or can't they?

A Well, they possibly would break even. They wouldn't make a reasonable return.

Q In other words, you think they would be smarter to take all this equipment that they have on the nine or ten wells and use it some place else rather than use it in a water flood under these conditions?

A Yes, sir, under these conditions the only thing that I could recommend to them would be to plug and abandon these wells if the thing cannot be water flooded without curtailment.

Q I understand that this testimony in no way is reflecting on them and they still are asking for their permit even on this whether you do it or somebody else does it for them?

A Yes, sir.

Q In other words --

A That's my belief. That's what I think about it.

MR. McBROOM: I believe that is all that we have. That's all as far as we are concerned, if the Commission has some questions to ask.

MR. UTZ: Did you wish to enter your exhibits?

MR. McBROOM: Yes.

MR. UTZ: Is there objection to the introduction of Exhibits 1 through 10? Without objection they will be entered into the record.

MR. ASTON: Would it be possible for me to make a statement at the close?

MR. UTZ: Yes, sir, we will hear the statements at the

close of the case.

MR. PAYNE: Before proceeding further, in view of the testimony of this witness, I move that the record in Case 1787 be incorporated into this record and that the Examiner take administrative notice of the order entered in that case.

MR. UTZ: That was the water flood case in Roswell recently?

MR. PAYNE: Yes, sir.

MR. UTZ: I think it's appropriate that the record in Case 1787 be entered in this record and it is so ordered.

CROSS EXAMINATION

BY MR. UTZ:

Q Mr. Porter, referring to your Exhibit No. 10, will you tell me how much oil you intend to recover by secondary methods?

A Which exhibit is that?

Q That's your last curve. To depletion of the field or depletion of the project in question here by the use of capacity allowables.

A It has been estimated that 844,600 barrels of cumulative secondary recovery will be produced.

Q That's to the end of 1967?

A Yes, sir.

Q That curve is your production curve?

A That's the cumulative production curve. This other curve,

the one shown here, is your daily rate.

Q I see.

MR. McBROOM: That's marked on what I intended to have it, on the original exhibit.

A This is cumulative.

Q (By Mr. Utz) How much oil to depletion, to the end of your project, do you anticipate that you would obtain with the 42 barrel per day limitation?

A That has not been calculated, and I don't know of any way to calculate it. It can be estimated from other floods that we have seen which have been for some reason or another production has been, production and injection has been curtailed, and of course we know it would peak out at 42 barrels per day per unit, which here would be just slightly over 500 barrels per day, and then it is my feeling that the project would fall off at a rapid rate, and I would estimate that it would be somewhere around half of the 844,000 barrels.

Q What was the figure that you gave for primary recovery for this area in question?

A 338,000 barrels cumulative primary.

Q That's just in the area that you have outlined on your exhibits?

A Yes, sir.

Q Did these wells, when they produced 333,000 --

A Yes, sir, I am quite sure they did.

Q --did your operators make money?

A Yes, sir, I'm quite sure they did.

Q If you only recovered half of 844,600 will you not make money on this project?

A I feel that you might possibly break even. Your operating costs to operate a water flood project are tremendously greater than primary operating cost.

Q You mean the initial cost, the overall cost costs more than it does to operate a primary?

A No, I wasn't referring to the development costs. The operating costs, the overhead, the labor, the intangible costs such as for power and so forth are at least double the operating cost for a primary lease.

Q But you are not including any investment for drilling wells and so forth?

A Not when I say operating costs, no, sir, that would be development.

Q The question I'm asking is including all the costs contingent with your water flood operation, if you recovered 422,300 barrels of oil out of this project, will you make money?

A I don't feel that you will. I feel that possibly you'll break even. I can give you development cost figures on that if you would like.

Q I just want to make a comparison between your operating costs, not only your operating cost, but the complete cost of your water flood project as compared to your project. You say you made money producing 338,000 barrels. I want to understand why you can't make money producing 422,000 barrels.

Q Sir, there were eight wells produced on the project including the two plugged and abandoned wells. I would estimate that they cost, put them in the tank ten dollars per foot, which would be around $31,000 apiece, which would give you a total investment for primary of somewhere around $250,000. Thereafter your operating costs, now that would be a development cost, the operating cost would be for that lease, I would not think it would run over $800.00 per month. I mean that would be an estimate on my part. The money that we must spend to develop that thing for water flood I estimate to be around $234,000.

