

BEFORE THE
NEW MEXICO OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
November 29, 1967

EXAMINER HEARING

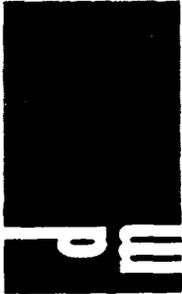
IN THE MATTER OF:)

Application of Atlantic Richfield)
Company for an exception to Order No.)
R-3221, Lea County, New Mexico.)

Case 3693

BEFORE: Elvis A. Utz, Examiner

TRANSCRIPT OF HEARING



MR. UTZ: Case 3693.

MR. HATCH: Case 3693, application of Atlantic Richfield Company for an exception to Order No. R-3221, Lea County, New Mexico.

MR. HINKLE: Clarence Hinkle, Hinkle, Bondurant and Christy, appearing on behalf of Atlantic Richfield. We have one witness and three exhibits. I would like to have the witness sworn.

(Witness sworn)

MR. UTZ: Other appearances?

MR. GRANT: J. B. Grant, Skelly Oil Company. We have no witnesses and no testimony.

MR. HINKLE: I have already had the exhibits marked and I think, furnished each of you with copies of them.

LADD C. HUDRY

called as a witness, after having been 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 Ladd Hudry, Roswell, New Mexico. I am employed by the Atlantic Richfield Company, been with them since 1946.

MR. UTZ: Would you spell your name for the record?

A H-u-d-r-y.

Q (By Mr. Hinkle) What is your position with Atlantic Richfield?

A I am an operation engineer with Atlantic Richfield.

Q Have you previously testified before the Commission?

A No, sir.

Q Are you a graduate engineer?

A Yes, sir. I graduated from the University of Tulsa in 1942.

Q With what degree?

A B.S. in Petroleum Engineering.

Q Have you practiced your profession since your graduation?

A Yes, outside of, from '42 to '46 when I was in the U.S. Navy. I have been with Atlantic Richfield since.

Q What has been the nature of your work with Atlantic Richfield?

A I started in as a Junior Engineer and in 1949 was transferred to Denver City, Texas which included New Mexico as the area, as District Engineer and in 1961 when we consolidated I became Operation Engineer in the new area.

Q Have you been familiar with the Denton Pool or Field since it was discovered?

A Yes.

Q Have you made a study of that particular area?

A I have made a study of the salt water disposal.

Q How was the salt water disposal system inaugurated in the Denton Pool?

A In 1956 we had twenty-five pools of which ten were requested to dispose of water underground. The operators in Denton Field held a meeting and elected Atlantic Refining Company, which is now Atlantic Richfield, as the operator of the Denton Salt Water Disposal system and the engineering committee was set up which consisted of the major oil company operators in this pool and we designed a salt water gathering and disposal system for Denton Field.

Q Did you represent Atlantic in connection with this committee?

A Yes.

Q Did you have anything to do with the design of the system?

A Yes, sir.

Q What was the nature of your work in connection with it?

A We worked together with the other engineers of the

other major companies on size of lines and picked a disposal plant site and a disposal well for the disposal of water in Denton Field.

Q Now, I believe you have testified that this system was inaugurated or put in on account of an order of the Oil Conservation Commission?

A Yes, sir. I believe the order is R-1224A which requested that the operators dispose of all produced water in Denton Field.

Q Did you make any reports to the Commission with regard to the system?

A Progress reports were made on the system and how it was progressing until we were disposing of all the water. Now we commenced disposing of water in the fall of 1958 and after we were disposing of water we were not required to submit any more progress reports.

Q Has the Commission been advised of any major changes in the system since its inauguration?

A Yes, sir. Whenever we have a major workover such as parrallelling a line or have a major break in a line, we have obtained permission from the District Supervisor in Hobbs for the repair work and to temporarily store water in the emergency pits.

Q So the Commission has been fully cognizant of the way

the system has been operated and the way it was constructed originally?

A Yes, sir.

(Whereupon Applicant's Exhibit
1 marked for identification)

Q Now, refer to your Exhibit Number 1 and explain to the Commission what it is and what it shows?

A Exhibit 1 outlines Denton Field. It is about five miles long in a north-south axis and about two miles wide on an east-west axis and it covers part of Township 14 and part of Township 15 South and Range 37 East and starting at the upper lefthand corner in say Section 22 and Township 14 South, there is a gradual drop in elevation from Section 22 down to your lower righthand corner in Section 13 and that drop is about 40 feet. It is just a gradual slope so we had a perfect setup for using gravity for a means of moving the water from the farthest tank battery to the salt water plant, and that is why we installed the plant in the southeast corner.

Now, the lines were sized; they started in small and gradually worked on up and our largest size is a twelve-inch line but as your volume increased why we installed larger and larger lines until we came to the twelve-inch line going into the plant.

On our original setup, there were about 200 wells

in the Field, approximately a hundred were Devonian and a hundred Wolfcamp.

Q That is at the time it was started?

A Started, yes, sir, and the Devonian wells are marked with a dot with a circle around it as in the legend and the Wolfcamp wells are marked with just a dot. Now, our salt water disposal wells which are in Section 13 and Section 10 in Township 15 South, are marked with an SWD with a triangle and since we have installed this system the Denton-Wolfcamp Unit was inaugurated and there from the dividing line between Township 14 South and Township 15 South and they take everything north in the Wolfcamp wells and their injection wells are indicated with a triangle.

Since we had a forty foot drop in elevation we utilized a gravity system in this field and based on the knowledge that we had at that time of the volumes of water, we sized the lines according to the volumes that we anticipated.

The disposal well which was the Dickinson 8131 which is in the southwest -- southeast corner, was used as the disposal well.

