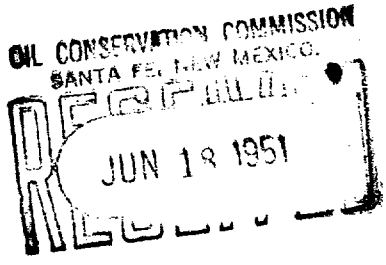
BEFORE THE

OIL CONSERVATION COMMISSION



TRANSCRIPT OF PROCEEDINGS IN

CASE NO. 274

May 22, 1951
May 23, 1951

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BEFORE THE

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Case No. 274: This is the amended application of Cities Service Oil Company to dually complete its State S No. 3 and S No. 4 S/2 NW/4 section 15, T. 21 S, R. 37 E; or in the alternative for the authority to transfer allowable between said wells, thereby effecting 80-acre spacing.

(Notice of Publication read by Mr. Graham.)

MR. HOUSTON: Mr. Commissioner, I realize that it is unorthodox and I don't want to interfere in anyway with the Cities Service handling of its case or Tidewater, but the following case will involve the same general proposition. We were wondering if they could be heard together. It would save quite a bit of repetition of evidence, I think.

MR. ARMSTRONG: We would have no objection to that except as I understand from Mr. Adams, he is expressing a preference for dual completions, whereas Tidewater is expressing its preference for allowables.

We have no objection if you would like to hear it altogether, but we would like it to be made clear that there is that difference in opinion as to Cities Service and Tidewater.

MR. ADAMS: Cities Service has no objection.

MR. SPURRIER: I think, gentlemen, we had better put it this way. In view of the difference in the two cases, let's hear them separately, and the Commission will certainly recognize the testimony of 274 applies to 275 and, if it is all right with Tidewater, we suggest you limit your testimony as much as possible.

MR. ARMSTRONG: It might be all right after Cities Service has completed its case for us to proceed with ours and let all of those who are going to object, let them voice their objection.

MR. McCORMICK: That will be all right.

MR. SPURRIER: That is all right.

MR. ADAMS: My name is R. E. Adams, proration engineer for the Cities Service Oil Company. This is an amended application of the Cities Service for authorization to dually complete and produce its State S No. 3 and 4 wells located in the Brunson-Hare fields of Lea County, and the McKee Sand of the Simpson group and the Ellenberger Lime, common source of supply.

In the event the Commission finds that the request to dually complete these stated wells is impractical and/or not feasible, it is asked that a transfer of allowables be authorized so that one well may produce from the McKee Sand and the other well from the Ellenberger, each with allowables

commensurate to those of two 40-acre unites.

If this later request should be approved by the Commission, it is further suggested that before such allowable transfer be authorized that the wells be definitely shown capable of producing from each of their respective common sources of supply.

I wish at this time to state however it is very definitely the recommendation of the Cities Service Oil Company that dual completions in its opinion are more practical and feasible than transfer of an allowable.

In Case No. 261 which was heard on March 20, 1951 we submitted data relative to the dual completion of our State S No. 3 well. Commission action on this matter was deferred due to the fact that our State S No. 4 was at that time drilling and had not at that time encountered either the McKee or the Ellenberger sands and had not proven its productive possibilities in those horizons.

In order to expedite this hearing, I would like to request that the transcript made in that case be made a part of this record with all the Exhibits and data that we submitted at that time.

MR. SPURRIER: It will be done.

R. E. ADAMS,

having been previously duly sworn, testified as follows:

DIRECT EXAMINATION

MR. ADAMS: The location of our well Number 4 is 100 feet east of the center of the southwest quarter of the northwest quarter of Section 21.

It was completed on April 17, 1951, at a total depth of 8182 feet subsea depth of 4719 feet. The top of the McKee sand was encountered at 7650 feet subsea depth of 4187; top of the Ellenberger was 8030 feet subsea depth of 456 to 7. Three hundred and eleven feet of 13-3/8 surface pipe was set. An intermediate string of 2818 feet of 8-5/8 was set and cemented and the oil string was set and cemented on top of the Ellenberger at 8030 feet. In drilling the well, when the McKee sand was encountered a drill stem test was made from 7720 to 7852 feet with one inch top choke and 5/8 inch bottom choke. Gas came to the surface in four minutes, oil in 13 minutes and the well flowed 134 barrels of clean oil in two hours with the gas-oil ratio of 910 cubic feet per barrel. That production would be at a 24 hour rate of 1628 barrels. Gravity of the oil was taken at the time of this test and was 43-1/10 degree.

The Ellenberger lime, the well was completed in open hole from 8030 feet to 8182 feet. Upon potential the well flowed 205 barrels of oil in 7 hours through a 29/64 inch choke giving it a rated 24 hour potential of 696 barrels of oil. Gas-oil ratio was 975 cubic feet per barrel and the gravity was 41.4 degrees corrected.

The number four well has been dually completed. That is, the packer has been set and both formations have been tested. In our opinion the dual completion is not affected until such time as the Commission authorizes an allowable for that formation.

The packer was set and the test made in order to prove that dual completions were impractical in this area. The packer installation which we have used in the number 4 well and which we propose to use in the number 3 is a model "D" Baker Retainer Production Packer which Cities Service Oil Company has found to be mechanically efficient and extremely satisfactory for the purposes for which it was designed, and other state regulatory agencies in which the packer has been set under their supervision have also approved it.

In Texas alone we have over 40 dual completions in some six different fields. The Dollar-Hyde field of Texas as we stated at the hearing on March 20th, we have around 18 dual completions in the Clear Fork and Devonian formations. This field borders on the New Mexico line and there may be some possibility of its extension into New Mexico.

In this field, Dollar-Hyde, the Railroad Commission permits dual completion in two of any five different producing horizons, the Witchita limestone, theClear Fork, theDevonian, the Silurian and the Ellenberger formations.

Our primary reason for requesting authorization to

dual complete the two State S wells is to prevent waste and to protect correlative rights for the confiscation of property with a minimum expenditure of critical material.

I beleive that it is well known that by reason of the national emergency tubular goods have reached the stage where they are extremely difficult to get. On March 13th, Secretary of the Interior Chapman issued a four point program of the Petroleum Administration for Defense for stepping up oil and gas yield for the minimum use of oil. They involved wider spacing, increased use of pressure maintenance and re-pressure operation in oil and gas.

It is my personal opinion compliance with these recommendations is just a step closer to the federal control of our oil operations. If this application is granted Cities Service Oil Company will fully comply with Rule 304 and any other rules that may be applicable to the use of dual completions.

We will have surface connections designed for the installation of all gauges to make any possible tests that the Commission might require to insure that the wells are producing from separate reservoirs.

In regard to the dual completion of our State S No. 4 well, the packer was set at 7965 feet on May 8th following a standard form for pack electrical testing.

The shut-in casing pressure was 1020, the shut-in

tubing pressure was 650 pounds. The well flowed from the McKee Sand through a 14/64 inch choke 470 barrels of oil in 24 hours. The gravity was 42, gas-oil ratio 980 cubic feet per barrel and the tubing pressure held constant.

The well was produced through the annular space through the tubing and casing. After another shut-in period of 24 hours, the shut-in casing pressure was 1000 pounds. The shut-in tubing pressure 65 and the well was flowed through the Ellenberger lime through a choke 22/64 inch, 607 barrels of oil in 24 hours. The gravity was 41.8. The gas-oil ratio was 933 cubic feet per barrel and the casing pressure held constant.

In our opinion that showed that the two formations were definitely sealed apart.

I would like to give just a brief resume of the oil completions in Texas. In going through the proration reports of the Railroad Commission, not their orders or anything, but the actual proration reports, it shows where these wells are getting allowables. I found 944 wells had been dually completed in some 95 fields. In those 95 fields, in a number of them, there were innumerable producing pools, one of them I think had as high as 37 different pools under the same field.

In the dual completion practice there in Oklahoma and in other areas, where we operate, has received a decided stimulas and we feel that it is one of the best ways in the world to save steel and man hours.

In the drilling of our No. 3 well, we used 134 tons of tubular goods. The 1200 sacks of cement all of which is listed as critical at this time and the total labor in drilling that well was 10,000 man hours. While dual completion of a well increases recoverable reserves in development, that figure can be cut in half by dual completion.

I think that is all I have.

By way of exhibits, I would like to introduce as our exhibit No. 1, the plat of the Brunson and Hare fields, showing the lease ownerships in that area. As Exhibit No. 2, an electric log along with a micro-log of our No. 4 well. You already have in that previous hearing, our electric log on the No. 3. Exhibit No. 3, a diagramatic sketch showing a dual completion installation which has been made of the No. 4 well. Exhibit No. 4, the Packer Leak Test which was made showing the---along with the charts, showing that there was no leakage. Exhibit No. 5 and also as Exhibit No. 5, packer setting affidavit that follows the forms that are generally used. I believe in our previous hearing we have introduced the special order of the Texas Railroad Commission showing pools in which all oil completions were approved. I would like to point out at this time, however, that this order shows only some of the pools in which this has been done. There is a number of other fields that have been covered by special field rules that are not set out in this special order. That order which is also a part of the exhibits

in our other hearing shows the requirements made by that regulatory agency in regard to testing the wells.

MR. SPURRIER: You have offered all these exhibits?

MR. ADAMS: Yes.

MR. SPURRIER: They will be received. Does anyone desire to question the witness?

