Case Number

4433

Application

Transcripts.

Small Exhibits

ETC.

BEFORE THE
NEW MEXICO OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
September 30, 1970

EXAMINER HEARING

IN THE MATTER OF:

The Hearing called by the Oil Conservation Commission upon its own motion to permit Allied Chemical Corporation to appear and show cause why said Corporation should be permitted to institute its proposed waterflood project in its Milnesand (San Andres) Unit Area, Milnesand-San Andres Pool, Roosevelt County, New Mexico, by the injection of fresh water.

Case No. 4433

BEFORE: Daniel S. Nutter, Examiner

TRANSCRIPT OF HEARING

I N D E X

INDEX (Continued):

E X H I B I T S

	Marked	Offered and Admitted
Applicant's Exhibits Nos. 1 thru 7	4	18
Applicant's Exhibit No. 8	26	38
Applicant's Exhibit No. 9	42	46
Applicant's Exhibit No. 10	44	46
Applicant's Exhibit No. 11	109	
Doak, et al Exhibits Nos. 1 & 2	56	
Commission's Exhibit No. 1	95	108
Commission's Exhibit No. 2	96	108

MR. NUTTER: We will call Case No. 4433.

MR. HATCH: Case No. 4433. In the matter of the Hearing called by the Oil Conservation Commission upon its own motion to permit Allied Chemical Corporation to appear and show cause why said Corporation should be permitted to institute its proposed waterflood project in its Milnesand (San Andres) Unit Area, Milnesand-San Andres Pool, Roosevelt County, New Mexico, by the injection of fresh water.

MR. HINKLE: Clarence Hinkle of Hinkle, Bondurant, Cox and Eaton, appearing on behalf of the Allied Chemical Corporation.

MR. BUZZARD: I am Dan Buzzard from Clovis, New Mexico, Box 1064. I appear on behalf of the land owners in the area of the proposed fresh water development. They are: Mr. Rodney Doak, Mr. Carl Cox, Mr. Buster Blakey and Mr. T. H. Carmichael.

MR. HATCH: George Hatch appearing on behalf of the Commission and Staff. We will have one witness, Mr. Nutter.

MR. NUTTER: Do you have any witnesses, Mr. Buzzard?

MR. BUZZARD: Put on my clients names, if you would, Mr. Examiner.

MR. NUTTER: You will have them on the stand?

MR. BUZZARD: I will have, if you please.

MR. HINKLE: Mr. Examiner, we have two witnesses; one for Allied Chemical, Howard Perdue. We have another one from the Double Eagle Corporation who is not here. He is due here, but he hasn't shown up right now, so we will go ahead and have Howard sworn.

MR. NUTTER: Is he in town?

MR. HINKLE: Yes, he is here. We had lunch with him and I don't know why -- he thought there were two or three other cases.

(Whereupon, a discussion was held off the record.)

(Whereupon, Applicant's Exhibits Nos. 1 through 7 were marked for identification.)

HOWARD PERDUE

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

DIRECT EXAMINATION

BY MR. HINKLE:

Q State your name, your residence and by whom you are employed?

A My name is Howard Perdue. I live in Midland, Texas, and I am district Petroleum Engineer for Union Texas

Petroleum, a division of Allied Chemical Corporation in the Midland District.

Q Have you previously testified before the New Mexico Oil Conservation Commission?

A Yes, I have testified before this body.

Q And your qualifications as a Petroleum Engineer are a matter of record with the Commission?

A Yes, sir, they are.

Q Are you familiar with the Order which has been presented on May 28th, 1969, R-3770, approving the Milne-sand waterflood project?

A Yes, I am familiar with that Order.

Q Mr. Clyde D. Ford, a Petroleum Engineer for Union Texas testified in connection with the original Hearing, did he not?

A Yes, he did. Mr. Ford at that time was Manager of Unitization and Secondary Recovery for Union Texas Petroleum. Mr. Ford resigned in July of 1969 to practice law for another firm.

Q Was a project plan filed in connection with the Unit after it was approved by the Commission?

A Yes, there was a plan.

Q What did that provide for insofar as the use of water is concerned?

A That plan provided for the use of water from the Crossroad-Devonian Field located some 13 miles southeast of the Milnesand Unit.

Q Since the approval of the waterflood project by the Commission, have you conducted or has anybody on behalf of Allied Chemical conducted an investigation to determine whether or not that water supply is adequate and sufficient?

A Yes, we have. Since a pipeline of some 13 miles in length and costing some $300,000. would be required to move this water from the Crossroads-Devonian Area up to the Milnesand Project, we instigated a detailed study of the adequacy and reliability of this water. In looking for water to provide the needs for the project, we ran into some difficulty in locating it, however, one of our first considerations for a supply of water was that we looked at the large supplies of Bough "C" water that was produced in the general vicinity of the project. The first thing we noticed was the very short life of the production from the Bough "C". We also found that the water was incompatible with the San Andres water in the Milnesand formation, so we concluded that this was not a prospective supply. The Engineering Committee then investigated other sources of saline and fresh water. They indicated the

availability and the cost involved and it was agreed by the Engineering Committee that the produced water from the Crossroads-Devonian Pool would suffice. Since that time, though, when the time came to make an expenditure for transporting the water, a further detailed study was made of this area and it revealed a number of facts that indicated the Crossroads water supply would be neither adequate nor dependable. I would like to outline these, if I might.

Q Go ahead.

MR. NUTTER: Have you prepared certain exhibits in this connection to show the condition in the Devonian-Crossroads Pool?

THE WITNESS: Yes, sir, I have. I have prepared Exhibits 1 through 7 -- actually, 1 through 6 that are related to the Crossroads supply.

MR.NUTTER: You can refer to those in your answer.

THE WITNESS: I will refer to them as I proceed. I am continuing from the number of facts that we uncovered in our detailed study.

One of the first things that we uncovered was that one of the operators in the Crossroads-Devonian Field was injecting something in excess of 4000 barrels of water per day of the produced water in the Crossroads Field back

into the producing reservoir in the Crossroads-Devonian Field and this water was not available. It was not connected to the salt water disposal system that is operated by Mobil which was considered to be the water source.

Another operator in this field -- they operate five wells -- and they indicated a definite reluctance to make its future-produced water from their wells available to the Milnesand Unit, as they indicated they were considering a pressure maintenance project in this field at some future date. These particular wells presently produce no water.

One of the wells that was supplying water to the salt water disposal system at the time of the Hearing for approval of this Unit was held has since reached the economic limit. This well was shut in and hasn't produced -- has produced no oil nor water during 1970.

Three other wells have high water-oil ratios at the present time and will probably be shut in in the near future because they have reached the economic limits.

I would like at this time to submit a curve which is shown as Exhibit No. 1. This is a curve of the water that is produced into the Crossroads salt water disposal system and disposed of in their salt water disposal well. You may note from the curve that at this time

they are disposing of approximately 18,000 barrels of water per day which is some 2000 barrels of water per day below our required volume for the Milnesand project.

BY MR. HINKLE:

Q What is your required volume?

A The required volume is 20,000 barrels of water per day.

I would also like to submit another curve which is noted as Exhibit 2. This curve shows oil and water production from the Mobil-Santa Fe Pacific Well No. 3-M. If you will look at this curve, you will see that it indicates a trend in oil and water production up until the time the well reached its economic limit and was shut in, in 1969, in late 1969, making approximately 5000 barrels of water per day and 50 barrels of oil per day.

It may be noted on the previous curve -- and that would be Exhibit No. 1 -- that a definite decrease in available water occurred at the time this well was shut in which is late '69.

MR. NUTTER: It was shut in in late '68 and then put back on production, wasn't it?

THE WITNESS: Yes, it was put back on and produced --

MR. NUTTER: (Interrupting) In '69

THE WITNESS: (Continuing) Small quantities, yes, that's right, but a large portion of the production during 1969 was rough water, but it did have an effect on this water curve that I have submitted. It shows a definite decrease there at the time it was shut in.

I would also like to submit curves on the three other wells that I mentioned and point out -- I will submit that these are Exhibits Nos. 3, 4 and 5. These wells are the Mobil-Santa Fe Pacific Wells Nos. A-K, 9-E and 7-M. In each case, you may note a characteristic similar to the characteristics seen on the 3-M prior to the time that it was shut in. You may note large decreases in oil production and large increases in water production. Our analysis indicates, along with the operators, that these wells will reach their economic limit in the near future and have to be shut in.

BY MR. HINKLE:

Q What do you mean by "near future"?

A I would suspect within the next 2 years.

Q What is the projected life of your waterflood project?

A This waterflood project should have a life of approximately 13 years.

Based on this study, the working interest

owners concluded that the water produced into this salt water disposal system in conjunction with the oil production was neither adequate nor dependable.

Q If you should go ahead and decide to construct a pipeline to the Crossroads Pool, what distance would you have to construct the line and what size line would you need?

A Well, a line of approximately 10-inch diameter, 13 miles long would be required to transport the water from the Crossroads-Devonian Pool to the Milnesand-San Andres Unit, and I will submit Exhibit No. 6 which is a map showing both the Crossroads Pool and the eastern outline of the Milnesand Unit.

Q I believe you have already testified that the approximate cost of this line would be about $300,000.?

A Yes, sir, that is correct.

Q Could Allied Chemical afford to construct this line, or the working interest owners involved in this Unit, in the face of the fact that you have determined that the water supply is not adequate for the life of the waterflood project?

A This matter was given very deep consideration by the working interest owners and it was concluded that we could not.

Q In other words, you could construct this pipeline and maybe have an adequate supply for a while, but on account of your testimony indicating that some of these wells are going to water out and be plugged and abandoned, you would not, then, have an adequate water supply, is that right?

A That is the conclusion we came to after a detailed and studied analysis of the production from this pool, that we felt that it was neither adequate at the moment nor would it be reliable in the future.

Q After you made this determination, what steps did you take or have you taken to try to obtain a water supply which would be adequate?

A After the Crossroads supply was found to be inadequate and undependable, a new search was made and prospective sources considered previously were reviewed. No adequate or dependable source of saline water was found within any reasonable distance of the project.

During this time we had additional discussions with some of the salt water disposal companies. One of them that we definitely talked to was the New Mexico Salt Water Disposal Company, and samples of this water were taken and analyzed, and it was found to be incompatible.

Now, I would at this time like to submit a

letter that shows the results of the compatibility tests made between a sample of water from the New Mexico Salt Water Disposal Company water and the Milnesand water. As a matter of fact, this letter also includes a compatibility study that was made on the Crossroads-Devonian. It is on the second page. In that case the waters were found compatible, but I would like to point out in this letter -- and this is Exhibit 7 -- that the worse thing about the analysis was that definite formation of insoluable iron sulphides was indicated. The formation of these precipitates require mechanical means to treat. In other words, it is a matter of letting the insoluables precipitate out and then by some mechanical means removing this solid by some screening and removing it from the screen which entails an expensive and elaborate set-up to handle. Some of the other problems noted in this compatibility study was that the combined waters would be corrosive, the combined waters would have a tendency to form calcium carbonate deposition, and a slight tendency to form calcium sulphate depositions, along with the suspended solids.

Q I believe that you testified that the Bough "C" water, that the wells that that is produced from is relatively short-lived, are they not?

A Yes, they are.

Q And this would mean that even if you connected to some of them and treated the water, that it might be a relatively short time that you would have to abandon that and make connection with others and so forth?

A This was the problem that was indicated here. Even if we were to lay a line or connect to a supply of water that contained the Bough "C" produced water, and then after we had gone and made some set-up for handling -- if we could -- we are not certain we could handle this water, but if we could do that, then we feel that the production life of the wells producing this Bough "C" water make it so undependable that it wouldn't justify the investment that would be required.

Q In your opinion is there an adequate and dependable source of saline or brackish water available at the present time for use in connection with the Milnesand Waterflood Project?

A No, sir.

Q What source of water have you been able to determine that is available that might be adequate?

A During the period of our investigation of a water supply, the Unit had been approached by a number of water suppliers and when it became the conclusion of the working interest owners that the Crossroads supply was not

adequate or reliable and that no other sources of saline water could be found that would be adequate or reliable, then it was decided by the working interest owners that bids would be taken from these suppliers of fresh water.

Q Has this decision been made just recently?

A Yes, it has.

Q When was that made?

A Well, the decision to take bids, I don't have an exact date on that, but I would say approximately three months ago.

Q Have you let bids at the present time or accepted any bids?

A We have not accepted any bid. We have taken the bids and we have recommended one of the bids to the working interest owners.

Q Have the working interest owners approved it?

A Some 85 percent of the working interest have indicated that this would be a supply that they could approve, but no contract has been let.

Q Prior to entering into a contract, what do you propose to do as far as obtaining approval of the Oil Conservation Commission as required under the Unit Agreement?

A As provided in the Unit Agreement for any

change of plan, both the Conservation Commission and the U. S. Geological Survey would be asked to approve this change.

Q When this case was put on the Docket, you were getting ready to do that?

A Yes, sir.

Q Now, what is the proposal --

A (Interrupting) One thing right there, we felt that the time to do that would be after the working interest owners had decided that this was the contract to --

Q (Interrupting) And that has been just recently?

A Yes.

Q What is the proposal of the Double Eagle Corporation Company, water company?

A Double Eagle Corporation has furnished the Unit evidence that it could supply an adequate and dependable supply of water. This water would be made available to the Unit at a reasonable cost. It would be supplied from properties that were not within a declared underground water basin and would require no permit or license.

Q Where is the location of the source of this water?

A The location of the source of the water is in what is known as the Lingo-Causey area. I believe we have another witness that will testify in detail to that.

Q What Township and Range is that?

A It is located in Section 22, Township 6 South, Range 36 East.

Q Will that entail the building of a pipeline to the Milnesand area?

A Yes, it will.

Q What length?

A The pipeline will be approximately 16 miles in length.

Q Has the Dougle Eagle Water Company furnished you with any information to convince you that the water supply that they have would be adequate and sufficient to go ahead with the waterflood project?

A Yes, they have. They have furnished a hydrologist's report that is the evidence that I referred to that it would be an adequate and dependable supply of water.

Q Now, in the event you are unable to obtain approval or find an available saline water supply and you are not permitted to use this fresh water, what is going to be the situation?

A Well, we would have to abandon the project, I suppose, because as you say, if the fresh water supply isn't approved, we have not found an adequate supply of

saline water, so I see no other recourse.

Q Now, if it becomes necessary to abandon this waterflood project, what loss or waste would occur, if any?

A If it were necessary to abandon this project, it is estimated -- and this is part of the record in the previous Hearing, I believe -- that some 4,000,000 barrels of secondary oil would remain in the ground unrecovered and constitute waste.

MR. HINKLE: We would like to offer in evidence Exhibits 1 through 7.

MR. NUTTER: Allied Exhibits 1 through 7 will be admitted.

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

BY MR. HINKLE:

Q Do you have anything further?

A No, I haven't.

MR. HINKLE: That's all the direct for this witness.

MR. NUTTER: Are there any questions of this witness?

CROSS EXAMINATION

BY MR. RAMEY:

Q Mr. Perdue, going back to Mobil's wells, how

are these wells being produced at the present time?

A They are being produced by Reda pumps.

Q You state that you are going to need 20,000 barrels a day; you won't need 20,000 barrels a day throughout the life of the flood, will you?

A Not for full 13 years, no, sir.

Q You would probably get water break-through after so many years and you would recirculate this water?

A After a certain length of time, we would get some injected water into the produced water and we would plan to re-inject.

Q So actually, your water needs would diminish as the years went on?

A Yes, after some years, yes, sir.

Q Yes, right. Now, Pan American presently has a pressure and maintenance project in the south end of this pool, do they not?

A In the south end of the Milnesand, yes.

Q Milnesand-San Andres?

A Yes.

Q What kind of water are they using there?

A They are using produced water.

Q Produced San Andres water?

A Yes, sir.

Q How about the Milnesand-Pennsylvanian, is it making any water?

A As far as I know there is only one Penn well remaining in the Milnesand Pool. I am not certain right now whether it is still being produced or not, but it did make some water, to answer the question, but I believe it would be small compared to the needs.

Q Yes, certainly. I was just wondering what was being done with this water at this time, if it is being produced, but I don't know and probably you don't know.

A Well, yes. I am not certain right now, but for a while that water -- we have a salt water disposal well to inject the small volume of produced water from the Milnesand area into right now. This is a well that we recently had permission to use and will be an injection well eventually, but the produced water, the total produced water amounts to something on the order of 400 barrels a day.

Q You stated that you spoke with New Mexico Salt Water Disposal about a water source?

A Yes, sir.

Q Which I assume would be Pennsylvanian water?

A He indicated that it would be primarily Bough "C"

water.

Q Did he make you any kind of a firm offer?

A I believe he did. I believe he offered to supply us with water for 2¢ a barrel. I would like to make that indefinite because I am really speaking from memory and I have no data along that line to refer to.

Q Did he put any time limit on it or anything like that or did he just say he would furnish you water?

A This was a verbal offer, as far as I know. I don't recall seeing any written offer and I remember no time limit.