Q Was that well approved by the Commission for disposal?

A Yes, sir, it was. We applied for disposing of water in the low circulation zone which is approximately at

10,000 feet in the Upper Penn and we received permission to use that well and that zone to dispose of salt water or produced water. We had, when we first started, approximately a hundred thousand feet of line in the system plus two skimmers and the disposal well. When we first started, the disposal well was taking the water on a vacuum and since that time we have increased in pressure and are up at about 95 pounds pressure, but in the original installation of the gathering system since this was a gravity system, we used a low pressure system for gathering the water. The pipe and everything was low pressure and we did not anticipate any pressure in any of the system all the way down to the plant.

Now, the skimmers at the plant are for skimming any oil that happens to be carried over with the water due to a malfunction of a heater treater and the oil is sold.

Q Approximately what did this system cost in the beginning?

A The original cost was about three hundred thousand dollars.

Q How was this cost defrayed by the operator?

A Each of the operators contributed his share according to the number of wells that he had connected to the system.

Q And they paid the cost of the maintenance of the

system on the same basis?

A Yes, sir.

Q Approximately how many barrels of water is being disposed of at the present time?

A At the present time the plant is disposing of about twenty-two thousand barrels of water a day. Now, this figure varies and we sent reports to the Commission, like in January we disposed of twenty-two thousand four hundred forty-seven, in September we disposed of twenty-one thousand, oh, seven nine, but it is right around twenty-two thousand barrels.

Now, Mobil utilizes part of this water for their injection system for their secondary recovery of the Wolfcamp in Township 14 South in Denton.

Q Approximately how many barrels of the total production do they use?

A They are using approximately seven thousand barrels of water which added onto the twenty-two thousand would make it about twenty-nine thousand barrels of water per day that we are disposing of in Denton Field.

Q Some of it is going to the Wolfcamp and the balance, the approximately twenty-two thousand is going into these two disposal wells?

A Yes, sir.

MR. NUTTER: Mr. Hudry, is the Mobil plant shown in the southwest of the northwest of Section 1, their injection plant?

A No, sir. Mobil's plant is in Section 26 of Township 14 South.

MR. NUTTER: Now, the water that is being injected there by Mobil is water that is gathered in the north end or does it come down here to the plant and be skimmed and then return back up there or what?

A No, sir, what they have done to the plant from the north to the plant, they run through a skimmer and trap any oil in any water that is produced north of the Mobil plant. The other plant which they have is down in Section 1.

MR. NUTTER: That's the one I referred to in the southwest of northwest of 1.

A They gather all of the rest of the water that is below this first Mobil plant, the big Mobil plant, and then the water is picked up and is transferred to the Mobil plant in Section 26. In other words, they are running a line from there all the way on up.

MR. NUTTER: Now, what is this line that comes from your plant down in Section 13 up to the Mobil Plant in Section 1?

A Now, if -- they had hopes of using a lot more water in their secondary recovery system and this other parallel line was to transfer the rest of the water which was caught at the plant, the surplus water to this plant which in turn transferred it to the big injection plant up here in 26.

Q (By Mr. Hinkle) Has that line been used?

A No, sir, not to my knowledge it hasn't.

Q Is there a possibility it will be used in the future?

A It could be, but, well, their volumes, what they have been using is, like in January of '67, they used two thousand seven hundred sixty and it went as high as eight thousand five hundred twenty-two in March and in September of '67, was six thousand nine hundred and thirty-four and whether they will increase or decrease, I don't know, but that's what our plant down here is for; if they don't use the water, we will dispose of the water in the disposal wells.

Q In connection with the operation of the Denton salt water disposal system, have you used open pits for any purpose?

A The purpose of the pits is not for disposal; the main purpose of the pits is for if you have a line break and you have to repair it so that an operator won't lose any oil and the State won't lose any revenue, we have diverted that water to the pit temporarily for a temporary storage, repair the line and then have trucked this water to the disposal plant.

In fact that water is being trucked immediately. Let's make an assumption here. Let's take this Maxwell Lease in Section 27 in 14 South, let's assume that this line breaks in the center or something happens to it. We close off the main valve right before it enters the main system, right there at the Mobil plant. We divert the water to the emergency pit just for a temporary storage. It is not for disposal, that isn't the idea at all, it is just for if we have trouble in a system that we can drop it into the pit instead of letting that water run all over the ground and destroying the ranch, the pastures and the ranches and that is not the way it should be; it is more of a sub or a means of holding the water in a container and we immediately start trucking that water back to the plant and then putting it in a disposal well, but the --

Q Since the inception of the system here, how many pits have been used?

A We originally started out with about forty-one pits and the idea of a pit was that we had a pit at each tank battery and the pit was set up so that it was used as a temporary storage measure only, not for disposal of water and as the wells have been depleted and the tank batteries abandoned, like in Section 23 way up at the top of your map, you will notice the Shell Foster and the Sinclair Whitman B,

that there is no pits asked for in this area here, because the three wells on Sinclair have either been temporarily abandoned or shut in. Now, the nomenclature is used in the Commission books and Shell Foster 1 is being -- well, it goes into the Mobil plant, is where it goes because that is that Wolfcamp well.

Q Well, now, the use of less and less number of pits than the original forty-one had been due to the fact that there have been a good many wells plugged and abandoned in the Field, is that right?

A Yes, either plugged and abandoned or temporarily abandoned or shut in.

Q In other words, you started with approximately two hundred wells in the Denton Pool, is that correct?

A Yes, sir.

Q How many do you have at the present time?

A There are approximately a hundred and sixty wells of which half are Devonian and half are Wolfcamp that are producing.

Q Now, where you have used pits for temporary emergency storage of water, how long has that water as a rule, stayed in those pits?