R. L. HUGHSTON: I have some questions in be half of Shell Oil Company.

CROSS EXAMINATION

By MR. HUGHSTON:

Q Mr. Adams, if I understand your application correctly, the application of Cities Service, it is for a dual completion and in the alternative for the transfer of allowable you ask for the dual completion on a permanent basis, is that right?

A Yes, sir.

Q In the event the wells are completed so that one is in one horizon and the one in the other, you would ask for a transfer of allowable as between the wells only on an emergency basis?

A Now, our application says nothing about the application. I think you will find that in the Tidewater, but our company does not.

Q I just want to understand because it wasn't in the application with Tidewater, but they made the statement at the last hearing and I wanted to know what is your position with reference to that.

A We feel that if you make a dual completion installation that it is going to be permenant. I don't believe anyone can say, and I certainly wouldn't attempt to conjecture how long this present emergency is going to last. As far as I know, we are still in World War II.

Q Sir?

A As far as I know, we are still in World War II.

Q Never been a Peace Treaty signed?

A Never has.

Q Has any statements come from the President within the last month or so that we may be in a state of emergency for 20 years or a long period of time?

A I have seldom read anything he puts out.

Q Have you seen any such statements?

A No, sir.

Q Have you seen any statements made by any of our responsible military authorities that we may be in a state of emergency for a good long period of time?

A I think that is their opinion, yes, sir.

Q Well, then, you take the position that a transfer of allowable, if such was made, would be on a permenant basis, is that right?

A It would be on a permenant basis to this extent, if it is granted, It is very probable that later on Cities Service would come in again and ask for dual completions.

Q And any request for dual completion since it is on a permanent basis is in effect asking the Commission to depart from its more or less established practice against all oil dual completions in this state.

A That is my understanding of the position of the Commission. Any order that the Commission issues is subject to change. All you have to do is file an application and ask for an amendment, to that order.

Q You completed your No. 3 well in a different way than you completed your No. 4, did you not, in the Ellenberger?

A I believe the No. 3 in the Ellenberger, we set the casing through it and perforated.

Q In No. 4, you set the casing on top?

A Set the casing on top.

Q Why did you make that difference in completion methods.

A I don't know. We have an engineer here, I think, that could probably answer that question.

Q We would like to know the company's reason, whether you give it or the engineer.

MR. ADAMS: Mr. H. E. Massey, Division Engineer for the Cities Service Oil Company. I don't believe he has been sworn.

(Witness sworn.)

H. E. MASSEY,

having been first duly sworn, testified as follows:

MR. MASSEY: On the State S No. 3 well as has been testified, we set casings through perforated and acidized in completing No. 4 at approximately the same time Tidewater was in the process of completing State S. No. 5. We then changed our policy to set on top for two reasons.

First, from the drill stem test we had definite indications that the Ellenberger was a good producing well. By setting casing on top, we eliminated putting cement on the formation and also having to make the choice of just exactly where to perforate the casing for production.

The second reason, we desired to complete the well naturally and not use a side on the formation.

Does that answer your question?

MR. HUGHSTON: It is also further down the structure is it not?

MR. MASSEY: That's right.

MR. HUGHSTON: The higher in the formation you could complete it the better off you would be?

MR. MASSEY: Possibly. I say that because it depends on how high on the structure.

MR. HUGHSTON: Mr. Adams, now you stated awhile ago that you though dual completions, or that you proposed dual completions in this case because it would prevent waste. Will you tell us how it will prevent waste?

MR. ADAMS: I am speaking primarily of economic waste. As I stated afterwards it will save 135 tons of tubular goods, critical material; 10,000 hours of man labor, and 1000 sacks of cement.

MR. HUGHSTON: Would not prevent any waste of oil or gas, do you think?

MR. ADAMS: No.

MR. HUGHSTON: You said it would protect correlative rights, in what way will it do that?

MR. ADAMS: It will protect correlative rights because the north offset of our No. 4 well has been completed in the Simpson zone and will be--and we will have to drill a dual well making the third well, we already have a Drinkard well on that 40, and we have an Ellenberger well and we would have to drill a third well, a McKee well, to offset that one.

MR. HUGHSTON: Well, how would that protect correlative rights? You can't drill the well under the present rule.

MR. ADAMS: We can if we can get the material.

MR. HUGHSTON: Do you not have the material?

MR. ADAMS: I couldn't answer that. I know we are pretty well pressed for it and we are trying to use everything that we have got in expanding fields and our exploratory work.

MR. HUGHSTON: It would involve a choice but you could have the steel for it, could you feel certain?

MR. ADAMS: I don't feel certain.

MR. HUGHSTON: Cities Service has some steel in which to drill wells?

MR. ADAMS: Well, yes, but we prefer to use it in exploratory fields.

MR. HUGHSTON: It is a matter of choice?

MR. ADAMS: Yes.

MR. HUGHSTON: Is it your position that the P. A. D. in asking the state regulatory bodies to make wider use of multiple completions was asking them to do so even though thereby they would not be fulfilling their duty to prevent waste of all our gas and to protect correlative rights?

MR. ADAMS: I don't believe so, no. I think they just wanted to take another look at it. It was found practical and feasible in a lot of areas where it had been more or less condemned. They wanted to go back and reconsider the matter. That is why we are here today.

MR. HUGHSTON: Do you contend that a dual completion will make the Commission's task of policing, with reference to prevention of waste, any easier?

MR. ADAMS: No, it won't make it any easier. I don't think it will make it any harder either.

MR. HUGHSTON: Well, is it very difficult to determine whether or not there has been communication as between the different zones?

MR. ADAMS: Well, we have these, I gave you this packer leakage test report. As far as the Ellenberger and the McKee is concerned, it is my understanding, that all the Ellenberger is a green oil and the McKee is a more or less

black; the Ellenberger gas is sour and the McKee is sweet. And, there is probably a two degree differential in gravity and I can't see where it would be more difficult to police something like that than it would be to police between wells producing into approximately the same tank battery.

MR. HUGHSTON: You stated awhile ago that you would comply with any rules which the Commission might promulgate with reference to making tests. What tests would you suggest that the Commission should require?

MR. ADAMS: I would suggest that they follow more or less the procedure of the Texas Railroad Commission, which has been more or less proven to be satisfactory in my opinion.

MR. HUGHSTON: What is that?

MR. ADAMS: That is just taking these packer leak test reports, making these packer leak test guages, if there is any differential, if they show up any leakage, just go in and set another packer and--or do some remedial work.

MR. HUGHSTON: How often should they be required?

MR. ADAMS: Well, in a flowing well, I don't think they should be required very often.

MR. HUGHSTON: Is there any possibility that the Commission would find in the performance of its duty preventing waste, more difficult by reason of the fact of, that the workings in your completed well?

MR. ADAMS: I don't understand your question.

Q MR. HUGHSTON: Well, is it ever possible, or have you ever heard of a situation where one horizon was abandoned before the limit of commercial had been reached, by reason of the fact of the cost of dual completed wells.

MR. ADAMS: Yes, that has been done.

MR. HUGHSTON: Then, if the two horizons are each capable of production that would pay for a well to that horizon and by virtue of the dual completion, one was abandoned before it was exhausted there would be waste that would have been recovered by twin wells.

MR. ADAMS: Not necessarily. When they would reach that exhausted stage, my recommendation would be to co-mingle production. We do that in Oklahoma right along; throw two reservoirs together.

MR. HUGHSTON: It is possible correlative rights might be effected by that?

MR. ADAMS: Not when they reach the completion stage, no. In fact, you are preventing waste.

MR. HUGHSTON: You are assuming that the whole field or area will reach completion at the same time, are you not?

MR. ADAMS: No, sir, not necessarily. As long as the reservoir pressure, whether one is commercial or whether one is not, if there is not any substantial pressure differential there will be a migration of fluids from one to the other. I don't see any reason in the world why you couldn't

throw them together.

MR. HUGHSTON: Did I understand you there would be migration of fluids as between the reservoirs?

MR. ADAMS: There would be if there was considerable pressure differential.

MR. HUGHSTON: Where would that occur?

MR. ADAMS: From the high pressure area to the low.

MR. HUGHSTON: Where would it occur around the packer?

MR. ADAMS: I though we were talking about co-mingling production here, not around dual completions. I am not talking about packers leaking. When they leak, we fix them.

MR. HUGHSTON: As I understand you, as to--say, after the one was completed and one was under high pressure, there would be co-mingling?

MR. ADAMS: No, I--I misunderstood your question. I though we were talking about having the two reservoirs open together. If the packer is in there, there wouldn't be any co-mingling.

MR. HUGHSTON: It is possible that there would be if not waste, correlative rights affected , if you allowed one operator to co-mingle two reservoirs?

MR. ADAMS: I don't believe so.

MR. HUGHSTON: Well, if the--

MR. ADAMS: (Interrupting) I think you would produce oil which you otherwise wouldn't get.

MR. HUGHSTON: Sir?

MR. ADAMS: I think in my opinion you would produce oil that you otherwise wouldn't get if you did it. You can produce a reservoir that is economical along with one, that is, you are getting more oil which otherwise wouldn't produce.

MR. HUGHSTON: If you are producing oil what sort of allowable would you fix in a case like that?

MR. ADAMS: Where co-mingling--

MR. HUGHSTON: (Interrupting) Yes.

MR. ADAMS: Just set it for one reservoir.

MR. HUGHSTON: In this case, if the Ellenberger and McKee were involved and the McKee were depleted or substantially so, to the point where it would not be economically possible to work your dual completed well over it so as to produce more from it, you would base your allowable for the well on the Ellenberger?