Q But he didn't say that he would furnish you water for three years or for five years or whatever the life of the pool was that you know of?

A No, but we didn't have any contract-type proposal either. This was strictly a discussion-type proposal, but to answer your question, no, he didn't say he would supply it for any particular length of time.

Q You state that the Bough "C" water is incompatible with the San Andres water?

A Yes, sir.

Q But I noticed your Exhibit 7 does say that in addition to the mechanical equipment costs, it would cost you approximately 2 mills per barrel to treat this water

where it would be compatible?

A Yes, sir, I would like to point out that that mechanical cost is considerable.

Q Do you have any idea what it is?

A Because of all of the problems involved, I didn't actually make a study of the cost of doing this because there were so many problems, we felt that this was not a prospective water supply.

Q You probably have to aerate the water and have some kind of flock unit in there to settle out the iron sulphide?

A I would think, Mr. Ramey, that the procedure would involve mixing waters in order to precipitate the iron sulphides. It would then have to be filtered and the precipitants be removed. I think you can see this is quite an operation.

Q I think you can add chemicals which would make your iron sulphides form and settle out. You could aerate the water to remove some of the hydrogen sulphides in the water and then add chemicals which would form your iron sulphides and they would settle out and then you would draw your clean water off the top?

A I believe it works -- the iron is in the Penn water, the Bough "C" water, and the sulphides would be in

the formation, so you see, I believe it would entail a matter of precipitating out the iron in order to make the water usable.

Q But there does seem to be at present, anyway, a source of water. You will admit there is at least 20,000 barrels in the immediate area of Bough "C" water that is available?

A I am sure there is considerably in excess of that.

Q It is just a question of cost of which --

A (Interrupting) I would like to qualify that -- at the present time.

Q Yes. Back to the Devonian water in the Crossroads area, you state that this is not a reliable source, that the wells are being plugged out at this time?

A One well has been.

Q And you contacted Mobil and you say you contacted others in the area; did you contact Union Oil of California?

A No, sir.

Q Would you agree that they had approximately 5000 barrels per day of water in the Crossroads area; I think they are operating in the west Crossroads-Devonian which is reasonably close to the Crossroads-Devonian Pool?

A But a matter of miles.

Q I think a matter of a half mile between pool boundaries?

A One thing I think we need to consider, if I can refer back to Exhibit 7 which is the pipeline; as you can see from this Exhibit, we are dealing with a collection system here that if you had to collect water from a number of different sources, you would be involving a considerably higher investment. In other words, this water is already collected in the Crossroads Salt Water Disposal System operated by Mobil, so if we were to try to go out and collect water from other sources, we would be involved in a considerably higher investment cost.

Q But it wouldn't entail a 10-inch line; you know, the cost wouldn't be in proportion to your 13 miles of 10-inch line to pick up an additional 5000 barrels at a distance of 2 or 3 miles; it wouldn't cost you approximately $100,000., would it?

A Offhand, I wouldn't think so.

Q Did you contact Texaco in the Crossroads?

A Texaco is a working interest owner in the Milnesand Unit. We didn't specifically ask them if they would be willing to stop their injection into it, but -- because we felt that their injection as opposed to the

disposal that Mobil is doing is actually into the producing reservoir and constitutes something of a re-pressuring or pressure maintenance-type operation.

Q Well, according to the Commission forms there that they are sending in each month, it is considered a water disposal, but do they not have some 4,600 barrels of water per day that they are disposing of?

A Yes, sir.

Q So in essence at the present time you have somewhere along the line of some 27,000 barrels of water a day in the Crossroads area?

A Well, you are adding in the Union of California water?

Q Yes, Union or California, Mobil water and Texaco water.

A In the Crossroads-Devonian Pool alone we do not have that much water. It is nearer 22,00, somewhere between 22,000 and 23,000 including Texaco.

Q Right. This is 20,000 barrels or better?

A Yes, sir.

Q Now, going on down the line, suppose you did run on down the line and pick up this 22,000 barrels -- this is just suppose for a minute -- and suppose the life of the Crossroads pool depletes and they start plugging

wells, your water supply gets down below 20,000 barrels; don't you think it would be possible for the unit operator to possibly enter one of these disposal wells and set a Reda pump and use it for make-up water?

A Technically, it is possible to set a Reda pump in one of these disposal wells and produce water. I think that our attorneys indicate that there is a pretty grave legal problem that has been unresolved relating to the ownership of such water that is not produced in conjunction with oil production, and I am not qualified to testify on that.

Q But it would be mechanically possible?

A It would be mechanically possible, but I would like to point out another thing --

Q (Interrupting) If you could assume the ownership of the well or the right to produce this Devonian water?

A Yes, sir. May I submit another Exhibit which I think might help in our discussion some, and it would be a structure map of the Crossroads-Devonian Field.

Mr. Examiner?

MR. NUTTER: That would be fine.

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

THE WITNESS: I will submit this as Exhibit 8 which is a structure map on the top of the Crossroads-Devonian structure, up on top of the Devonian reservoir in the Crossroads-Devonian Field. This is a structure map which indicates, if you will note over here in Section 33, the disposal well that is used by Mobil is up in the northeast corner of Section 33 and is noted as Mobil 1-A which conforms to the curve that I submitted as another Exhibit.

The Texaco Disposal is in Well No. 4-O which is in Section 34. It would be the southeasternmost well in that section. This is my own map,but it looks to us as though that well is producing below the water level in the same reservoir that is producing and this is the reason I said what I did.

MR. NUTTER: In other words, the Mobil well is on the bad side of the fault and the Texaco well is on the good side of the fault?

THE WITNESS: Yes, sir.

MR. NUTTER: So there is no production over here on the left side of the fault?

THE WITNESS: It doesn't produce over there on the other side of the fault. That's the point I wanted to make.

BY MR. RAMEY:

Q Well, you do agree that this is probably a very strong water-drive pool?

A Yes, sir, I do.

Q Now, the operator you said was planning on a pressure maintenance and I take it that is probably Sun, since they don't report that they are producing any water?

A Yes.

Q Would it seem logical that perhaps further down the line they would produce some water?

A I think that it would certainly be logical -- if I might continue just a little bit further with this Exhibit No. 8 -- Well No. 9-E, if you would like to mark it, and I don't have it marked -- in Section 35, is one of the wells that we feel like is near the point of reaching its economic limit. No. 3-M shown as a temporarily abandoned well just up in Section 26 is the one that has already been shut in. Well No. 8-K in Section 23 is another well and 7-M just down to the southwest of that, these are two other wells that appear to be near the point of having to be shut in because of the fact that they are nearing their economic limit. As you can note from this, all of these wells tend to be along a structure contour which is to be expected. Now, the thing that will

occur, and I think we can expect to occur is that as you go up-dip as the reservoir is produced, the wells further up-dip will start making water. What would hurt us very badly is when we get up here to some point and when Sun's well starts to make water, that water would no longer be available and the other wells would have to be shut in because of their economic limit and we are left without a water supply.

MR. NUTTER: Mr. Perdue, have you ever given any consideration to this point, say, out here on the west side of this fault and taking one of these abandoned wells and just re-entering it and completing it as a water-production well? I know the Devonian has a lot of porosity and it usually has a lot of water in it?

THE WITNESS: Yes, sir. Lifting Devonian water by itself is a pretty expensive operation.

MR. NUTTER: Normally, how high will the Devonian water stand in the well bore?

THE WITNESS: It would probably stand somewhere between 3000 and 4000 feet.

MR. NUTTER: So you would have to lift it 3000 or 4000 feet?

THE WITNESS: So you would have to lift it 3000 or 4000 feet. Now, you say one well with 7-inch

casing lifting from 3000 or 4000 feet, the maximum volume that you could lift is somewhere between 6000 and 7000 barrels. So if you do this to acquire the amount of water that we are talking about, we are talking about more than one well and it depends on how much other water is available as to how many wells we are talking about. We have looked into the cost of doing this. We feel like the cost of lifting this water -- do you think I ought to guess?

MR. HINKLE: Yes.

THE WITNESS: I think I might as well. I want you to know we have made a thorough investigation of what we think are all evidences on this thing. We looked into the cost of lifting this water, and we felt like that a good indication of what the cost would be, would be indicated by what it cost these operators in the Crossroads Field to lift their wells.

MR. NUTTER: To operate the oil wells?

THE WITNESS: Yes, because they get to the point where they are lifting, say, 5000 barrels of water plus about 50 barrels of oil before they shut them in. Their cost, not counting the investment or any ammortization of the investment in the equipment, their actual lifting cost amounts to something on the order of 2.6 cents per barrel which I think you can see, when you combine this with the ammortization of lift equipment that would have to

be installed to do this, and building the line to transport the water, gets to be a very high cost of water.

MR. NUTTER: How much are you going to pay Double Eagle for the water you are going to buy from them?

THE WITNESS: It averages over the life of the project just slightly over 2¢ per barrel delivered to the Unit.

MR. NUTTER: In other words, the cost to lift it out of the ground alone of the Devonian water would be more than the cost of buying this water from --

THE WITNESS: (Interrupting) By a considerable amount, yes, sir.

MR. HINKLE: Delivered at the location?

THE WITNESS: Yes, sir.

MR. NUTTER: Do you build the pipeline or does Double Eagle build the pipeline?

THE WITNESS: They build the pipeline.

(Whereupon, a discussion was held off the record.)

MR. NUTTER: I think it would be very appropriate if you would go into some of these cost analyses that you have made on this lifting cost and so forth. You just alluded to it there, but I would like a little more detailed information on this. I think it is very vital to

this case.

(Whereupon, a discussion was held off the record.)

THE WITNESS: Before discussing the economics or comparative comparative economics between using Crossroads water and fresh water, I would like to say that I don't actually have economics that involve the cost of lifting this water. The economics that I do have are a comparison with building the line from Crossroads to Milnesand, getting the water at only pumping costs from the Crossroads Disposal System, compared to buying fresh water.

Now, the extent that we went to on looking at lifting costs didn't involve an overall economic study including these costs because of the legal situation involved. Before we got very far at all in our study of lifting the wells beyond the economic limit or going into a disposal well and lifting this water, this spector of a legal ownership of water came up and we only got as far as finding out what the lifting cost would be.

I don't have enough copies to make this an Exhibit, but I can read into the record the comparative economics with water that is produced in conjunction with oil production from the Crossroads-Devonian Field compared

with the purchase of fresh water. The easiest way to get this into the record, I believe, would be to read the item and the dollar value or cost relating to the Crossroads Project and then the next one would be with the use of fresh water, purchased fresh water:

Investment, $1,509,000 for Crossroads. For fresh water, $1,200,400. Operating Expense, $5,062,000 for Devonian. For fresh water, $5,717,700. Net operating income using Devonian water, $5,898,600. Using fresh water, $5,387,700.

If I may digress for a moment, you will note at this point that we make less money by using fresh water than we would be assuming that the Devonian would last, but our big consideration here was that it was not dependable.

The return on the investment for Crossroads, 3.9. Fresh water, 4.5. The rate of return on Crossroads, 28.6 percent. Fresh water, 30.9 percent. Pay-out in years, Crossroads, 4.6 years. Fresh water, 4.6 years. Present worth profit, discounted at 8 percent after Federal Income Tax for Crossroads, $2,384,000. Fresh water, $2,321,000.

You are welcome to look at that, Joe.

MR. HATCH: We could make copies of this if you would like to introduce a copy.

MR. HINKLE: Would it be helpful to you if we did?

MR. NUTTER: I've got the information.

(Whereupon, a discussion was held off the record.)

MR. NUTTER: Why is it, Mr. Perdue, that your operating expense would be higher for fresh water than it would be for the salt water?

THE WITNESS: We actually pay so much per barrel which we consider operating cost for the fresh water. On the Devonian salt water, the costs that are involved is a certain amount of pumping charge that the salt water disposal system has plus a certain amount of treating charge, and we don't actually pay anything as an operating cost, but of course, we do have considerably higher investment.

MR. NUTTER: I notice your investment is $300,000 more. This would be the cost of the 13-mile pipeline?

THE WITNESS: Yes, sir.

MR. NUTTER: Do you have the cost of the treating equipment for treating this water in here, filters and stabilizing?

MR. HINKLE: Do you mean the Bough "C"?

MR. NUTTER: Well, I think the Devonian water would require some treatment too, wouldn't it?

THE WITNESS: About 2 mills per barrel only. A very small treating charge for it.

MR. NUTTER: I see.

THE WITNESS: And it is included in there, yes, sir.

MR. NUTTER: You do have some treating equipment included?

THE WITNESS: Yes, but it only amounts to chemical treatment. It doesn't amount to any mechanical. None is required.

MR. NUTTER: I see.

BY MR. RAMEY:

Q Do you have a figure on how much water you are actually going to need; you surely used something to come up with these costs?

A Yes. It amounts to approximately 30,000,000 barrels.

Q This would be water that you would have to bring in and wouldn't include make-up water?

MR. NUTTER: Do you have an annual projection on the water you are going to need annually?

THE WITNESS: I don't have that as an Exhibit.

Just a minute. I don't have a projection on the water requirements here.

MR. NUTTER: I am sure you have worked this up in your office. Would you furnish us with a tabulation or graph showing the expected water demand per year through the life of the flood?

THE WITNESS: Okay.

MR. NUTTER: Mr. Buzzard, did you have any questions?

MR. BUZZARD: I believe not, Mr. Examiner. Thank you.

REDIRECT EXAMINATION

BY MR. HINKLE:

Q Mr. Perdue, you stated, I believe,in your testimony that in the cost figures of economics of using salt water or Devonian water and fresh water, that you didn't consider lifting costs as far as the Devonian is concerned, is that right?

A No, sir, all of that water would be produced in conjunction with oil production.

Q Then you also stated that you were advised that you might get into some legal difficulties as far as using the water is concerned after these wells have been plugged?

A Yes, sir.

Q Now, refer to your Exhibit No. 8. Does this indicate that most of the ownership of the acreage in the Crossroads-Devonian Pool is fee acreage?

A Yes, sir, it does.

Q Owned by U. D. Sawyer and Santa Fe?

A Yes, sir.

Q This would mean, would it not, that upon plugging these wells, you would have to go back and make a deal with Mrs. Sawyer and with the Santa Fe Railroad and pay them so much a barrel to use the water, would it not?

A I would say --

Q (Interrupting) Besides the lifting cost?

A I would anticipate that some such arrangement would need be made.

Q And you can't anticipate what those costs might be?

A No, sir, I have no idea.

Q It might be such that you couldn't make a deal with them?

A That is possible.

Q That is what you mean by the legal problems that might be involved in continuing the use of this water after these wells have been plugged out?

A Yes, sir, that is what I was referring to.

RECROSS EXAMINATION

BY MR. RAMEY:

Q Have you ever approached Mobil with the idea that perhaps for some compensation that they would extend the life of their producing wells? I would think they could keep producing the wells as oil wells so long as they made any oil whatsoever; if you paid the lifting cost, then, the water may be there?

A Yes, we have done that, but we still get into the legal problem. They will not warrant title. We have discussed this in great detail with Mobil, and considered the possibility of producing the wells past the economic limits in order to extend the life of the water from this area.

Q Isn't Mobil having a little trouble right now taking care of all of their produced water; are you aware of that?

A I didn't know that they were.

MR. HINKLE: I believe that I offered Exhibits 1 through 7. I would like now to offer Exhibit No. 8.

MR. NUTTER: Allied's Exhibit 8 will be admitted in evidence.

(Whereupon, Applicant's Exhibit No. 8 was offered and admitted in evidence.)

MR. NUTTER: Mr. Perdue, I notice up here in your map of your Milnesand Unit that there are some old Mobil leases there, but Union Texas seems to have taken those over, is that correct?

THE WITNESS: What happened there, Mr. Examiner, is that El Choro farmed out that acreage from Mobil and drilled these wells in which Mobil maintained an override and then a back-end clause. Union Texas, Allied, subsequently purchased El Choro.

MR. NUTTER: So any interest that Mobil may have up here in this unit would have an overriding royalty or did they back into a working interest ownership?

THE WITNESS: No, sir, they maintained some acreage that was not farmed out, and they have a substantial working interest in the unit, and as much interest, you might say, as anyone in obtaining an adequate water supply, so we have very close cooperation with Mobil engineers.

MR. NUTTER: That Langlie-Jal Unit that we had the Hearing on this morning for your Company, you are going to be buying that Capitan reef water from Skelly in that; will any treatment of that water be necessary?

THE WITNESS: I don't think so

MR. NUTTER: Are there any further questions of Mr. Perdue?

You may be excused.

(Witness dismissed.)

MR. HINKLE: We have one other witness, Mr. Joe Kenworthy, and I believe he has not been sworn.

J. D. KENWORTHY

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

DIRECT EXAMINATION

BY MR. HINKLE:

Q State your name, your residence, and by whom you are employed?

A I am J. D. Kenworthy from Tulsa, Oklahoma, 5126 East 38th Place. I am General Manager for Double Eagle Corporation.

Q Is the Double Eagle Company a New Mexico Corporation?