Q That's in addition to the equipment that's already on the lease?

A Yes, sir. The operating costs we've found from experience on a water flood project is $250.00 per well per month, which is $2,000 per month or double your operating costs for primary production. So your development cost is very nearly the same and your operating costs are practically double.

Q You anticipate that you will recover considerably more oil than you did in primary?

A If we're allowed to produce it the way we would like to.

Q Even producing at the 42 barrel rate, I believe your testimony was that you would recover 422,000 barrels or half of the 844,000 barrels?

A Yes, I said I felt that we would produce somewhere around half of what we would without restriction.

MR. UTZ: Are there other questions of the witness?

MR. PAYNE: Yes.

BY MR. PAYNE:

Q You can increase your allowable by putting additional injection wells on the 40's, could you not, under Rule 701 as revised?

A I haven't studied that rule. It only came out yesterday. If you say so, I'm sure you are familiar with it.

Q I believe you testified that you have the same expenses in a water flood project whether you are producing at capacity or whether you are producing at restricted rates since you have, you install your equipment and you have a water flood project going and therefore the expenses would be the same, is that right?

A Yes, sir, I would say they would be practically the same.

Q What if you back pressure the producing wells and make them flow, you don't have to have pumps on them, do you?

A No, sir, that's right, you don't.

Q That would cut your cost, wouldn't it?

A Yes, sir, that would cut your cost.

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

REDIRECT EXAMINATION

BY MR. McBROOM:

Q What happens when you back pressure a water well on water flood?

A Well, as I mentioned before, if you did this you would cut down your pressure differential across your front because you are not pumping. In all the literature, one of the principles of operating water flood is that you pump your producing well down to the lowest possible depth. In other words, you set your pump on bottom and produce all the fluid out of the well that the well will make.

Q Why do you do that?

A In order to keep your pressure drop across your front as great as possible and to flood out the tight zones along with the permeable zones.

Q Are you familiar with the experiments that Sinclair Oil Company conducted in trying to flow water floods on the Bartlesville sand floods in October?

A No, sir, I don't believe I am.

RECROSS EXAMINATION

BY MR. PAYNE:

Q You say all the literature, Mr. Porter. You are not

familiar with any literature the other way?

A No, sir, I'm not; in all the literature that I'm familiar with.

Q Now, Mr. Porter, do you propose to inject your water through the casing rather than through tubing?

A Initially, yes, sir, I do.

Q What shape is this casing in, do you know? I notice these wells were drilled during World War II, I was just wondering whether the casing was so-called wartime casing which didn't have the life expectancy that present day casing has.

A I do not know whether it was wartime or not. However, on initiation of injection it is easy to find out whether you have any leaks in your casing or behind your pipe. It could be ascertained when injections were started.

Q Now, are there any fresh waters above the injection interval in this area?

A No, sir, this is outside of any declared basin and no water has been reported and drilled in these wells which was fresh water.

MR. PAYNE: I see. Thank you.

MR. UTZ: Are there other questions? Mr. Irby.

BY MR. IRBY:

Q I'm not sure this is important, but this application is in the name of Franklin, Aston & Fair, and the witness, Mr. Porter,

says that he has some connection with the Water Flood Associates, I'm not sure what that is, and that they are getting their water from Caprock Water Company. I would be interested to know what the connection is between these three different outfits.

A Well, of course Caprock Water Company is a public utility in that area which transports water and sells it to commercial establishments and for oil field purposes, residences and so forth and have a pipeline down along the highway from Caprock to below the Loco Hills. Franklin, Aston & Fair are the operators of this property, Water Flood Associates is a consulting engineering and operating company.

Q Yes, sir. Now, you've told me what each of them are, what is the connection between them, please?

A Well, as far as Franklin, Aston & Fair is concerned, we are representing them at this hearing. As far as Water Flood Associates and Caprock Water Company is concerned, they have retained us to do certain work for them. However, there's no joint ownership or anything like that concerned.