MR. ADAMS: Base it on the horizon that gets the highest allowable. That is what we do in Oklahoma.

MR. HUGHSTON: You spoke of some oil completions in Texas, 904 wells and 95 fields, how many of those duals were necessary as salvage operation where one of the horizons would not have been commercially productive but for the fact it was produced through a dually completed well?

MR. ADAMS: I have no way of answering that question. I don't know.

MR. HUGHSTON: Do you have any reason to think that there weren't quite a lot of them?

MR. ADAMS: No, because if they were they wouldn't show up on the proration report. They all had allowables, most of them substantially in each formation.

MR. HUGHSTON: Are you a geologist?

MR. ADAMS: No, sir.

MR. HUGHSTON: Is this gentleman a geologist?

MR. MASSEY: No, sir.

MR. HUGHSTON: Do you have anyone here capable of correlating electric logs?

MR. ADAMS: No, sir, we don't. Tidewater, do you have anybody?

MR. HUGHSTON: Mr. Adams, have you all ever filed a report on your dual completion with your No. 4?

A MR. ADAMS: No, sir, it is just a test that was made. We didn't file any report because the well is not dually completed until we get an allowable for it.

MR. HUGHSTON: You perforated the casing in that connection?

MR. ADAMS: Yes, sir, it is perforated. Yes, sir.

MR. HUGHSTON: How does the packer in the Baker packer hole--is it a friction packer or what?

MR. ADAMS: It has got two sheets of slips in there. You put one in, it is stuck, you can't pull them.

MR. HUGHSTON: It has a lock of some sort on it?

MR. ADAMS: Well, these slips - I will be glad to introduce an Exhibit showing the Baker packer.

MR. SPURIER: Is there anyone here that is technically educated in the oil business that doesn't know how a Baker packer works? Do you want to pursue that question?

MR. HUGHSTON: No, sir, I don't know myself, you see.

MR. SPURRIER: I AM sorry, go right ahead.

MR. ADAMS: Mr. Massey can give you -

MR. SPURRIER: We have had lots of testimony on these Baker packers before. I thought we may save some time.

MR. HUGHSTON: IF you wish to consider that testimony that will be agreeable with us.

MR. ADAMS: That is Exhibit No. 6 or 7, whichever it is.

MR. SPURRIER: Six.

MR. ADAMS: It is a diagramatic sketch of the Baker packer.

MR. HUGHSTON: What is the present difference between the bottom hole pressure in your number four well and the Ellenberger and Simpson?

MR. ADAMS: We have no bottom hole pressures in the Simpson.

MR. HUGHSTON: You found that you had a 1020 pounds casing pressure when you were flowing the Simpson, is that right?

MR. ADAMS: YES, that was the shut-in pressure on the casing.

MR. HUGHSTON: The shut-in pressure?

MR. ADAMS: Yes.

MR. HUGSTON: You had 650 pounds in the Ellenberger in the tubing?

MR. MASSEY: 650 shut-inpressure on the tubing.

MR. HUGHSTON; As the field is produced the variance between the pressure will probably become more, is that correct?

MR. ADAMS: I imagine that it will, but I wouldn't want to answer that for sure either. I don't know. It depends on how it is produced.

MR. HUGHSTON: That is all.

QUESTIONS BY MR. E. W. NESTOR, Shell Oil Company:

Q Mr. Adams, do you think it not irregular to, after completing your well in the Ellenberger, to perforate the casing without having given any notification to the Conservation Commission?

A Notice was given to them. We asked them if we could make the test and we received their approval.

Q On what form was that filed?

A It wasn't filed on any forms. As I understand it was just a telephone conversation.

Q Should that not have been filed on a form?

A I don't think there is any form provided for that purpose.

Q Yes, it comes under the miscellaneous reports covered in Rule 1110. The point I wish -

A (Interrupting) If you think there is any irregularity, we will be glad to file a form.

Q The fact is we would have no way of being notified if such form were not filed as required. We sometimes have to get

information from the Commission.

A I didn't know any form was provided for that purpose.

MR. NESTOR: That is all.

MR. SPURRIER: Anyone have anything further.

MR. McCORMICK: I would like to ask Mr. Adams a few questions.

Q (By Mr. McCormick) You are actually producing this from the McKee now?

A No, the Ellenberger. The McKee oil that was made during that test is still in the tanks. It is sitting out there now.

Q You are producing at the rate of 90 barrels per day?

A Yes, sir. There has been no McKee production run to my knowledge.

Q Do you have more than one producing shown in the McKee?

A In this field I don't believe we do. The McKee is part of the Simpson series. It is the sand in the Simpson and under the McKee I think there is the Waudel and the lower Simpson, but all this production is from the McKee which is the upper sand of the Simpson zone.

MR. McCORMICK: That is all.

MR. SPURRIER: Anyone else?

MR. DEWEY: I WOULD like to ask some questions of Mr. Adams.

Q (By Mr. Dewey) Mr. Adams, you failed to state the size of casing that was set in your number four well?

A We set five and half inch in both of the wells.

Q And could you tell me the size of the open hole below the five and a half?

A I don't have that figure. I would be glad to get it for you.

MR. MASSEY: Six and three quarters, I believe. We drilled a big hole to total depth.

Q That is, that the five and a half was swung and cemented.

A I didn't hear your question.

Q That means that the five and a half must have been swung and cemented, is that right.

MR. MASSEY: That's correct.

Q You think that is a preferable method of setting pipe?

A (by Adams) I would like to refer that question to Mr. Massey. He is in charge of the work out there.

MR. SPURRIER: Do either one of you know the answer?

MR. ADAMS: I don't know.

MR. MASSEY: Generally our policy is to drill shoulder and ran hole ahead and set the casing on the shoulder. But as testified earlier, in the completion of the well and the difficulty at the time with the offset well, we changed the policy after the large holes had been drilled.

Q Mr. Massey, in your estimation then, it is preferable in getting good cement jobs to set your pipe on the shoulder and cemented place and attempt to cement rather than attempt to cement it in the open hole. Aren't you sure of a better cement job around your pipe as a rule?

MR. MASSEY: In the over all picture, I wouldn't say that was necessarily so. In this job we used a packer type shoe and we are satisfied that the cement job was just as successful.

Q If it becomes necessary to later on to do some remedial work of some kind in the open hole below the casing, which I understand is six and three quarters and the casing is five and a half, the hole size is larger than the casing, doesn't that require that you set a liner or some sort of inside string rather than depending on a packer in there?

A That is true, the type of work over or remedial work would depend on the job desired. The liner could be set. A temporary bridge put into the hole and cement squeeze job performed certainly would eliminate at this time the use of formation packers.

Q The reason I asked was to determine whether you contemplated that it would ever be necessary or possibly necessary in the future to do any remedial work in the open hole in the Ellenberger. Or, whether you thought that the well would produce its productive life without requiring a work over job.

A We believe so.

Q You believe that it will produce to completion without necessity to work over?

A As we see it now, yes, sir.

Q Is it your opinion that the production from the McKee formation will be obtained primarily from gas expansion or water drive or the combination of both?

A We **feel** at this time it will be obtained from gas expansion.

Q If it is obtained from the gas expansion type of drive, then you anticipate that the reservoir pressures will decline progressively as the oil is removed from the reservoir?

A Yes, sir.

Q Get lower and lower as production takes place?

A That's correct.

Q And that as the pressures are reduced that it will be a -- for a time at least the gas-oil ratio will increase progressively?

A I would think so.

Q Get higher and higher to reach some sort of a peak before it tends to decline, is that right?

A Yes.

Q In your opinion, do you think that you will ever have any water at all to handle in the McKee formation in conjunction with your production?

A That is, of course, just an estimate or guess, at this time we do not anticipate it.

Q You don't anticipate sufficient water that the McKee formation, the production from the McKee formation will not be stopped due to the well loading up with water in the annulus?

A I can't answer that question because I cannot tell you.

Q It is a possibility that sometime in the life of the well sufficient water may come into the well bore in conjunction with the oil so that there will be difficulty to flow the water and oil combination through the annulus between the tubing and casing, is that right?

A If it should start making sufficient water, that is true.

Q In that event it would be necessary to use some means of artificial lift to produce the oil from the McKee formation?

A If the cut becomes high enough to.

Q In that event, how would you propose to lift that oil and water in the annulus?

A At the present time it would be done with gas lift.

Q You would have to run a small string of pipe parallel to your tubing and inject gas, is that it?

A That's right.

Q That rather restricts the area of the annulus, doesn't it, whatever size of inside string you run?

A Normally the size of casing or the oil string in the well has some effect on what you can do with gas lift installations.

Q If you have to run an additional string of tubing to produce your Ellenberger, you would further reduce the effective area within the casing so that you are limiting the amount of production that you can take out, are you not?

A That's right.

Q Did you say what size tubing you had in this well?

A Two inch tubing.

Q Is it your opinion that the reservoir pressures of the McKee will decline faster or slower than the reservoir pressures of the Ellenberger?

A I cannot answer that. It depends upon the production rate, the number of wells drilled in the reservoir, the type and size of the reservoir.

Q It would be a coincidence if the production rate from both reservoirs were such that the one reservoir's pressure wouldn't decline more rapidly than the other?

A It would be a coincidence.

Q It usually doesn't happen that way, is that right? You take two reservoirs, the reservoir pressures don't decline at the same rate, isn't that right?

A I think that in lime type reservoirs there have been different ones where the pressure declined for oil produced has been quite similar.