A Normally, less than seventy-two hours because

whenever we have a line break, we immediately get on the line break and start commencing repair work. The water is immediately trucked to the plant where we have a gunnite pit and the water is picked up and put into the system and disposed of underground.

Q Now, you begin taking or disposing of that water as soon as you start turning the water in, you start pumping it out, is that right?

A Yes, sir, we normally, as soon as we get a truck within twenty-four hours, we have the truck moving and pumping the water out of the emergency storage pit and on to the disposal plant.

Q Now, has this practice been carried on since the inception of the salt water disposal system?

A Yes, sir, this system has been in operation since '58 which is approximately nine years and to my knowledge, the Commission has been well satisfied with the system and there has never been any objection, and so far as I know we have not had any pollution of fresh water.

Q Well now, in that connection are there some fresh water wells in the area?

A Yes, sir.

Q What are they, shallow wells for stock water purposes?

A Yes, sir.

Q Use a windmill to pump them?

A Windmill to pump them and to water stock.

Q Are they scattered throughout the whole field?

A Yes, there are, in fact Pedro Collins has one which he uses for his home and we use fresh water in our Denton gasoline plant.

Q To your knowledge, has there ever been any complaint by any of the surface owners of contamination of these fresh water wells?

A None.

Q Through this nine year period?

A None at all.

Q In case of line breakage of any consequence, have you been notifying the Hobbs office of the Oil Conservation Commission?

A Our District foreman, on a major break, they have been obtaining the approval from the District Supervisor. On small breaks, no, we hadn't. On small breaks we immediately repair the work and get rid of the water immediately.

Q Would it be practical in your opinion, to operate this system without the use of open pits for temporary emergency storage of water in case of line breaks?

A No, sir, I believe that for a temporary storage pit,

I don't believe that we are hurting anyone on a temporary basis.

Q Is it necessary, in your opinion, that these pits be located at the tank batteries rather than at the plant site?

(Whereupon Applicant's Exhibit 2 marked for identification)

A Yes, sir, and if we will look on our Exhibit Number 2, since this is a low pressure gathering system, we attempt to remove all the gas from the line which will tend to go ahead and block the line; in other words, let's assume that we have an eight-inch line and if you let air or gas get into the line and trap it in a high spot, what you will do is reduce the amount of water that the pipe will allow you to pass through it. In other words it acts just like an orifice or a valve of that nature and as a result we have gone through the field and have installed vents on our gathering system to remove all possible gas or air from the line and on the battery itself. If you will notice the fluid comes into the heater treater, the good oil is passed on over to your stock tank, the water is dropped over into a boot which is an atmospheric pressure and from the boot the water goes to your gathering system in the Denton salt water disposal system.

Now we have a U tube so that the water will not go to the emergency pit. The only time that it goes to the pit, to my knowledge, is when the valve is closed on the line going to the salt water disposal system and we purposely divert the water to the pit. Now you can have some water go to the pit if something happens to the line, like it gets plugged or something happens of that nature, but this system was designed so that the wells would not be shut in, no one would lose any oil and we have found out since then that if there is a shut down of some of the wells in this field, that it takes them two, three days before they can come back on oil. That they seem to be watered out and the same thing is true down around Eunice and Oil Center.

Q Now, let me interrupt you. What you are saying is that if you didn't use pits it would be necessary to shut in the wells in the pool in case of breakage?

A Yes, sir. If we didn't have emergency storage pits, just for temporary storage of water, then we would have to shut in the wells and if we shut in the wells, we know that some of the operators have experienced a loss because it will not come back on oil immediately.

Q Has it been your observation that these wells never come back to as good as they were before they were shut in, when they are shut in?

A Eventually, they gradually attempt to reach that age, state.

Q In your opinion, is there likely to be any loss or waste of oil by shutting in these wells from time to time in connection with the disposal system?

A I believe if you have a shut down that there is a good possibility of loss of oil due to the oil being bypassed by the water, because there are a lot of wells in this field that are beginning to make quite a large volume of water.

Q Now, Exhibit 2 is a typical installation in connection with each tank battery being used in the field, is that right?

A Yes, sir. Where they have heater treaters or pressure vessels, we attempt to put a boot in this system that is shown by Exhibit 2, at the battery.

Q Now, in your opinion, is there any alternative to the use of pits for temporary emergency storage of water?

A If we do not use pits, we will have to parallel the lines or break the system up into smaller areas and have more disposal wells and more plant facilities to limit the size of shut down, because if we have a plant failure which would be the extreme case, let's assume that the line parts right at the skimmers which would be the worst condition possible, then the whole field has to be shut down if there are no emergency pits, until that is repaired.

Now, whenever we have any breaks or any emergency, we get on them immediately and stay on them twenty-four hours a day until they are repaired. There is no delay or wait, say, work eight hours and shut it down and we continually go.

Q Now, I believe you mentioned that one of the alternatives would be to put in a parallel system of pipes so that they could be switched in case of breakage, to the alternate line?

A Yes, sir.

Q Do you have any estimate as to the probable cost of an alternate system of that kind?

A To parallel the existing lines in size, we more than likely would spend our original investment of three hundred thousand dollars, but since we have installed this, pipe has gone up in price, labor has gone up, everything has gone up.

Now, since we installed this we have spent approximately a hundred and fifty thousand dollars more in -- well, we spent over a hundred thousand dollars in our second disposal well and we have spent over fifty thousand dollars for paralleling lines that are in the system now, so we have in the neighborhood of four hundred, five hundred thousand dollars already invested in this field.

Q Now, if you went to the second alternative that you

mentioned, by erecting a series of small plants within the pool, do you have any estimate of what the cost would be in that case?