A Yes, sir, it is.

Q State briefly the business of the Double Eagle Company?

A Double Eagle Corporation furnishes water on contract for various oil producing companies, primarily in the Artesia Vacuum Trend, which water is used for -- most of it is used for waterflooding -- some is plant cooling water or some rig sales, but mostly we sell on

contract to waterflood operators for waterflooding.

Q Double Eagle has been engaged in that business for a number of years in New Mexico?

A Yes, sir, we have.

Q Have you had any negotiations with Union Texas relative to furnishing water for the Milnesand Waterflood Project?

A Yes, sir. Approximately two years ago, Union of Texas was forming the Milnesand Unit and we discussed the possibility of furnishing water with them at that time as well as other fields in the area. Then we heard that they were going to use Crossroads water and the negotiations ceased until this spring when once again, they approached us about furnishing water and we did arrive at a source of water and a price that we could furnish water to them.

Q Have you made the Union Texas firm a proposition for furnishing water for a waterflood project?

A Yes, sir, we have.

Q Have you prepared a plat to show the source of the water and the proposed route of the pipeline from the water source to the Milnesand area?

A Yes, sir, I have. I have an Exhibit here which shows that.

(Whereupon, Applicant's Exhibit No. 9 was marked for identification.)

BY MR. HINKLE:

Q Mr. Kenworthy, refer to Exhibit No. 9 and explain what this shows?

A Exhibit No. 9 is a plat of a portion of Roosevelt County, New Mexico and the lower lefthand corner, we have outlined the Milnesand Unit and show on that Unit their plant site. The green line running off to the northeast is the approximate route of a pipeline which we propose to lay into this area from a water source primarily in Section 22 of I believe that is 6 South, 36 East.

Q What size pipeline do you propose?

A It will be a 10-inch line.

Q What arrangements have you made, if any, for the water source in Section 66, 6, 36?

A The shaded area in the yellow area, Township 6, 36, are areas where we can't possibly get water from. Our plan is, and very probably the three black dots shown in Section 22 are existing wells, irrigation wells owned by Mr. Victor, and initially our water will be taken from these three wells and quite likely throughout the life of the project, these three wells will furnish sufficient water for Union's needs.

Q What investigation, if any, have you made to determine whether the water supply in that area would be

adequate and reliable for this waterflood project?

A A hydrological study was made by a qualified hydrologist. The wells were tested and indicated sufficient capacity to meet this need.

Q In your opinion from the information that you have, you will be able to furnish as much as 20,000 barrels per day?

A Yes, sir, we should. These wells tested 1120 gallons a minute combined and 20,000 barrels a day is roughly 580 gallons a minute or about half the total capacity of these three wells.

Q Now, translating 20,000 barrels a day into acre feet over a year, what would this amount to?

A 900-- a little less than 950 acre feet a year.

Q Approximately how many acres would that irrigate?

A At the Hearing before the State Engineer in Roswell recently, most of the testimony presented indicated that on cotton, they needed four acre-feet of water per acre, so Union's total requirements would be enough water for about 240 acres of cotton.

Q How many acres is Mr. Victor irrigating in Section 22 at the present time from these wells?

A I think he irrigates the entire 320 acres to some extent.

Q So you would be really taking less water than is being used to irrigate 320 acres?

A He does not grow cotton on all of those. He does grow some feed. We can only assume that when he is irrigating, he is operating these wells at capacity of the equipment which would be over 1100 gallons a minute,and the water requirements of Union Texas are 580, so it should be at a lower rate than he would be using to irrigate.

Q Have you made any investigation to determine whether or not Section 22, 6, 36 is located in an area declared by the State Engineer to be public water and subject to prior appropriation?

A Yes, sir, we have checked with the State Engineer's Office in Roswell and they indicate that it is not in a declared basin.

Q Do you have a letter from the Engineer's Office to that effect?

A Yes, sir, I have a letter from Mr. Hennighausen, the District Supervisor in Roswell to this effect.

MR. HINKLE: We will mark that 10, please.

(Applicant's Exhibit No. 10 was marked for identification.)

BY MR. HINKLE:

Q Would you mind referring to Exhibit 10 and reading that to the Commission?

A This is a letter dated September 22, 1970, addressed to me, Double Eagle Corporation. It says: (Reading) Reference is made to your recent inquiry concerning the necessity for obtaining water rights for beneficial use for wells located in Township 6 South, Range 36 East, New Mexico Prime Meridian, commonly known as the Causey-Lingo Area. This area is not within a declared area as an underground water basin at this time, and therefore, is not subject to administration or regulation of ground water by the State Engineer's Office. It is not necessary for you to file application for use in this area as the State Engineer has no jurisdiction to approve such applications. We will, of course, appreciate any information as to log of wells and the capacity of wells put into operation. Signed by Fred H. Hennighausen. (End of reading.)

Q What investments do you contemplate making in building this pipeline and putting in the necessary facilities to furnish water to the Milnesand area?

A About $225,000.

Q That includes pipeline and tanks?

A Yes, pipeline and tanks.

Q Is Double Eagle in a position to go ahead with the project right away without delay?

A Yes, sir, we hope so.

Q In the event the Application of Allied Chemical is approved to use this water, you would be in a position to go ahead with it right away?

A We would proceed immediately, yes, sir. That is, assuming they sign this contract.

Q We assume that they would sign the contract if they got approval?

A Right.

Q Do you have anything else that you would like to testify to with respect to this project?

A I think we pretty well covered it. Essentially, we feel that there is adequate water, fresh water in this area. The amount we propose to take is less than the landowner can produce at the present time. The water should be suitable for flooding Milnesand Field.

MR. HINKLE: We would like to offer in evidence Exhibits 9 and 10.

MR. NUTTER: Allied's Exhibits 9 and 10 will be admitted in evidence.

(Whereupon, Applicant's Exhibits Nos. 9 and 10 were offered and admitted in evidence.)

MR. HINKLE: That's all the direct examination that I have.

CROSS EXAMINATION

BY MR. NUTTER:

Q Mr. Kenworthy, the three little black dots on Mr. Victor's acreage, you say, are irrigation wells. What are the little red dots up there?

A These little red dots are other known -- or we think this is the irrigation wells within that area -- these are the only ones we know about.

Q Would you go into a little more detail as to whay this hydrologist's report that you had prepared revealed on the water in this area?

A Primarily, the report consisted of testing the wells and measuring the draw-down and the deliverability. This is our major interest, the deliverability of the wells. One of the wells had a capacity of 850 gallons a minute. Another one had 180-gallon-a-minute capacity, and the third well had 87 gallons.

Q What are these wells produced from?

A This is that Ogalala.

Q It is equivalent to Ogalala; it is shallow gravel?

A Yes, sir, gravel or fine sand.

Q What is the average depth of the wells in there?

A Not over 250 feet.

Q How has the water table been behaving in this area in the last 15 or 20 years?

A The State Engineer prepared a report on this thing about two years ago, I believe. Since it is not a declared basin, they don't have a great deal of history on it and I don't believe the history goes back 15 years. I think the irrigation is within the last 8 or 10 years. As I recall from this report, the water-table drop had been rather slight over this six or seven-year period covering this report.

Q Do you actually have water rights up here at the present time or are you in the area or do you have them among Mr. Victor's acreage or just what is the status of Double Eagle?

A We entered into a contract with Mr. Victor wherein he will put water into a tank for us to re-sell to Union Texas from his existing wells or from other wells that he might want to drill. In addition, if you will refer to Exhibit 9, we have State water on Section 16 and Section 32.

Q What is the State water easement?

A It gives us the right to go in and water under these State-owned lands. We have no plans to do this because we have confidence in Mr. Victor's wells

that they have the capacity to furnish us this water.

MR. HINKLE: But you would have that to fall back on?

THE WITNESS:

BY MR. NUTTER:

Q How is it that you can build a 16-mile line for $225,000. and it costs Union Texas $300,000. to build a 13-mile line?

A I cannot testify to their costs, but I sure hope I've got our costs right. It is possible that it is different having fresh water rather than salt water because certainly different materials would be required.

Q Are you going to have to have any pump stations along the line?

A No, sir, we will have one pump on Mr. Victor's tank.

Q That will carry it all the way?

A Yes, sir.

Q Maybe that's the difference; maybe you are going downhill and they are going uphill.

A It could be.

Q How much of this land up here in this Township, Mr. Kenworthy -- I presume you are acquainted with it -- what is the extent of irrigation as to the other water

users in this immediate area; did you say these little red dots are other wells?

A Yes, sir.

Q Are they irrigation wells?

A Yes, sir. In Section 28, the two red dots there are used to irrigate the northeast quarter of that Section. I believe this is the only irrigation in the bottom 12 Sections in that Township. There is some irrigation as indicated in Section 16, some in 15, Mr. Victor's in 22, and there is some irrigation up in Section 9. Now, I haven't been over on the eastern part of that Township and don't know just what -- whether there is any over there or not -- but it is rather sparse. It is rather poor soil and light wells for irrigation.

MR. NUTTER: Well, you fellows are residents of that area and you can probably give us more information on those activities.

Are there any further questions of this witness?

CROSS EXAMINATION

BY MR. BUZZARD:

Q Do you have a copy of your hydrology report with you?

A No, sir, I don't.

Q Did you get any information from the State

Engineer's Office in Roswell with regard to the Causey-Lingo Area?

A I had a discussion some time ago with a fellow in the Roswell Office who is very familiar with this -- I can't recall his name --

Q (Interrupting) Hennighausen?

A No, one of the others.

Q Galloway?

A Mr. Galloway.

Q What are you paying Mr. Victor per barrel of water that he is furnishing?

A Oh, golly. I don't recall exactly.

MR. HINKLE: I don't think that is material anyway.

THE WITNESS: Apparently it is more than he figures he is getting in dealing with it. I don't recall just exactly.

BY MR. BUZZARD:

Q You do have a written contract with him, don't you?

A Yes, sir, we do.

Q Do you have that with you?

A No, sir, I don't.

Q When did you enter into it?

A On May 20th.

Q Could you --

A (Interrupting) It is now a matter of public record in Roosevelt County.

Q Filed for public record?

A Yes, sir.

Q You have the authority from Mr. Hennighausen that the State Engineer doesn't have a supervision; have you checked on prior appropriators in the event you effect adjacent wells by your pumping?

A No, sir.

Q You don't know whether that has any effect on the problem or not?

MR. HINKLE: This is improper cross examination. We didn't go into this on direct. We object on that account.

MR. NUTTER: There was very little direct in regard to the contract. He did refer to his hydrologist's report.

MR. HINKLE: Yes.

MR. NUTTER: The hydrologist's report may have some reference as to effect on immediate or surrounding areas to draw-downs here.

THE WITNESS: We have testified to the rate

that we will take water from this source which is probably at a lower rate than he uses when he irrigates. The well has a capacity of something around 1100 gallons a minute and we are going to take 600 gallons a minute.

BY MR. BUZZARD:

Q Did you test the wells?

A We had them tested, yes, sir.

Q What sustained period did you test?

A These were relatively short tests. I believe the longest one was 48 hours.

Q You don't know if you continued 24 hours a day, 365 days a year, what the effect would be on that water basin there?

A We presume the wells would have the deliverability in excess of 600 gallons per minute.

Q Every day in the year?

A Yes, sir.

Q Did you inquire of the neighbors what the effect they have on sustained pumping on their wells?

A No, sir.

Q What is the name of the hydrologist?

A I don't recall that.

Q Do you have a written report from him?

A I don't have it with me, no, sir.

Q You do have a written report?

A Yes, sir.

Q Did you state when you had this report made?

A I did not.

Q Would you state?

A It was in about May -- I guess it was June.

Q What town does the hydrologist live in?

A Midland, Texas.

Q Did he come to New Mexico and make his investigation?

A Yes, sir.

Q Do you know what records he depended on to determine or use; do you know?

A Our primary interest was the deliverability of these three wells and the crux of his report was based on the test of these three wells. This was our primary interest.

MR. NUTTER: Mr. Kenworthy, I wonder if you can obtain a copy of that report and make it available to the Commission as a part of the record in this case, please? Union Texas testified that the other source of water was not reliable, but they do have a reliable source here, so we would like to have evidence in the record that this is a reliable source.

THE WITNESS: If you feel it is necessary, I presume we could send it to you.

MR. HINKLE: You will furnish it to him?

THE WITNESS: Yes.

MR. NUTTER: Are there any further questions of Mr. Kenworthy?

CROSS EXAMINATION

BY MR. RAMEY:

Q Mr. Kenworthy, did you make any study as to the aerial extent of this aquifer?

A Just a cursory investigation, sir.

Q You don't know whether it extends further to the west or further to the north?

A We don't think it extends much further to the south. We were trying to get as close to Milnesand as possible, so our investigation was confined to a water supply as close to Milnesand as possible. We don't think it extends too far to the south from our water wells here.

Q But you have no idea of the aerial extent or perhaps water reserves in the area?

A Aerial extent is not an extensive or blanket situation.

MR. RAMEY: I think that's all.

MR. NUTTER: Any other questions of this witness?

You may be excused.

(Witness dismissed.)

MR. NUTTER: That concludes your direct testimony?

MR. HINKLE: Yes.

(Whereupon, a discussion was held off the record.)

(Whereupon, Doak, et al Exhibits Nos. 1 and 2 were marked for identification.

MR. NUTTER: Mr. Buzzard, do you have a witness that you wish to call at this time?

MR. BUZZARD: Yes, I do, Mr. Examiner. I call Karl Cox, and would all of you gentlemen stand and take oath?

(Witnesses sworn.)

KARL COX

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

DIRECT EXAMINATION

BY MR. BUZZARD:

Q Would you state your name and address?

A Karl Cox, Rogers, New Mexico.

Q What is your business?

A Farming.

Q Is that in the Rogers area?

A I live 14 miles south of Rogers, but the mail route runs down there.

Q Do you own real estate in the Causey-Lingo area?

A Yes, sir.

Q What is its proximity to Section 22, Township 5 South, Range 36 East that would be the Victor land as heretofore testified about? What is the proximity to that land?

A It is a mile south from my line.

Q Do you have irrigation wells in this immediate area?

A Yes, sir.

Q How many?

A Four.

Q When were they drilled?

A One was drilled in August of 1953 and one was drilled in April of '55, one was drilled in '64 -- I don't remember what month -- and another one was drilled in '68.

Q What is the depth of the wells to redbed?

A From 105 to 198.

Q What is the depth of the water strata or water-bearing sand and gravel?

A Three of these wells will run 31 feet and one of them will run 110 feet.

Q What is the depth of the static water level that you pump from?

A Now?

Q Yes.

A 85 feet.

Q Has the water level been increasing or decreasing over the years?

A Well, I hit this water at 74 feet to begin with. It was 74 feet when I first started it. It has gone down to 85 and 86 feet.

Q Over what period of time?

A 17 or 18 years.

Q What is the recharge capacity of these wells on sustained pumping?

A Well, now, what do you mean by that?

Q I mean, can you pump it sufficiently to lose the suction, where you dry up the water supply at any time?

A If I increase the RPM's on the pumps, I can break the water any time.

Q What RPM do you run your pumps?

A Approximately 1500 RPM.

Q What do these wells produce in gallons per

minute?

A One of them produces 900 gallons. One of them produces 700 gallons, and the other two produces 200 gallons a piece.

Q What is the average length of pumping days -- and I refer to days as being 24 hours -- in your irrigation business?

A 60 days a year.

Q Would you pump continuously for 60 days or would there be a break?

A It would be a break. We will water across, which it takes me 18 days to water across, and I will probably wait a week and then water 18 days again, and then wait another week and water 18 days another time. Three waterings a year.

Q There was a reference made to one of Mr. Victor's wells on this Section 22 that produced 180 gallons a minute. Are you familiar with that well?

A I have watched every well in our vicinity tested but one since they was tested, as I drilled the first well in that vicinity in '53, and I have watched Mr. Victor's wells, I will say within every month since they were drilled.

Q Could you give the Examiner your personal

knowledge, then, with regard to the well I asked about?

A When it was drilled in '55 or '56 -- and I couldn't tell you which year -- it would pump 800 gallons a minute, and with continual use as we have been using this water, it has gone down and he has pulled that pump and taken the 8-inch pump out and put 4-inch in. Now, he's got a 4-inch pump in it. He told me at one time it was dry.

MR. HINKLE: We object to what he told him.

BY MR. BUZZARD:

Q Do you know the data on increase or decrease of the other two wells on the Victor land that was referred to in Section 22?

A No, I couldn't tell you.

Q How much land does he irrigate from the three wells?

A He's got 320 acres there, and he will water approximately half of it one year and half of it the next year and leave out some and fallow the other half. That's the general custom of our country.

Q What is the difference, if any, in your judgement and opinion from your observations of sustained pumping over a period of 24 hours a day, 365 days a year as opposed to the 60 day a year off-and-on-type pumping

that goes on in that community?

A My opinion is that in three years it will be a completely exhausted supply.

Q Why do you say that?