Q Similar, but they don't keep in step.

A If you are talking about pound for pound, obviously you would have to say it would be a pure coincidence.

Q If that is--unless it is a coincidence then the differential pressure across whatever packers that you have in the well to segregate the two horizons, that differential pressure is increased with whatever differential takes place due to the

difference in the decline in pressure, is that right?

A In shut-in conditions, yes.

Q Well, wouldn't that be applicable to flowing conditions too?

A Flowing rates would determine to a certain extent the differential you would have across your packer.

Q Aren't the draw downs greater in the McKee than they are in the Ellenberger?

A I cannot answer that because we have not run a P.I. test on the McKee.

Q You haven't tested it? Is it your opinion that the production from the Ellenberger be obtained primarily from gas expansion or water drive or combination?

A Only thing I have is the evidence and the study that we have made of the Brunson pool or Ellenberger formation, the producing rate that we now have. I don't believe that we can draw the conclusion that we have an active water drive. There definitely does seem to be some water encroachment.

Q Do you know the apparent production rate of the Ellenberger?

A 90 barrels per day.

Q And do you know whether that is the production rate that one would normally anticipate for a well of that depth under the New Mexico ordinance?

A No, sir. It is less.

Q Do you believe that certain wells in the Brunson-Ellenberger pool will make sufficient water during their life time so that it might be difficult to produce them flowing through two inch tubing?

A No, sir, I do not.

Q That condition might exist, might it not?

A It might.

Q Without your knowledge?

A It might.

Q In that event would it or wouldn't it be necessary to install some sort of artificial lift equipment to produce the Ellenberger oil?

A Yes. It could possibly be that an artificial lift would have to be applied to the Ellenberger formation.

Q Would it be your recommendation under those circumstances that gas lift be employed or that some type of pumping equipment would be employed?

A I think that would depend--in dual installation, if the upper zone were still flowing by annulus, you could have a choice of producing the lower zone with gas lift or with pump.

Q Again, if the upper zone were producing by gas lift, would you still have the same opportunity to gas lift the Ellenberger oil?

A You mean a dual gas lift installation?

Q A dual gas lift.

A Yes, sir.

Q You would have your annulus pretty well crowded up with valves and one thing and another, would you not?

A Not necessarily so. If you want an example, the Union Oil Company in the Dollar Hyde field have five and a half inch casing and are dually gas lifting the Siluro and Ellenberger

formation from respectively around 8 thousand and 10 thousand feet deep with strings of tubing which means two strings dually gas lifting those two formations.

Q Do you know what size strings or tubing they are using?

A Two and a half strings with the inside one quarter inch Macaroni.

Q Doesn't that kind of an installation rather restrict the amount of fluid that can be produced? Isn't there a definite limit as to how much fluid you can put through a two and a half inch tubing with a Macaroni string inside it.

A I would say offhand that a minimum of approximately 150 barrels per day from each zone could be produced.

Q In the event it were necessary to produce more fluid from a dually completed well in the Brunson area, you would be definitely limited to fluid rights of approximately what you stated?

A With the type of installation that I stated, yes.

Q Well, now if single completions were made in that area, all other conditions being equal, all relative to the fluid, size of casing, would it not be possible to install equipment that would handle a great deal more fluid?

A You would then have to be assuming that the formations had been depleted to such a state that comparable situations, that gas lift had to be installed. I don't know whether you would produce any more fluid or not.

Q They pleaded to the state that in order to get the allowable,

let us put it, it would be necessary to produce greater amounts of fluid progressively as time went on?

A I don't believe that, of course, you are assuming that the percentage of water has increased making volumes larger and larger.

Q That's right.

A I believe earlier in my testimony I said that I didn't believe that the McKee would be a water drive and that the Ellenberger would be only water encroachment. I do not believe that under those conditions that the cuts by the time the well has depleted, the cuts would go to such a high figure that we could not handle the fluid.

Q As I understood Mr. Adams, this was to be a permanent order to the Commission that was your intention and if it is a permanent order of the Commission, would it in your estimation be equitable to let other operators to dually complete in other fields in New Mexico?

A As far as we are concerned, each field would have to stand on its own merits and we would see no objection.

Q In other fields you might not encounter the same ideal conditions of limitation of fluid to be produced from a dually completed well such as you have limited you testimony to, is that right?

A If the Commission decided that it would create waste, it appears obvious that they would disprove the application.

Q My question--

MR. ADAMS: (Interrupting) I would like to interject one thing that in my opinion, no order that the Commission issues is permanent. They have these hearings every month and what they find one month, they might change their minds on it next month, due to changed conditions or something.

Q Due to--what I object to--

A We aren't specifying any time limit, if that is what you mean by permenant.

Q What I meant is if you have a semi-permenant order, we will put it that way, then that is a precedent, is it not, for some other operator to ask for a similar--

MR. ADAMS: I think they should be entitled to it, yes, sir.

Q And the conditions that that operator is confronted might not be as ideal as the conditions as Mr. Massey is testifying to?

MR. ADAMS: That's correct and that would be up to the Commission to decide.

Q The point of my question of Mr. Massey is that a singularly completed well to either the McKee or the Ellenbergerr formation has a great deal more flexibility in production rate due to the ability to put in larger pumping equipment it doesn't have the limitation, say of one hundred fifty barrels of fluid through the tubing, the tubing put in, larger tubing, you can go to casing pump, you can put in intermediate pumps, you have a wide range of operation that you do not have

with an inside five and a half inch casing with the necessity to produce two reservoirs through one string of casing. That is, it wouldn't, that I wanted to bring out for Mr. Massey. Would you agree with that, Mr. Massey?

MR. MASSEY: I think, generally speaking the larger size casing or the single completions.

Q They are much more practical?

A You could produce at this time greater quantities of fluid as an example with a Reeder pump.

Q You can produce a lot more through a single completion than through a dual completion. In the event that it is found that there is leakage or migration from one reservoir to another through the forms that Mr. Adams proposes to submit or otherwise, what position is the operator--does he know whether the mechanism or the dual completion is at fault or does he know that the leak is coming through some poor cement job and run the casing through some leak in the casing? How can you identify where the leak comes from in a dual completion?

MR. BODIE: Mr. Chairman?

MR. SPURRIER: Mr. Bodie.

MR. BODIE: E. E. Bodie from the Cities Service Oil Company. I object to the line of questioning of the operators here. There has been no testimony, direct testimony from these witnesses in regard to the line of testimony he is cross

examining on if the gentleman wishes to put on testimony of his own let him get his own witness up there and put his witness on in that manner. If not, I move that we adjourn today until we can hire a lawyer and carry this out in regular court procedure.

MR. SPURRIER: Gentlemen, we will recess until 9:30 in the morning.

Recess.

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STATE OF NEW MEXICO)
: SS.
COUNTY OF BERNALILLO)

I HEREBY CERTIFY, that the foregoing and attached transcript of proceedings before the Oil Conservation Commission, in Case No. 269, on May 22, 1951, at Santa Fe, is a true and correct record of this portion of the same to the best of my knowledge, skill and ability.

Dated at Albuquerque, this 13th, day of June, 1951.

Reporter

(Proceedings of May 23, 1951, beginning at 9:30 A. M. before Honorable R. R. Spurrier, Secretary and Member.)

(Case 274, continued.)

MR. SPURRIER: The meeting will come to order, gentlemen. Yesterday evening Mr. Bodie made a protest on the method of the kind of questioning by Mr. Dewey. I think Mr. Bodie's protest or objections will be sustained, and if Mr. Dewey desires to testify, why, we will put him on the witness stand. If you care to cross examine in line with the direct examination of Mr. Massey or Mr. Adams, you may proceed.

MR. CAMPBELL: Mr. Commissioner, I would like the record to show the appearance of Jack M. Campbell of Atwood, Malone and Campbell, Roswell, New Mexico, for Cities Service Oil Company. Unfortunately, I did not stay for the first portion of this hearing yesterday. I have been over it--with the Cities Service Witnesses, the testimony and the exhibits they presented.

We feel that sufficient evidence and opinions, ample evidence as to the mechinical set up of these wells, is an evidence to justify the Commission in granting this application. And for the sake of maintaining some order in the record, we feel that if there are those who have testimony to present to the contrary or as to the mechanical features or as to dual completions generally, then they should take the witness

stand and present testimony for the Commission's consideration, and to give us an opportunity to determine what their views are in the matter so that we can bring out from their witnesses the differences of viewpoint, and the Commission will have then some order in the record. We have no objections to cross examination of our witnesses, but feel it should be confined to the testimony offered. And feel as far as we are concerned we are ready to rest our case.

We may want to put on some rebuttal after hearing the objections of those who appear to be in opposition to the application.

MR. SPURRIER: You may proceed, Mr. Dewey.

MR. DEWEY: Mr. Spurrier, I apologize if the line of questioning is out of order and caused the Commission any embarrassment or Mr. Massey. We felt that the burden of the application rested with the applicant, and with no intention--we did not intend to over step the bounds of propriety. If the Commission will accept it, I would like to make a statement at the end of the hearing summarizing the views of the Humble Oil and Refining Company.

MR. SPURRIER: Very well. Mr. Campbell, I understand now your case is complete?

MR. CAMPBELL: We feel we have made out, and the burden has been accepted by us, and we have made a prima facie case.

MR. HUGHSTON: We would like to ask Mr. Adams one or

two more questions.

MR. SPURRIER: All right.

BY MR. HUGHSTON:

Q Mr. Adams, you stated yesterday it was your company's preference that dual completions rather than transfer of allowable be granted.

