BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
May 15, 1968

REGULAR HEARING

IN THE MATTER OF:

Application of William A. and Edward R. Hudson for an exception to Order No. R-3221, Eddy County, New Mexico.

Case No. 3758

BEFORE: Honorable David Cargo
Mr. A. L. Porter
Mr. Guyton B. Hays

TRANSCRIPT OF HEARING

MR. PORTER: We will take up Case 3758.

MR. HATCH: Application of William A. and Edward R. Hudson for an exception to Order No. R-3221, Eddy County, New Mexico.

MR. KELLAHIN: If the Commission please, Jason Kellahin, Kellahin and Fox, Santa Fe, appearing for the applicant. I have one witness I would like to have sworn, please.

MR. PORTER: Before we have the witness sworn, are there any other appearances in this case? Does anyone desire to present testimony in the case? You may proceed to swear the witness.

(Witness sworn.)

MR. KELLAHIN: We have one large exhibit I would like to put up on the board.

(Whereupon, Applicant's Exhibits 1 through 13 were marked for identification.)

RALPH L. GRAY

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

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q Will you state your name, please?

A Ralph L. Gray.

Q Mr. Gray, what business are you engaged in?

A Consulting engineering.

Q Where are you located?

A Artesia, New Mexico.

Q In connection with your work as a consulting engineer, have you done any work for William A. and Edward R. Hudson in connection with Case 3758?

A Yes, sir.

Q Have you testified before the Oil Conservation Commission as a petroleum engineer and made your qualifications a matter of record?

A Yes, sir.

MR. KELLAHIN: Are the witness' qualifications acceptable?

MR. PORTER: Yes, they are.

Q (By Mr. Kellahin) Mr. Gray, briefly, what is proposed by William A. and Edward R. Hudson in Case 3758?

A The applicant has made application for an exception to Order Number R-3221 so as to permit the applicant to continue to dispose of produced waters into unlined surface pits on his leases in the Dos Hermanos Pool.

Q How many wells are there located on that lease, or

those leases?

A There are ten wells owned and operated by the applicant.

Q Now, referring to what has been marked as Exhibit No. 1, would you identify that exhibit, please?

A Exhibit No. 1 is a map of the Dos Hermanos Pool showing the leases and wells. This map also shows the type of structure, with contours being shown on top of the Yates formation.

Q What is the significance of the area that's outlined in yellow on that exhibit?

A The areas outlined in yellow are leases which are owned by William A. and Edward R. Hudson.

Q Now, referring to what has been marked as Exhibit No. 2, would you explain that exhibit?

A Exhibit No. 2 shows well data for all of the wells which are operated by the Hudsons. This table shows that most of the wells were completed during 1956, although two wells were completed in 1955 and one well was completed in 1957.

MR. PORTER: Mr. Gray, at this point, now, you testified that they had ten wells. Is one of those temporarily abandoned?

THE WITNESS: Yes.

MR. PORTER: So actually, they have nine wells producing?

THE WITNESS: Very recently we temporarily abandoned the Eddy State "B" No. 1 well.

MR. PORTER: So we have nine producing wells?

THE WITNESS: Nine producing wells.

Q (By Mr. Kellahin) What was the reason for abandoning that well, Mr. Gray?

A Well, an economical reason, essentially. Also, this well had some large equipment which we wanted to use at some other location. Exhibit No. 2 also shows the total depth of these wells, and you will note that the depth of these wells range from approximately sixteen to seventeen hundred feet. They're relatively shallow wells. Also, information on casing and casing depth and sacks of cement are shown on Exhibit No. 2.

Q Now, referring to what has been marked as Exhibit No. 3, will you identify that exhibit?

A I think I can best explain this if I hold this exhibit up on the board here and explain a few parts of it a little more clearly.

Exhibit No. 3 is a gamma ray neutron survey of the Hudson Federal Well No. 7. This is presented as a typical log

in the area. I think it's maybe significant that there's a prominent shale member at a depth of approximately 150 to 160 feet. I believe on most of your exhibits this shale member will be indicated by green coloring here. Usually a shale member as prominent as that is a permeability barrier and we can't definitely state, of course, that this is the case in this area, but many times a shale member like that will prevent any movement of fluid up or down through it. Usually they are permeability barriers.

There is a shallow fresh water zone in the area. It isn't the quality of water that is suitable for domestic use, but it is being used for watering cattle, and this shallow fresh water is encountered, oh, usually they get a show beginning at about 250 feet, and this extends on down to approximately 400 feet. Most of the better parts of this water sand are encountered at depths between three and four hundred feet from the surface.

Exhibit 3 shows the top of the salt formation, which in this well was encountered at 513 feet; the base of salt was encountered at 1362 feet, the top of the Yates is found at 1493 feet. This well has a total depth of 1710 feet and the pay interval is indicated on this log by the red coloring at the very bottom part of the hole.