A The first well I drilled, I pumped two years. There wasn't very many wells around there -- without it affecting my domestic well which was 100 yards from this one -- and after we got more wells and I continued to pump my wells 60 days a year, I pumped water out from under my domestic well and had to lower it 20 feet. And if you are going to have to lower these wells, even domestic wells, I am pretty sure the irrigation wells are going to run out.

Q How much money do you have involved in the investment of your four wells and allied equipment?

A $200,000.

Q What effect, if any, is there between the market value of the land that you own, dry and irrigatable?

A $100,000.

Q What is that per acre?

A $100.

Q Then you have 1000 acres?

A I have 2000 acres there.

MR. HINKLE: Mr. Examiner, if this is for the purpose of indicating damage here to the witness, we

object to it because I don't think the Oil Commission has any prerogative or jurisdiction to determine damages. All this witness can testify to is whether or not in his opinion there is -- what constitutes the water supply in this area.

MR. HATCH: I would say so except for the investment cost which was raised by the Applicant in this case, Allied Chemical. This is a part of their case. This point about the investment in the equipment, I think is admissible or should be admissible.

(Whereupon, a discussion was held off the record.

MR. NUTTER: Your next question, please?

MR. BUZZARD: I will pass the witness, Mr. Examiner.

MR. NUTTER: Does anyone have any questions of Mr. Cox?

CROSS EXAMINATION

BY MR. NUTTER:

Q Mr. Cox, where are your wells; you mentioned that you have four wells? I see your property lines on Allied's Exhibit here and they are in the south half of 10 it looks like. That 160 across there has your name on it, I believe.

A I have one well in 10. I have one in 9. I have one in Section 4, and one in Section 34, 5 South and 35 which is just across this line.

Q Just off the map?

A Yes, 100 yards north of this line. That's the one I drilled in '53.

Q Okay.

A I have some domestic wells and stock wells scattered over this area too that I have had to deepen two of those-- well--one completely re-drill it,because it went dry and I had to re-drill.

Q Those are low-volume wells?

A Yes, 10 gallons a minute, but it went dry after pumping these irrigation wells and I had to re-drill it.

Q Now, you mentioned that the water level at the present time is about 85 feet?

A Yes, sir.

Q And when you first drilled your well back in 1953, the water level was 74, so it has fallen 11 feet?

A Yes.

Q Since 1953?

A Yes. That has happened in the last 10 years because more wells has been put in. At first, it didn't show any decline because there wasn't but three or four

wells in this area -- maybe six -- but now there are quite a few wells in this area now, you know, quite a few, way more than the number of red dots here.

MR. NUTTER: Are there anymore questions of Mr. Cox?

MR. HINKLE: I might ask him one here.

CROSS EXAMINATION

BY MR. HINKLE:

Q How many acre-feet of water do you use a year from your wells?

A I put approximately 10 inches per year on cotton and 12 inches on grain sorghum a year.

Q All right. On this that you put 12 inches on, how many acres do you have in cultivation on that?

A 400.

Q Now, Mr. Victor has approximately 320 acres in cultivation?

A Yes.

Q Do you know whether or not how much water he uses on his cultivated land per year?

A I would estimate the same amount per acre as I use. We all use about the same amount of water per acre.

Q The testimony has been that the water that will be used for waterflood purposes would not be as much

as 320 acre-feet, and if you take this out of cultivation, what difference is it going to make?

A I didn't know that it was stated that he was taking his out of cultivation.

Q Well, he may not have stated that positively, but if he is going to permit the use of his wells for this purpose, I assume that would be the case.

MR. RAMEY: He has 1100-gallons-per-minute capacity and he is only going to sell 550. He has still got another 550 that he could irrigate with.

MR. NUTTER: I think also, Mr. Hinkle, that Mr. Cox testified that Mr. Victor only irrigates 160 acres each year and he leaves the other 160 fallow, so if he puts 12 inches on it, he is only using 160 acres rather than 320. Isn't that right, Mr. Cox?

THE WITNESS: Yes.

MR. HINKLE: Okay.

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

(Witness dismissed.)

MR. BUZZARD: I call Mr. T. H. Carmichael, Mr. Examiner.

T. H. CARMICHAEL

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

DIRECT EXAMINATION

BY MR. BUZZARD:

Q Are you Mr. T. H. Carmichael?

A Yes.

Q What is your address, please?

A 178 Yucca Drive, Portales.

Q What is your business?

A Farming and ranching.

Q Do you farm and ranch in the Lingo-Causey area?

A Yes, sir.

Q Where is that with relation to Portales?

A Southeast.

Q Approximately 30 miles from Portales?

A Yes, sir. It is 27 south and about 8 east are the headquarters.

Q How many acres do you have in that area?

A I have about 15 -- a little better than 1500 acres.

Q Do you have any that is under irrigation?

A Yes, sir.

Q How much?

A Just 160.

Q What do you irrigate with, one well?

A Yes, sir.

Q What size?

A Six-inch.

Q Is it a centrifugal turbine-type pump?

A Yes.

Q And pulled by a motor?

A Yes, sir.

Q On butane?

A Yes, sir.

Q Is that what generally is done there?

A Yes, sir.

A Yes, sir.

Q What is the depth of your well?

A 183 feet.

Q What is the water level?

A I couldn't tell you the water level on it. I've got a log on it and I tried to find it and couldn't. I had it misplaced.

Q When was the well drilled?

A Six years ago.

Q What has been the effect, either increase or decrease of the water level in your well, if you know?

A The wells in our vicinity there, this was -- in other words, we drilled our first wells in '56 -- and this was an estate and my brother, he helped with these

five wells -- since '56, about a foot a year; about 14 feet since '56 that the water level has run down, according to the fellows that come around and measure.

Q That's your well and the wells of your brother you are referring to?

A Yes.

Q And others in the community or not?

A Yes, sir. And I have had to drill right east of my well about three-quarters of a mile, I had to lower a domestic well this time, just a windmill well. I ran out of water and had to get a man over there and we definitely are going to run out of water. I don't know when. I hope never. I hope I don't see it and nobody else, but --

Q (Interrupting) Will that water supply take a sustained pumping, continuously?

A I run about 15 or 20 days at a time and maybe I will skip two weeks, and there ain't a well in that country that you won't weaken if you throw the gas to her. I don't bar nobody's. I have been -- in other words, I have been around most every well there sometime or other.

Q Do you know if there is a recharging of these wells during the winter months when they are not pumped

for irrigation?

A I don't think so. There may be, but I don't think so.

MR. BUZZARD: I will pass the witness.

CROSS EXAMINATION

BY MR. NUTTER:

Q Mr. Carmichael, you mentioned that you had about 1500 acres. Here on this map I see some acreage with your name on it. Where is the 160 that you irrigate?

A I don't even know what Section it is in. I believe it is 29. I don't think all of mine is on that. I was looking at one of them here a while ago.

MR. BUZZARD: Where is your land from Mr. Victor's land? Perhaps you can answer the Examiner's question that way.

THE WITNESS: Well, I am northeast of Victor's land.

MR. BUZZARD: How far?

THE WITNESS: Like the crow flies, I would say four miles.

BY MR. NUTTER:

Q Then up here in the northeast quarter of Section 13, it shows J. W. Carmichael,160.

A That's my brother's.

Q Then up in Section 12 there is some J. Carmichael acreage. Would that be your land up in there?

A No, sir.

Q Yours is four miles northeast?

A I don't believe mine is on there.

Q I see.

A I believe the map played out or something there. The man wasn't focusing right.

Q In other words, your land is about four miles northeast?

A Northeast like the crow flies, it is about approximately four miles. It is about six or seven miles the way you have to go around the road.

(Whereupon, a discussion was held off the record.)

MR. NUTTER: Are there any other questions of Mr. Carmichael?

CROSS EXAMINATION

BY MR. RAMEY:

Q Mr. Carmichael, have you had to lower the pump in your well since you drilled it in '64?

A No, sir, we have had one well -- of the first five that was dug, we have one well that we -- we've got a submergible in it now, three-quarters horse. In other words, it had a 6-inch pump in it and it went dry.

I wouldn't say it went dry, but it got to where a three-quarter horse will handle it for house use.

CROSS EXAMINATION

BY MR. HINKLE:

Q What size casing do you have in your well?

A 16 and 18.

MR. NUTTER: Are there any other questions? The witness may be excused.

(Witness dismissed.)

MR. BUZZARD: Mr. Buster Blakey.

BUSTER BLAKEY

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

DIRECT EXAMINATION

BY MR. BUZZARD:

Q State your name, please?

A Buster Blakey.

Q And your address, please?

A Star Route, Rogers.

Q What is your business:

A Farming and ranching.

Q Do you have irrigation wells in the Causey-Lingo area?

A Yes.

Q How many?

A Four.

Q Where are they located with reference to Mr. Victor's land in the north half of Section 22?

A Mr. Victor has a well about approximately 900 feet south of my first well.

Q Are you referring to Section 15 where your first well is?

A Yes. Where is Mr. Victor's?

Q Right here.

A This is my well and this is his.

Q The red dot immediately above the black dot is your well, is that true?

A And this other one, that's mine.

Q And the red dot to the west of the dot that you spoke of?

A Yes.

Q Where are your other wells?

A It would be approximately here. The new well, I drilled it two years ago.

Q You are indicating a little below mid-line of Section 15 on the east boundary line thereof?

A Yes. I drilled it -- I doodle-bugged it or seismographed all over that country and found me a little

quarter here.

Q That's three wells. Now, where is the fourth one?

A That would be this one right here, I guess. I got three quarters right in here.

Q You are indicating the southeast quarter of Section 14, Township 5 South, Range 36 East?

A Yes. It would be, I guess, here probably. Here is a quarter, and here is a quarter and here is a quarter. It would be here.

(Whereupon, a discussion was held off the record.)

BY MR. BUZZARD:

Q It exchanges the southwest quarter of Section 14?

A Southwest of 14.

Q Did you drill the well yourself?

A I drilled two of them, and the other two were on the place when I bought it.

Q How long ago did you drill and buy, so we can get some history?

A I bought the place in '59, this one place here, and the other one in '61 and the other one in -- two years ago -- and I drilled this well two years ago in this place.

Q What is the depth of the wells, and give us the water level?

A 145 feet is the depth.

Q And the water level?

A Oh, I think 75 to 80 feet.

Q What has it done since you have drilled or acquired, increase or decrease so far as level toward the surface?

A Well, I couldn't say for sure. I can break suction on this well here.

Q You are indicating the well on the southwest quarter of Section 14?

A Yes.

Q What do you mean, "break suction"?

A Well, it is just not a very good well. In other words, you run out of water. Mr. Victor don't have no water -- seismograph -- we went together and dug a hole here and you couldn't even get windmill water.

Q Elaborate on this. You say Mr. Victor doesn't have water either. What do you mean by that?

A Well, this is on his other place. We have seismographed -- this would be his place here.

MR. NUTTER: In the northwest of 23?

THE WITNESS: I believe that's right. We

seismographed and 100 -- it was about 120 or 30 feet, the red there, and there was no water.

MR. HINKLE: You said that Mr. Victor does not have water on the northwest of 23; is that the gist of your testimony?

THE WITNESS: That's correct. That's right. You better believe it.

MR. HINKLE: No well on it?

THE WITNESS: No well.

BY MR. BUZZARD:

Q You spoke of doodle-bugging, Mr. Blakey. Explain what you mean by that and what you have to do to acquire a well in that area?

A Looking for the formation, your sand formation and so forth.

Q Is it a situation where you can drill a dry hole one place and move over 100 feet and hit a stream of water?

A Definitely, that is right.

Q So it isn't under a basin entirely?

A No, sir, it isn't.

Q Do you have any personal knowledge about the water level lowering or increasing?

A I think it has, Mr. Buzzard. I sure think

it is lower. I sure do, because I had a domestic well here and it is lowered. It is abandoned. I don't use it anymore.

MR. BUZZARD: I will pass the witness.

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

MR. HINKLE: Yes.

CROSS EXAMINATION

BY MR. HINKLE:

Q Have you drilled any dry holes in the area looking for water?

A Yes, sir, definitely.

Q Where did you drill them?

A We will go back to this again -- say, a dry hole between me and Mr. Victor -- and there is a seismograph man, Dewey Kilby, and he can testify to this thing.

Q Just a moment. Try to answer the question. Where did you drill, was the question?

A Between -- let's see, where is Mr. Victor -- here.

MR. BUZZARD: What section is that in?

THE WITNESS: Right here.

MR. BUZZARD: He is referring to Section 14.

THE WITNESS: We come across -- it is here -- it is

a dry hole here.

MR. NUTTER: Mr. Buzzard, would you repeat that for the record where that well is?

MR. BUZZARD: I take it, if the Court please, it was in the southwest quarter of Section 14.

MR. NUTTER: What part of the southwest quarter would he be indicating, which 40?

MR. RAMEY: In the center?

THE WITNESS: Well, it would be on a corner.

MR. BUZZARD: It would be the southeast corner of the southwest quarter of Section 14, sir.

MR. NUTTER: Okay. That was a dry hole?

THE WITNESS: Yes, sir.

MR. BUZZARD: Do you have other dry holes that you can specify that were drilled by you?

THE WITNESS: Yes. I drilled a well on this corner right -- another well here in the north, I would say, 100 feet or 200 feet that was a dry hole.

MR. BUZZARD: Are you indicating the southwest quarter of Section 14?

THE WITNESS: This place here, yes, sir.

BY MR. HINKLE:

Q In other words, there were two dry holes in the southwest quarter?

A Yes, there were several of them. I drilled 10 seismograph holes in that place looking for water.

Q Using a seismograph?

A Yes, sir.

Q How big a hole did you drill?

A Four-inch.

Q How deep?

A Redbed, 140 or 50 feet.

Q Could you test water in the seismograph?

A No, but you can look at your formation.

Q Did you get a core?

A No, sir.

Q How do you look at the formation?

A You can tell by your formation when you drill it. I mean you go by your -- you know, these boys know.

Q That's the only place you have drilled dry holes, then, is in the southwest quarter of 14, is that right?

A Yes, sir, and this other one here. It is definitely dry there.

MR. RAMEY: Where is that, in 23?

THE WITNESS: The one where Victor and I went together on that, Mr. Buzzard. It would be here, wouldn't it?

MR. BUZZARD: I think he is indicating

the southwest corner of the southeast quarter of Section 14.

THE WITNESS: On the north side of that place there has been several dry holes on it. Mr. Doaks drilled several dry holes.

MR. HINKLE: That was in Section 14 too, that other dry hole?

MR. BUZZARD: Yes, sir, but the last statement he made would be in Section 15. I will develope it further with another witness unless you want to inquire of this witness, sir.

MR. HINKLE: That's all.

MR. NUTTER: Are there any other questions. Mr. Ramey?

CROSS EXAMINATION

BY MR. RAMEY:

Q Mr. Blakey, you stated that you could "break suction" on these wells which I assume you lowered the water level when you increased your pump speed; you lowered the water level below your pump?

A Yes.

Q Have you been able to do this since you drilled the well; has this been a common occurrence every year?

A No, not when we first drilled, you couldn't,

but you can now.

Q You can now?

A Yes.

MR. RAMEY: That's all.

CROSS EXAMINATION

BY MR. HINKLE:

Q How many acres do you have under cultivation?

A 480, three-quarters.

Q All together?

A Yes.

Q Is it all in one piece?

A Three-quarters. I don't water it all. I water approximately 300 acres, 150 to 300.

Q What crops do you grow on the 400 acres?

A Cotton and maze or milo.

Q Alternating?

A Yes.

Q From year to year?

A Yes.

Q Do you let part of it lay out or do you irrigate all of it at the same time, the 400 acres?

A I fallow some of it,yes, sir.

Q You said that you let some of it lay out each year?

A Yes.

Q Is that on account of the Government Subsidy?

A Yes.

Q You could irrigate it all if it were not for that?

A Well, I wouldn't say that. I don't know if I've got enough water, see?

Q How do you know; have you tried it?

A Yes, I have.

Q What year did you try it?

A '59 when I first bought the place I tried to make some cotton, a lot of cotton.

Q With 400 acres?

A No, 160 in the southwest.

Q You say that you have tried to irrigate the 400 acres, but then you say it is only 160.

A I said 160 for one year.

Q Well, but you haven't irrigated 400?

A No, I haven't.

Q And you haven't tried to?

A I don't think I could.

Q Well, you don't think; you don't know until you try.

A That's right. I don't want to try.

MR. HINKLE: That's all I have.

MR. NUTTER: Are there any further questions? The witness may be excused.

(Witness dismissed.)

MR. BUZZARD: I will call Rodney Doak, if I may,please.

RODNEY DOAK

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

DIRECT EXAMINATION

BY MR. BUZZARD:

Q Are you Rodney Doak?

A Yes, sir.

Q What is your address?

A East Star Route, Box 17, Portales.

Q Do you have irrigated land in the Causey-Lingo area?

A Yes, sir, I do.

Q Do you also have irrigated land around Portales?

A Yes, sir.

Q Why did you acquire land in the Causey-Lingo?