A That's correct.

Q How do you favor dual completions over transfer of allowable?

A In the first place, the Commission has found that in the Brunson pool 90 barrels of oil a day is more or less the MER for that reservoir. In this north extension, it probably could be produced at a higher rate, but I don't believe it could sustain a production of 180 barrels very long. And we do feel mechanically, dual completions are practical and feasible and that is the best solution to the problem.

Q Is it part based on the fact that it complies with spacing already in the field?

A Not necessarily. If we felt we had a reservoir that could drain more than 40 acres, we would certainly come in and try for wider spacing.

Q Sir?

A If we felt we had a reservoir that would drain more than 40 acres we certainly would come in and try for wider spacing.

Q Well, is it your opinion one well will adequately drain

80 acres in the Brunson pool?

A I don't know.

Q Have you made any study in that connection?

A No, sir.

Q Would it be your opinion that a dual completion is fairer to the other operators in the field than transfer of allowable?

A Yes, sir.

Q Does Cities Service study of the Ellenberger field indicate it is an innerconnected homogeneous formation or heterogeneous formation?

A I can't answer the question.

Q Can you answer with reference to the McKee horizon?

A No, sir.

MR. HUGHSTON: That's all.

MR. SPURRIER: Anyone else?

MR. NESTOR: Mr. Adams, yesterday during our discussion of the reservoirs, I believe that you or Mr. Massey, I can't recall which, stated that you had reason to believe that the McKee reservoir and possibly the Ellenberger were gas drive or depletion type reservoirs.

A That was my personal opinion, not necessarily that of the company.

MR. NESTOR: Mr. Chairman, am I at liberty to question Mr. Massey now?

MR. CAMPBELL: If the Commission please, you wish to excuse this other witness?

MR. NESTOR: We questioned both simultaneously yesterday.

MR. CAMPBELL: I think for the record, if you wish to excuse Mr. Adams, if that is all your questions.

MR. NESTOR: We may have other questions from Mr. Adams, neither one is qualified to comment, on what they stated, and we questioned both simultaneously yesterday.

MR. CAMPBELL: I think it would be much easier if you had to bring Mr. Adams back, why, then, do it. But I think we ought to let the record show that Mr. Massey takes the stand and you are questioning him so that it won't be a matter of a debating society here. Go ahead and question him as far as we are concerned.

(Further testimony by Mr. Massey.)

BY MR. NESTOR:

Q How does oil reach the bore hole in a gas drive reservoir?

A Well, generally speaking from pressure differential.

Q Now, to induce flow, does there have to be some expenditure of energy?

A That is correct.

Q Then after the oil has reached the bore hole, how does it reach the surface in a gas drive reservoir during the period of flow?

A By means of bottom hole pressure and the gas breaking out of solution as the fluid travels upward.

Q In flowing oil to the surface is there any energy expended?

A Certainly.

Q In a depletion type reservoir, is this energy ever replaced?

A You mean the gas dissolved?

Q Yes. The energy we are using up to get this oil to the surface, first moving to the bore hole and then getting to the surface.

A There is no outside replacement of energy, no.

Q Is annular flow as efficient as flow through two inch tubing?

A Repeat that.

Q Is annular flow as efficient as flow through two inch tubing?

A Generally speaking, no.

Q Now we are using energy, gas energy, to move the oil to the surface and therefore if annular flow isn't as efficient as flow through tubing, are we not wasting some of the gas energy?

A As long as the gas-oil ratios remain comparable, I would say you are not.

Q Well, we have just commented that the flow, the annular flow, isn't as efficient and it is a function of energy.

A That is correct. But in measuring the consumption of that energy, you only have the drop in bottom hole pressure which shows up, plus the fact of the amount of gas produced per barrel. As long as the barrels produced per pound bottom hole pressure drop and the gas-oil ratio is the same, and the maintenance of flow is the same, I cannot see where you have used more energy.

Q If it isn't as efficient, how can they be the same, that is the question.

A Well, it may be the definition of efficiency--that may qualify the point more as far as I am concerned. In other words, it is possible to flow this particular well through tubing, a smaller annular space, when it will not flow through a larger annular space.

Q That in itself then would be some indication of efficiency, wouldn't it?

A That would be an indication of the ability of the well to produce.

Q Or the efficiency. That is another way of saying efficiency. The ability of the well to produce is the efficiency.

A If you desire to put it that way.

Q Now if energy is wasted in annular flow which we must have in a dual completion, wouldn't this result in the loss of recoverable oil?

A I do not particularly agree energy is wasted in annular flow.

MR. NESTOR: I have no more questions.

BY MR. CAMPBELL:

Q Mr. Massey, in connection with the point apparently being brought out here, is that same thing true for oil-gas dual completions, as far as the oil reservoir is concerned?

A Yes, it is in oil.

Q And oil-gas dual completions have been approved by this Commission, is that correct?

A That is correct.

MR. CAMPBELL: That is all.

MR. NESTOR: A question please.

BY MR. NESTOR:

Q I think you are confusing the issue here in that the Commission has never gone on record as having permitted annular flow of the oil in a dual completion in the State of New Mexico. Am I correct?

A That is correct, as I understand it.

BY MR. SAVAGE:

Q I believe you stated yesterday,Mr. Massey, that failing natural flow, the next thing would be gas lift in your opinion?

A I said, if I remember correctly, that some type of artificial lift which could at this time possibly be gas lift or by means of a pump.

Q Assuming that gas lift will not be satisfactory, can you tell us of any nationally advertised and accepted oil tools to lift oil by pumping means through dually completed wells? Is such an accepted technique.

A You mean pumping from both zones?

Q Yes. In, oil, wells of the type that have a, say, five and a half inch casing.

A At the present time we are using in the Shafter Lake pool in Texas a pump with which we can pump one zone, and by means

of raising or lowering the sucker rod strip open and close ports, which allows us then to pump the other zone.

Q Are both pumped simultaneously?

A Not at the same time, no, sir.

Q And is the equipment not still in the experimental stage?

A As far as we are concerned in respect to the pump, it isn't. We have used it a sufficient length of time and it has proved satisfactory, and the Commission in Texas has given us authority to install it in five wells and produce them.

Q As I understand this is still not a usual technique, let us say.

MR. CAMPBELL: If the Commission please, he has testified as far as his company is concerned, it is an acceptable piece of equipment. I don't see any point in arguing with him.

MR. SAVAGE: I am trying to bring out the thing isn't nationally advertised and in wide use and generally accepted within the industry as ordinary deep well pumps now manufactured.

MR. CAMPBELL: If he knows whether it is or not he can answer.

THE WITNESS: At the present time the reason is that in the design and development of the pump by the concern that makes it, the pump has not been released to any particular manufacturer to make it and market it.

MR. ADAMS: May I elaborate a little bit on that? The Gulf Oil Corporation at the present time has an application pending in this particular field for the same type of pump. Sinclair is also using it. At the present time the Fluid Pack Pump Corporation in Los Angeles is making it. It is for sale to the public but it is comparatively new.

MR. SPURRIER: Mr. Massey, if the Texas Railroad Commission allowed use of it on an experimental basis or gave you more or less--

A (Interrupting) They gave us, as I understand it, one year in which certain tests and information was to be gathered and presented.

MR. SPURRIER: Do you have anything more?

MR. SAVAGE: I think your statement proves that at least some authorities hold it is still of an experimental nature.

MR. ADAMS: It was in use at least a year before the Texas Commission approved it.

MR. NESTOR: Many are in use longer than that before they are approved.

MR. ADAMS: That's right. And the only way it can be proved is to use it.

MR. NESTOR: Mr. Massey, you stated that you pumped the two zones alternately. I wonder if you can give us some detail as to how you produced those two zones?

A I can't tell. That field isn't under my jurisdiction.

MR. NESTOR: I see.

A And other than the fact that I stated before about the operation of it is about the extent of my knowledge. I haven't actually been on the job day in and day out.

MR. NESTOR: Would it be your opinion that producing the zones alternately, I assume you don't change the setting of the pump every day, in such case would such production be the most efficient way of stripping your reservoirs, in your opinion?

A Well, again it depends upon the reservoir, and the stage of depletion and so forth.

Q I wonder if you could tell me what you mean by that?

A Well, as an example, I can see no objection to producing any particular zone for ten days and then switching to another zone, particularly as it applies in this field in which it is operating.

MR. NESTOR: Is that normal practice in any of your wells in the State of New Mexico, to produce them say ten days and at double the amount of oil?

A No, it isn't. Not at the present ruling.

MR. NESTOR: That is all.

MR. SPURRIER: Does anyone have anything further?

MR. LOVERING: If the Commission please, I want to ask a question as to the suitability of this dual producing equipment if either zone would make any quantity of water. Would it

be desirable to pump a well only part time if it was making any quantity of water. Could they handle any appreciable quantity of fluid in five and a half inch casing with that type of equipment.

A I think that would depend upon the action of the reservoir and the well. If you are referring to the point that by not producing it daily the particular well would load up with water and it might take you then five or ten days of pumping before getting oil back, that would particularly be a condition and a problem.

MR. CAMPBELL: Mr. Massey, based upon your knowledge and the mechanical situation of the wells included in your application, and a knowledge of the reservoirs involved, and the experience of your company in dual completions, is it your opinion that these wells can be dually completed in the manner which you have recommended without damage to the reservoir and without waste of oil?

A Yes, I believe they can.

MR. CAMPBELL: That is all.

