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

EXAMINER HEARING

IN THE MATTER OF:

Application of Chaco Oil Company for a water flood project. Applicant, in the above-styled cause, seeks an order authorizing it to institute a peripheral water flood project in the Red Mountain Oil Pool in McKinley County, New Mexico, by the injection of water into the Menefee zone of the Mesaverde formation through 11 wells to be located on unorthodox locations in Township 20 North, Range 9 West. Applicant further seeks capacity allowables for producing wells in the project.

Case 1805

BEFORE:
Elvis A. Utz, Examiner

TRANSCRIPT OF HEARING

MR. UTZ: The hearing will come to order. The next case on the docket will be 1805.

MR. PAYNE: Application of Chaco Oil Company for a water flood project.

(Witness sworn.)

HENRY S. BIRDSEYE

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

DIRECT EXAMINATION

BY MR. PAYNE:

Q Mr. Birdseye, are you representing yourself as a joint venturer in this Chaco Oil Company?

A Yes, sir. I am Henry S. Birdseye, a co-owner of Chaco Oil Company, a joint venture, which operates Santa Fe Pacific Railroad Company lease SFP 9426 covering the South Half of Section 20, the North Half of Section 29 in Township 20 North, Range 9 West, McKinley County, New Mexico on which is located the Red Mountain Menefee Oil Field.

I have for the members of the Commission three copies of data and a technical report which will be of some benefit in describing our project. This envelope contains logs on certain of our wells and maps to be entered as exhibits showing various pertinent portions of our testimony here today.

The Red Mountain Field was discovered in 1934, in which a producing well was completed by Stacey, Webber et al, in 450 food sand, so-called a stray sand in the Menefee formation of a Mesaverde group. Since that time approximately 25 wells have been drilled of which some 7 were reported producing or productive.

The ownership of the field has changed hands at various times and at the present time the field occupies a portion of the Santa Fe Lease assigned to Chaco Oil Company. The structure of this field is a faulted nosing or possible closed-dome in a down-dropped wedge -shape fault block. As far as we can determine from the data at hand, which admittedly is limited, the producing sand in

the Menefee formation is continuous at least in this local area.

The field has produced, Page A-2 refers to the B.O.P. report. Page A-2 shows a production summary from the Red Mountain Field which contains reasonably reliable data since 1951. Prior to that date we have no reliable information, but we inherited a cumulative production figure of about 16,000 barrels starting in 1951, and I cannot verify that. The records of the Commission do not reflect the veracity of that figure.

At the present time let us refer to Applicant's Exhibit 1 from the envelope. This is a base map showing well locations and such pertinent data as we have. The wells which are marked Nos. 1, 2, 3 and 4 are presently producing or productive. Well No. 3 in the Southeast Quarter of Section 20 is the only well presently producing. The other wells, No. 1, 2 and 4 are capable of producing but they are temporarily shut down because of mechanical difficulties.

Each of those four wells has a productive capacity of about 2 barrels a day for a total of the four of approximately 8 barrels a day. You will note also Wells No. 20-9 indicated as an oil well, No. 20-9, No. 29-18, No. 29-19 and No. 29-20. Those wells were drilled in the early part of 1959 by Chaco Oil Company and they produced the only accurate and detailed information, technical data which we have on this field.

In each of these wells the pay zone was cored and core

analyses for porosity and permeability were run. We were unable to freeze the cores due to field conditions, so we do not have connate water and oil saturation from a pay zone of those wells. A detailed description of each of those cores is found on the back of the report, Pages A-4 through A-7 inclusive. Core analyses from these cores are shown on Page A-8 of the report. They show an average porosity of 25, analyzed core intervals of 24.8% and average permeability of 341 millidarcies. Casing was run on Well No. 20-9, through the pay, it was perforated in the pay zone and a small acid treatment was given the well. It has not been produced since that date. Wells No. 29-18, 29-19 and 29-20 have not been completed. They are awaiting on orders with no casing.

We have, therefore, eight either presently productive wells or wells which by being completed or reequipped would be productive. on two 40-acre units which are shown in Applicant's Exhibit No. 2, which is a structural contour map, and the map showing locations of proposed injection wells. At the present time the total productive capacity of the Red Mountain Field is approximately 8 barrels per day, at which rate of production the operating company, Chaco Oil Company, would sustain an operating loss of about $200.00 per month.