MR. PORTER: What do you have, about fifteen feet of pay there, Mr. Gray?

THE WITNESS: Well, we really don't know, because these wells were drilled in with cable tools and usually they just barely penetrated the oil pay and they were wanting to stay as far away from water as possible, and usually they did not drill through the pay. So, actually we don't know how thick that thing is.

Q (By Mr. Kellahin) Then any fresh water in the area is located below the shale member, is that correct, Mr. Gray?

A Yes. If you want to call it fresh water. It hardly would qualify as what we normally speak of as fresh water. The shallow water that we are referring to does occur below the shale member.

Q The water is not fit for human consumption?

A That is correct.

Q Only fit for use by livestock?

A Yes.

Q What is the general nature of this reservoir, Mr. Gray?

A Oil is produced from the Yates dolomite reef formation. The reservoir has a natural water drive and a large quantity of water has been produced from these wells.

Q You will have an exhibit later to show that, is that right?

A Yes.

Q Now, referring to what has been marked as Exhibit No. 4, would you identify that exhibit, please?

A Exhibit No. 4 shows monthly oil production for the three Hudson leases for 1965, 1966 and 1967. It will be noted that oil production is declining, and Exhibit No. 4 shows that during 1965, 33,192 barrels of oil were produced; 1966, 29,447 barrels of oil were produced; and in 1967, this figure had declined to 27,585 barrels of oil.

Q In the meanwhile did the production of water increase?

A Yes.

Q Referring to what has been marked as Exhibit No. 5, would you identify that exhibit?

A Exhibit No. 5 is a table showing water production for the three leases operated by the Hudsons, as reported to the state and federal agencies. The total of the figures, as shown on this report, shows that a cumulative water production of approximately six million barrels have been produced up through March of 1968. However, I would like to state that these figures, of course, are not accurate figures, that it is quite common practice in the oil industry to not

spend a great deal of money or a great deal of time in determining accurate water figures. That's quite common with all of the companies, and as a general rule, these figures are very conservative.

Now, we don't intentionally try to mislead anyone on submitting this information. It's just a case of where we don't actually know ourselves a lot of the time just what quantities of water are being produced.

Q What information are these figures based on generally, Mr. Gray?

A Well, generally they're based on whatever testing facilities that are available at the time on the lease, and quite often the method used in determining this is based on a very short testing period, and usually the water is, or a well is tested into a tank and the water is drained off and then the pumper makes a determination by the amount of water that has been drained off and the amount of oil that's left in the tank.

However, there are some shortcomings to this method. In the case of a property of this nature it takes a very long time in some instances to drain off quantities of water, especially if we try to get a longer period in the test, and usually the pumper has a lot of other things to do, he's

supposed to be different places, and it's quite common for pumpers to be a little careless in the way that they make these tests.

One thing I would like to point out is that one error that they quite commonly make is that just as soon as the first appearance of oil is found in draining the tank down, well, then they shut the tank off and they record the water production as being that that has been drained off down to this top of the valve. The error in that is that some of this oil will start coning up from a higher level, actually, and will find its way into the water stream. I might illustrate that a little more graphically here. I will draw a rough outline of a tank and show a pipe connection coming out of the bottom, close to the bottom with a valve on it and, of course, when the pumper starts his test, well, the fluid level in the tank may be in the upper portion and then the pumper draws this fluid down; before the level of the oil actually reaches the top of the drainoff point, due to the flow of this volume of fluid out of the pipe, the oil will have a tendency to cone into the drainage nipple here and the pumper will shut the thing off at that point. Well, he's calling everything water from the top part of this pipe down to the bottom of the tank, and everything above, oil. Well,

you can see the error, because as soon as he shuts that valve off, well, the oil level is up above that at some point and the additional water in there which he is calling oil is actually water; so, that's one reason why most of our measurements are on the conservative side.

Then, in addition to that, quite often there will be some water held up in suspension with the oil up in here, which wouldn't be settled out, so there again, that will cause some inaccuracy of the actual measurement of the thing. I just want to explain that point because someone who isn't too familiar with lease operation might get the idea that we're purposely filing wrong information on water production and that isn't the case at all. It's usually a case of where in the past it hasn't really been necessary to determine these water volumes accurately and we know that the volumes haven't been accurate.

Another thing that can cause inaccuracies is that we may run a series of tests, say, in February, and we may not run these tests again, say, for another year. Well, in the meantime the water production is increasing and so all of the time that the water production is increasing, well, we're not aware of this in our report figures; and a third factor is that sometimes we may install larger pumping equipment in order

to get more oil out of the well and, of course, when we do that, well, we do recover more fluid from the well, and that, again, makes our water figures too conservative. So I just want to point out these reasons for these conservative figures which we report.