Q Are you a member of Water Flood Associates?

A Yes, sir.

Q A partner in the firm?

A I'm an officer, I am not a partner.

Q And Water Flood Associates has been retained by Franklin, Aston & Fair?

A I believe that's correct.

MR. McBROOM: That's right.

Q And there is a contract between Caprock and Franklin, Aston & Fair for water for this water flood?

A No, sir, there's been an offer made.

Q I heard the letter read.

A Well, that's the offer, yes, sir.

Q Where is Caprock getting this water?

A To the best of my knowledge they're getting it from that Ogala formation, I am not sure about the pronunciation of that, on the Caprock it's the Lea County Underground Basin.

Q Do they have enough water legally appropriated to furnish you 4,000 barrels a day to an ultimate of 5,480,000 barrels?

A Yes, sir, they have somewhere on the order, I'm not sure what their water rights on, but it's in the name of I believe Hollman and Taylor and is on the order of 700 acre feet per year.

Q Over and above their other uses they can supply this water to you?

A Yes, sir. Their present uses, I'm not sure about this, but their present uses are running to where they can supply it, I'm sure. I don't know, I would have to check with Caprock Water Company on that. I am not in a position to testify on that.

Q You said that your injection rate would be 4,000 barrels per day. Is that going to be constant?

A No, sir, I said 2,000 barrels per day. I said they're offering to sell us 4,000, but our rates would be 2,000, anticipated rates.

REDIRECT EXAMINATION

BY MR. McBROOM:

Q The 4,000 figure would take care of these other joint operators if they joined in the flood, is that right?

A Well, that's for our disposal to water flood with, according to the offer that's the way it read, yes, sir.

Q Is there any brine or brackish water available in the vicinity of this water flood?

A Not that I know of. None has been reported in any sufficient quantities around on the drillers' logs that I have examined in that area. As far as, I don't believe anybody has made any exploration for it, but in all these wells that have been drilled they have been drilled with cable tools. If there were water, it would, of course, have showed up and filled up the hole without any fluid in the hole.

Q How far away is the nearest salt water production of appreciable quantity?

A I really couldn't say. None of those fields in the Artesia vacuum trend, which are all the fields from Artesia over to, nearly to Hobbs, make any salt water that I know of. Now, over around Lovington, of course, they make quite a bit of salt water.

Farther south, I would say maybe twenty or thirty miles south in the Capitan Reef, there's salt water. But there's no method of transporting it that I know of and I know some of it has been examined and it has been declared unfit for injection, the Capitan Reef water, by chemists.

RECROSS EXAMINATION

BY MR. PAYNE:

Q The cost would be prohibitive to transport and treat it?

A Yes, sir, that's right, that far away.

MR. PAYNE: That's all.

BY MR. IRBY:

Q Then I take it that the nearest salt water you know of is approximately twenty miles west?

A That's what I would estimate, yes, sir.

Q You had an exhibit there on your casing and cementing which I didn't see. I would like for you to tell me in detail what the casing and cementing construction is immediately above the commercial zone which is somewhere around 250 or 350 feet.

A You want this by well?

Q Yes.

A The Stevens No. 1 has 8 5/8 casing at 525 feet which was cemented with 50 sacks.

Q Where is the top of it?

A The top of it is at the surface, the top of the pipe?

Q No, the cement.

A Oh, well, sir, I'll have to calculate that. I could calculate it, I don't have it calculated. I would be glad to do that and I would like to have it.

MR. IRBY: I think it's important that it be in the record.

A If it's all right I'll submit that data to you after I have had time to calculate it.

MR. UTZ: You want that, Mr. Irby, on all wells on this exhibit?

MR. IRBY: Yes, sir.

MR. UTZ: What exhibit number is that, No. 8?

A No. 8.

MR. PAYNE: On injection wells?

MR. IRBY: Yes.

A Just on injection wells.

MR. UTZ: If you will calculate the tops of the cement on both strings of casing. I wanted to include everything you wanted in this.

MR. IRBY: Yes, I want the type of casing, the depth at which it's set, and the top of the cement on each string of casing and each injection well.

MR. UTZ: Everything he asked for I believe except the tops of the cement is on Exhibit No. 8, is that correct?