We have, therefore, reached the economic point of no return. We either must abandon the field as it is in its late stage of primary production or by water flooding this field institute a

water flood secondary recovery program which we have reason to believe would create an economically feasible operation.

As you can see, in referring to Applicant's No. 2 in the Southeast Quarter of Section 20, the No. 20-1 Well, this is the deepest well which has been drilled on the structure. It was drilled into the top of the Morrison formation at a total depth of 3935 feet. Pertinent data concerning that well appears on Page A-10 in the report, which includes elevations, a casing record, et cetera, formation tops and drillstem tests.

The drillstem tests are what I would like to direct your attention to now. The well was not commercial in terms of oil or gas production, but in two drillstem tests of the Hospah and Gallup sand, large quantities of Artesian water were recovered. electrologs, gamma ray neutron logs and micrologs of this 20-1 Well, which will be our proposed water supply well, are filed in the large envelope which I handed you.

If you will refer to the microlog you'll note a section has been marked in red showing the porous interval in the Hospah and Gallup formation between approximately 2700 and 2900 feet. We drillstem tested the interval from 2718 to 2750 feet. The tube was opened forty-five minutes, water was to the surface in sixteen minutes, it flowed at the measured rate of 40 barrels per hour. The flowing pressure ranged from 583 to 1161 pounds per square inch. The shutin pressure after forty-two minutes was 1245 pounds.

We also tested the subjacent interval to the first test I have mentioned from 2750 to 2782 feet. This is including the uppermost portion of the Gallup Sand, the basal portion of the Hospah Sand. Water was to the surface in twelve minutes at the measured rate of 50 barrels per hour. Flowing pressure ranged from 693 pounds to 1217 pounds. The shutin pressure after forty-three minutes was 1272. It is evident from these shutin and flowing pressures that a surface, there is a pressure gradient which would create a surface shutin pressure from these two Artesian zones of approximately 100 pounds per square inch. That is sufficient to raise the Artesian water approximately 200 feet above the present surface elevation of the well. This is the well which we propose to use as an injection well.

You will find in the back portion of the report Applicant's Exhibits 5-A and 5-B which are water analyses which were run on these two samples of Artesian water, one from the Hospah and one from the Gallup zone. From these water analyses you can see that the water is slightly brackish, the mineral constituents of the water are explained in some detail. We have run laboratory tests with this water on cores taken from wells drilled in the early part of 1951 and there was no adverse reaction of this Artesian water with the cores from the pay zone.

There is no reason to expect that there would be any fluctuating or expansion of any of the matrix material in the oil

pay zone. Furthermore, the Artesian water is, as we found, free from suspended solids, which again is reason for us to believe that there will be no plugging of the pay sand upon injection of this Artesian water.

Now, as Applicant's Exhibit 2 shows, we propose a peripheral or edgewater flood of this small, shallow oil field. The pressure in the reservoir at the present time has declined to a point of close to zero; judging from the fillup of the producing wells when they have been shutin for a period of weeks or months, the fillup averaging not over 50 feet, we believe that the reservoir pressure is not in excess of 20 pounds per square inch.

The hydrostatic head, which would result by simply filling the injection wells under gravity or vacuum without exerting any injection pressure on the injection wells, this hydrostatic head would be approximately 200 pounds per square inch, and we have found by simply pouring water in the amount of a few barrels into certain of these producing wells that the wells will certainly take it under gravity. We therefore think that, with the proper completion, the injection wells with their high porosity and permeability will take satisfactory amounts of water under a gravity injection program until such time as the reservoir pressure has been built up to approximately 100 or 150 pounds per square inch, at which point we may have to boost the injection rate by exerting pressure.

If you'll refer to Applicant's Exhibit 4, it is a schematic plan of the water supply and injection systems. This long, narrow map. Our plan is simply to complete the water well by drilling out six or seven cement plugs which were spudded in that well at the time it was plugged and abandoned. There are actually six cement plugs approximately 25 feet long, each one which would need to be drilled out to open up the Hospah and Gallup Artesian water sands.

These plugs are shown in detail on Page A-10 of the report which is the well record of that 20-1 well. Having drilled out these plugs, the whole diameter 7 7/8s inches, will set a retrievable openhole production packer on 2 7/8s EUE tubing at the top of the Artesian water zone approximately 2700 feet. The well will then be so equipped as to produce Artesian water with a surface head of around 100 pounds per square inch.