Q In order to get a more accurate report, have you recently made tests, Mr. Gray?

A Yes, sir. We were faced with having to comply with this "no pit order", and the first thing that we did was to make some calculations on what it would cost to install pumping equipment and to actually dispose of this water; so, in order to know how to size our pumps, well, it was necessary that we have accurate water figures, and during the month of February 1968 we rented a 500-barrel tank and made tests of each well in a manner just as accurately as we could.

Q Now, referring to what has been marked as Exhibit No. 6, would you identify that exhibit?

A Exhibit No. 6 is a table showing the results of these individual well tests which were made during the month of February 1968. You will note that oil production varied between two and a half and 25 barrels of oil per day and the water figures varied between 224 and 1105 barrels per day. The total oil recovered --

MR. PORTER: I believe that's 151 to 1105.

THE WITNESS: Excuse me, Mr. Porter, you are right. I overlooked that. The low figure should be 151 barrels per day.

MR. PORTER: Right.

A Yes, sir. The total figures amount to 81 barrels of oil and 6,428 barrels of water per day. The last column on Exhibit No. 6 shows the percentage of water produced by each well and you will note that these figures vary from a low of 97.4 to a high of 99.5 percent water. The over-all average for the properties is 98.75 percent water.

MR. PORTER: In other words, you have to pump some of these wells here, this Eddy State "BD" No. 2, for instance, you have to produce a hundred barrels of fluid to get a half barrel of oil?

THE WITNESS: Yes, sir.

Q (By Mr. Kellahin) Is that a marginal operation, then, Mr. Gray?

A Yes, this property has reached an advanced stage of completion.

MR. HAYS: How much longer do you think this will continue?

THE WITNESS: Well, if we can continue with our

present operation and continue disposing of our produced water as we do now, we feel that we have four to five years of profitable operation left.

Q (By Mr. Kellahin) Have you had an examination made of the produced water to determine its quality, Mr. Gray?

A Yes, sir.

Q Referring to what has been marked as Exhibit No. 7, would you identify that exhibit?

A Exhibit No. 7 is a water analysis showing the analysis that was made on a sample of water from the Hudson Federal lease at the tank battery. I won't go over all of these figures. The most significant figure on this analysis, I think, is the chloride content, and this analysis shows chloride content of 18,150 milligrams per liter.

Q Now, referring to what has been marked as Exhibit No. 8, would you identify that exhibit?

A Mr. Kellahin, may I make one more additional statement in regard to Exhibit No. 7?

Q Sure.

A We have investigated some experiments that have been conducted by various agencies, and one example, we would refer you to a publication which has been prepared by the United States Geological Survey in cooperation with the New Mexico

Department of Public Health. This bulletin is entitled "Proposed Water Quality Standards for the Pecos River in New Mexico". It was prepared by John W. Hernandez. This publication summarizes the quality of water data at selected sampling stations on the Pecos River. There's one reference I would like to make for the record. I don't see any page numbers in this publication, but there is a table which is shown as "Frequency of Occurrence of Selected Chemical Constituents in Properties at Water Quality Stations in the Pecos River Basin, 1960 to 1965, Water Years". This table shows chloride content in parts per million.

There's one water station here which they designate as Pierce Canyon Crossing, in which they show that samples containing as high as 15,500 parts per million of chloride were found.

Q As compared to the 18,550 on your produced water?

A Yes.

MR. PORTER: That's in the Pecos River?

THE WITNESS: Pecos River, yes.

MR. PORTER: The figure was above 15,000?

THE WITNESS: 15,500. That's a maximum. That isn't an average figure.

MR. PORTER: Yes, sir.

A Then in Red Bluff Reservoir, well, some of their measurements were as high as 16,600 parts per million chloride, so, again, I repeat, that these aren't average values at all but it does show that values as high as that have been found. So this water isn't really too different --

MR. PORTER: Mr. Gray, does that study indicate at what depth those samples were taken?

THE WITNESS: No, sir, not as far as I know. I am not certain what their sampling point was. It's possible that the bulletin states that. I have not gone through the bulletin in that much detail.

MR. HAYS: They are from the wells?

MR. PORTER: From the Pecos River, and at Red Bluff.

THE WITNESS: Out of the Pecos River.

Q (By Mr. Kellahin) Does that complete your summary?

A Yes.

Q Now, referring to what has been marked as Exhibit No. 8, would you identify that exhibit, please?

A I have an enlarged map of Exhibit No. 8 which we have on the board here and I will refer to this rather than the small maps that you have. The Dos Hermanos Pools in which the Hudsons have these properties is shown in the southern part of the map in part of Section 28, and mostly in

Section 33. This is in Township 20 South and Range 30 East.