A Yes, sir, that's true.

MR. UTZ: And if you will submit the tops of the casing on both the surface string and the production string, the tops of the cement I mean, it will be entered as a part of the record in this case.

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

BY MR. UTZ:

Q I believe I'm correct, Mr. Porter, in that all your injection wells have casing run to the top of the formation in which you intend to inject?

A Yes, sir, into the limestone above the pay.

Q And that is the only section that you will inject in in this project?

A Yes, sir.

Q Your Zone No. 6? A Yes, sir.

Q How about your producing wells, are they cased in the same manner?

A Yes, sir, they are.

Q You will inject the openhole, and produce from the openhole?

A Yes, sir.

Q And pump the producing wells?

A Yes, sir, that's correct.

MR. UTZ: Are there any other questions? If there are

no other questions, the witness may be excused.

(Witness excused.)

MR. UTZ: Are there other statements to be made in this case?

MR. ASTON: If I may, I would like to make a statement. Rogers Aston with Franklin, Aston & Fair, Incorporated. I would just like to make one statement that I think is of paramount importance that we not lose sight of, in our hearings in Roswell recently conservation was somewhat bypassed. We placed our main emphasis on market impact, which means that primarily that hearing down there seemed to deal ultimately with economics, and if that's the yardstick by which the rule was passed, I should like to apply that same rule of economics to consideration of a case such as this. The ultimate feasibility and workability of any rule is not proved in the laboratory or not proved in engineering studies. It's proved in the market place where you have to go to get your finances.

I think you should give sincere consideration to the impact of this ruling on the marketability of such a project. One of the reasons that we're pursuing this permit at this time is to determine in our own minds the impact that such a ruling would have on the ability to get the risk capital available. If we refer to conservation by the figures that you yourself mentioned and that have been discussed, we take in the neighborhood of an excess of

400,000 barrels of possible recovery that might be lost so that conservation becomes vitally important, but as a small operator who has been operating in the State of New Mexico since the early 30's, we want to point out that here we have a stripper property. The major companies can lay their operation over a very wide basis, but an independent company that operates in a limited area, a ruling such as has been passed has a tremendous impact on that company which is not true of the other major companies involved because they operate in many, many areas.

Here we have a property that is a stripper property. In the event that the recovery figures do not allow sufficient margin of profit to interest risk capital, in effect, you could preclude a small operator from taking a stripper property which can no longer operate economically, and at the same time prevent him from getting the necessary outside capital to undertake a water flood. Very few small independents are capable of setting up their own water flood operation. That's a business in itself, you gentlemen will agree. We don't care to try to set up such an organization in our firm.

Therefore, we have to hire concerns which undertake this. That is the purpose of making this relation with Water Flood Associates, but the marketability of this prospect is of vital importance to us because it is a stripper property, in this case the impact is not as great as it would be on preference right

Federal leases which are held only by production and in which you have to keep your production going or you are going to lose your lease. That factor is also going to be faced by many of the independent operators in this general area.

So I merely wanted to point those things out and state our case very clearly, that we feel that this ruling, any ruling that would place in jeopardy in excess of 400,000 barrels. I still can't quite grasp why secondary oil has an unpleasant connotation when if we can say we will go out and discover a new field with 300,000 barrels of reserves under which the State is going to get its royalty, I am sure the State would say we are glad we have a new oil field. This constitutes the same thing. I merely wanted to make that statement and give our position on this.

It's rather like saying this is an excellent rule, the operation was a terrific success but the patient died. And gentlemen, you can contribute to material damage to the small operator who operates limited properties if there is no exception or right of review. I can certainly sympathize and understand the Commission's viewpoint, but I think any rule that is promulgated to apply to all possible circumstances for all time to come is an exceedingly tricky rule. I think it's going to be hard to apply because I think it's going to be hard to foresee all the multitude of problems that are going to arise here. We went ahead to get the permit with the idea we are going to pursue this thing

of marketability. After all, if the profit incentive is gone ultimate loss is going to occur to the State of New Mexico.