A A peanut farmer got into trouble with black peanuts,and what have you, so he moved to a sandier-type soil or where there is irrigation water to grow these peanuts.

Q Did you acquire Section 16 from the State Land Office as a lessee?

A Yes, sir. No, Section 16 from the school office and the north half of Section 15 from an individual.

Q We are talking about the Section 16 that ties onto Mr. Victor's 22, catty-cornered to the west, right?

A Yes, sir, that's right.

Q And the north half of 15 being immediately above Section 22 of Mr. Victor's?

A Yes, sir.

Q Was there wells on Section 16 when you acquired it from the State Land Office?

A There was one.

Q Then you developed the other two?

A Yes, sir, after digging about 20 test holes before I ever located any water to see if it was feasible to pump.

Q Was this done with a doodle-bugging machine?

A Yes, sir.

Q And the hole was four inches in diameter?

A Yes, sir.

Q How did you determine the capacity of the water strata with that machine?

A Well, those fellows that run those things are

familiar enough with them that they can tell when you hit the water, sand and gravel. The bit will just fall, you know. A fellow can do that kind of stuff, I tell you. They can tell pretty close where there is water and where there is not.

Q Is there any other available water near you in Section 16 other than what is being produced by your three wells?

A I wouldn't know where to find it. We dug several holes.

Q All over the Section?

A We dug holes all around the south central part of it and then back over in the north and northwest of that section. We never have dug over in the southeast.

Q Who did the drilling for you?

A Dewey Kilby of Littlefield.

Q Does he drill most of the wells in this area?

A He is just a test hole driller. He is not the driller that actually digs the water well.

Q Now, the three wells on Section 16, what are they equipped with; what size pumps?

A Two 8's and one 6.

Q What do they produce per minute in gallons?

A We've got them set where they are producing

about 450.

Q Do you pump into a tank and then force it in --

A (Interrupting) The 6-inch well is less. It is probably not producing over 3½. Yes, we pump into the pipeline and we've got those circuit breakers.

Q And you sprinkle peanuts?

A Yes, sir.

Q How many acres in Section 16?

A About two circles there. We just water one circle and then let the other one -- either dry-land it or a summer crop.

Q Why?

A I ain't got enough water to water two circles.

Q You have two valley sprinklers there, though?

A Well, no, sir, I've got one there and then one on the other place. By the time I move it and make the circle, I can't get back to the peanuts before they burn up.

Q How long have you been operating your peanuts on Section 16?

A Well, it will just be two years on Section 16.

Q How long have you owned the north half of Section 15?

A Since '63 or '64.

Q Did it have a well on it?

A Yes, sir.

Q What size well is it?

A Well, it's got an 8-inch discharge.

Q What will it produce in gallons per minute?

A Well, it is producing about 4½.

Q Is the static water level up or down since you have been operating in that area?

A It is down real bad in that particular well because whenever we first started farming down there, I believe in '63 or '64, we had a valley sprinkler which the water propelled the sprinkler. It operates under pressure. We were putting about 800 or 900 gallons out of that well to operate this sprinkler and it done it. It done a good job for about two years. Then it got to where you would start it up, run it about three days and nights and it would go sucking air. We just finally had to just shut her down and keep putting smaller nozzles in the sprinkler to where it is down about 450 gallons now.

Q Have the three wells on Section 16, the State land, diminished or increased since the two years that it has been in operation?

A Well, I just dug one of them wells last year, this last winter. I don't know -- this one on the road,

it is diminished pretty bad.

Q That's the well that is fartherest to the east line of Section 16?

A Yes, sir.

Q As depicted on the Exhibit?

A Yes.

Q Okay.

A This other well is --

Q (Interrupting) Which other well?

A This south one. We was a little more fortunate in locating in a little better formation, and it is the deepest of any of these wells, any of these four wells that we've got.

Q How deep is it?

A I think around 170 foot, but all the rest of them is about 140 or 50 foot. I had this well out this summer and where water stands, it is setting in the bottom, plumb to the bottom, 140 foot, and the water stands on the pipe two joints, which are 10-foot joints, plus the bowl. It would be about 20-foot of water in this hole right there.

Q You are speaking about the one in the north half of 15?

A Yes, sir, and I am sure this well is pretty much the same.

Q The one fartherest to the east shown in Section 16?

A Yes, sir.

Q Now, what you are referring to is the column pipe that is inside the 16-inch casing?

A Yes, sir.

Q And the bowls are attached to the bottom which causes the water to come up to the top?

A Yes, 5-foot of bowl. I dug two wells right here.

Q You are indicating where, so the Examiner --

A (Interrupting) The southwest corner of this place on Section 15, right there.

Q What did you find when you dug the two wells on that west side of the north half of Section 15?

A Well, we went ahead and cased them and put a test pump down and one of them made maybe 100 gallons.

Q 100 gallons a minute?

A Yes.

Q Go ahead.

A So we abandoned it and Mr. Kilby dug some more test holes, and then we dug one right down here south, right in the very corner.

Q You are talking about the southwest corner of

the north half of Section 15?

A Right.

Q All right, sir, go ahead.

A It looked a little more favorable than the other one. We shot it and went ahead and dug it and cased it, and I doubt if you can make 200 gallons.

Q Of course, that is getting close to your weak well that is on the east side of Section 16, isn't it?

A Yes, but the thing of it is, you could move 50 foot and you might not be able to get a drink. You can go dig holes all over the thing and you are lucky if you hit.

Q Do you have to be careful about the RPM you turn those motors?

A Yes, sir.

Q Why?

A Well, like on these automatic sprinklers which is a similar situation that these fellows are planning on doing. A lot of times, you know, you don't have to change no pipe. You just kick them on. Sometimes I run them as high as a week or 10 days, day and night, without shutting them off. You just go over there and give it just the least bit more RPM and you are just out of water. You over-wind your motor and no load and you will come in, suck a little water and --

Q (Interrupting) And surge in that manner?

A Yes. That's the reason it is set on about 450 gallons because that's all the water that will come in there, getting every drop of it. Next year it will be less. Probably next year you will have to shut her down to 400. I know it has happened this way on this one right there.

Q You are going to have to tell the Examiner what you are talking about, please --"this well right there."

A Oh, this one on Section 15 and this one on the east.

MR. NUTTER: East side of 16?

THE WITNESS: Yes, sir.

MR. BUZZARD: I pass the witness.

MR. NUTTER: Are there any questions of Mr. Doak?

MR. HINKLE: I would like to ask him a few.

CROSS EXAMINATION

BY MR. HINKLE:

Q You have three wells that you irrigate from in Section 15?

A Right.

Q How many acres do you irrigate?

A 140. That's what one of those sprinklers irrigate.

MR. RAMEY: I think you mean 16.

BY MR. HINKLE:

Q You have three wells in 15, don't you?

A No, 16. Excuse me, three wells in 16.

Q All right. You have one well in the north half of 15?

A Right, yes, sir.

Q Let's go back, then. How many acres do you irrigate from the three wells in Section 16?

A One circle, 140 acres -- just two wells.

Q From two of those wells?

A Yes.

Q What crops do you grow?

A Peanuts -- nearly all peanuts.

Q How many acre-feet of water do you use a year?

A Oh, I put down about three inches before I plant them. Then I put on probably 7 irrigations at an inch and a half. That would be around 13 or 14 inches a year.

Q On 160?

A 140.

Q You are using over 140 acre-feet, then, a year?

A Yes, we have about an acre-foot a year or a little over.

Q Now, you have one well in the north half of 15?

A Yes.

Q How many acres do you irrigate from that?

A 140.

Q Do you use about the same amount of water there that you use in the other 140?

A Yes, sir, about the same.

Q You use 140 acre-feet of water there?

A Yes.

Q And that is all made by one well, is it not?

A No, it is two wells. It is piped together there. I've got two wells on each system.

Q Do you have any acreage in the south half of 15?

A No, sir.

Q It is all in the north, but you used the well in 16 and the one in 15, those two?

A Yes.

Q Then you use the other two for the other 140?

A Yes.

Q So you are using two wells for each 140 acre area that you are irrigating?

A That's right.

Q Using about 140 acre-feet?

A Yes.

MR. HINKLE: That's all I have.

MR. NUTTER: Are there any other questions of Mr. Doak? You may be excused.

(Witness dismissed.)

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

MR. BUZZARD: We will rest, Mr. Examiner.

MR. HATCH: I would like to have Mr. Ramey sworn.

(Witness sworn.)

JOE D. RAMEY

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

DIRECT EXAMINATION

BY MR. HATCH:

Q Mr. Ramey, would you state your name and position for the record?

A Joe D. Ramey, Supervisor of the Commission, District 1.

Q As supervisor of District 1, do you have duties concerning the supervision of waterflood projects in District 1 authorized by the Commission?

A Yes, sir, I do.

Q Would you describe briefly just a few of your

duties concerning the waterflood projects?

A Briefly, we check first and see that there has been an Order issued, and then we check to see if they meet the requirements on casing and tubing of the injection wells. Then we will make periodic field trips to determine that they are handling all of the produced water and, of course, set allowables.

Q Are you familiar with the Order that authorized Allied Chemical Corporation to institute a waterflood project in the Milnesand area?

A Yes, I am.

Q Are you familiar with the testimony presented in the case that resulted in the issuance of Order No. R-3770?

A Yes. I wasn't here at the original Hearing, but I did read the transcripts.

Q Are you familiar with the purpose of this Case No. 4433?

A Yes, I am.

Q In connection with that, have you made a study of the availability of produced water in that area for waterflood purposes?

A Yes, I have.

Q Would you present that for the Examiner at this time, please?

A Yes. I have two Exhibits, the first of which -- I posted one on the wall back there.

Q That would be Exhibit No. 1?

A This would be Exhibit No. 1.

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

A (Continuing) Exhibit No. 1 is a plat of the area showing the Milnesand-San Andres Pool which is the red pool, and I also depicted several adjacent pools in the area which are rather large water producers. The purple is the Beta-Penn Pool. A portion of the green is the Bough-Penn. The brown portions are the Devonian Pools.

I have also depicted on this plat, blue dots which are numbered and these denote salt water disposal wells which are in the area.

Q About how many of those salt water disposal wells are in the area shown on your plat?

A I have 11 wells. Now, this does not include all of the disposal wells in the area, but these are wells which dispose of appreciable volumes of water. There are some which are in the neighborhood of 100 and 200 barrels which I didn't think would be an adequate supply, shall we say.

Now, on Exhibit 2 which I have labeled "Salt Water Disposal Wells," I show the code on the left and then --

Q (Interrupting) Do you have a copy to give to Mr. Hinkle?

A Yes, excuse me.

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

A (Continuing) As I stated, the left column is the code number which, if you will notice on the map, I coded all of these wells that are shown on here.

MR. HINKLE: They are coded on Exhibit 1?

THE WITNESS: Right, 1 through 11. And then the operator of the disposal well, the location by unit, section, township and range, and the daily volume of water that is being disposed of in the wells.

BY MR. HATCH:

Q Where did you get the figures for the daily volume of water?

A These were from Form C-120 -- or 120-A, I should say -- which the operator of the disposal system submits monthly to the Oil Conservation Commission.

Q Continue.

A If you will note, I have grouped these wells into three groups and then shown a total for each group. The first group which is Wells 1 and 2 which are, shall we say, due south and perhaps a little west of the Milnesand-San Andres Pool. These wells are operated, No. 1, by

Rice Engineering; No. 2, by New Mexico Salt Water Disposal. The total daily input in these wells is 25,200 barrels of produced water per day. Now, this is Bough"C" water.

The second group of wells -- let me digress and discuss here -- I contacted both Rice and New Mexico Salt Water Disposal,and they both indicated that some kind of a deal could be worked out whereby they could furnish water for waterflooding purposes from these wells. Mr. Lovelace,with New Mexico Salt Water Disposal System, stated to me that he had made a firm offer to Union Texas to supply them 20,000 barrels of water per day. He also did state that compatibility tests had been run on this water and that the water was found to be incompatible. I think from the indications this morning, they are not even talking about that any further.

The second group of wells is four wells which are in the -- or five wells -- which are in the Crossroads and West Crossroads area. These wells are grouped within a circle of approximately 3 miles. Four of the wells handle produced water from the Crossroads-Lower Devonian and the west Crossroads-Devonian Pools. The 5th well is a well operated by B.T.A. and does handle water which is produced from the Beta-Pennsylvanian, and this is Bough "C" water.

water. I talked to all five of these people and they all indicated that they would be willing to let Union Texas have their water. The only stipulation was, Texaco said that they -- if in the future, they found a use for their water -- they would certainly want to be able to take it out of this system, but in reviewing Texaco's production in the area, I don't see any possible future use of water for Texaco for flooding or any other purpose in this area.

As I said, the B.T.A. is Pennsylvanian water. Now, your total volume of these five wells is 39,850 barrels. This was a July figure. Subtracting the 12,250 from this, you would still have some 27,600 barrels of Devonian water in the Crossroads and West Crossroads.

The third group I think is insignificant, and I don't know whether we need to discuss this or not unless we can figure some way to use the Bough "C" water. I am sure it can be treated.

MR. NUTTER: All of the third group is Bough "C" water again?

THE WITNESS: Yes. And there again, this volume is only 14,380 barrels.

BY MR. HATCH:

Q And most of that is made up by one particular well?

A Yes, most of it is from the Roger Hanks Well which is some 12,600 barrels.

Q Is there anything further that you want to add to your testimony?

A I would just -- well, in my estimation, I think an adequate water supply is available in the Crossroads area. It may be that they would have to tie into the four systems which are present which might entail a few more miles of pipeline than they originally planned just to pick up the Mobil water. There again, I don't think we should discount this on the supposition that the operator won't be able to get the water after the Mobil and other parties have plugged the wells. I think something could be worked out.

MR. HATCH: That's all.

MR. NUTTER: Are there any questions of Mr. Ramey? Mr. Hinkle?

MR. HINKLE: Yes.

CROSS EXAMINATION

BY MR. HINKLE:

Q On your first group there, 1 and 2, Rice Engineering Salt Water Disposal Company, that is all Bough "C" water, isn't it?

A That is all 100 percent Bough "C" water.

Q And that, as you have testified, and as Mr. Perdue testified, that water is incompatible as far as --

A (Interrupting) Without treatment, yes.

(Cont) Q Without treatment, and the complexion of mechanical use and the treatment and all, why, that is an unknown quantity of what it is going to cost to use it?

A Well, we have a figure of 2 mills per barrel.

Q Well, that's only --

A (Interrupting) That's for the treatment of water.

Q Chemical treatment, but not mechanical.

A Mechanics, we do not know about.

Q Now, the B.T.A. No. 7 there, that is Bough "C" water too, isn't it?

A That is correct.

Q Then what about 8, 9, 10 and 11. Is that all Bough "C"?

A The American Petrofina is Devonian water from the South Prairie Devonian Pool.

Q It is just a very small one?

A Yes, it is a small one.

Q Where is the Roger Hanks Well located?

A It is located in Section 25 of Township 8 South, Range 36 East.

Q It is just your opinion that they could get enough water here; you couldn't say definitely that this would be a reliable water supply?

A Mr. Hinkle, my experience with Devonian reservoirs after, you know, observing them for some 17-plus years that I have been in New Mexico, I would say that there is just worlds of water in the Devonian formation. Now, on the surface, no, it may not be always available. It is right now and,true, I think some wells are going to be plugged, but then,again, if some wells are plugged, there are going to be some wells that are going to start making water. I am not thoroughly convinced that you wouldn't have 20,000 barrels of water a day available in the Crossroads Devonian Pool itself.

Q But you can't expect Allied Chemicals to go in there and rely upon being able to get water from the landowner after the wells have been plugged or the lease has been forfeited, can you, to gamble on this? You wouldn't say that is a reliable source of water, would you?

A Then, again, I don't think we can say that he is not going to be able to get the water unless he tries.

Q I know, but you do have that problem, that when this occurs --

A (Interrupting) I know in several other

instances, Mr. Hinkle where the wells are being produced below their money-making capabilities, below their economic limit just so they can furnish water for waterflooding.

Q Well, you can't assume, though, that a company is going to do that, can you?

A No, but --

Q (Interrupting) And lose money?

A I think it can be worked out. I don't think Union Texas is going to lose money by operating Devonian Wells past the economic limits.

I might inject something else, Mr. Hinkle. You have quite an outlay of money for a pipeline. All right, in Section 6 of 9, 36, in that Section, B.T.A. has a terminal station where all of their water is gathered and then from there, it goes to the disposal well down in Section 5 of 10, 36. So a line from Milnesand to this point which is, say, 6 miles, would pick up 12,250 barrels. All right, in the same instance, you would be crossing the line which goes from the Roger Hanks Property over to their well in Section 25. This is another 12,600 barrels.

Q That is all Bough "C" water, though?

A That is all Bough "C" water. But by a 6-mile line --

Q (Interrupting) And that is provided you were

able to treat it?

A Well, the report shows it can be treated. But by laying a 6-mile line, you are picking up 24,000 barrels of water.