Also there are two wells located in the eastern portion of Section 32. This map was prepared for the Hudsons by John West Engineering Company of Hobbs. Mr. West surveyed in the open pits on the Hudson leases and these are indicated by the square or rectangular markings or symbols on the map.

You will note that in some cases there is more than one pit. For example, in the Northwest Quarter of Section 33 there are two water pits there. The reason for that is that from time to time these pits will fill up and quit taking water and we have found it necessary over a period of years in some cases to go out and construct another pit nearby and convert it for water disposal --

MR. PORTER: Does salt crystallize in the bottom of the pits?

THE WITNESS: I don't know what happens, Mr. Porter. They do quit taking water over a period of time, and I can't say, really.

A Then the Duval Sulphur and Potash Company has a potash mine working which is shown on this map in the extreme northeastern part of Section 35. Their mill tailings go over a stockpile which is indicated on the map in the North Half of Section 35, and in this area there's a large stockpile of

material which has been built up over the years containing various types of clays and silt material, along with salt. These heavier constituents drop out on this pile and then the salt water continues on in an easterly direction and finally collects in a natural surface depression, which is located in the northern part of Section 34 and in the southern part of Section 27, and this is indicated on our map by these green crosshatched colorings.

This pond presently has two earthen dams which have been constructed, one in the northern portion and one over on the west side here, which served to contain these waters. It's my understanding that at the present time Duval is dumping approximately 24,000 barrles of salt water into this lake per day.

I would like to also point out the location of the Barber Pool which is mostly in Section 20. This pool was discovered much earlier than the Dos Hermanos Pool. It was discovered in 1937 so it has been producing over a substantially larger period of time and this pool also produces from this reef formation and has a natural water drive. It also has produced large amounts of water.

Then the PCA Pool is located principally in Section 15. It also is a reef-type pool with a natural water drive,

and produces water.

MR. PORTER: Does it produce water on pretty much the same order that the Dos Hermanos or Barber or are you familiar with that?

THE WITNESS: Mr. Porter, I have not made a study of production in the PCA Pool. I know from the records that it is a reef-type pool and produces water. Other than that, I don't have any information on it.

MR. PORTER: That would be reflected in the Commission records, I suppose.

THE WITNESS: Yes.

A The last item which I would like to call to your attention on the map is the workings of the Potash Company of America, which is located in Section 4 of this township. In the case of the Duval tailings pond, we had the surveyor to survey in this body of water here so that we could get a fairly accurate determination of its extent, which roughly is approximately 80 acres in size.

In the case of the PCA salt water ponds, which we indicate on the map by the green crosshatching, we have not made a survey of those ponds. The map states that this is the approximate location of these ponds. They're based on a very rough visual determination of three salt water ponds which

exist in that area. We do not claim that these are the actual outlines of those lakes, but this being further away from our operation, we just merely want to call attention to the fact that it is there and that the water is also being put into the ground in this area, and other than that we don't have specific figures on the size or the area of these things.

Q What is the distance of the Duval salt water pond from the Hudson leases?

A The Duval salt water pond is approximately one-half mile east of the oil properties.

Q Would it be less than a mile from your closest pit, disposal pit?

A Yes. The closest Hudson pit would be in the Northwest Quarter of the Southeast Quarter of Section 33, and this would be approximately one mile.

Now, there is one other feature that we would call your attention to, there is a shallow water well which is being used by the rancher to water cattle with in this area and this water well is shown on the map; it's located in the Northeast Quarter of the Southeast Quarter of Section 33. It is still in use and being used to water cattle.

MR. PORTER: You don't know what the chemical analysis of the water is, what the chloride content is?

THE WITNESS: No, sir, we didn't get a sample for analysis simply because to us the fact that it is being used for watering cattle is a significant thing.

MR. PORTER: But as far as you know, it is not being used for human consumption?

THE WITNESS: No. It is far from the quality that can be used for human consumption. Back in 1955 when the Hudsons drilled this field they located a pumper on one of these leases, they put a trailer out there and he was never able to use this shallow water even from the start for domestic use. He has always had to haul that water.

MR. PORTER: That's prior to the disposal of any salt water in the pool?

THE WITNESS: Yes.

Q (By Mr. Kellahin) Is there any possibility of water flowing over this stockpile and leaking further salt down into the disposal pit?

A Well, I am sure that every time it rains, well, some of that rain will dissolve some of that salt from the stockpile.

Q Does the water that is being disposed of by Duval Potash Company go directly across this stockpile?

A Yes, sir.

Q It just flows right across it, is that right?

A Yes, sir.

Q So, if there is any rain, that would just be additional water going across the same place, is this the way it would work?

A Yes.