MR. SPURRIER: Does anyone have any further question? Mr. Nestor?

BY MR. NESTOR:

Q Mr. Massey, to your knowledge do any wells in the Ellenberger reservoir make water at this time?

A Yes, sir, they do.

Q Would you give an estimate as to the number of wells that make water, just roughly, or a per cent?

A Not having made that particular survey, Ican't tell you. I know there are some, located particularly down structure which obviously there seems to be water encroachments.

Q To your knowledge, do those wells make considerable volumes of water, some of them?

A To my recollection, not too much.water. Percentage-wise, perhaps, yes.

Q Could you give an estimate as to the volume since we are worrying about having to get fuel out?

A The estimate would be purely guess with me at this time.

MR. NESTOR: That is all.

MR. SPURRIER: If there are no further questions the witness may be excused.

MR. NESTOR: May they be recalled for further questioning?

MR. SPURRIER: At what time?

MR. NESTOR: After we present part of our case.

MR. CAMPBELL: They probably will be recalled by us after you present your case.

MR. NESTOR: All right.

MR. SPURRIER: You have witnesses to put on the stand?

MR. HUGHSTON: That is what I wish to state. Whether you would wish us to proceed or wait until Tide Water presents its case.

MR. ARMSTRONG: We will put on our case. If they desire to rebut in each case reply to both cases, whatever the Commission desires is agreeable to us.

MR. CAMPBELL: There may be some other testimony confined to this particular case and perhaps it would be better to get it in and then put the Tide Water evidence on.

MR. SPURRIER: Yes, I would rather put this whole case on, then come to yours.

MR. ARMSTRONG: It is perfectly all right with us.

MR. SPURRIER: You may proceed.

E. W. NESTOR,

having been first duly sworn, testified as follows:

DIRECT EXAMINATION

By MR. HUGHSTON:

Q State your name please.

A E. W. Nestor.

Q By whom are you employed, Mr. Nestor?

A Shell Oil Company.

Q In what capacity?

A As Exploratory Engineer in the Hobbs Office.

Q ARe you a geologist also?

A Yes, sir.

Q Have you ever qualified to testify before the Commission?

A No, sir, I haven't.

Q What is your educational background for your profession?

A I hold a degree of Bachelor of Science in Petroleum Engineering and Natural Gas from Pennsylvania State College and graduated in 1941.

Q How much experience have you had in the practice of your profession?

A I have been in the oil fields since '46, approximately five years.

Q Have you made any study of the Brunson area, had any contacts with it?

A Yes, sir, I have.

Q For how long?

A For the past several years.

Q Have you made any study of the completion of the Cities Service S-4 well?

A Yes, I have.

Q Will you detail to the commission the study you made and your findings as a result thereof?

A Yes, sir, I will. From my study and the testimony entered in the record by representatives of the Cities Service Oil Company yesterday, I find that the well in question, Cities Service State S-4, at this time is already producing in a dually completed condition. And that this--such a completion--is not permitted presently by any rules or regulations in effect by the New Mexico Oil Conservation Commission.

MR. CAMPBELL: Mr. Commissioner, he is testifying in

connection with the violation of the rules and regulations of the Commission. Is that correct? And testifying--

A (Interrupting) I am testifying, sir, on evidence given yesterday in this case--

MR. CAMPBELL: (Interrupting) The Commission it seems to me can determine what is in evidence in this case. I don't believe it needs to be advised of the testimony.

MR. SPURRIER: Are you making an objection?

MR. CAMPBELL: I am making an objection to him making statements that his evaluation of the testimony is that these people are violating rules and regulations of the Commission.

MR. SPURRIER: The objection is sustained, because the Commission did give the company permission to dually complete the well.

THE WITNESS: I haven't been fully heard. If you will wait and then object. My argument is this. Even though a packer separates the perforations through the casing in the upper part of the well, this well is already producing dually from the open hole. General practice in the Brunson field area has been do one of two things. A well may be completed by running casing to total depth and completing the well through perforations of the casing opposite the Ellenberger formation. An alternate way is to set casing on top of the Ellenberger formation, as recognized by geologists, and completing such a well from an open hole. This well has been completed by setting casing in the open hole and above the top of the

Ellenberger lime formation in such a manner as to leave members of the Simpson Sand, or a member of the Simpson Sand open to production in the open hole along with the Ellenberger formation.

MR. CAMPBELL: I wish the witness would state, as he renders these opinions, whether he bases them on any study of conditions in the field. Would you mind stating what your studies consisted of before you make estimates of the situation?

THE WITNESS: If you will state the question, I will try to answer the question for you. I don't know just what you have in mind.

MR. CAMPBELL: Mr. Commissioner, I believe before he renders the opinions in this argument, the basis of them should be established. In other words, whether obtained from micro-magnetic logs or samples or what else you have to base opinions on. Otherwise, they are just opinions and we are entitled to know what he bases them on.

THE WITNESS: I base my findings, my understanding, my opinion of this completion, on copies of the electrical survey run in this well and the data presented in evidence, and on the applicable state forms by the Cities Service Oil Company.

Q (by Mr. Hughston) Have you compared the electric logs of the State S-4 well with the electric logs of other wells in the field?

A I have.

Q With several other wells in the field?

A Yes, sir. Will all adjacent wells in the field.

Q And what particular horizon have you noticed that is below the depth of 8030 feet where, I believe, casing is set in the S-4 well that isn't a part of the Ellenberger.

A That is a part of the Simpson Sand section as indicated by the electrical log and by comparison of electrical logs of other wells already completed in the Hare field and so recognized by the Conservation Commission.

Q Do you have the electrical logs you have compared it with?

A Yes, sir, I do.

Q I suggest you take those out and offer them to the Commission. The log of the State S-4 well with which we will compare and the logs of the other wells, and we will mark it as Shell Exhibit No. 1. Those three will be sufficient. You have several more there and you may be interrogated about them if anyone wishes to. Now, will you take the log of the Cities Service S.-4 and compare it with one of the logs which you have there and state which log it is. Which log are you making the comparison--

A This first log which I lay beside it is the Cities Service S-3 well.

Q Where do you find the top of the Ellenberger in the S-3 well?

A At approximately 7828.

Q And how did you base that.

A I base that on a correlation with samples obtained in other wells, in correlation with their logs, and then by transferring the correlation from the other logs to this log.

Q All right. What are the wells in which you have the samples which with/you correlated the logs?

A Our State S-3, the east offset to the State S-3.

Q Do you have that log there?

A Yes, sir, I do.

Q Now will you mark the portions of those three logs which you consider to be at the Connell by including them in a bracket of some sort? And put beside those brackets the word Connell. Now, what is the Connell formation?

A It is a cemented sand member in the lower Simpson series.

Q Based on your correlation of the Cities Service S-4, where is the top of the Ellenberger?

A According to my correlation, the top of the Ellenberger in the Cities Service S-4 is at approximately 8098.

Q And I believe it is in evidence that their casing is set to 8030. And where is the Connell?

A The Connell Sand, according to my interpretation is encountered in the Cities Service State S-4 at the approximate depth of 8033 to 8062.

MR. HUGHSTON: That is all.

CROSS EXAMINATION

By MR. CAMPBELL:

Q Mr. Nestor, these conclusions of yours are based upon your own interpretation? Isn't that right?

A Yes, sir.

Q And isn't it correct also that the interpretation of geologists and engineers of structures of this kind can differ?

A Yes, sir.

Q I believe you stated that according to your interpretation the top of the Ellenberger was at 8098, and the top of the Connell was 8033?

A Yes, sir.

Q Will it change your opinion in connection with this matter if you could be shown samples in place in the Ellenberger at 8030?

A Change my opinion? It would not change my interpretation of the electrical surveys which have already been run.

Q Even though Ellenberger samples were spotted at 8030 feet?

A Well, sir, in my experience with this field, I have seen Ellenberger samples as high as--roughly--7400 feet in these wells.

Q Samples in place or reworked?

A Reworked samples.

Q I am referring to samples in place.

A You asked if it would change my opinion. Nothing is going to change my opinion on electrical surveys.

Q Now in reference to this Connell you say it is part of the Simpson, is that correct?

A Yes, sir.

Q A lower portion of the Simpson?

A Yes, sir.

Q And in this area is it correct there are only the McKee and the Connell present in the Simpson?

A There is some variation of opinion as to the top and base of the McKee among the various companies. So far as I know, those companies which recognize the Connell Sand all place it in approximately the same position within two or three feet.

Q Well, now, what separates the Connell Sand from the McKee Sand?

A The same thing that separates different members of the McKee sand from each other, shale breaks.

Q Is it an impervious separation?

A Yes, sir.

Q They are, in fact, two different reservoirs?

A They are zones in the Simpson Sands. The State Commission is already on record as permitting production from the lower Simpson Sand known as the Connell in the Hare field.

Q But even assuming that to be true except for the fact that the Connell appears to be in the sand and the Ellenberger in limestone, and assuming your interpretation of the structures is correct, there is no essential difference in dual completing the upper--the Simpson altogether with separate zones--and the Ellenberger and theConnell?

A I am afraid I don't quite understand the question/

Q If this well were dually completed, you would have no objection I take it, to the inclusion of the Connell Sand in the Simpson, produced with the Simpson?

A No, sir, I could not.

Q But you do have if produced with the Ellenberger?

A In the open hole, yes. I think that is not proper.

MR. CAMPBELL: I think that is all.