A That would be very prohibitive because you would have to break your areas down. Let's assume that we stop in Township 14 South, between -- take an east-west line between Section 27, 34, 26, 35, 25, 36, let's assume that this is one area, then the next three sections on the east-west line would be another area and then Section 1, 2 and 3 would be another area, then the rest would be in the plant. In other words, you would have three to five areas where you would have to equip plants, revamp your gathering systems so that it would go into a plant, equip your disposal well and you are talking about somewhere in the neighborhood of five hundred to six hundred thousand dollars for revamping the whole system. Because if you have three to four or more disposal wells, you are talking over a hundred thousand dollars for a disposal well.

Q If you attempted to line the pits which are necessary to use in connection with this system, do you have any estimate as to the probable cost of lining the pits?

A Approximately, if we lined every pit in the system we would spend two hundred or three hundred thousand dollars in lining the pits. Now, the pits will be of varying size

and we do not recommend just having this one pit at the plant because having the pit at the plant is like having a horse before the cart or backwards, it just isn't quite Hoyle because when you have a line break in a well, I mean, line break in a line, you want that pit right by the tank battery so that you can go ahead and temporarily store that water, let the rest of the system operate the way it should and not shut anything down.

Q Do you anticipate that the produced water in the Denton field is going to increase as time goes on?

A Yes, sir, we anticipate it to increase. We anticipate that we will have to expand our plant system, we will have to add another disposal well and we will have to add some more pumps at the plant.

Now, this water that we are disposing of, originally our chemist in our laboratory, indicated that this water would be corrosive, but would be easy to handle, but since that time by using different metallurgy in the different pumps, we have found out that this water is very corrosive and we learned a lesson from the potash mines and we have used Worthite in the Worthington pumps and have been very successful in disposing of this water, but that water will eat it, it just eats this metal right on up.

Q Now, does the salt water disposal system in the Denton pool, compare with other salt water disposal systems in Lea County?

A It is highly corrosive.

Q Well, as far as the size is concerned?

A The amount of water that we are disposing of in the system, is large. Now, we are in other disposal systems like in Hobbs and EME and where the volumes are not as large, they are not faced with the problems that we are because the amount of water from each individual well is larger. The volumes are larger for a concentrated area and we have to dispose, as a result of more water per well in this field, now in both the fields we had an outsider put a disposal system in and normally on a cost-plus basis you tend to size your piping and your plant and your wells, disposal wells, you give yourself a little bit more grace and you tend to increase the size and the amount that you actually need and when you have a group of engineers like we did in Denton field, representing the major operators, we are pinching pennies and we designed the system to handle the water but not go to extreme cases of putting in larger size than we would anticipate.

Now, as we had to move and we increased the volumes of water and we have gotten more water, we have paralleled the lines.

(Whereupon, Applicant's
Exhibit 3 marked for
identification)

Q Now, have you prepared a list of the open pits that you would like to use in connection with the system?

A Yes, sir, the pits are outlined on your Exhibit 1 and also on Exhibit 3. Exhibit 3, we can tell where they are at but if you will go down your Exhibit 1 on your map, it picks up all your plants like in Section 27 you have a pit for Mobil Maxwell. Your next one in Section 26, would be the Shelton and also the approximate size of the pit that we would like to have, not for disposal of water, that is what I am trying to emphasize, this is just for emergency pits.

Q Now, as your produced water increases, do you anticipate it might possibly be necessary to enlarge some of these pits as time goes on?

A Yes, sir, there is a very good possibility that some of the leases will have larger volumes than the pit size indicated in Exhibit 3 and we would attempt to increase the size of the pit by approval from the District Supervisor.

Q In that connection, would it be desirable to have administrative approval by the Commission of enlargement of pits?

A Yes, sir.

Q Have all of the operators in the Denton Pool been

apprised of this application of Atlantic Richfield in this Case?

A Yes, sir, we have notified all the operators, have sent out letters. We have held a meeting since then, have obtained majority approval to attempt to use emergency pits in this field.

Q Do you have any specific suggestions to the Commission as to the type of exception that you desire in this Case?

A I would like to state that as an exception to Paragraph 6 of Order R-3221, it is permissible to allow the use of unlined pits for temporary emergency storage of produced water in connection with separate tank batteries connected to the Denton Pool, salt water disposal system located in Denton Pool in Lea County, New Mexico. However, said water shall not remain in said pits for more than 72 hours at any one time.

Q Now, is the exception of that kind necessary to continue the operation of the Denton salt water disposal system?

A To prevent any loss in production and to minimize any loss of oil production in the reservoir, yes.

MR. HINKLE: We would like to offer in evidence

Exhibits 1, 2 and 3.

MR. UTZ: Without objection, Exhibits 1, 2 and 3 will be entered into the record of this case.

(Whereupon, Applicant's Exhibits 1, through 3 were offered and admitted in evidence)

MR. HINKLE: That's all of our direct.

CROSS EXAMINATION

BY MR. UTZ:

Q Mr. Hudry, referring to your Exhibit Number 2 --

A Yes, sir.

Q -- when the water goes into the boot out of the heater treater, does it go in under pressure?

A Normally your treater is operating from, oh, approximately fifteen to twenty-five pounds and it dumps to the boot which is under atmospheric pressure.

Q So that actually the pressure is vented off in the boot and you wouldn't have anything but gravity going into your disposal line?

A Yes, sir, that's right.

Q Therefore, for that reason, when it unloads it wouldn't push water over the top of your U2 bender pits?

A No, because you have an automatic vent there to dump it.

Q How often do you have emergency uses let's say, in the past year how often have you had to use these pits for emergency storage?

A It has varied in the exact number of times that we have used the pits, I don't have an exact number on that, but I would say that it would be, oh, one to two per cent of the volume that we are disposing of per day, when we have to use them, when we use it for temporary storage.