Q Have you had an analysis made of the water being disposed of by Duval?

A Yes.

Q Referring to what has been marked Exhibit 9, would you identify that Exhibit 9, please?

A Exhibit No. 9 shows an analysis of a sample of water which was taken from the Duval Disposal Pond, and here again we will only refer you to the chloride content. This analysis shows the chloride content of 197,000 milligrams per liter, which is more than ten times the salt content of the produced water on the Hudson lease.

Q Do you know how long Duval has been disposing of water in that pit?

A No, I don't.

Q It has been a number of years, has it not?

A Yes. It's been a number of years, but I can't say how long. I think it's interesting in that if we consider

the fact that Duval is putting approximately four times the volume of water into their pit as the Hudsons are into their leases, and the water has ten times as much, or over ten times as much salt content, you can readily see that there is over forty times as much salt being put into that little pond than the Hudsons are putting into the ground on all of their leases.

Q Do you know of the approximate surface acreage of the Duval pond?

A Well, the Exhibit No. 8 shows the approximate outline of this pond.

Q It would be roughly 80 acres or more?

A Roughly, yes.

Q Now, referring to what has been marked as Exhibit No. 10, would you identify that exhibit, please?

A Well, Exhibit No. 10 is a photograph which I took standing on the western edge of the Duval Salt Water Pond and looking in an easterly direction. This photograph shows the mine workings in the background and this just shows one little edge of this salt water pond.

Q That doesn't show the pond as a whole, does it?

A No, sir.

Q In the photograph there appears to be a light

colored area to the rear in the right side of the picture, what is that?

A Well, the very light portion in that photograph in the general area that you referred to is this tailings dump that we show on the map as a stockpile.

Q In response to a question by Mr. Hays, Mr. Gray, you stated that if you could continue to operate as you are presently operating and disposing of water on the surface, you'd have a remaining life of about four years in the Dos Hermanos Pool?

A Four to five years.

Q Is the pool, in your opinion, substantially depleted?

A Yes, sir.

Q Have you made a study of the economics of continued operation of this pool under different conditions?

A Yes, sir, we have.

Q Would you refer to what has been marked as Exhibit No. 11, please, and discuss that exhibit?

A Exhibit No. 11 is an estimated realization schedule of the Hudson interests based on the conditions that operations will continue under the present conditions. The first column that we show is the estimated annual gross oil production, and you will note that the total figure for our

estimated five years of future life is 107,800 barrels of oil, so by continuing to operate this property for five more years, we should recover 107,800 barrels of oil, or approximately that much.

The second column shows the Hudson gross income by years. The next column shows the direct charges, or what we commonly refer to as lifting costs, and these figures are based on the company's actual direct charges incurred during the year of 1967. It does not include any figures for depreciation.

Q You mean 1972, don't you?

A Pardon?

Q You say your direct charges into 1972? Did you say '67?

A I said that our direct charges were based upon the actual lifting cost figures that were actually incurred during the year 1967.

Q The next column on taxes.

A The next column shows the estimated taxes that will be paid. The next column shows the estimated operating and administrative overhead charges, which again are taken from the 1967 records; and, then, the total expense is shown in the next column for each year. The last column shows the

estimated Hudson net profit figure which was determined by subtracting the total expense from the Hudson gross income figures. You will note that during 1968 we predict a net profit of $12,171.00. In 1969 we predict a net profit of $8,210.00; 1970, a net profit of $4,465.00; 1971, a net profit of $695.00; and in 1972, a loss of $2,085.00.

Usually a company continues to operate a property for some time even after it starts losing money simply because it takes a certain amount of time to get into the plugging part of these fields. So we estimate that over the five-year period Hudson will gain a net profit of possibly $23,456.00.

Q Have you made a study of the cost of installing disposal equipment to handle the water from this pool?

A Yes, sir.

Q Referring to what has been marked as Exhibit No. 12, would you identify that exhibit?

A Exhibit No. 12 is an estimated realization schedule, again, for the Hudson portion of the interest, showing our estimate of cost and income, assuming that four triplex pumps will be installed, and that other related disposal facilities will be installed so as to handle all of the produced water.

The estimated gross oil figures are the same as for

Exhibit No. 11, the gross income figures are the same. In the case of direct charges, there will be an additional $8,550.00 added on per year for power cost to operate these four thirty-horsepower electric motors.

Then in the next column is taxes, administrative overhead and operating expense is the same as for the Exhibit No. 11. We have added a new column for new development expense and we show that Hudsons' portion of the expense necessary to install these disposal facilities should amount to $22,800.00.

The next column shows total expense, and again, the last column shows the estimated Hudson profit or loss, and in this case, of course, there is no profit. The operator would incur a loss of $19,179.00 during 1968, assuming that these disposal facilities would be installed during this year, during 1969 a loss of $340.00 would be incurred. During 1970 the loss would be $4,058.00, and if he continued to operate over four years, the loss during the fourth year would be $7,855.00.