Mr. Irby made reference to the water rights. I would like to make one. We have 750 acres of commercial water rights in the same general vicinity, which if necessary we would make arrangements to get transported and make our own water rights free for the same flood. My feeling is it's water from the same bucket. I have calculated roughly and it's approximately 128 feet of water per acre. Having large farm holdings in the Pecos Valley, I challenge economic return factor on motivation of that small quantity of water for the type of yield that's returned to the State of New Mexico. Thank you very much.

MR. UTZ: Are there other statements?

MR. PAYNE: I would make one observation, Mr. Examiner. As you well know, the Examiner is not in a position to overrule the Commission, period.

MR. UTZ: It is well taken and quite obvious.

MR. McBROOM: With that very astute comment, I would like to close this with making it clear that as I understand it, from what Mr. Aston has said, that regardless of the restrictions that may be imposed, their firm wants to have a permit granted of whatever nature it may be. Let me urge in that connection that you give serious consideration, and ask the Commission to give serious consideration to allowing under your rules, which I don't

believe, I haven't had a chance to study them, but if it is as it was before, that this cumulative 42 barrels per day from the beginning of the time that water is injected would give the relief that would be necessary to take care of this relatively short peak period still staying within the rules.

I suppose it would have to be treated as an exception, since your daily allowable, ordinarily we think of what it will make today But we're saying we are doing all the work, we are doing everything to build up that production from the minute we start water in. Therefore, it's not an unreasonable thing that we would accumulate our allowable, because if on that day that we started water in we could take the 42 barrels and put it in a tank some place and hold it until the market permitted us to market it, we could abide by the, any restrictions on allowables which might be imposed. So we urge that the Examiner consider that and that he pass it on to the Commission for their consideration that a cumulative allowable from the beginning of water flood on the 42 barrel a day basis be permitted.

Another statement which I feel needs to be dealt with just very slightly, but it could have considerable impact under the new rules, as I understand them, where a unit allowable would be set up under a flood of this kind where you have 320-acre strip of production here and another 320 acre strip up here that belongs to somebody else, that I haven't figured out in my mind even

if we were able to do it, how you could balance out that unit allowable as between two operators when the production gets out of balance. You've got, you are taking all the wells around, some are on my lease, some are on the other fellow's lease. Then my lease happens to hit first. I get a well that goes 50 or 60 barrels, 70 barrels produced by the allowable, the unit has a sufficient allowable to allow me to sell that, but if the other man at the same time gets his production above, who gets it, do I get to take it or does he get to take it? It needs a clarification, or I don't understand the rule. Maybe it doesn't need clarification, maybe I just need to be clarified.

MR. PAYNE: In that regard, Mr. McBroom, you can't get credit for somebody else's tract. He would get credit for his tract if he had a water flood.

MR. McBROOM: The point is, he has a well up here that is going above the allowable, I have got a well that's going above the allowable, the two of them put together go above the unit allowable. How do we split that out? How is it decided which one of us gets that oil?

MR. PAYNE: There's two different units in the case you pose there. Are you talking about royalty owners?

MR. McBROOM: No, I'm talking about working interest. Say this was right he and you have allowables allocated to the wells around.

MR. PAYNE: You only get the allowable for the offsetting well if you own the offsetting acreage. In other words, your allowable under 42 would be 504 barrels per day.

MR. McBROOM: Well, it still isn't quite clear to me. I haven't got it figured out. As I say, maybe I'm the one that needs clarification. Here's an instance which is not unitized which it might, they might get it unitized over the next four or five years, but it can't be unitized right now for various reasons. I didn't understand just how those would balance out.

MR. UTZ: Are there any other statements? If there are no other statements, the case will be taken under advisement. Let's take a ten minute recess.

(Whereupon a recess was taken.)

STATE OF NEW MEXICO)
: ss
COUNTY OF BERNALILLO)

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

IN WITNESS WHEREOF I have affixed my hand and notarial seal this day of November, 1959.

Ada Dearnley
Notary Public-Court Reporter

My commission expires:

June 19, 1963.

I do hereby certify that the foregoing is a [illegible] record of the proceedings in the [illegible] of Case No. 1806, heard by me on [illegible] 1959.

[illegible], Examiner
New Mexico Oil Conservation Commission