Q You are up in the area considerably, are you?

A What?

Q You are up in this area considerably, are you, so that you observe these things?

A No, sir, I am in Roswell most of the time, but we have a pumper who continually rides the lines. In other words the lines are observed every day. The pits are observed every day and any malfunction in the system is reported immediately to the foreman in Hobbs, New Mexico. Since the shakeup and change in the system, six to one, I am in Roswell most of the time.

Q Do you have any occasions where your line does plug up or is restricted or the line is undersized where it won't handle the water out of your --

A Yes, sir.

Q Where it actually flows into the pit?

A Yes, sir.

Q Which is different than a line break?

A Yes, sir, and at that time we normally go ahead and acidize the line to increase the size. If we can't increase the size, if there isn't any plugging action, then we go ahead and increase the size of the line. In other words, if we have a 3 inch we are getting ready to go ahead and install a 4 inch line or if the 4 inch line won't handle it, we may parallel the line.

Q This one or two percent figure you gave me is for all emergency uses whether it is plugged lines, broken lines, or undersized lines?

A I believe that's right, yes, sir.

Q What is worthite?

A Worthite is a high nickel content.

Q It is a type of metal, then?

A Yes, sir. It is a Worthington product and it is their trade name on the composition of the metallurgy that they use in constructing their Worthington pumps. They cost quite a bit more but it does a much better job than any other pumps we have run across so far.

Q Is this water treated before it is injected in the ground at all?

A No, sir.

Q What is the salt content of the water?

A The salt content varies. Now your typical Wolfcamp will run about 42 thousand parts per million chloride while your Devonian will run about, between 32 and 34 thousand parts per million chloride.

Q It is your testimony that you don't allow water to stand in these pits for any length of time at all?

A No, sir. Pits are emptied immediately.

Q Do you have trucks available out there to go right on the job?

A Yes, sir, there are a number of companies within that area that we call and use their trucks for hauling water.

MR. UTZ: Other questions?

CROSS EXAMINATION

BY MR. NUTTER:

Q Mr. Hudry, you mentioned that the operators had a meeting back in '56 and I see the date on this exhibit is January 26, of '56, so evidently this system was designed 10 or 12 years ago. What was the water production at the time the system was designed?

A Volume of water, as I recall, was somewhere between 10 and 15 thousand barrels of water per day, I don't know the exact figure.

Q And, of course, the water production has gone up to the point now where you mentioned the plant is disposing of 22 thousand and Mobile is taking 7 thousand?

A It is about 30 thousand.

Q 29 to 30 thousand barrels per day?

A Yes.

Q Now, what is Mobil operating? They are operating a Wolfcamp pressure maintenance --

A Secondary recovery, yes, sir.

Q Have those wells started making higher water cuts as a result of water injection yet?

A Not that I know of.

Q We can expect considerable increase in water production from the Wolfcamp wells in the future?

A Yes, they should increase their water cut but since their Wolfcamp production goes into this plant, they automatically pull that water out and reinject it.

Q So, it shouldn't affect the operation in the Southeast at all then?

A I don't believe so unless they change their method of operation. Say, that they quit using our produced water and go to some other method. Now if that happens, then we would get more water down at the plant.

Q Well, now it has been necessary, has it not, since 1958, when the system was put into operation, to parallel the lines and possibly put in larger lateral lines?

A Yes, sir. We have installed in Sections 12 -- well, actually from Section 1, 12 and 13, the right hand line is a 12 inch gathering line and where the Gulf G cuts into the system, which is in Section 1, and our Dickinson A-1 connects into the system, we have paralleled that line with an 8 inch line all the way down to the skimmer.

Q I thought that was for the purpose of taking water back up to the Mobile plant?

A It is.

Q But you are using it for Wolf south?

A Yes, it is a two way system, in other words, the system, the line will come, either take water or we can go ahead and pump it and when they get to the point where they are going to take more water, then we will move the connection from the 8 inch on over to the 12 inch and let the water dump into the 12 inch and then use that line for a straight through going to Mobil .

Q But right now that 8 inch actually constitutes a loop to the 12 inch?

A That's what it is.

Q Hasn't there been a trend in the Devonian production here to increase in water cut as a natural function of the depletion of this reservoir?

A Yes, sir.

Q And, some of the operators have put in reda pumps and some of the other high volume pumps that are moving considerable volumes of water?

A Yes, sir. We only have one reda pump in the field to my knowledge and that is on the Skelly F Number 2.

Q Do you know the total volume of fluid that that well is making for example?

A About 43 thousand barrels per month as I recall.

Q In other words, over a thousand barrels of water per day?

A Yes, sir, we are getting a high volume of that lease there. We are getting somewhere in the neighborhood of three thousand barrels of water a day of Skelly F lease.

Q Do you know if other operators are considering installation of reda or other high volume fluid pumps?

A To my knowledge, no, and in talking with the operators at our different meetings that we have had, they do not intend on putting redas on but they may say they won't put

in and still put them in. Now, I can't answer that.

Q But, we do know that in order to recover the oil from the Devonian, we are going to have to lift a large amount of water?

A If it is economical, I don't believe that -- I won't swear to it but I just don't believe Skelly is finding that that profitable, lifting large volumes of water in comparison with what they have to pay for electricity.

Q Now, Mr. Hudry, what is the average size of a lateral that comes from an individual tank battery?

A They vary in size.

Q What is the smallest size that you have?

A We start out with 2 inch and that was up here in Section 23, off the Shell Foster; we came across over to here, we had a 2 inch lateral because the volume on that thing was real small. Now, others are larger and smaller. Now, on our Federal Jones, we have a 4 inch line coming across as a lateral.