Q Now, you know as a matter of law, that the water that is produced from these wells where Mrs. Sawyer owns fee, for instance, and where the Santa Fe Railroad -- that the general law is that you can only use the water off a lease for uses on that lease itself, do you not?

A I heard it rumored to that effect. I have never read the Law.

Q I can make the statement that that is the Law.

A All right, I believe you.

Q You would have to still get permission from these landowners, would you not, to transport that water over here to the Milnesand Area for use in waterflooding purposes?

A I imagine so, yes.

Q Is there any certainty that we can get that?

A No, I can't make that statement.

Q Doesn't that support our testimony that we do not have an adequate certain water supply?

A Well, there is no statement made to the contrary that you can't.

SPECIALIZING IN: DEPOSITIONS, HEARINGS, STATEMENTS, EXPERT TESTIMONY, DAILY COPY, CONVENTIONS
1120 SIMMS BLDG. • P.O. BOX 1092 • PHONE 243-6691 • ALBUQUERQUE, NEW MEXICO 87101
1400 FIRST NATIONAL BANK EAST • PHONE 256-1294 • ALBUQUERQUE, NEW MEXICO 87108

Q Well, with all of these legal entanglements involved with the Devonian Pool, I don't think --

(Interrupting) Evidently at one time Allied Chemical had this worked out. They testified to the effect that they were going to use this water. They evidently had those hurdles crossed at one time.

Q Well, I think the testimony is that they originally intended to use this, but the testimony further is today, that upon investigation, they found it was not an adequate supply and a certain supply.

A To the contrary, I would say that there is an ample supply of Devonian water.

Q Yes, provided you can work it out legally to do it. in there; provided you have a lot of contingencies

A I am sure of that.

Q Then you've got economics.

A Double Eagle may not be able to get a right-of-way.

Q That's true, but the testimony is that they are willing and able to contract to furnish this water.

A That's right.

Q Now, nobody in the Crossroads Pool has offered to do that.

MR. BUZZARD: I think an objection would be

appropriate here and I make it. I was limited and not able to put on testimony with regard to prior appropriations, it being out of scope of this examination. Now, we are into other legal fields that are different. I think the same objection would apply to the testimony that was sustained on the previous one.

MR. HINKLE: This is a question of Law.

MR. BUZZARD: Well, Mr. Hinkle, this prior appropriation is a question of Law.

MR. HINKLE: That is a matter of rights between parties.

THE WITNESS: Let me state that in a previous case of Union Texas, they are going to get water which is produced over here and pipelined over here. Now, it has been done and I don't know that it can't be done. I have had nothing definite. I have been talking to the operators and they say, "Now, we don't want to be in a position where we are going to have to guarantee Union Texas 20,000 barrels a day." They are planning on operating their leases as oil leases; not as water leases.

BY MR. HINKLE:

Q As I say, I don't think you can get anybody in the Crossroads area to enter into a firm contract to furnish that much water, whereas, we have an offer here

of Double Eagle to do it.

A There,again, there is nothing to the extent that this -- nothing testified that it definitely could not be worked out.

Q Well, I think the testimony shows here that they haven't been able to work it out or find what they consider an adequate economical water supply of saline or brackish or salt water.

A Well, I think their testimony is that they cannot be furnished 20,000 barrels. What I am saying is I think they can go in and perhaps furnish some themselves.

Q They might be expending a lot of money, but I think there is a limit to the economics of this, as Mr. Perdue has pointed out.

A In part.

Q They just can't spend more than they are going to get out of the waterflood.

A I don't know that the Sawyers have been contacted or the Santa Fe Railroad has been contacted.

Q I don't know either, as far as I know.

MR. NUTTER: Mr. Ramey, I will ask you one question and I think the answer is rather obvious.

THE WITNESS: I hope.

MR. NUTTER: If one company can go and find

somebody that is willing to sell fresh water, don't you imagine somebody else could go and find somebody that has salt water they would be willing to sell?

THE WITNESS: I would think so, yes.

(Whereupon, a discussion was held off the record.)

MR. NUTTER: Are there any other questions of this witness?

REDIRECT EXAMINATION

BY MR. HATCH:

Q Mr. Ramey, when fresh water is used in water-flood operations and then produced, can that water be used for any domestic purposes afterward?

A Not for --

Q (Interrupting) For irrigation purposes or drinking the water?

A No, it picks up a certain amount of solids from the formations which make it completely unusable for probably anything but waterflooding.

MR. HATCH: That's all the questions I have.

I would like to introduce the Commission's Exhibits Nos. 1 and 2.

MR. NUTTER: OCC Staff Exhibits 1 and 2 will be entered in evidence.

(Whereupon, Commission's Exhibits Nos. 1 and 2 were offered and admitted in evidence.)

MR. NUTTER: Are there any other questions of Mr. Ramey?

(Whereupon, a discussion was held off the record.)

(Witness dismissed.)

MR. NUTTER: Does anyone have anything that they wish to offer in this case at this time?

Mr. Hinkle, do you have a closing statement that you wish to make?

(Whereupon, a discussion was held off the record.)

MR. HINKLE: I would like to recall Mr. Kenworthy for a couple of questions.

J. D. KENWORTHY

recalled as a witness, having been previously sworn, was examined and testified as follows:

REDIRECT EXAMINATION

BY MR. HINKLE:

Q In your previous testimony, you referred to your contract or agreement with Mr. Victor to obtain water from Section 22, 6, 36?

A Yes, sir.

Q What is the substance of your agreement with Mr. Victor?

MR. BUZZARD: I believe the contract would be the best evidence. I would make an objection, Mr. Examiner.

BY MR. HINKLE:

Q Do you have a letter on this?

A I have a letter from Mr. Victor, and I think I have a copy of the contract with me.

(Whereupon, Applicant's Exhibit No. 11 was marked for identification)

BY MR. HINKLE:

Q Mr. Kenworthy, refer to Exhibit No. 11 and read that to the Examiner.

A This is a letter from Mr. K. V. Victor to Union Texas Petroleum, a Division of Allied Chemical dated May 20th, 1970: (Reading) This is to advise on May 20th, 1970, I have entered into a contract with Double Eagle Corporation to provide water for their re-sale to your waterflood project in the Milnesand Field. This waterflood will come from three existing wells which have a combined capacity of approximately 1500 gallons per minute and additional wells which I propose to drill if required to meet their requirements. The existing wells have been on production for several years and have indicated only the normal decline in fluid level. We are confident that

sufficient water can be developed on our property to meet the projected needs for your waterflood project. (End of reading.)

Q Now, are you ready, able and willing to enter into a firm contract with Allied Chemical to furnish 20,000 barrels per day for the Milnesand Waterflood?

A Yes, sir, we are.

MR. HINKLE: That's all.

MR. NUTTER: Are there any other questions?

MR. HATCH: Yes, I have one.

RECROSS EXAMINATION

BY MR. HATCH:

Q You say you have entered into a contract?

A We say we are ready to enter into a contract.

Q This is Mr. Victor I am speaking of?

A Yes, you are correct. We have entered into a contract.

Q You would be obligated to take this water if, say the Commission did not approve this fresh water being approved and you never entered into a contract with Allied Chemical, would you be obligated to take the water?

A Perhaps this is an Option Agreement rather than a contract with Mr. Victor.

Q It may not be a firm contract at this time,

though?

A It is not a firm contract. I think it is specified --

Q (Interrupting) You do not have the water yet?

MR. HINKLE: Do you consider you have the right to hold Mr. Victor to a contract to furnish this water?

THE WITNESS: I would think so.

MR. HINKLE: In the event that you are successful in negotiating the contract with Allied Chemical?

THE WITNESS: Yes.

MR. RAMEY: Does Mr. Victor have the right to make you take the water?

THE WITNESS: No, only if we need it.

MR. HINKLE: You do have an option to take it in the event that you do negotiate a contract with Allied Chemical, is that right?

THE WITNESS: Yes, sir.

MR. NUTTER: Are there any further questions of Mr. Kenworthy?

RECROSS EXAMINATION

BY MR. RAMEY:

Q Mr. Kenworthy, didn't you state that you tested these wells for 1160 or something like that?

A Yes, I believe it was 1120.

Q And he states he has 1500?

A Yes, sir.

Q My, we have a little decline already, haven't we?

A A little over-optimistic there.

RECROSS EXAMINATION

BY MR. BUZZARD:

Q Do you have your easements spoken for?

A Just what do you mean by "spoken for"?

Q Do you have them contracted for?

A The State water easements?

Q The easements for your assumed 10-inch pipeline from Mr. Victor's to the waterflooding project?

A No, sir, we do not.

Q Have you contemplated what that is going to cost as far as your cost items?

A We put an estimate in for that, yes, sir.

Q How much?

A I believe it was $8000.

Q So you have made no arrangement to go through the south half of Section 22 with the Lock family or have any of your agents attempted to go through that?

A Yes, we did attempt to go through that.

Q Were you successful --

A (Interrupting) Either the south half of 22

or the south half of 21. I believe it is in Section 21.

Q Well, that is also Lock, isn't it, that south half?

A Yes, it is.

Q Did they tell you that you could go through or tell you that you couldn't?

A They told us we couldn't go through.

Q But you nevertheless have drawn a line here to indicate to this Commission that you could go through, haven't you?

A We have drawn a line on the map on the County Road right-of-way.

Q You do not remember what you are paying for this water; do you know what you are getting for it?

A We are getting about $140.or $150. per acre-foot on the average.

Q How much is that per barrel?

A It is a little over 2¢.

Q How much over 2¢?

A Well, it depends on how much Union Texas takes. They pay a base price and then they pay a delivery charge, so I can't say exactly how much because if we deliver the full 20,000 barrels a day for the full period of the contract, then it is right at 2¢, but if we deliver less

than 20,000 barrels a day, the average price would be more than 2 cents.

Q So you are not contracting to deliver 20,000 barrels a day to where you would be obligated and if you couldn't, you wouldn't be facing a breach of contract, are you?

A We are contracting to deliver up to the maximum of 20,000 barrels.

Q If you can get it or are you telling me that you will get it?

A We are telling them we will get it subject to the force majeure, normal force majeure of the contract; strikes, war, flood and that type of thing.

Q And availability of water?

A I suppose, yes, sir.

MR. RAMEY: That's all the questions I have.

MR. NUTTER: Are there any other questions of the witness? You may be excused.

I might ask you one question, Mr. Kenworthy.

RECROSS EXAMINATION

BY MR. NUTTER:

Q As a water pipeline company, do you have the Right of Eminent Domain in condemnation proceedings?

A We have never exercised or attempted to

exercise this right.

Q Is it there?

A We think it is.

Q But it hasn't been tested so you are not sure?

A We have not as a water company, but we have been advised that we do have that right.

Q Are you classified by the Public Service Commission or the Corporation Commission as a common carrier or what?

A No, sir.

MR. NUTTER: Are there any further questions of the witness? You may be excused.

(Witness dismissed.)

MR. NUTTER: Closing statements?

MR. HINKLE: I don't think that I can add much to what has already been produced here by the testimony, but I think it has been very clearly and forcibly shown that Allied Chemical, through the investigation that they have made, are unable to obtain a water supply from the Devonian-Crossroads area which they consider as dependable and adequate, and this has forced them to look elsewhere. They have investigated the Bough "C" water which there is a lot of it in the area, but they have problems in connection with that because the water is not compatible with the

water in the Milnesand area.

They have investigated the economic aspects of the water, and the proposition that has been submitted to them by Double Eagle is one which they can live with economically, and they believe that the water supply is dependable enough. The Double Eagle Corporation with their past experience in New Mexico can furnish them water for this and would be a company that is dependable and may be relied upon in entering into a contract that they would be assured of an adequate and safe water supply to go ahead with this project.

If this is not permitted, they do have problems which may not be insurmountable, but it may be a matter of economics, then, in trying to work it out as to whether it would be possible for them to go ahead with this waterflood project. It has been pointed out that if it gets to a point where they have to abandon it, it means the waste of about 4,000,000 barrels of oil being left in the ground.

MR. NUTTER: Thank you. Mr. Buzzard?

MR. BUZZARD: I gather, Mr. Examiner, that from my view of the record that the Petitioner has not exhausted his liberties and abilities to obtain salt, brackish or some type of water instead of asking to use

the public water, fresh water in this area. I don't think he has made a thorough effort to show this Commission and this Examiner in good faith that it cannot be done.

The economics that was presented to this Examiner are pretty much a toss-up so far as cost and net, although, there may be an element or two that wasn't in that that could throw it off such as operation, and I am not certain enough myself to argue it effectively because of that one aspect.

I do urge that on the first point, that they have not made an effort. They say, "Yes," and then they say,"No." They don't have their reports in complete to show this Examiner of what the situation is.

Then they say they have water supply in the vicinity of my clients, but they don't have a water engineer's report. All of the engineering reports that I was able to find and submitted to counsel and this Examiner indicates quite to the contrary, that there is not water supply dependable and available in the Causey-Lingc Area. It is a stream-type affair as depicted in Exhibit 2. It isn't a basin effect that you pump from. You hit it on a stream as it depicts in that Exhibit 2. It says that the decline has been rapid and has been most rapid 12 miles southwest of Causey, and if you follow as the crow flies

12 miles southwest of Causey in Section 22 or in that vicinity, or in Section 16 where these gentlemen have their investments, they don't show that there is available water in that place, and all testimony indicates there is not at Causey. Their much better risk is with their salt water in the vicinity as indicated by Mr. Ramey so far as capital investment risk is concerned, because this water will surge if you turn it out and pump it 24 hours a day. Report No. 1 says that this does recharge in the winter months, in the last paragraph of Report No. 1. If you are going to pump that 365 days, 500 gallons a minute, this is not the type of structure under this stream-type thing that will sustain that. If you go to the east into Mr. Victor's other land, you find dry holes as indicated by Mr. Blakey. I don't know about testimony west. If you go north as indicated by one witness, that he could move onto State land in derogation to the rights of the lessee, I assume. I don't know how else. He is not going to find any water anyway, because it is all being produced according to the testimony.

Therefore, there is no dependable, reliable source that they want to really invest this much money in. We don't see any written contracts. We don't see any water reports from people in the expertese in the field, and the

general reports from the State Engineer submitted herein says quite to the contrary.

We therefore submit to this Court that the Application for fresh water utilization should be refused.

MR. NUTTER: Thank you.

MR. HINKLE: Mr. Examiner, I would just like to add this: I know of nothing that would require Union Texas in this case to use salt water. I think the operators and the working interest owners of this Unit have a discretion as to the water which they want to use. I think they can decide whether or not -- it is up to them to decide whether they consider the supply which has been offered to be adequate and safe and dependable and so forth. This area where they propose to obtain the fresh water is not in the declared area of the State Engineer that it is public water and subject to prior appropriations.

Now, if there is any interference in taking this water with other water rights that may exist there, that is not a matter for this Commission to decide. That is something that would be decided in a suit brought against Double Eagle and that's their worry and look-out, and something that we do not have to worry about. If they are willing to enter into a contract with us to furnish a dependable and adequate water supply, I think we have a

right to take it. As I say, we don't have to use salt water. There is nothing in the Law that requires us to do it.

MR. NUTTER: Thank you. Does anyone have anything further they wish to offer in Case No. 4433?

We will take the Case under advisement and we will call the next case.

STATE OF NEW MEXICO)
) SS.
COUNTY OF SANTA FE)

I, RICHARD L. NYE, Court Reporter, do hereby certify that the foregoing and attached Transcript of Hearing before the New Mexico Oil Conservation Commission was reported by me, and the same is a true and correct record of the said proceedings, to the best of my knowledge, skill and ability.

Richard L. Nye
RICHARD L. NYE, Court Reporter

My commission expires April 8, 1971.

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 4433, heard by me on 9/30, 1970.

..., Examiner
New Mexico Oil Conservation Commission

OIL CONSERVATION COMMISSION

STATE OF NEW MEXICO
P. O. BOX 2088 - SANTA FE
87501

GOVERNOR
DAVID F. CARGO
CHAIRMAN

LAND COMMISSIONER
ALEX J. ARMIJO
MEMBER

STATE GEOLOGIST
A. L. PORTER, JR.
SECRETARY - DIRECTOR

November 18, 1970

Mr. Clarence Hinkle
Hinkle, Bondurant, Cox & Eaton
Attorneys at Law
Post Office Box 10
Roswell, New Mexico 88201

Re: Case No. 4433
Order No. R-3770-A
Applicant:
Allied Chemical Corporation

Dear Sir:

Enclosed herewith are two copies of the above-referenced Commission order recently entered in the subject case.

Very truly yours,

A. L. PORTER, Jr.
Secretary-Director

ALP/ir

Copy of order also sent to:

Hobbs OCC x
Artesia OCC x
Aztec OCC
Other Mr. Dan Buzzard, Box 1064, Clovis, N. Mex. 88101

BEFORE THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO

IN THE MATTER OF THE HEARING CALLED BY THE OIL CONSERVATION COMMISSION UPON ITS OWN MOTION TO PERMIT ALLIED CHEMICAL CORPORATION TO APPEAR AND SHOW CAUSE WHY SAID CORPORATION SHOULD BE PERMITTED TO INSTITUTE ITS PROPOSED WATERFLOOD PROJECT IN ITS MILNESAND (SAN ANDRES) UNIT AREA, MILNESAND-SAN ANDRES POOL, ROOSEVELT COUNTY, NEW MEXICO, BY THE INJECTION OF FRESH WATER.