It is intended that this water will then be produced through three inches of pipe uphill to a 2,000 barrel open storage tank which is topographically higher than any of the injection or producing wells in the field. From this open storage tank a two inch plastic feeder line will be laid to each of the injection wells. The hookup for each of these injection wells will include a liquid flow meter and a satisfactory arrangement of gate valves that injection can take place into any or all of the injection wells simultaneously and we will have a record of the

quantities of water injected.

Applicant's Exhibit 2, which shows a progressive movement of the flood front under ideal conditions, is based on an injection of approximately six to seven thousand barrels of water in each injection well per month. This idealized depiction shows the flood front after respective periods of thirty, sixty and ninety days.

Referring again to the back portion of the report, Applicant's Exhibit 3 shows the intended method of completion of the injection wells in such a fashion as to isolate the oil sand and prevent loss to any feed zones of the injected water. As an illustration explains, the two inch by six inch swage nipple will be run on two inch line pipe in approximately a six and a half diameter openhole to a shoulder on top of the pay zone. Sufficient cement will then be dumped on top of the swage nipple to form a seal and cement the swage in position on top of the shoulder, which will make it impossible for the injected water to go anywhere except into the oil sand.

Now, it is pertinent to mention here that the oil sand is isolated between two thick shale members top and bottom, and the only sand which is present at the so-called 450 foot interval is the oil sand. There is a water sand at a depth of about 250 feet in the hole, but we shall effectively seal off the water sand in both the injection and producing wells. Consequently any water

which is injected into the oil sand will be prevented from entering any other formations higher in the hole and the arrangement which we have planned on for this typical water injection well completion will enable us at the completion of the flood project to recover virtually all of the tubular goods in each injection well.

MR. UTZ: I believe you said, Mr. Birdseye, that you had water at 250 feet?

A There is a water sand. It's at some location which occurs at a depth of about 250 feet in the four locations which we have drilled as producing wells.

MR. UTZ: How do you propose to seal off this water?

A Well, that is the only sand, and we think that by running this swage nipple on two inch line pipe and cementing it at the bottom of the hole so that our injection water can't go anywhere, so that this water sand at 250 feet will simply fill up the hole to the depth of the water sand and will not go anywhere else. It's relatively low pressure. It's enough of a nuisance to be able to drill dry. It might take considerable pressure, under high pressure, and consequently it has been our experience and it is my belief that that water sand which is nothing more than a nuisance sand, once it has filled the hole up to its own depth, that is as far as it will go. It will certainly fill the hole to the surface we have found on numerous instances.

MR. UTZ: Is that a potable water, fresh water?

A I don't know. I doubt it, but at the time we have drilled it there has been mud in the hole and you couldn't actually tell whether it was or not. It makes such small quantities that we haven't attempted to test it. We simply were interested in finding how much fillup it produced, and the fillup was very slight and at a very low rate. That is why we felt it would be an unnecessary expense and technical difficulty to seal off that 250 foot water sand since it is apparently of low porosity and permeability and just dribbles water at a very low rate.

MR. UTZ: What's the average depth of your injection well?

A The average depth of the injection wells will be approximately 450 feet, which is on the average slightly deeper than the average depth of the producing wells because of their structural relationship. Structurally the injection wells will be generally somewhat lower than the producing wells, in order to take maximum advantage of a structural configuration of the field and the apparent hydrodynamic tilted water table which we have here.

There is in the large envelope which I presented to you, there is shown a nuclear log, a radioactivity log on Well 20-9. This is the only log which has been run on any producing well. Even though that well is not presently producing, it is producable. It has some 14 feet of saturated oil sand. It also has such low pressure that it will not make a commercial well

at the present time. This is submitted in the interest of completeness. It's Well No. 20-9.

The oil pay interval is shown at the bottom of the log from approximately 416 to 432 feet. There is a streak of about 3 feet of very hard, tight nonproductive sandstone in the middle of a porous and saturated sandstone. This makes a very good marker zone and we refer to it continuously in well correlations and in predicting the depths of these wells.