Exhibit No. 12 illustrates very clearly that from an economical point of view the operator is not justified in installing disposal facilities because they won't pay out.

Q Mr. Gray, in your opinion would the denial of this

application result in the failure to produce oil that would otherwise be produced?

A Yes, sir. We think we can get a little over a hundred thousand more barrels of oil,which in view of the oil becoming more scarce and harder to find, we consider that that's a worthwhile goal to produce that much more oil.

Q You are familiar with the provisions of the Commission's order prohibiting surface disposal of produced water. Is it your position, Mr. Gray, that because Duval Potash is disposing of water on the surface you should be permitted to do so, is that the reason for your exhibit?

A No, not in that light really, because somebody does something, somebody else shouldn't necessarily be allowed to do the same thing. The point is that even though we should abandon all of these leases and discontinue disposing of this produced water, that isn't going to put an end to salt being continued to be disposed of in the area. The potash companies are still going to dispose of it, as far as we know, so you are really not eliminating any polution by shutting this little portion of the thing down.

Q Now, referring again to the well located in the Northeast, Southeast Quarter of Section 33, does that indicate that in spite of the surface disposal of produced

water and the Duval water also, there has still been no contamination, in your opinion?

A Well, I would almost have to come to the conclusion that in view of the millions and millions of barrels of salt water that have been put into the ground on the Hudson leases, and in the Duval pond, that after all these years if there's no visible evidence of polution by this time, I frankly seriously doubt if there will ever be any, because you can do some rough calculating and see that since the potash people are putting forty times as much salt as we are into the ground, I can see that maybe our cumulative water figure, instead of being what the records show, is more probably in the nature possibly of fifteen million barrels of water; so when you consider all of these factors, well, it looks to me like that there's a very good chance that this shale member is perhaps a barrier and maybe we will never get any contamination. I can't say definitely, but certainly by this time it looks like we would have had some indication that contamination is occurring.

Q Mr. Gray, were Exhibits 1 through 12 prepared by you or under your supervision?

A Yes, sir.

MR. KELLAHIN: At this time I would like to offer

in evidence Exhibits 1 through 12.

MR. PORTER: If there are no objections, the exhibits will be admitted.

(Whereupon, Exhibits 1 through 12 were offered and admitted in evidence.)

Q (By Mr. Kellahin) Do you have anything further to add to your testimony?

A No, sir.

Q One further question, are the Hudson leases federal, state or fee, do you know?

A The Hudsons have one state lease, the Eddy State "BD" lease, and then two leases which are federal, the Federal lease, and the Gulf Federal lease.

Q And no fee land involved here, is that right?

A That's correct.

MR. PORTER: How many wells are producing on state lease, Mr. Gray, at this time?

THE WITNESS: One well.

MR. PORTER: Do you have a disposal pit on state land there?

THE WITNESS: Yes, sir.

MR. PORTER: And the other disposal pits are located on federal land?

THE WITNESS: Yes, sir.

MR. KELLAHIN: If the Commission please, that completes our direct testimony in this case. I would like also to offer in evidence our Exhibit No. 13, which is an abstracter's certificate to show that all of Section 27, 34 and 35, which include the area of the Duval salt water pond and the salt stockpile are actually federal lands.

MR. PORTER: Any objection to the admission of this letter? It will be entered as Exhibit 13.

(Whereupon, Exhibit 13 was offered and admitted in evidence.)

CROSS EXAMINATION

BY MR. PORTER:

Q Mr. Gray, I wanted to review a little bit of your testimony that I missed at the outset. Did you testify as to the depth from which this stock well is producing from, this water, I mean the well that's producing the water for the livestock?

A I do not have the figures on this particular water well. I do have records on some of the wells, the oil wells which have been drilled in the pool, and these records indicate that this shallow water was encountered from, between depths of approximately 250 and 400 feet, with most of the

prolific part of the water being obtained between 300 and 400 feet.

Q That is below this shale member that you were talking about?

A Yes.

MR. PORTER: Anyone have any questions? Mr. Nutter.

CROSS EXAMINATION

BY MR. NUTTER:

Q Mr. Gray, does this shale member appear on the logs of all the wells that have been drilled in the Dos Hermanos?

A As far as I can tell, some of the wells have been logged on different sensitivity scales and in some cases it doesn't show up exactly like this one, but as far as I can tell it's a predominant formation.

Q Do you think it's a blanket situation that covers the general area?

A Probably.

Q Any any water soaking into the surface of the ground, be it a potash tailings, produced water, or anything else, would only go down to the impermeable shale barrier and could go no further, in your opinion?