CASE No. 4433
Order No. R-3770-A

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 a.m. on September 30, 1970, at Santa Fe, New Mexico, before Examiner Daniel S. Nutter.

NOW, on this 18th day of November, 1970, the Commission, a quorum being present, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS:

(1) That due public notice having been given as required by law, the Commission has jurisdiction of this cause and the subject matter thereof.

(2) That Order No. R-3770, dated May 28, 1969, authorized Allied Chemical Corporation to institute a waterflood project in its Milnesand (San Andres) Unit Area, Milnesand-San Andres Pool, by injection into the San Andres formation through 28 wells in Township 8 South, Ranges 34 and 35 East, NMPM, Roosevelt County, New Mexico.

(3) That the evidence presented during the hearing of Case 4140, which resulted in the issuance of said Order No. R-3770, was to the effect that up to 20,000 barrels of salt water per day from the Crossroads Siluro-Devonian Pool would be injected.

(4) That the evidence at said hearing indicated that Devonian water from the Crossroads-Devonian area is compatible with Milnesand-San Andres area water and should present no precipitation problem.

(5) That Case 4433 was called by the Oil Conservation Commission on its own motion to permit Allied Chemical Corporation to appear and show cause why said corporation should be permitted to institute its proposed waterflood project in its Milnesand (San Andres) Unit Area by the injection of fresh water in lieu of produced salt water from said Crossroads Siluro-Devonian Pool.

(6) That Allied Chemical Corporation contends there is not available a dependable supply of produced salt water sufficient to meet the requirements of the aforesaid waterflood project through the life of the flood.

(7) That applicant's anticipated requirements for water for injection purposes is 20,000 barrels of water per day at initiation of flooding; that said requirements drop rapidly to 2000 barrels of water per day by 1978; that said requirements drop slowly thereafter to about 1100 barrels of water per day by 1983.

(8) That approximately 39,850 barrels of compatible produced Devonian salt water are being disposed of per day in the Crossroads Siluro-Devonian Field area at the present time.

(9) That the Crossroads Siluro-Devonian Pool is an active water drive pool, containing large volumes of salt water.

(10) That there are sufficient volumes of salt water available in the Crossroads Siluro-Devonian Pool area to constitute a dependable and adequate source of supply for the injection requirements of the subject waterflood project through the life of the flood.

(11) That the request of Allied Chemical Corporation to inject fresh water in its Milnesand Waterflood Project in lieu of produced salt water from the Crossroads Siluro-Devonian Pool area should be denied.

IT IS THEREFORE ORDERED:

(1) That the request of Allied Chemical Corporation to be permitted to inject fresh water in its Milnesand Waterflood Project, Milnesand (San Andres) Unit Area, Milnesand-San Andres Pool, Roosevelt County, New Mexico, is hereby denied.

(2) That jurisdiction of this cause is retained for the entry of such further orders as the Commission may deem necessary.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

DAVID F. CARGO, Chairman

ALEX J. ARMIJO, Member

A. L. PORTER, Jr., Member & Secretary

esr/

Docket No. 22-70

DOCKET: EXAMINER HEARING - WEDNESDAY - SEPTEMBER 30, 1970

9 A.M. - OIL CONSERVATION COMMISSION CONFERENCE ROOM,
STATE LAND OFFICE BUILDING - SANTA FE, NEW MEXICO

The following cases will be heard before Elvis A. Utz, Examiner, or Daniel S. Nutter, Alternate Examiner:

CASE 4416: (Continued from the September 16, 1970, Examiner Hearing)

Application of Robert L. Parker Trust for a waterflood project, Lea County, New Mexico. Applicant, in the above-styled cause, seeks authority to institute a cooperative waterflood project in the Langlie Mattix Pool on its George L. Erwin Lease by the injection of water through its Erwin Well No. 2 located in Unit L of Section 35, Township 24 South, Range 37 East, Lea County, New Mexico.

CASE 4422: (Continued from the September 2, 1970, Examiner Hearing)

Application of Atlantic Richfield Company for amendment of Order No. R-3588, Lea County, New Mexico. Applicant, in the above-styled cause, seeks the amendment of Order No. R-3588, which order authorized the disposal of produced salt water into the Yates and Seven Rivers formation in the perforated and open-hole interval from 3110 feet to 3300 feet in the Sinclair ARC Federal Well No. 1 located in Unit O of Section 9, Township 20 South, Range 33 East, West Teas Pool, Lea County, New Mexico. Applicant now seeks authority to dispose into said zones in the interval from 3010 feet to 3300 feet.

CASE 4222: (Reopened)

In the matter of Case 4222 being reopened pursuant to the provisions of Order No. R-3850, which order established 80-acre spacing units for the West Sawyer-San Andres Pool, Lea County, New Mexico, for a period of one year. All interested parties may appear and show cause why said pool should not be developed on 40-acre spacing units and present evidence as to whether or not the subject pool is in fact an associated reservoir.

CASE 4429: Application of Union Texas Petroleum Corporation for a unit agreement, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval of the Langlie-Jal Unit Area comprising 3,748 acres, more or less, of federal, state, and fee lands in Townships 24 and 25 South, Range 37 East, Langlie-Mattix Pool, Lea County, New Mexico.

CASE 4430: Application of Union Texas Petroleum Corporation of a waterflood project, Lea County, New Mexico. Applicant, in the above-styled cause, seeks authority to institute a waterflood project in its Langlie-Jal Unit by the injection of water into the Seven Rivers and Queen formations through 46 wells in Townships 24 and 25 South, Range 37 East, Langlie-Mattix Pool, Lea County, New Mexico.

(Reopened)

CASE 4173: In the matter of Case 4173 being reopened pursuant to the provisions of Order No. R-3811-A, which order extended 80-acre spacing units and a limiting gas-oil ratio of 4000 cubic feet of gas per barrel of oil for the Hobbs-Drinkard Pool, Lea County, New Mexico, for a period of 90 days. All interested parties may appear and show cause why said pool should not be developed on 40-acre spacing, why the limiting gas-oil ratio should not revert to 2000 to one, and/or why all casing-head gas produced by wells in the pool should not be reinjected.

CASE 4420: (Continued and Readvertised)

Application of Xplor Company for the creation of a new gas pool and special rules therefor, a dual completion, and authority to commingle, Lea County, New Mexico. Applicant, in the above-styled cause, seeks the creation of a new Pennsylvanian gas pool for its Cleveland Well No. 1 located in Unit G of Section 23, Township 12 South, Range 32 East, Lea County, New Mexico, and for the promulgation of special rules therefor, including a provision for 160-acre spacing units. In the alternative, applicant seeks approval of a non-standard 160-acre gas proration unit comprising the NE/4 of said Section 23 to be dedicated to said well. Applicant also seeks authority to dually complete said well in such a manner as to produce oil from the East Caprock-Devonian Pool and gas from said Pennsylvanian formation and to commingle on the surface the liquids from said zones.

CASE 4431: Application of William A. and Edward R. Hudson for unorthodox well locations and a dual completion, Lea County, New Mexico. Applicants, in the above-styled cause, seek authority to drill a well at an unorthodox location (off pattern) 660 feet from the South line and 1980 feet from the West line of Section 15, Township 17 South, Range 32 East, Lea County, New Mexico, for the production of oil from the Baish-Wolfcamp and Maljamar-Abo Pools and to dually complete said well in the subject pools.

CASE 4432: Application of MWJ production Company for an unorthodox oil well location, Lea County, New Mexico. Applicant, in the above-styled cause, seeks an exception to the rules governing the Baum-Upper Pennsylvanian Pool to permit the drilling of an oil well at an unorthodox location 2310 feet from the South line and 990 feet from the West line of Section 5, Township 14 South, Range 33 East, Lea County, New Mexico.

CASE 4433: In the matter of the hearing called by the Oil Conservation Commission upon its own motion to permit Allied Chemical Corporation to appear and show cause why said corporation should be permitted to institute its proposed waterflood project in its Milnesand (San Andres) Unit Area, Milnesand-San Andres Pool, Roosevelt County, New Mexico, by the injection of fresh water; said corporation testified in the hearing that authorized said waterflood project that produced salt water be used for waterflooding purposes.

CASE 4423: (Continued from the September 2, 1970, Examiner Hearing)

Application of Union Oil Company of California for compulsory pooling, Roosevelt County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests down to and including the San Andres formation underlying the N/2 NE/4 of Section 20, Township 8 South, Range 38 East, Bluitt-San Andres Associated Pool, Roosevelt County, New Mexico. Said acreage to be dedicated to a well to be drilled at an orthodox location in the NW/4 NE/4 of said Section 20. Also to be considered will be the cost of drilling said well, a charge for the risk involved, a provision for the allocation of actual operating costs, and the establishment of charges for supervision of said well.

CASE 4434: Application of Union Oil Company of California for the creation of a new gas pool and special pool rules, Lea County, New Mexico. Applicant, in the above-styled cause, seeks the creation of a new gas pool for its Pipeline Federal Well No. 1 located in Section 4, Township 19 South, Range 34 East, Lea County, New Mexico. Applicant further seeks the promulgation of special rules therefor, including a provision for 640-acre spacing and proration units and fixed well location requirements.

CASE 4435: Application of Blackrock Oil Company for a dual completion and salt water disposal, Lea County, New Mexico. Applicant, in the above-styled cause, seeks authority to dually complete its Mobil Atlantic Well No. 1 located in Unit D of Section 10, Township 9 South, Range 36 East, Lea County, New Mexico, in such a manner as to produce oil from the Pennsylvanian formation through tubing and to dispose of produced salt water into the San Andres formation from 4300 feet to 5045 feet and possibly other formations between the 8 5/8-inch casing shoe at 4153 feet and the top of the cement at 9205.

CLARENCE E. HINKLE
W. E. BONDURANT, JR.
LEWIS C. COX, JR.
PAUL W. EATON, JR.
CONRAD E. COFFIELD
HAROLD L. HENSLEY, JR.
STUART D. SHANOR

C. D. MARTIN
PAUL J. KELLY, JR.

LAW OFFICES
HINKLE, BONDURANT, COX & EATON
600 HINKLE BUILDING
POST OFFICE BOX 10
ROSWELL, NEW MEXICO 88201

TELEPHONE (505) 622-6510

MIDLAND, TEXAS OFFICE
521 MIDLAND TOWER
(915) MU 3-4691

October 7, 1970

Mr. Dan Nutter
Oil Conservation Commission
Box 2088
Santa Fe, New Mexico 87501

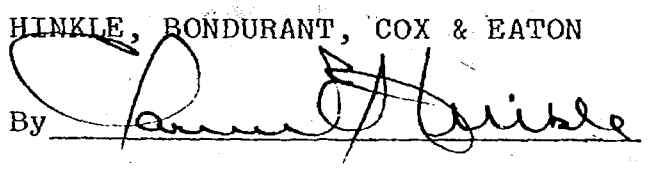
Re: Case No. 4433

Dear Dan:

We have just received from Double Eagle Corporation the enclosed groundwater investigation of the K. V. Victor property in Roosevelt County made by Ed L. Reed and Associates, Consulting Hydrologists of Midland, Texas, in July of this year. You will recall that Double Eagle was to file a copy of the report which they had had made and which was referred to in the testimony of J. D. Kenworthy, General Manager of Double Eagle, in Case No. 4433, which was heard before you as examiner last Wednesday, September 30.

Yours sincerely,

HINKLE, BONDURANT, COX & EATON

By 

CEH:cs
Enc.
cc: W. R. Herrin
cc: J. D. Kenworthy

Buster Blake, Regan, ND.
Has 3 quarters (3/2 of 15 Acres ND)
145' deep 75-80 water level
Has water right in irrigation of 480 Acres
Mineral rights on one

Camp Dale Partners

3 Wells in Sec 16 8" about
400-450 6" pressure about 300-350
Well in N/2 Sec 15 / makes about
450 gpm.

Irrigates 2 140 acre sections.

	Wm. Hall Xmas 1957	Wm. Hall Jan. thru Oct
Investment	1,509,000	1,200,400
op expense	5,062,000	5,717,700
net op income	5,898,600	5,387,700
net on investment	3.9	4.5
rate of return	28.6 %	30.9
payout	4.6 yrs	4.6 yrs
present worth of net income discounted @ 8%	2,384,000	2,321,000

Cox — Virgin well drilled in 55-56
800 gals/min with [illegible] ft
[illegible] feet lift, replaced 6" pump w/ 4" pump.
Victor irrigates, ½ of his 320 each year.

Carmichael — 178 Yucca Dr Parlier.
160 acres under irrigation
6" centrifugal pump runs on butane
120' deep
water level ?
drilled 6 years ago
Water level dropped about 1 ft per year
or about 14 ft since 1956

BEFORE EXAMINER NUTTER
OIL CONSERVATION
EXHIBIT NO. OCC #2
CASE NO.

SALT WATER DISPOSAL WELLS

1	Rice Engineering	L-3-10-34	8,000 BWPD
2	New Mexico Salt Water Disp. Co.	P-15-10-34	17,200 BWPD
			25,200 BWPD
3	Union Oil Co. of Calif.	G-31-9-36	2,100 BWPD
4	Union Oil Co. of Calif.	L-32-9-36	3,200 BWPD
5	Mobil Oil Corporation	A-33-9-36	17,700 BWPD
6	Texaco, Inc.	O-34-9-36	4,600 BWPD
7	BTA	C-5-10-36	12,250 BWPD
			39,850 BWPD
8	Sunset International	L-16-8-36	830 BWPD
9	American Petrofina	E-21-8-36	250 BWPD
10	Lone Star	A-29-8-36	700 BWPD
11	Roger Hanks	M-25-8-36	12,600 BWPD
			14,380 BWPD

Tank Report #4

BEFORE EXAMINER NUTTER
OIL CONSERVATION COMMISSION
9/30/70 EXHIBIT NO. Donkey #1
CASE NO. 4433

CAUSEY-LINGO AREA, ROOSEVELT COUNTY

By

J. B. Cooper

Ground water is pumped for irrigation in south-central Roosevelt County near the towns of Causey and Lingo on the High Plains of eastern New Mexico about 30 miles southeast of Portales. In years of normal or above normal precipitation, dry-land farming is fairly successful in this area. Rainfall has been deficient for the last several years, and crop yields of dry-land farms have declined seriously. The average annual precipitation at Pep, near the southwest corner of the area, over a 41-year period is 15.11 inches. According to the U. S. Weather Bureau, precipitation at this station from 1951 through 1953, in inches, was 11.31, 8.82, and 9.39, respectively. A new station near Milnesand,13 miles south of Pep, reported 12.78 inches in 1955 and 7.61 inches in 1956. This cumulative deficiency of precipitation has caused a large increase in the use of ground water for irrigation.

Irrigation in this vicinity began about 1946; however, the major development of irrigated farms began in 1954. In 1956 nearly 90 wells were available for irrigation of which 72 were used to irrigate about 5,000 acres of land. Most of the irrigated acreage is concentrated in about 20 square miles northeast of Lingo, although a few other irrigation developments are distributed throughout an area of 300 square miles.

The average depth of irrigation wells is 150 feet and the average reported yield is 500 gpm. The average thickness of saturated material in the principal aquifer is 50 feet. Virtually all irrigation wells in the Causey-Lingo area are completed in sand and gravel of Cretaceous age, filling channels in the underlying bedrock (red beds of Triassic age), The Ogallala formation of Pliocene age, which mantles the older rocks, also yields water to irrigation wells in part of the area. The ground water, under water-table conditions, is moving slowly east-southeastward. Recharge is from precipitation on the High Plains that seeps downward to the water table. The region has no permanent streams.

A great increase in withdrawal of ground water for irrigation in the area in recent years dictated the necessity of obtaining data on the extent of the water-bearing formations and the amount of water available for irrigation. Water levels were measured in a few wells and a preliminary investigation of ground-water resources was begun in November 1955. A more intensive field investigation was completed in September 1956 by the U. S. Geological Survey in cooperation with the State Engineer of New Mexico.

Several wells distributed widely throughout the area, were selected for periodic measurement of water level (table 9). Most of these observation wells also are active irrigation wells and may be pumped at any season of the year; they are pumped least, however, in the winter. Water levels in these wells generally are highest and least affected by pumping

during the winter. Water levels measured in the winter are valuable, therefore, for comparison with previous winters measurements and are indicative of the net yearly change in the volume of ground water in storage. In 1956 water levels were measured in January and February in 19 observation wells. In order to determine effects of pumping on water levels, water levels were measured at bimonthly intervals in 12 wells and occasionally in 9 additional wells. At the end of the year a total of 75 measurements of water level had been made in 28 observation wells. Yearly measurements of water level indicated an average net decline from January 1956 to January 1957 of 2.6 feet in the 17 wells for which measurements were available for both years. Declines ranged from 0.3 foot to 10.1 feet (fig. 5). The larger declines are thought to be a function of the aquifer. The Ogallala formation in a part of the area contains only a few feet of permeable saturated material above its base. A layer of relatively impermeable silt and clay separates the Ogallala from permeable strata of Cretaceous age below. When the water level declines below the base of the Ogallala formation into the relatively impermeable silt and clay, the rate of decline is accelerated greatly until more permeable material is reached. Near the town of Lingo, where most irrigation wells are located, the greatest observed decline of water level was 3.3 feet.