The structural relationship of the field was determined by us approximately a year and a half ago by drilling two depths of two to three hundred feet and a series of stratigraphic test holes which were subsequently logged with SP resistivity and gamma ray curves and gave us sufficiently good correlations that we could confirm the structural picture which is shown in Applicant's Exhibit 2.

In the back of the report, the final page, Applicant's Exhibit 6 shows ownership surrounding the lease of Chaco Oil Company, in Township 20 North, Range 9 West. There appears to be no question of violation of correlative rights here insofar as the productive area of the field, as you can see from the larger scale maps, is at least, to date is at least a quarter of a mile from our nearest lease neighbor which is Sinclair Oil Company in Section 21 and the Santa Fe Pacific Railroad Company in Section 28.

Due to the relatively large number of wells which have been drilled in this small, shallow field, it is extremely doubtful that the field will extend off of structure sufficiently far that it will overlap on to any adjacent lease holder. As far as the economic results of water flooding the property are concerned, calculations of recoverable oil are made and shown in the report on Page A-3 in the back of the report. In this we have used an average porosity of 26% and derived from core analyses connate water saturation of 40%, which is an assumed figure since we have no laboratory determinations of water saturation.

The original reservoir pressure was assumed to have been hydrostatic, the net pay thickness used here of ten and one-half feet is the average of four of the net pay found in the cores of four wells which were cored by Chaco Oil Company, although somewhat questionable data from some of the older wells appears to confirm this as being a reasonable figure of pay thickness.

Employing these figures and a primary recovery factor for the oil produced to date of 15%, it appears that some 14 acres have been voided by primary production. It is our opinion, having made very thorough structural studies and having drilled these additional four wells outside of the older producing area of the field, that a productive area of some 40 acres will be found in the injection program. This is to a large extent the factor responsible for choosing injection locations where they are shown

on the map. We have assumed a secondary recovery factor of 35%, and a secondary productive area of some 40 acres.

These, employing these figures we arrive at a total primary and secondary recovery of 169,435 barrels of which, at the time this report was prepared, some months ago, 25,290 barrels had been produced, leaving a recoverable reservoir of 144,145 barrels under secondary recovery.

Now it's conceivable that in the drilling and coring of some of these injection wells we will encounter locations in which the pay sand rather than being water saturated is oil saturated, and in such an instance as that it would behoove us to move out, to move out another four to five hundred feet for the injection well at that particular portion of the reservoir.

There is included in the report as Page A-9 in the back, a summary of anticipated costs of equipment. What this shows is that the total cost of instituting the water flood as we propose it will be approximately $19,000 with some $3,000 in salvageable equipment. This allows for the drilling and equipping of injection wells, the preparation for production of the water supply well, purchase and stringing of plastic pipe for the water supply and feeder system and other items as specified.

Now, as you can see, referring to Applicant's Exhibit 2, the production at the present time is all on two 40-acre units, Unit O in Section 20, Unit B in Section 29; you can also see from

Exhibit 2 that the proposed locations of the most easterly injection wells will fall on Units P of Section 20 and A of Section 29, and that if we succeed in flushing oil from those two units we will then be producing oil from at least four 40-acre units. It is our desire, as specified in the application, that this production from the secondary recovery program, the water flood not be restricted to unit allowables. In other words, that we be granted capacity allowables from the producing wells in order that we may establish the flood front by a maximum rate of injection through this highly porous and permeable sand and keep the entire oil bank and flood front moving at such a rate that the field will be easily flushed in a period of somewhat under three years. In other words, it is our anticipation, although there are granted enough unknown reservoir factors that it is somewhat indefinite, it is our anticipation that we can build production up to approximately 250 barrels per day using the present eight wells which are either productive or producable as shown on the map.

We will also be testing from time to time certain of the older wells which have casing in them but which have not, do not have cement plugs in them. We intend to test those wells and continuously ascertain what, if any, fillup there has been as this flood front progresses. And if we are justified, we will put some of those older wells on production. These wells which are presently producing have very small equipment on them, practically

the minimum which is available, and they will produce by pumping about 75 barrels per day on a 24 hour day each well.

Consequently with eight wells we will have certainly ample producing capacity to handle all the oil which those wells are anticipated to produce. Therefore in our application we have asked that these wells be given capacity allowables so as to allow us to inject at a maximum rate of some six to eight thousand barrels per well per month and recover the secondary recoverable oil at a maximum rate and deplete the field in a period of somewhat less than three years.