Q Take a lease like Phillips Denton lease, I think they call it --

A All right.

Q -- which has 16 wells on it, 8 on the Devonian and 8 in the Wolfcamp,

A Yes, sir.

Q Now, that is a typical large lease in that pool, what size of the lateral did you have on that?

A Our lateral on that, I believe, is a 6 inch coming into it. It is either 4 or 6 coming right into the line because our line, main line comes right by it and the line at that point is a 10 inch line. This line coming in through here is 10 inch.

Q Are your trunk lines and are your laterals buried lines?

A Yes, sir, they are all buried.

Q So breakage would be the result of corrosion?

A Corrosion, that's right and at the time that we installed the plant, we debated whether to use AC pipe, which is asbestos or cement-lined pipe, steel pipe, and the majority of the operators believed that cement-lined pipe was the thing to use and that's what we used.

Q That was going to be the next question I had was whether it was a transit^e or whether it was a plastic-coated or cement-lined pipe.

A Cement-lined pipe. The bulk of the system is cement-lined.

Q Have any observations been made of samples of

this lined pipe to see how the cement lining is holding up?

A Yes, sir.

Q How is it holding up?

A In spots -- I know if we ever put in another system, we will never go to cement-lined pipe because it tends to swell but at that time, that was the best that we knew of what to use in the system and that's what we used.

Q Well, chances are, as this water production increases, a lot of these lines are going to have to be replaced because they are just not going to have the capacity anyway, are they?

A Right. And we have, like this 8 inch lateral that we installed, we didn't install cement-lined pipe, we put epoxy lined AC pipe in and this line over here, which is another lateral across coming right above the Phillips Denton to the plant, that is an 8 inch AC pipe that is an epoxy line and we have gradually steered away from the cement-lined pipe except, now, where we have a repair job within the cement-lined pipe, like on this 12 inch, we have cut out a section and put back in cement-lined pipe that we had on hand.

Q I see.

A Instead of just jerking out the whole system which would be a tremendous cost.

Q I didn't understand too clearly in response to a

question by Mr. Utz just how frequent these lines break as a result of corrosion are.

A That is variable and it varies on corrosion. Some months, we don't have any problems at all and everything is just going fine and dandy, then there is other months where we may have three line failures within the month and we do ahead, or line stoppage or where we have to acidize the lines, or do something, go ahead --

Q How many times in the last ninety days have you had to divert the salt water into these pits while you made some sort of a repair?

A We have done quite a bit of acidizing this last ninety days and I don't know the exact amount of water but we have picked the water up immediately and moved it down to the plant, I mean, it doesn't stay there, our trucks are moving.

Q Now, aside from a break in a line or a leak in a line, these lines also stop up sometimes, you might say.

A They gradually tend to get less and less, they tend to scale up or --

Q Now, with this 'U' tube being the control to whether the water goes into the disposal system or to the emergency pit, if you just start getting a buildup in your line, it is

automatically going to build up in the 'U' tube and flow on over into the pit, some going down the disposal system and some going --

A But your pumper will notice that immediately because he runs those lines and pits every day.

Q How high are the 'U' tubes?

A They are about, oh, I am guessing around 12 feet, 12 to 14 feet high, I mean, they aren't -- You normally think of a 'U' tube 3 feet high.

Q It is going to take some heading to go over the top?

A Yes, sir, it will take a little head to get on over there.

Q Now, do you do regular maintenance work on those lines? In other words, do you attempt to clean them out before they start plugging up or to keep them from plugging up or do you wait until you have had a plug-up and overflow through the 'U' tube?

A Normally, we have been waiting and the first sign of any malfunction, we immediately go to work.

Q In other words, you don't do anything about keeping the lines clean until you have a buildup and it overflows?

A Normally, we haven't had the buildup that we are getting now and we seem to be getting more of a buildup lately

than we ever had before.

Q Was it paraffin or gilsonite?

A No, sir, it is more on the order of a scale and it's not --

Q Kind of a carbonite or something?

A It is either calcium carbonate or calcium sulfate.

Q And acid will take it out?

A Acid will take it out; it's not VS or gilsonite

Q Now, we had an inspection report made by our field inspector a couple of days ago, Mr. Hudry, and he indicates that quite a number of the pits in this pool have already been filled, some of them have been filled, but they haven't been compacted; some have been levelled and compacted and pretty much completed. Then I noticed here on your Exhibit 3, are these all of the pits or are these only the pits that are still open?

A No, none of these, I wouldn't say that all of these pits are open because you take the Shell Shelton -- well, let's just start going from the line on down; you take the Maxwell lease, the first one that we indicated for a pit, there is not pit there now. It has already been compacted and your Shelton lease has already been burned, but the pit is still there and as you go down the line, we know that in some places

the pits have already been broken and compacted and removed but in talking with the operators, the operators have told us that they would rebuild, you know, put in the pits if this order was all right.

Q Now, what is the size of these pits that you have got here on the right column based on? Is that based on the pit that was originally used for salt water disposal?

A No, sir, that is based on the amount of volume of water that we anticipate and it is two days storage.

Q That is 48-hour storage for the present production from that lease?

A Right.

Q Now, would these, in some cases, be the pits that were used for disposal?

A Yes.

Q Now, it's the habit of some operators in some areas, not that it is in Denton, but of some operators in some areas to shoot the pits when they are using them for evaporation. I wonder if these pits in this area have ever been shot?

A I couldn't answer that, I don't know, but I know one thing: before the pits were burned that we had an impervious layer there which was helping, in other words, if there had been any seepage, it was stopped by the BS that

was in the bottom of the pit but I think we have destroyed that one phase of it because I think burning it was the wrong thing to do because we destroyed our layer in there that we were depending on, you know, for temporary storage.