Water levels decline rapidly in the spring at the beginning of the pumping season and remain at comparatively low levels until cessation of pumping for irrigation in the fall, when they begin to rise gradually. Water levels fluctuated only slightly during the year and declined only slightly from January 1956 to January 1957 in areas of little or no withdrawal of ground water for irrigation. If pumpage for irrigation continues and if precipitation remains deficient, water levels may be expected to continue to decline.

Tech Report
#3

Causey-Lingo Area, Roosevelt County

by

J. D. Hudson

The Causey-Lingo area is located in east-central Roosevelt County on the Southern High Plains, adjoining Texas. The area of irrigation is near the small communities of Causey and Lingo, some 30 miles southeast of Portales. About 13,000 acres of land were irrigated in 1965.

The first irrigation well was drilled in 1945, and in 1954 an intensive program of well construction began. Prior to 1945, dryland farming was practiced with some success, especially during years of above-normal precipitation. An investigation to obtain data concerning the extent of the water-bearing formations and the amount of ground water available was initiated in 1955 by the Geological Survey in cooperation with the State Engineer. Findings of the investigation were published by the State Engineer in 1960 as Technical Report 14.

The principal aquifer is unconsolidated, and sand and gravel of Cretaceous age that occur mainly in erosion channels cut into the under-

lying red beds of Triassic age. The average thickness of the saturated material in this aquifer is 45 feet. The average depth of irrigation wells is about 150 feet; average reported yield is about 400 gallons per minute, some 100 gpm less than when the first wells were constructed.

Precipitation for the 5-year period 1961-65 averaged about 2.5 inches below normal, that for 1964 being 6.0 inches below normal. Pumpage has been about 10,000 acre-feet per year except in 1964 when, because of less than average precipitation, pumpage rose to 11,700 acre-feet and in 1963 when pumpage, because of above-normal rainfall, declined to 8,500 acre-feet.

Measurement of ground-water levels in the Causey-Lingo area by the Geological Survey in cooperation with the State Engineer was begun in 1956 and has been a continuing program. Measurements made in wells in January 1965 were compared with measurements made in the same wells in January 1966 to determine the 1965 change (table 5, fig. 9). The areas of greatest decline during 1965 were about 5 miles southeast of Causey and 3 miles northeast of Lingo. There were a few isolated rises, the greatest occurring about 12 miles southwest of Causey. Water levels measured in January 1961 were compared with January 1966 measurements to obtain a 5-year (1961-65) water-level change (fig. 10). During the 5-year period, water levels declined an average of about 7 feet, with greatest declines occurring 3 miles northeast of Lingo and 12 miles southwest of Causey.

Table 5.--WATER LEVELS IN THE CAUSEY-LINGO AREA, ROOSEVELT COUNTY, N. MEX., FEBRUARY 1966, HIGHEST AND LOWEST RECORDED LEVELS IN JANUARY, FEBRUARY OR MARCH, IN FEET BELOW LAND-SURFACE DATUM, AND CHANGE FROM MARCH 1965 TO FEBRUARY 1966, IN FEET

(Source: HR, rocks of Cretaceous age, undivided; 7H, Ogallala Formation)

LOCATION NUMBER	NAME	SOURCE	66 WATER LEVEL	DATE	CHANGE	HIGHEST LEVEL	YR	LOWEST LEVEL	YR	YEARS OF RECORD
04S 35E 28 111	PHILIP FRAZE	7H				162.91	64	152.91	64	64-65
04S 36E 06 111		7H				113.51	64	113.51	64	64-65
04S 36E 16 243A	G.A. SHEPPARD	7H	165.19	2- 3	+12.24	156.93M	62	165.19	66	60-66
04S 37E 09 244		HR				114.83	64	114.83	64	64-65
05S 35E 24 412	FRITZ ADAIR	HR	95.25	2- 3	-5.75	86.86	62	102.36	57	56-66
05S 35E 34 333	KARL COX	HR	86.30	2- 3	+1.71	74.56	59	86.30	66	56-62,64-66
05S 36E 07 113	RALPH HARVEY	HR	138.52	2- 3	- .71	129.77	56	144.14M	61	56-66
05S 36E 10 421	CLARENCE FULLER	HR	182.99	2- 3	+ .73	165.39	58	182.99	66	57-66
05S 37E 21 333B	H.U. JACKSON	HR	94.17	2- 3	-5.99	94.17	66	94.17	66	65-66
05S 37E 31 111	NORENE LEDBETTER	HR	88.65	2- 3	-1.45	82.07	58	88.65	66	56-66
05S 37E 32 133	T.W. HEATHERS	HR	100.39	2- 3	- .99	95.38	57	100.39	66	56-58,60-66
05S 37E 33 112	V.E. SEEFELD	HR	93.80	2- 3	-1.69	84.01	56	93.80	66	56-66
06S 35E 30 312		HR				132.27	64	132.27	64	64-65
06N 36E 09 143	EUGENE LE GRAND	HR	101.40	2- 3	-3.93	86.95	56	101.40	66	56-66
06S 36E 15 332	G.M. RUSSELL	HR	82.50	2- 3	-1.00	69.49	59	82.50	66	56-62,64-66
06S 36E 30 440		HR				162.25	64	162.25	64	64-65
06S 37E 02 222	PERRY MCGAHA	HR	96.28	2- 3	+ .19	89.83	58	96.28	66	48,56-62,64-66
06S 37E 07 414	W.M. CARMICHAEL EST.	HR	96.28	2- 3		89.83	58	96.28	66	
06S 37E 22 443	WILLARD COX	HR	108.45	2- 3	+5.62	101.87	62	108.45	66	56-66
06S 37E 23 111	HUGH M. POE	HR	103.10	2- 3	- .66	98.07	56	103.10	66	56-66
06S 37E 31 311		HR				134.06M	64	134.06M	64	64-65
06S 38E 05 222	C.S. JONES	HR	93.75	2- 3	- .95	82.69	56	93.75	66	56-59,61-66
06S 38E 08 133	C.B. STREEBECK	HR				87.60	57	90.40	66	56-65
06S 38E 09 133	MAX BOWERS	HR	85.65	2- 3	- .50	79.37	56	85.65	66	56-66
06S 38E 18 121	J.N. LEAVITT	HR	100.73	2- 3	-7.48	88.60	57	100.73	66	56-66
06S 38E 21 233	C.C. HARVEY	HR	94.28	2- 3	- .68	87.18	56	94.28	66	56-66

M. Measurement uncertain.

Ex. 7

CALGON
CORPORATION
SUBSIDIARY OF MERCK & CO., INC.

WATER MANAGEMENT DIVISION CALGON CORPORATION 907 SOUTH GARFIELD MIDLAND, TEXAS 79701 (915) 682-5751

Union Texas Petroleum Corporation
1300 Wilco Bldg.
Midland, Texas 79701

October 15, 1969

HDM 2050

Attention: Mr. Bill Lorenz

COMPATABILITY AND TREATMENT EVALUATION

Milnesand Unit
Roosevelt County, New Mexico

Subject project was visited September 8, 1969 during which time samples were obtained to study the proposed compatability with Mobil's Santa Fe lease produced water and/or New Mexico Salt Water Disposal Company Penn water. In addition to compatability studies, mineral analyses were performed to assertain the need for any mechanical or chemical water treatment. Attached you will find the result of these analyses.

COMPATABILITY

NEW MEXICO S.W.D. CO. and MILNESAND

DISCUSSIONS

1. All percentages of these waters showed a definite formation of insoluble iron sulfide.
2. Combined waters would be corrosive.
3. Combined waters would have a tendency to form calcium carbonate deposition.
4. A slight tendency to form calcium sulfate deposition was noted.
5. Suspended solids as mentioned in #1 above were high.
6. Organic (oral) amounts were highest for the New Mexico salt water disposal Co. water.
7. Due to the presence of sulfate reducing bacteria in the New Mexico SWD Co. water the resultant mixture has bacteria. Sulfate reducing bacteria contribute to consentrated corrosion.

TREATMENT

1. It would be necessary to mechanically provide equipment or retension time for the removal of the large amounts of suspended iron sulfide and oil. This mixture of water is by far the most unsuitable of the two under consideration. However, should it be necessary to use these two waters, the chemical coagulation cost (in addition to mechanical equipment cost) would approximate two mills per barrel.

BEFORE EXAMINER NUTTER
OIL CONSERVATION COMMISSION
9/30/70 EXHIBIT NO. 7
CASE NO. 4433

2. A suitable corrosion inhibitor should be initiated. (See recommendations for corrosion inhibitor below)
3. A scale inhibitor should be incorporated (see scale inhibitor recommendations below).

MOBIL and MILNESAND

DISCUSSION

1. All percentage mixtures of these two waters show only slight incompatability. The incompatable by-product of mixing these two waters was a slight amount of iron sulfide.
2. The nature of these waters also showed a tendency for formation of calcium carbonate scale.
3. A tendency for the formation of calcium sulfate scale was determined.
4. Suspended solids were primarily oil and some iron sulfide.
5. Suspended solids amount was lower than for the previous mixture.
6. The combined waters, by the presence of hydrogen sulfide, was found to be corrosive. No sulfate bacteria were cultured.

TREATMENT

1. Although some suspended material was formed upon the mixture of these two waters, it is believed no coagulation and extensive retention time will be needed to assure optimum quality water. However, it would be advisable to have a central filtration unit to handle any upset or surge of suspended material.
2. A scale inhibitor should be incorporated into the system to run water prior to mixing the waters. Calgon S-31 scale inhibitor would afford inhibition of both calcium carbonate and calcium sulfate deposition. A scale inhibitor treatment should be added continuously to afford ultimate protection. Cost of treating for scale inhibition utilizing Calgon S-31 would be a maximum of one mill per barrel based on this recommendation; After the initiation of a treatment program and subsequent testing to determine residuals present reduction in this treatment may be considered.
3. A corrosion inhibitor treatment utilizing Calgon X-2 should be initiated on a daily slug basis (2-6 hrs.). The exact amount of chemical needed cannot be determined at this time as this requirement is based on the total square footage of

3. cont
injection piping not on injection water volume. The water is only used as a vehicle to carry the inhibitor to the metal surface. The total cost of treating an unlined system is 0.5¢ per square foot per year.
4. Although no bacterial problems or bacteria were noted in mixture of these two waters, it would be comforting to know I'm sure, that the Calgon X-2 recommended above for corrosion production will also afford bacterial kill when utilized at the recommended rate. Thus, should bacteria ever be present, the X-2 would afford maximum kill.

Should you have any question concerning these results and/or recommendation please contact our Midland office.

CALGON CORPORATION

Water Management Division

R. C. Kirwin

RCK/ph

STATE OF NEW MEXICO
STATE ENGINEER OFFICE
ROSWELL

S. E. REYNOLDS
STATE ENGINEER

ADDRESS CORRESPONDENCE TO:
P. O. BOX 1717
ROSWELL, NEW MEXICO
88201

September 22, 1970

Mr. Joe Kenworthy
General Manager
Double Eagle Corporation of New Mexico
P. O. Box 1556
Roswell, New Mexico

Dear Mr. Kenworthy:

Reference is made to your recent inquiry concerning the necessity for obtaining water rights for beneficial use for wells located in Township 6 South, Range 36 East, N.M.P.M., commonly known as the "Causey-Lingo" area. This area is not within a declared underground water basin at this time, and therefore, is not subject to administration or regulations of ground water by the State Engineer Office.

It is not necessary for you to file applications for use in this area as the State Engineer has no jurisdiction to approve such applications. We would, of course, appreciate any information as to log of wells or capacities of wells put into operation.

Very truly yours,

Fred H. Hennighausen
District II Supervisor

FHH*jl

BEFORE EXAMINER NUTTER
OIL CONSERVATION COMMISSION
9/30/70 EXHIBIT NO. allied #10
CASE NO. 4433

May 20, 1970

Union Texas Petroleum Division
Allied Chemical Corporation
1300 Wilco Building
Midland, Texas

Gentlemen:

This is to advise that on May 20, 1970, I have entered into a contract with Double Eagle Corporation to provide water for their resale to your waterflood project in the Milnesand Field.

This water will come from three existing wells which have a combined capacity of approximately 1,500 gallons per minute and additional wells which I propose to drill if required to meet their requirements. These existing wells have been on production for several years and have indicated only the normal decline in fluid level.

We are confident that sufficient water can be developed on my property to meet the projected needs for your waterflood project.

Very truly yours,

K. V. Victor

KVV:jm

BEFORE EXAMINER NUTTER
OIL CONSERVATION COMMISSION
CASE NO. 4433 EXHIBIT NO. Allied #11
CASE NO. 4133
6/30/70

DRAFT

GMH/esr
10/19/70

BEFORE THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO

~~IN THE MATTER OF THE HEARING CALLED BY THE OIL CONSERVATION COMMISSION OF NEW MEXICO FOR THE PURPOSE OF CONSIDERING:~~

CASE No. 4433

Order No. R- 3770-A

IN THE MATTER OF THE HEARING CALLED BY THE OIL CONSERVATION COMMISSION UPON ITS OWN MOTION TO PERMIT ALLIED CHEMICAL CORPORATION TO APPEAR AND SHOW CAUSE WHY SAID CORPORATION SHOULD BE PERMITTED TO INSTITUTE ITS PROPOSED WATERFLOOD PROJECT IN ITS MILNESAND (SAN ANDRES) UNIT AREA, MILNESAND-SAN ANDRES POOL, ROOSEVELT COUNTY, NEW MEXICO, BY THE INJECTION OF FRESH WATER.

ORDER OF THE COMMISSION

11-16-70

BY THE COMMISSION:

This cause came on for hearing at 9 a.m. on September 30, 1970, at Santa Fe, New Mexico, before Examiner Daniel S. Nutter.

NOW, on this _____ day of November, 1970, the Commission, a quorum being present, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS:

(1) That due public notice having been given as required by law, the Commission has jurisdiction of this cause and the subject matter thereof.

(2) That Order No. R-3770, dated May 28, 1969, authorized Allied Chemical Corporation to institute a waterflood project in its Milnesand (San Andres) Unit Area, Milnesand-San Andres Pool, by injection into the San Andres formation through 28 wells in Township 8 South, Ranges 34 and 35 East, NMPM, Roosevelt County, New Mexico.

(3) That the evidence presented during the hearing of Case 4140, which resulted in the issuance of said Order No. R-3770, was to the effect that ~~approximately~~ up to 20,000 barrels of salt water per day from the Crossroads-Siluro-Devonian Pool would be injected.

(4) That the evidence at said hearing indicated that ~~the~~ Devonian water from the Crossroads-Devonian area is compatible with Milnesand San Andres area water and should present no precipitation problems.

(4) That Case 4433 was called by the Oil Conservation Commission on its own motion to permit Allied Chemical Corporation to appear and show cause why said corporation should be permitted to institute its proposed waterflood project in its Milnesand (San Andres) Unit Area by the injection of fresh water in lieu of produced salt water from said Crossroads Siluro-Devonian Pool.

(5) That Allied Chemical Corporation contends there is not available a dependable supply of produced salt water sufficient to meet the requirements of the aforesaid waterflood project through the life of the flood.

(6) That applicant's anticipated requirements for ~~make-up~~ water for injection purposes is 20,000 barrels of water per day at initiation of flooding; that said requirements drop rapidly to 2000 barrels of water per day by 1978; that said requirements drop slowly thereafter to about 1100 barrels of water per day by 1983.

(7) That approximately 39,850 barrels of compatible produced Devonian salt water are being disposed of per day in the Crossroads Siluro-Devonian Field area at the present time.

(8) That the Crossroads Siluro-Devonian Pool is an active water drive pool, containing large volumes of salt water.

(9) That there are sufficient volumes of salt water available in the Crossroads Siluro-Devonian Pool area to constitute a dependable and adequate source of supply for the injection requirements of the subject waterflood project through the life of the flood.

(10) That the request of Allied Chemical Corporation to inject fresh water in its Milnesand Waterflood Project in lieu of produced salt water from the Crossroads Siluro-Devonian Pool area should be denied.

IT IS THEREFORE ORDERED:

(1) That the request of Allied Chemical Corporation to be permitted to inject fresh water in its Milnesand Waterflood Project, Milnesand (San Andres) Unit Area, Milnesand-San Andres Pool, Roosevelt County, New Mexico, is hereby denied.

(2) That jurisdiction of this cause is retained for the entry of such further orders as the Commission may deem necessary.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.