CROSS EXAMINATION

By MR. SAVAGE:

Q Mr. Nestor, is this a comparable situation--has this comparable situation happened before in the Brunson area?

A Yes, sir. To my knowledge at least one other case of this sort has occurred in the Ellenberger field, known as the Brunson field.

Q Which well was that?

A That well was in the Gulf Oil Corporation--this occurred in the Gulf Oil Corporation Carson C-8.

Q Would you elaborate further as to the operators actions there?

A Yes.

MR. CAMPBELL: Mr. Commissioner, I object. On what do you base your knowledge of Gulf's operations there?

A From reports released by the Gulf in the scout check which are printed records. Information relaased by their company to all members participating in the New Mexico

check.

MR. CAMPBELL: I believe the Gulf representatives are present and it would be better to have them explain what happened in that well. They can testify.

MR. SAVAGE: I see no reason why we can't bring it out.

MR. CAMPBELL: It is hearsay with you.

MR. SAVAGE: No, it is recorded.

THE WITNESS: It is recorded on the electrical surveys.

MR. CAMPBELL: I have no objection to testifying about the surveys, but what Gulf did about it is another proposition.

MR. SAVAGE: Very well.

MR. SPURRIER: Mr. Boss, are you prepared to keepthe record straight here?

MR. BOSS: Yes, sir.

MR. SPURRIER: Will you come up and testify?

(Mr. Nestor excused.)

R. L. BOSS,

having been first duly sworn, testified as follows:

DIRECT EXAMINATION

By MR. NESTOR:

Q Mr. Boss, do you recall the conditions attendant to the completion of your Carson C-8 well in the Brunson field?

A Yes, sir.

Q I wonder if you would explain to the Commission those

conditions which occurred during the completion of the well in the Brunson field?

A Prior to the drilling of the Carson C-8 well, Gulf had completed a well immediately south as an Ellenberger producer, in which instance there was no part of the Simpson formation present in that well. It had been removed by truncation on the high part of the structure. The No. 8 well was drilled and approximately the same type of section had been anticipated. And when a depth was reached at which it was the interpretation that the Ellenberger had been reached, the casing was run and cemented and an electrical survey made prior, of course, to the running of the casing. And from the evidence of the electric log, it appeared that the two wells were comparable. However, coring operations were started subsequent to the drilling of the cement plug and the core recoveries indicated that the Ellenberger had not been reached and a basal portion of the Simpson was present. Within this portion of the Simpson was this lower Sand member which is commonly referred to as the Connell, and on a drill stem test this Sand produced at the rate--I don't recall exactly--but it was in the approximation of 40 barrels per hour. The coring was continued until it was definite that the Ellenberger formation had been reached, and then a liner was run to seal off the exposed portion of the Simpson formation, and the well then completed from the open hole below the liner, which was cemented in the top of the

Ellenberger dolomite.

MR. SPURRIER: Do you know what the formation pressure of the Connell is?

A No, sir.

Q Mr. Boss, could you from your knowledge of the Simpson obtained by coring a head in this well and the subsequent correlation with the electrical survey, identify this member of the Simpson known as the Connell Sand on an electrical survey of that well?

A Yes, I think so.

Q Would you oblige the Commission by correlating that location at this time for us please?

A The Gulf Carson C-8?

Q Yes, sir.

A In this copy of the electrical log from the Gulf Carson C-8 it would be my interpretation that the Connell member there included between 7415 and 7445. I do not have the record here of our core recovery through that particular interval, but it is my recollection that the cores from which we had very good recoveries corroborated this electrical survey very closely.

MR. SPURRIER: Do you mean that the Connell is 30 feet thick there when you say between 15 and 45, that those are the limits?

A That would be approximately. It would be dependent on how an individual would interpret.

MR. SPURRIER: Yes.

A Acutally, as I recall from the cores, the Sand was in excess of 20 feet in thickness.

MR. SPURRIER: Very well.

Q Mr. Boss, are you acquainted with the electrical characteristics of this Connell Sand and other wells in the Brunson field area?

A Yes, sir.

Q Would you for the Commission take these same surveys which have already been offered in evidence and mark off the Connell Sand interval in your opinion and place your initials beside them please?

(Witness complies with the request.)

Q Mr. Boss, I would ask now that you mark similarly your opinion as to the top of the Ellenberger in these same logs and at the same time, beginning with the Cities Service State S-3 and the Cities Service State S-4 and the Shell Oil No. 3 wells? Would you read into the record your opinion of the limits of the Connell Sand and the top of the Ellenberger in each case? We will get them on the record and then there will be no chance for confusion.

A In the Cities Service State S-3 well it would be my interpretation from the electrical log that the top of the Ellenberger formation was encountered at approximately 7825 feet. And the Cities Service State S-4 well, solely from the electrical log, it would be my interpretation that the Ellenberger formation

was encountered at 8100 feet.

Q Would you give the Connell Sand that way?

A I marked it on the log.

Q I see.

A In the Shell State No. 3 well, it would be my interpretation that the Ellenberger formation was encountered at 7590 feet. Those are the three?

Q I believe your own well, the Carson, just for purposes of correlation.

A It would be our interpretation that the Ellenberger was encountered at 7485 feet in this well.

MR. NESTOR: No more questions.

CROSS EXAMINATION

By MR. CAMPBELL:

Q Mr. Boss, are you in a position to state what the attitude of Gulf is in connection with this application?

A Yes. Gulf wish to make a statement in this particular instance. The statement has no bearing on the particular case in that they have no comment to make as to the transfer of allowable or as to the dual completions. But they did wish to object to the manner in which this particular well was completed since in their opinion from the available evidence the casing was cemented to expose a portion of the Simpson formation, which included the basal sand member which is producing as a portion of the Hare pool in other wells in the area.

Q Your objection then is confined to themethod of completion of Cities Service S-4?

A That is correct.

Q And that objection does not apply to Cities Service S-3?

A No, sir.

Q And I believe you stated that the--your interpretation--of the Connell was based upon electric logs only?

A That is true.

Q You haven't had available samples which may have been taken?

A We haven't had available samples from this particular well. We always make a practice of attempting to corroborate samples evidence against the electrical logs evidence. In most instances there is a very close correlation. So that with the available evidence from the pool as a whole, one or the other seems substantial evidence. And since, in this particular well we didn't have samples available, although an attempt was made to secure them, the only evidence is the electrical survey.

MR. CAMPBELL: That is all.

MR. SPURRIER: Any further questions of Mr. Boss? Thank you very much.

(Witness excused.)

(Recess.)

MR. DEWEY: Mr. Commissioner?

MR. SPURRIER: Mr. Dewey.

MR. DEWEY: Is it permissible at this time to ask a

question about procedure on or off the record with respect to the recent testimony about the electric logs?

MR. SPURRIER: Yes, off the record, Mr. Dewey.

(Off the record discussion.)

MR. HUGHSTON: The Ohio Oil Company has some evidence they would like to put on.

MR. SPURRIER: All right.

MR. WHEELER: I would like to have Mr. Spellman sworn as a witness.

D. K. SPELLMAN,

having been first duly sworn, testified as follows:

DIRECT EXAMINATION

By MR. WHEELER:

Q State your name please.

A D. K. Spellman, Jr.

Q Have you ever testified before this Commission?

A No, sir.

Q What is your formal education and educational background?

A I have a Bachelor of Science in Petroleum Engineering and Production at the University of Tulsa and graduated in 1941.

MR. SPURRIER: Did you qualify the other day before this Commission?

A No, sir.

MR. SPURRIER: Very well.

Q How long have you been employed by the Ohio Oil Company?

A Approximately ten years, on July 1, ten years.

Q What is your present position?

A With the Ohio Oil Company I am District Petroleum Engineer in Midland.

Q As District Petroleum Engineer, as part of your duties you supervise the Ohio well completions in proven areas?

A Yes, sir.

Q You are familiar with their coring program in the Warlick C-7?

A Yes, sir. Warlick C-7 is located on our Warlick C lease which is in the SE¼ of Section 15, Township 21 South and Range 37 East.

Q And it is approximately what distance from Cities Service well No. 4?

A About a half mile.

Q In the coring of this well, did the core analysis reveal two sand zones to be productive in the Simpson series?

A Yes, sir, two different sand zones.

Q And the basal one of these is the sand commonly referred to as the Connell Sand?

A Yes, sir.

Q You have before you there copies of the Schlumberger on our Warlick C-7 and also the Cities Service No. 4, have you not?

A I have. I have the logs put out by the West Texas Electric Log Service.

Q On these logs have you made a correlation of the Connell Sand

between our C-7, which was cored and with which you are familiar, and the Cities Service No. 4 well?

A Yes, sir, I have.

Q Where does the Connell Sand occur in the Cities Service well, based on this correlation?

A Based on the correlation the Cities Service top of the Connell would be at 8034. And I will give the lower also. The base would be at 8060.

Q Is this below the pipe?

A Yes, sir. They testified that the casing was set at 8030.

Q Is it your experience that the top of the Ellenberger is either limestone or dolomite and not a sandstone?

A It definitely is. It is generally a very hard lime.

Q Based on this, then, is it your conclusion that in the Cities Service well No. 4 at the present time the basal Simpson Sand member and the Ellenberger oil is being co-mingled?

A It definitely is.

MR. WHEELER: I believe that is all.

CROSS EXAMINATION

By MR. CAMPBELL:

Q Is your Warlick C-7 well producing from the Connell?

A Yes, sir.

Q Is that the only well in that area producing solely from the Connell?