Q There would probably be an inner crustation of salt in the bottom of those pits, wouldn't there?

A I couldn't answer that. I don't know.

Q Are you familiar with the fact that it is a common provision in orders entered by various commissions around the country in prohibiting salt water disposal in a given area to require that the pits be levelled and compacted and in Texas, even mounded?

A Right.

Q Are you acquainted with the philosophy of these commissions in making that requirement?

A Yes, so there won't be any disposal of water in a pit but we aren't asking for a disposal, we are asking for just temporary storage.

Q Don't you think it would also be included in the philosophy of those commissions that they would want to eliminate the possibility of rain water and natural precipitation from accumulating in those pits and soaking on down, carrying that residue of salt into the earth?

A Of leaching, you mean?

Q Yes, sir, by rainwater.

A There is a possibility of that but as long as they had put in their BS in the bottom of the pit and had that impervious layer, I don't think you would have any leaching coming on down. Now, you are talking about your pits now and you have okayed the pit to go on this burning pit for this Phillips pit down in Section 11, which is roughly a 25 x 25 pit. It is flat with the ground and I think that is a mistake. Now, if you dump your BS into that pit and you do get some rainwater and the rainwater comes down on the surface and fills that pit and overflows that BS all over the ranch land --

Q There is no dike around that land?

A There is no dike there and I think that is the wrong way of going at it. I think we should have dikes to stop it because those pits are a little small.

Q What did you have in mind, Mr. Hudry, when you said that it would cost, I think you mentioned the figure, \$300,000.00 to line the pits?

A Oh, that is digging a pit and putting -- you have to go ahead and move out and then turn around and bring in sand and compact the sand so there aren't any hard projections

sticking out that would puncture your plastic because then you line it with plastic and you seal the plastic on in there with your epoxy dough and then you go ahead and haul from that pit. It makes an impervious layer in there and it will run -- it varies on the size of the pit.

Q What would a 50 x 50 pit cost?

A The 50 x 50 pit would estimate that that would cost approximately twenty-one sixty-two.

Q A little over \$2,000.00?

A Yes, sir.

Q Well, as long as you have got the figures there, what about a 100 x 100?

A A 100 x 100 would cost sixty-three eighty-two. These are estimates.

Q That is for the whole job, the plastic as well as excavation and sanding and smoothing?

A Excavation, sanding, and smoothing it out, put your plastic lining inside, epoxy it, and anchor your epoxy lining.

Q When did you start using SWD No. 4 over here in Section 10, Mr. Hudry?

A I don't know the exact date; it was somewhere in '65, I believe, '64 or '65, I don't know for sure.

Q In other words, the one well lasted maybe six years

as far as adequate capacity was concerned?

A Yes, sir. Well, now in talking about capacity, now the reservoir engineers have calculated the amount of void space that is in this loss circulation zone and the amount of water, now we are talking about disposal. Let me give you some figures here.

Q I didn't mean capacity of the reservoir. I meant daily capacity to take the water. I presume that's why you had to put in the second well, the first well just wouldn't take it?

A Yes, sir, we used to put in about 15, 20 thousand barrels of water in a vacuum in the No. 1 and then we started pumping it and the volumes are increasing so we applied and got permission to use No. 2, which was a Pacific Royalty No. 4 and since that time, we haven't had any problems. We have been disposing of all the water.

Q Now, that 95 pounds, is that into both wells?

A Both wells, that's tubing pressure now.

Q Yes, sir, at the surface.

A You have got your -- we are using 5 inch casing which is plastic-coated and we have -- well, that is using tubing and then between the tubing and the casing annulus, we have got oil, we have got a pressure gauge on it.

Q And, all the 22 thousand that you are disposing of, is it going into each well about equally?

A No, it isn't, Now these are by months in '67 and there is roughly, say, 250 thousand barrels going in No. 2 and about 350 thousand going into No. 1, just for a rough approximation.

Q No. 1 is still taking most of the water?

A It is taking the bulk of the water. It has been jimdandy disposal well. We figure that lost circulation will handle about 1.2 billion barrels of water in Denton Field and its entirety will produce somewhere between 200 to 300 million. Now, we are talking about filling the reservoir about, say, 20 to 30 percent.

Q You anticipate that the Devonian will make from 200 to 300 million to depletion?

A No, both of them, the whole field.

Q And, so far, you have disposed of --

A Say, 60 million.

Q A little over 62 million approximately. Does your committee have any projections as to the ultimate maximum daily water that you are going to have to dispose of?

A We are looking at the range of about 50 thousand a day but that may be and may not be, because as the wells

become uneconomical, your volume of water is so high in relation to the oil that you are producing, that it becomes non-commercial. We are plugging back and so is everybody else.

MR. PORTER: And when you plug back, you cut off some of the water?

A Yes. Really cut off and when we get to the top of the formation where we are stymied, then there is nothing we can do but plug the well or temporarily shut it in for a possible disposal well.

Q (By Mr. Nutter) Well, it is entirely probable at any rate, that if you approach this 50 thousand barrels per day maximum compared to 29 thousand barrels now, that a good deal of redesign and reconstruction of this system will be necessary?

A Yes, sir, it sure will be and I know we have meetings ever so often, the operators of Denton Field, to talk about the problems that are involved and what to do about them and we set up committees, engineering committees, which in turn present solutions to the operators, who in turn either vote that we will take it or won't take it.

Q Are any committees at the present time working on any project for pressure maintenance or water flooding in the

Wolfcamp in the south end of the pool?

A That I don't know. I don't know what they are going to do in the south end.

MR. NUTTER: I believe that's all, thank you.