A No, I didn't say it couldn't. I said it's quite often that these shale members are permeability barriers.

In this particular case I cannot say definitely that it can't go through it because I have no way of knowing, but we look upon shale members as permeability barriers, and, of course, in all of our oil field completion work we use shale as barriers between sets of perforations and so forth.

Q So normally, unless the shale should be fractured or something, it would impose a permeability barrier?

A Yes, sir.

Q How many water wells are in the immediate vicinity of this Dos Hermanos Pool, only the one water well you mentioned?

A I cannot state how many. I haven't gone into the records to determine that, I don't know.

Q Well, now, Mr. Gray, how can you make the statement that in your opinion, after all the millions of barrels of water have been put on the surfact of the ground here and over east of it, that it hasn't contaminated the water, when you say that this water in this well was not fit to drink anyway?

A Well, it never was fit to drink.

Q Before there was any oil production or potash production?

A Yes. In fact, these shallow waters, you can trace them over Eddy County and they are notoriously high in gyp content. I don't know of any place in this area or in a lot

of places in Eddy County where this type of water is suitable for domestic use.

Q Is it the gyp content or the chloride content?

A Well, both.

Q It's high in both?

A Yes, sir.

MR. PORTER: Sulphates and chloride?

THE WITNESS: Yes, sir. You see, the point is that nature herself has been a hindrance to collection of suitable waters for domestic use. There are deposits of gyp or caliche, we call it, all over the whole country. Everybody is familiar with these caliche pits all over the area. All over Eddy County, and water percolating down through these caliche pits causes the water to become brackish and not suitable for domestic use, and that is very common throughout Eddy County.

Q (By Mr. Nutter) So far as you know, this water in this particular well has been bad water --

A From the start.

Q -- from the start?

A Yes, sir.

Q Well, now, Mr. Gray, not long ago I was down in this area and I saw a water well over here in the Barber Pool and

they said it was producing from about 65 feet. You don't know of any water sand in 65 feet which would be above the shale member in the Dos Hermanos area?

A There's no such reference in our records. I went through all of our records, and in the process of drilling the wells there was no notation of any water being encountered at that depth.

Q Above the shale?

A Yes, sir. Also I went through the records of the United States Geological Survey office and I didn't find any indication in their records of that shallow water.

Q Well, now, this would be the Rustler formation immediately above the salt there?

A Yes, I suppose so.

Q So these water wells would be producing from the upper and middle Rustler?

A No. Your Rustler is a rather thin bed of anhydrite just above the salt. These waters occur above the Rustler.

Q Then, isn't it a fact, Mr. Gray, that the Rustler immediately above the salt constitutes an aquifer that is carrying large volumes of water in this area in a southerly direction and that this salt water flows into the Pecos River through springs at Malaga Bend?

A Did I understand you right? Did you make the statement that the Rustler is a body-carrying water?

Q It constitutes an aquifer-carrying water.

A I don't think so. As far as I know there is no water encountered in the Rustler at all. In fact, in drilling these wells you will note that the surface casing has been set in the Rustler anhydrite and the reason that they did that was that it's a good, hard formation that doesn't contain fluids, they shut off these upper waters by setting the pipe into the anhydrite and then they continue drilling the hole below dry, so as far as I know there is no water in the anhydrite. If it is there, I am not aware of it.

Q Well, the name itself would indicate there's no water there, but the Rustler formation does contain some permeable sands?

A In some areas.

Q Which constitute this aquifer, which is the aquifer which is pouring the salt water into the Pecos River at Malaga Bend, isn't it?

A I don't consider that it exists in this area because there's no indication of water in the Rustler in this area, otherwise there wouldn't have been much point in setting the pipe there.

Q Are you acquainted with the method of salt water disposal in the Barber Pool?

A No, sir.

Q You are not aware, then, that water is being disposed of on a vacuum into a well into the Rustler formation in that pool?

A No, sir. I have just been so busy that I didn't extend my investigation that far.

Q And the cost of water disposal does include four triplex pumps and all this other expensive equipment?

A I don't know what they're doing, but as I pointed out, our pits do fill up over a period of time. I would consider that in our area, that although we may get by with putting some water in at the start of the thing in under a vacuum, it's my belief and my experience that before the end of the project that we will have to pump the water into the formation under pressure.

Q What formation were you considering that you will have to dispose of?

A The same formation that we are producing the oil from.

Q In other words, right back to the pay?

A Yes.

MR. NUTTER: I believe that's all.

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

CROSS EXAMINATION

BY MR. UTZ:

Q Mr. Gray, you referred to some report there from Mr. Hernandez --

MR. PORTER: Dr. Hernandez.

Q The first sample that you stated in that report, when was that taken? Is that available there and where was it taken?