Gentlemen, I think that's all of my testimony.

CROSS EXAMINATION

BY MR. PAYNE:

Q Mr. Birdseye, do you contemplate reopening the No. 15 Well, the one nearest your water supply well?

A Well, that well, we shall reenter that and deepen it, the well is approximately 40 feet shy of being deep enough, and obviously it will behoove us to see if the productive interval in the other portions of the field is productive in that well. We found in the 20-1 well a few hundred feet to the Northeast of that No. 15 well that the oil sand was completely absent, not completely absent, but only about two feet of it.

Q It appears to me that you are very fortunate here because your allowable, as I compute it, will be considerably in

excess of 250 barrels a day. It will be approximately 346 or 364 depending on whether you reopen that No. 15 well.

A Well, I reassure you that we shall reopen that No. 15 well.

Q If you moved your injection well No. 1-11 a few feet to the north, would that result in a thorough and efficient sweep of the oil?

A Yes, I should certainly think that there would be definite advantages to moving that well, on the scale of that map, I'll say about 30 feet north.

Q Under the allowable provisions you would then have 52 more barrels?

A Those figures which you have mentioned, Mr. Payne, would be more than adequate for what we consider to be an economic operation of the property under a water flood, and under those conditions we would certainly be willing to strike that portion of the application which deals with capacity allowables.

MR. PAYNE: That's all.

BY MR. UTZ:

Q Have you indicated the location of your injection wells on any of these exhibits?

A I haven't specified the footages. I have them here. The locations are as shown on the map of the various exhibits. I can either read them to you or type them and give them to you

after the hearing.

Q If you have got them there.

A No. I-1, 980 feet from the South line, 2,025 feet from the East line of Section 20. No. I-2, 490 feet from the South line, 2300 feet from the East line of Section 20. No. I-3, 80 feet from the South line, 2280 feet from the East line of Section 20. No. I-4, 310 feet from the North line, 2290 feet from the East line, Section 29. For I-5 is 615 feet from the North line, 1920 feet from the East line of Section 29. No. I-6 is 600 feet from the North line, 1500 feet from the East line of Section 29. No. I-7 is 370 feet from the North line, 1150 feet from the East line of Section 29. No. I-8 is 50 feet from the North line, I am sorry, correction, 5 feet from the North line and 1130 feet from the East line of Section 29. No. I-9 is 450 feet from the South line, 1145 feet from the East line of Section 20. No. I-10, 900 feet from the South line, 1280 feet from the East line of Section 20 and No. I-11 is 1290 feet from the South line, 1490 feet from the East line of Section 20.

Q Did you give us the location of injection well I-11?

A I think it will be wise, and I hereby revise, the location of the injection, of the injection well to the point where it is 1330 feet from the South line and 1490 feet from the East line of Section 20.

Q Would that be on the quarter quarter section line?

A No, 1320 feet.

Q That would be 10 feet off?

A Yes, sir.

Q I believe your application stated that you wished an orthodox location approval for all of these wells?

A Yes, sir. I would like, however, to amend that to a point whereby the Commission could set up an administrative procedure to grant us additional unorthodox locations for injection wells in the instance that one or more of these specified eleven locations should prove to be oil productive and therefore permit us to produce from such a proposed injection well, produce oil and recover that oil by moving to an appropriate outside unorthodox location for a water injection well. Such a circumstance, of course, could not be anticipated in advance because we simply don't know the productive boundaries of the field.

MR. UTZ: Is there objection to the Applicant's amendment to the application to provide for administrative approval to relocate the unorthodox locations of the injection wells? If there is none it will so be amended.

Q (By Mr. Utz) Now, Mr. Birdseye, I think your request for amendment of the application almost includes this question, but the thought came to my mind in regard to oil in place outside your periphery. Do you intend to solve that problem by determining whether or not your injection locations are productive?

A Yes, sir, I think that's the only way to do it. As far as we have determined to date, this pay sand, while it varies in thickness from location to location, is everywhere continuous between these wells in which we have reliable control. But the structural position is the other factor in entrapment of oil in this field, and we haven't yet determined what the lowest productive contours will be. The situation is somewhat complicated by the presence of a tilted water table and it is our intention to proceed with drilling and coring of each of these injection wells in rotation, and if necessary, revise our unorthodox locations for injection wells according to the results we encounter in coring the pay sand.