MR. HINKLE: I have two or three more questions here.

REDIRECT EXAMINATION

BY MR. HINKLE:

Q I believe, in your testimony, it was brought out that some of the operators have filled in their pits?

A Yes, sir.

Q Were these pits filled in before the application of Atlantic Rich Field was filed in this case?

A Some were before and some were after the application was filed.

Q Why were they filled in?

A Because they had a deadline to -- according to the order, by the first of November, to fill and close up all pits.

Q And, the companies were simply carrying out that order?

A Yes, sir.

Q Now, I believe you stated that you had talked to the operators, or some of them, that had filled in their pits?

A And they are going to reopen them.

Q And they are willing to reopen the pits so that they can be used in connection with this system?

A Yes, sir.

Q Do they believe that is desirable to do so?

A Yes, sir.

Q Do you have a daily inspection of the entire system and all of the lines and plants in connection with it?

A Yes, sir, the pumper runs every line out every day and checks the pits every day.

Q So that any line breakage or any leak of any kind is caught pretty soon?

A Immediately.

Q And is taken care of.

A Now, if you have a line break in the middle of the night, there is no way of doing it, I mean, that is something that is uncontrollable.

Q Now, to your knowledge, has water ever stayed in any of these pits where you have had a line breakage for more than 72 hours?

A Not to my knowledge. The water is immediately being trucked out of there and disposed of at the central disposal plant.

Q In most cases, is it taken out in less than 72 hours?

A Yes, most of the time it is gotten rid of before that 72 hours has elapsed.

Q Now, I believed you testified that as time goes on and the water increases, it is going to be necessary to lay larger lines and redesign to some extent the whole system and to make additional investment. Now, in doing so, because of your knowledge and vast experience and the type of new lines that would be laid and so forth, would you have less and less line breakage?

A That is hard to say, Mr. Hinkle, because you are hoping for the optimum, which you don't have any line breakage or any problems at all.

Q Well, of course, you have had some experience in the type of pipe you have already testified --

A Yes, sir, and we believe we will have less problems.

Q So, as you replace these lines you are apt to have less and less line breakage?

A That's what we are assuming, yes, sir, because that's why we have gone to that epoxy line pipe and also, to our fiberglass pipe.

MR. HINKLE: That's all we have.

MR. UTZ: Are there other questions? Witness may be

excused.

(Witness excused).

MR. UTZ: Are there statements?

MR. GRANT: J. B. Grant, Skelly Oil Company. As has been brought out, Skelly is an operator in this field and contributes to the Denton salt water disposal system. Our lease is located in Section 2 of 15 South, 37 East, and for the record, the pumper previously referred to is in our well No. 7. Skelly is one of the operators who would be willing to reopen the pit should it become necessary because we feel it is advisable. We concur with Atlantic Richfield and the other operators in the field in that emergency storage of some type is needed to permit reasonable operation of the leases connected to the system. Emergency pits at the individual connected tank batteries, we feel, would provide the most flexibility for operation of the system and we feel that the request for exemption to the 'no pit' order is reasonable under the circumstances and should be approved. We would call attention of the commission to the fact in the request that you take administrative notice of your order R-3312, wherein Cities Service was granted a similar exception for emergency pits because we feel the commission has recognized the necessity in the past in cases of this nature and, again,

should recognize the necessity in this instance.

MR. UTZ: Are there any other statements in this case?

MR. HATCH: I have communications from Shell, Forest Oil Company, Sinclair, and Marathon in support of the applicant.

MR. UTZ: Other statements?

MR. HUDRY: I have got some more here.

MR. HINKLE: Can you read into the record what they are?

MR. HUDRY: This is John Hooks, Forest Oil Corporation, Barton, Red Fern Oil Corporation, Gulf Oil Corporation, Cabot Corporation, Sinclair Oil and Gas Company, Skelly Oil Company, and I believe this is Mary E. Hanter and Herd Oil and Gas Company.

MR. HINKLE: Those all concur in the application of Atlantic Richfield?

MR. HUDRY: Yes, sir. They have sent the New Mexico Oil Conservation Commission a letter.

MR. HINKLE: We would also like to have those in the record and all identified, I guess.

MR. PORTER: Does that constitute ownership of most of the wells in the area that we are talking about?

MR. HUDRY: The majority of the operators in this field concurred with this, yes, sir, because when we polled them on the vote down in Hobbs, when we had the meeting, the majority of the operators were in favor in going ahead and holding the meeting and also to go ahead and have emergency pits.

MR. HINKLE: To answer Mr. Porter's question though, these constitute a large ownership of the whole pool?

MR. HUDRY: Some of these are small and some are large.

MR. PORTER: I just wondered if that constituted either a majority of the wells or --

MR. HUDRY: Well, Sinclair Oil and Gas is about 13% and Atlantic is about 18, and Shell -- Atlantic is a little over 18%, and Gulf is just about 9%. Here is Sinclair with 13%, Skelly with just about 6%, Shell has just about 15%, Herd Oil and Gas, then start getting into the smaller --

MR. PORTER: Apparently, it does exceed more than 50%.

MR. HUDRY: Oh, yes, sir, there is only 50% of that.

MR. HINKLE: It is a majority.

MR. HUDRY: Yes, sir.

MR. UTZ: Further statements? The case will be taken under advisement.

STATE OF NEW MEXICO)
) ss
COUNTY OF BERNALILLO)

I, KAY EMBREE, 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 5th day of December, 1967.

Kay Embree

Notary Public

My Commission Expires:

November 13, 1971

I do hereby certify that the foregoing is a complete record of the proceedings in the Interstate hearing of Case No. 3693, heard by me on Nov. 29, 1967.
[Signature]

Register
New Mexico Oil Conservation Commission