A Would you like to look at the publication?

Q Oh, I might later. I was interested in that first sample, whether it was taken above or below Malaga Bend.

A Well, the sample that I referred to initially was at the Pierce Canyon Crossing. You may get some idea of where that is, let me just run down the stations here. Here is one, and I am going to go progressively south on the Pecos River so we will know where we are. Here is one at Artesia, the next is Carlsbad, the next is near Malaga, the next is Pierce Canyon Crossing, which I referred to.

Q That would be below Malaga, then?

A Yes.

Q How about the sands above Malaga, do they have as

much salt in them?

A No.

Q So this sample does represent some of the salt that's getting in at Malaga Bend?

A Yes, sir.

Q In regard to your Exhibit No. 11, your economics exhibit, where you estimated the gross production, how did you determine that decline?

A Oh, by roughly continuing the same decline that we seem to be following now.

Q For how many previous years?

A Of course, it varies from year to year. It's not a constant decline, but if you will plot these points on some graph paper I think you might agree that it is a reasonable estimate.

Q That's the way you arrived at it, you plotted annual production on graph paper and then drew an average line through?

A Yes.

Q What price are you getting for the oil? I guess -- would the division from gross oil into that figure give you the price per barrel? If it will, well, that's satisfactory.

A Well, no, it wouldn't, because the Hudson gross

income doesn't represent a hundred percent of the income.

Q Oh, I see.

A It represents roughly about 71 percent.

Q It has a pretty hefty override, hasn't it?

A No.

Q 29 percent goes out?

A Well, in some cases there is more working interests in this, too. I don't know that I -- Well, let's see --

MR. PORTER: What were you trying to establish, Mr. Utz, by this line of questioning?

MR. UTZ: I am trying to find out what is included in the expenses here, how they arrived at these economics.

A It's a regular posted price, I should have it somewhere.

Q (By Mr. Utz) It would be around what?

MR. LIGHT: $2.56.

Q (By Mr. Utz) Do you agree with the man?

A That sounds close.

Q What do all these direct charges include in this pool, is that just lifting costs?

A Just lifting costs. Just direct charges that are necessary in the operation of the property. That includes pulling costs, well service costs, power cost, some of the electric motors on some of the producing wells are as large

as 25 horsepower. It includes maintenance, cost of all types, all direct charges.

Q What percent did you use for taxes?

A Well, these taxes are the figures that the operator had in their data files. These are the exact amount, based on the exact amount of taxes that they paid during the year 1967.

Q That includes income tax, too?

A No, not income tax.

Q These are just production taxes?

A Just production type taxes, yes, sir.

Q I notice in your next column is operating and administration cost. I am having trouble in my mind differentiating between operating costs here and direct charges. What would operating costs include here?

A Well, what we mean by operating cost is, for instance, office expense in preparing monthly reports and making inventories and so forth. The type of expense that would be incurred by an operator usually in his office in that part of the operation; filing all of these reports, bookkeeper, so forth.

MR. UTZ: I think that's all I have.

MR. PORTER: Does anyone else have any questions?

Mr. Kellahin, I see a picture here. Did your witness testify to that exhibit?

MR. KELLAHIN: Yes. He identified that as Exhibit No. 10.

MR.PORTER: All right. Well, Exhibit No. 10 is a picture of the water disposal pond at Duval Potash Company, is that correct?

THE WITNESS: Yes, sir.

MR. PORTER: If there are no further questions of the witness, he may be excused.

(Witness excused.)

MR. PORTER: Does anyone have anything further to offer in this case? Mr. Anderson.

MR. ANDERSON: John A. Anderson, supervisor, United States Geological Survey. In addition to the two federal leases that were brought out in the testimony, owned by Hudson and Hudson, there's another federal lease in the Dos Hermanos Pool, operated by John Trigg. It has two wells producing from the same formation and both of them make large quantities of water which goes into the surfact pits. Now, the engineers of our Artesia office have been aware of the water situation in the Dos Hermanos Pool for approximately the last eight or ten years. We believe that the circumstances

of the case warrant an exception to the general rule in Southeastern New Mexico.

MR. PORTER: Does anyone else have anything to offer in the case? The Commission will take the case under advisement.

I N D E X

STATE OF NEW MEXICO)
) ss
COUNTY OF BERNALILLO)

I, ADA DEARNLEY, Notary Public in and for the County of Bernalillo, State of New Mexico, do hereby certify that the foregoing and attached Transcript of Hearing before the New Mexico Oil Conservation Commission was reported by me; and that the same is a true and correct record of the said proceedings, to the best of my knowledge, skill and ability.

Witness my Hand and Seal this 8th day of June, 1968.

Ada Dearnley
NOTARY PUBLIC

My Commission Expires:

June 19, 1971.