That is the principal reason for coring the pay sand, so that we can be sure we are not bypassing any oil, because actually what we are trying to do is prevent waste and recover the maximum ultimate amount of oil.

Q Do you feel that the productive boundaries of this pool is within the acreage owned by Chaco?

A Yes, sir, very definitely. We have found the boundary to the east in the 20-1 well, and which as I stated previously, the sand is pinched down to approximately two feet, the boundary to the south, not necessarily the production boundary, but the practical boundary is determined by the mesa whose rim is shown on Exhibit 2, which is a large topographic figure which makes it

economically impractical to drill any wells either on it or very close to its rim, and by the time one proceeds south of the mesa to good drilling locations again it is almost certain that it is outside of the productive area of the pool.

To the west, or to the southwest, there is a well not shown on Exhibit 2 or any of the other exhibits which is in Section 31 just practically at the corner, at the southwest corner, of section 29 just over into Section 31 which was drilled through the 450 foot pay, and it was found to be either absent or nonproductive in that well.

To the north it is both down the regional and local structural dip so far that although we have no good control to the north, it is extremely unlikely that 1300 feet further north, which would mean 150 or 250 feet further down dip in view of the large fault which is present up there, it's extremely unlikely that production will cross that fault and dip to the north on to the adjacent lease to the north.

Therefore, it is our serious contention that there is no problem of correlative rights here. There have been shallow wells drilled on Sections 21 and 28 which were nonproductive, to the east, and wells drilled to the southwest and west which do not show on this map which also were nonproductive. In essence then this is the only area in the entire township which has shown anything approaching commercial production. If it should turn out that

we are extending the productive area of the field an unexpectedly great distance toward another lease, we would certainly be willing to take necessary steps to unitize with the adjacent lease owners, but this would be extremely unforeseen.

Q Is it your intention to drill any more producing wells except those which might prove to be producing wells by drilling of injection wells?

A Well, our plans along that line involve reentering Well No. 15 in the Southeast Quarter of Section 21 and deepening it to the pay sand to determine just exactly if there is a pay sand in that well and possibly reentering the well shown as No. 5 or No. 6 in Unit O of Section 20 which are further down dip than any present producing wells. If we are unable to recomplete one of those wells in Unit O satisfactorily, then it may be advisable for us to apply for unorthodox locations and drill additional producing wells in that area.

Q Which well was that now?

A They're shown as No. 5 and No. 6 in Unit O. There is casing in both of those wells and both of those wells showed some oil sands, but they were unable to get water shut off, apparently they simply set the casing on a shoulder and didn't satisfactorily get a water shutoff, and rather than try to recomplete those wells it may behoove us to drill new wells, simply plug those old ones and drill new ones and properly complete them.

Q How are the present producing wells completed with regard to casing?

A Well, the only new well, producing well which Chaco Oil Company has completed since it has had this lease, is the one shown as No. 20-9 and this well, 5½ inch casing was set to total depth through the pay and cemented with the cement circulated and perforated so that after running a correlation log, as we have, this is theideal, but most expensive method of completing.

It is my intention in the future that in completing or re-completing producing wells, that we shall complete them in approximately the same method as we propose to complete the water injection wells. That is, have a shoulder at the top of the pay and run a swage nipple on two inch line pipe with proper pumping equipment welded to that and cement that at the top of the pay so that we can ultimately recover most of the tubular goods and yet not go to the expense of setting an unnecessary string of casing.

Q How much fillup will you have on the cement above your swage nipple?

A Well, I think that 30 feet would be adequate. The drawing which is shown in the exhibit is not to scale, but I think that 30 feet should be an adequate amount which would be from five to eight sacks of cement.

Q You think that will be sufficient to withstand any pressures that might be exerted upon them?

A Well, I think so. We sincerely hope that we will not have to exert any pressures aside from hydrostatic, but if we do, once the pressure in the reservoir has been built up to 100 or 150 pounds that we may have to boost the pressure by perhaps an additional hundred pounds above hydrostatic.

I think that should be adequate considering the weight of the tubing in the hole, and the fact that it has been cemented with some 30 feet of the annulus has been cemented, the tubing in the hole itself will be grafted to hold the swage nipple on the shoulder.