A We are not producing solely from the Connell, also producing

from the McKee.

Q Aren't those two separate zones?

A They are Simpson Sand members that have been opened up by the majority of the operators in that area, and it is considered one reservoir.

Q Assuming you are agreeable in principal with dual completions--I don't know what your company's attitude is--but you would have no objection to producing the Connell and the McKee as one portion of the dual completion, would you?

A You mean provided they perforate, for example, as we have done? We will take our well. We have the McKee and the Connell both open. Provided we had opened up the Ellenberger, you are talking about, would we produce the two sands together from one of the completions in the Ellenberger through another, is that right?

Q You would have no objection to that?

A Well, you generally don't--mixing the two sands, no, because they are one reservoir.

Q Well are they?

A They are now.

Q But by definition or in fact?

A In fact. Because they are open in the majority of the wells in that area.

Q That doesn't constitute a common reservoir, does it?

A Now it does.

Q They are producing at the same time is what you mean?

A Well, they are open in the casing. I mean, in most cases in that area and the fact that they are opening the casing in wells in that area, and lots of them, makes them one reservoir now.

Q Where do you show the top of the Ellenberger in your Warlick C-7?

A Warlick C-7. The top of the Ellenberger would be at 7680 feet. They only drilled into it a couple of feet and put the pipe.

Q You must be mistaken about that aren't you. Didn't you give the top of the Connell at 8034?

A That is in the S-4 well.

Q What is the top of the Connell in your well?

A 7612 in our well to 7640 feet would be the base.

Q If you saw samples taken at 8030 feet, samples in place, in the Cities Service S-4 well, and they were Ellenberger samples, would it change your view of the--

A No, sir, it wouldn't.

MR. CAMPBELL: That is all.

MR. SPURRIER: Does anyone have any further question of Mr. Spellman? Mr. Lovering?

BY MR. LOVERING:

Q Isn't it true that in most of our reservoirs that the reservoirs which we consider common reservoirs actually are

number or series of lenses separated by impenetrable streaks of varying thickness.

A Right. That is true in a lime, yes.

MR. LOVERING: That is all.

MR. SPURRIER: Any further questions? If not, the witness may be excused.

(Witness excused.)

(MR. DEWEY, having been duly sworn, made the following atatement.)

MR. DEWEY: The evidence I am about to read into the record has been given to me by our geologists. I realize that I am incompetent, not being a geologist, to check the information and comment on it very much. Beginning with the Shell State No. 3 well, their interpretation from the electric logs is that the top of the Connell formation is encountered at 7520 feet, the base of the Connell at 7550, and the top of the Ellenberger at 7585. Proceeding to the Cities Service State S-3, which is a west offset, their interpretation of the electric log is that the topof the Connell is found at 7760 and the base at 7785; and the top of the Ellenberger at 7820. Proceeding to the next location to the west, which is the Cities Service State S-4, they found from their interpretation of the electric the top of the Connell was found at 8030 and the base at 8060, and the top of the Ellenberger at 8095. From their interpretation the Connell formation appears to be--to have--a thickness varying between 25 and 30 feet and to overlie

the Ellenberger formation at a fairly constant interval. I do not know that they checked their electric interpretation of the log in this part of the Brunson against coring with a diamond bit that was done in our Humble State B-3 well.

That is all I have.

MR. LOVERING: I would like to question Mr. Nestor here.

BY MR. LOVERING:

Q Mr. Nestor, as stated and one of the witnesses implied, if they saw evidence of Ellenberger samples in the younger members above the Ellenberger, it wouldn't change their opinion as to the true top of the Ellenberger. How is the presence of the Ellenberger in the younger formations explained?

MR. NESTOR: That is the result of the detrital zone, which occurs at the base of the permian. Normally present in these wells, it separates the permian from the pre-permian formations. It isn't a full geological sequence in the wells in the Brunson field. This is the result of truncation of the earlier beds, washing of material from the earlier formations, and the deposition of this material is what is known as a detrital zone. This apparently occurred immediately prior to the deposition or formation of the permian beds. Consequently, this detrital zone may contain remnants and reworked material from the earlier deposited formations.

Q That answers one question. I have one other. Doesn't our study in geology teach us that this deposition of older beds on top of younger beds in such a fashion is rather a common

occurrence?

A Yes, sir. I would say that normally where there wasn't a full sequence of geologic formations, it would be anticipated that there would be detrital zones.

MR. LOVERING: That is all.

BY MR. SAVAGE:

Q Mr. Nestor, what are the dangers now present in this well of having the basal Simpson and the Ellenberger co-mingles in the same bore hole?

A The danger I see there largely would be the result of co-mingling this oil. Or from the Ellenberger formation which appears productive and the Connell member of the basal Simpson which is known to be productive in other wells and which appears productive in this well, and from the electrical survey data. It would be the tendency of the oil to migrate were there a variation in pressures in these two formations. It is impossible to say whether any variation exists inasmuch as no pressures have been offered in evidence. In similar wells of our own we have noted some variations in pressures.

Q What then, should the next step be with reference to this well?

A I believe that were it/our well we would take steps to isolate the Connell member of the Simpson series from the open hole such that it would not be in contact with the Ellenberger production. Then proceed with whatever work was necessary to restore the well to production.

MR. SAVAGE: Nothing else.

BY MR. CAMPBELL:

Q Am I to gather, Mr. Nestor, if this situation is correct as you interpret it, and if that were done, you would have no objections to the dual completion of this well?

A No, I am not saying that.

MR. CAMPBELL: That is all.

MR. HUGHSTON: That is all we have with reference to this particular situation. Anything else we have would be general and can wait the presentation of the Tide Water matter.

MR. SPURRIER: Do you have anything more in this case?

MR. CAMPBELL: Yes. I would like to ask Mr. Adams to come back as a rebuttal witness in connection with this well No. 4.

(Further testimony by Mr. Adams.)

BY MR. CAMPBELL:

Q Mr. Adams, you have heard the testimony here in connection with the interpretation of various geologists as to the top--as to the Connell and the Ellenberger formations--in your Cities Service S-4, have you not?

A Yes, sir.

Q Do you know, Mr. Adams, the basis upon which the completion was made on your S-4?

A We had samples on the well, and those physical samples show, in the opinion of our geologist, that the top of the Ellenberger was 8030 feet.

Q And where do you place the bottom of the Connell?

A At 8020.

Q That was the information furnished by your geology department, is that correct?

A Yes, sir.

Q And are those samples to which you refered taken at 8030 feet available to the Commission and to interested parties?

A Yes, sir, they are.

MR. CAMPBELL: That is all.

BY MR. HUGHSTON:

Q Have they been released as yet, Mr. Adams?

A I can't answer that. If you ask for them you get them.

Q You say you know this was done. It is pure hearsay as far as you are concerned? Somebody told you that.

A Yes, sir, that's right.

Q You didn't examine any samples yourself?

A No, sir, I am not a geologist.

MR. HUGHSTON: That is all I have.

BY MR. NESTOR:

Q Mr. Adams, did your company have any objection to running an electrical survey in that well below the casing or securing sidewall samples from the formation in the open hole in order

to ascertain definitely what is open?

A In my opinion, that isn't necessary. I think there is sufficient information now. We have these samples. They are available for you study if you want to see them. I can't see where a sidewall core would do any good at this time.

Q Did I understand that it is your company's position then that you have a dual completion there?

A We don't have a dual completion until we have an allowable given us by the Commission. Our position is this. That the well isn't dually completed. We are producing from the Ellenberger.

Q You maintain there is no production from the Simpson section open in your well?

A No, sir, there isn't.

Q You would not be willing to have any electrical surveys run or to permit sidewall sampling of your well in the open hole?

A I don't say we wouldn't permit it, now. But I think there is sufficient data without going into that.

Q You have heard the evidence offered by geologists of other companies?

A Yes. And the samples are available for your study if you want to see them.

Q Have you known of cases where samples have been known to be confused by improper sacking of the pieces in the well by the drilling contractors?

A Yes, sir.

A Yes, sir, we know. And then I have rough-necked and taken samples myself.

MR. NESTOR: No more questions.

BY MR. CAMPBELL:

Q Mr. Adams, in the event the Commission should find, based upon the evidence presented at this hearing, that the Connell Sand was actually exposed in this well, would your company be willing to take the necessary steps to correct the situation?

A They certainly would, yes, sir.

MR. CAMPBELL: That's all.

MR. SPURRIER: No further questions? I believe the case is completed.

(Off the record.)

MR. WHEELER: Mr. Spurrier.

MR. SPURRIER: Mr. Wheeler.

MR. WHEELER: May we introduce in evidence these two logs which Mr. Spellman referred to in his testimony. They are marked Case 274. Shall I also put on Ohio exhibit?

MR. SPURRIER: Yes, please.

(Off the record.)

MR. SPURRIER: We will now take up Case 275, with the understanding that some of the remarks that will be made after a presentation of this case will apply to both 274 and 275. Is that agreeable?

MR. HUGHSTON: Some of the remarks and general evidence. Yes, sir, that is agreeable.

STATE OF NEW MEXICO)
: SS
COUNTY OF BERNALILLO)

I HEREBY CERTIFY, that the foregoing and attached transcript of proceedings before the Oil Conservation Commission, in Case No. 274, on May 23, 1951, at Santa Fe, is a true and correct record of this portion of the same to the best of my knowledge, skill and ability.

Dated at Albuquerque, this 16th day of June, 1951.

E. E. Greer

REPORTER

My Commission Expires:
August 4, 1952.