Q Do you think the regular line pipe you intend to use will be good enough for the duration of this project?

A That's all that has been used in any of these wells to date, and there is a large safety factor over any pressures which we intend to exert. However, in the water supply well, as I mentioned previously, we expect to use regular 2 7/8s inch tubing which has a much higher strength.

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

MR. IRBY: May I ask a question?

MR. UTZ: Certainly.

BY MR. IRBY:

Q I am Frank Irby, State Engineer's Office.

A Yes.

Q I think I might preface my question with a statement

that we don't have a declared basin up there and therefore have not assumed jurisdiction of water, but we are interested. As I understand it, you went through a water sand at about 250 feet and you don't intend to make any provision to retain it within that sand. My question is, is there any place this water might migrate to in the hole below that level? In other words, will that water all be drained off and go in some other formation?

A No, sir, as we have found in carefully coring and trying to dry drill these holes, there is no sand interval either above or below that 250 foot water sand which could be a thief and cause a continuous drainage from that water sand. In addition, that 250 foot water sand I mentioned more for the sake of completeness than because it is an important water sand. It is there and it's just wet enough that you can't dry drill through it. It gums things up but it doesn't make over a gallon or two a minute and it just dribbles and it doesn't have any pressure behind it. In fact I assume it outcrops within a mile or two to the south and by drilling through that sand and simply leaving it there exposed in an open hole with tubing hung in it, it would seem to me that the worst that can happen is that the hole would fill up to the water sand and just stand there. There would be no further circulation after that has happend.

Q What type of material is between the water sand and your pay zone?

A It's almost a hundred percent continuous shale section. There are a few silty stringers, there are no other water sands. It's just, we're in the Menefee shale down to this water sand at some 250 feet, which incidently does not occur in every well, and below that we are in the Menefee shale again down to the pay sand at approximately 450 feet.

The Menefee in this area is almost a hundred percent shale. Our oil sand itself is encased, or overlapped and underlain by shale.

MR. IRBY: Thank you.

A Yes, sir. I might point out as regards this water supply well, there is a well ten miles west of here on the Smith ranch which was completed as a water well in the Hospah and Gallup sands. It has a three inch flow line on it, some four feet above the ground and the water comes out of the three inch flow line and goes about 15 feet before it hits the ground and in what I would estimate flowing at the rate that I would estimate to be between ten and fifteen thousand barrels a day, and it's been doing this for thirty years.

There is shown in this report a calculation of the amount of water which will under ideal conditions be required to flood the field and no more than two acres of the Hospah-Gallup water sand would be sufficient to flood the entire oil field.

MR. UTZ: Is this water that you speak of in the Smith

ranch being put into beneficial use?

A Apparently they have found it is mineral enough that it is not potable, certainly not for humans and cattle, and I am not enough of an agronomist to say, looking at these water analyses, whether it would be used for agriculture or not. I would think that something ought to grow with it that is edible. It hasn't been used, it's just going down an arroyo.

MR. UTZ: Any other questions of the witness? If there are none, the witness may be excused.

(Witness excused.)

MR. UTZ: In regard to your exhibits, how do you wish to enter these exhibits?

MR. BIRDSEYE: If we can enter them with the numbers as specified, I think it will avoid confusion, if that is satisfactory with you, Mr. Utz. There will be numbered Exhibits 1 through 7.

MR. UTZ: This report would be what exhibit number?

MR. BIRDSEYE: Well, we can call this Exhibit No. 8. There are quite a number of logs in the envelope, if you think it appropriate to number all of them we can do so, otherwise we could leave them as unnumbered exhibits or however you think would be appropriate.

MR. UTZ: I don't think it's necessary to mark them.

MR. BIRDSEYE: All right, let's just leave them then.

MR. UTZ: Any statements to be made in this case? If there are none, the case will be taken under advisement and the hearing will be adjourned till 1:15.

(Whereupon the hearing was adjourned until 1:15.)

STATE OF NEW MEXICO)
: ss
COUNTY OF BERNALILLO)

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

IN WITNESS WHEREOF I have affixed my hand and notarial seal this 19th day of November, 1959.

Ada Dearnley
Notary Public - Court Reporter

My commission expires:

June 19, 1963.

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 1606, heard by me on November 10, 1959.

Examiner
New Mexico Oil Conservation Commission