BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO
JUNE 14, 1961

IN THE MATTER OF:

CASE 2305 Application of Texaco Inc. for permission to market stock tank liquids approximately 11.5 percent in excess of top unit allowable plus such other liquids, including propane, which may be recovered by the installation of an extraction and stabilization plant on its Little Lucky Lake Unit, Little Lucky Lake-Devonian Pool, Chaves County, New Mexico.

TRANSCRIPT OF HEARING

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BEFORE:

Honorable Gov. Edwin L. Mechem
Mr. A. L. Porter
Mr. E. S. (Johnny) Walker

T R A N S C R I P T O F P R O C E E D I N G S

MR. PORTER: The meeting will come to order, please. We will begin with Case 2305.

MR. MORRIS: Case 2305. Application of Texaco Inc. for permission to market stock tank liquids approximately 11.5 percent in excess of top unit allowable plus such other liquids, including propane, which may be recovered by the installation of an extraction and stabilization plant on its Little Lucky Lake Unit, Little Lucky Lake-Devonian Pool, Chaves County, New Mexico.

MR. WHITE: If the Commission please, Charles White of

Gilbert, White & Gilbert, Santa Fe, New Mexico, appearing on behalf of the applicant. We have two witnesses to be sworn at this time.

MR. PORTER: Let's have them both stand and swear them both at the same time, Mr. White.

(Witnesses sworn)

J. E. ROBINSON, JR.,

called as a witness, having been first duly sworn on oath, testified as follows:

DIRECT EXAMINATION

BY MR. WHITE:

Q Will you state your full name, for the record?

A J. E. Robinson, Jr.

Q By whom are you employed and in what capacity?

A I'm employed by Texaco, Inc. as a petroleum engineer.

Q Have you previously testified before the Commission and had your qualifications accepted?

A Yes, sir.

Q Are you familiar with the subject application?

A I am.

Q Will you briefly state what Texaco seeks by the application?

A Texaco, Inc. proposes to install a processing plant on its Little Lucky Lake unit in the Little Lucky Lake-Devonian Pool to recover hydrocarbons that are presently being vented to the

atmosphere and going to waste. We request the Commission to permit us to maintain the present reservoir withdrawals and not penalize Texaco for recovering the fluids that would otherwise and are being wasted.

(Whereupon, Texaco's Exhibits Nos. 1 through 9 were marked for identification).

Q Will you refer to Exhibit 1, and describe the location of the wells and the development history?

A Our Exhibit No. 1 is a plat of the Little Lucky Lake-Devonian Pool. It's located in Chaves County, New Mexico, about ten miles off the Caprock. The discovery well for this Pool was Texaco's Peery-Federal Well No. 1. It was completed October 12, 1958. The second well to be drilled in this Pool was Shell's Elliott No. 1. It was drilled and completed on May 29, 1959. It was a dry hole, and it was plugged and abandoned. The third well was Texaco's Peery-Federal Well No. 2. It was completed June 27, 1959. The next well was Peery-Federal's -- Texaco's Peery-Federal Well No. 3. It was completed on September 12, 1959. The next well to be drilled in this field was Shell's State "LLA" Well No. 1. It was completed October 6, 1959, and this well was dry. The next well to be drilled was Texaco's C. E. Key-Federal, up in Section 17. It was completed on August 2nd, 1960. It was plugged and abandoned.

The next well to be drilled was Texaco's Kinahan-Federal Well No. 1. It was completed on August 19, 1960. And the last well to

be drilled in this Pool was Texaco's Seaboard B. E. Spencer-Federal "B" No. 1, located in Section 28. It was completed on January 10, 1961, and it was plugged and abandoned.

Q Mr. Robinson, are all these wells within the Little Lucky Lake unit?

A Yes, sir, they are. All of the wells are located in the Little Lucky Lake unit, which consists of 11,714 acres, more or less.

Q When was the unit approved?

A The unit was approved by the Commission's Order R-1131 dated February 28, 1958.

Q What is the average depth of the Devonian pay in this unit?

A The Devonian is completed at an average depth of approximately 11,100 feet.

Q Did Texaco take an original bottom hole pressure, and if so, what was it?

A Yes, sir, we did. On October 12, 1958, the date of completion of our Peery-Federal Well No. 1, the discovery well in this Pool, we took a bottom hole pressure at 11,092 feet, and the bottom hole pressure was 4,487 PSIG.

Q Do you find these crude characteristics to be unusual and out of the ordinary?

A Yes, sir, we do.

Q In what respect?

A When we first saw the liquid, it had a stock tank gravity of 60.6 degrees API. When we saw the crude, we were interested very much in learning whether this well was producing from either an oil or a condensate reservoir, and we realized immediately that we had a very highly volatile oil, or a liquid, rather.

Q Did you take any samples of the liquid or gas and have them analyzed?

A Yes, sir, we did. On November 25, 1958, shortly a month after the well was completed, Texaco took samples of the separator liquids and separator gas, and stock tank liquids, and sent them to Core Laboratories, Incorporated, for refining and analysis.

Q What was the result of these analyses?

A The reservoir fluid was found to be highly volatile, single phase unsaturated liquid as reservoir conditions of 4500 PSIA and at 161 degrees Fahrenheit, which was the bottom hole temperature of this reservoir. The recombined reservoir fluid exhibited a bubble point pressure of 2652 PSIA at 161 degrees Fahrenheit.

Q Mr. Robinson, what do you mean by single phase unsaturated liquid?

A By being unsaturated, it means that additional gas could and would have gone into solution into the reservoir liquid at reservoir conditions if the additional gas was available. By single phase we mean that the reservoir fluid existed in the reservoir at a liquid, and no gas was present. A two-phase system is where both

gas and liquid exist in the reservoir at reservoir conditions.

Q What do you mean by the bubble point pressure being 2652 PSIA at 161 Fahrenheit?

A This means that if the reservoir pressure was lowered from its original condition at 4500 PSIA to 2652 PSIA, then the first bubble of gas would come out of solution.

Q Did this analysis further establish the fact that this is an oil reservoir?

A Yes, sir, it did.

Q Did you cause any further analysis to be made?

A Yes, sir, we did. After we saw the Core Laboratories' analysis of this crude, Texaco's Bel Air Research Laboratories requested that we obtain additional samples and send to them for analysis. In August, 1959 we took additional samples and sent to our Bel Air Laboratories for them to do additional PVT work and to make an experimental study of the effects of injecting various fluids into the reservoir fluid introduced by our Peery-Federal No. 1.

Q What were the objectives of these studies?

A Actually, they served for three purposes. First, they were to examine the possibilities of using produced gas and another gas in a miscible [illegible] flooding at the original reservoir pressure. The second object of the study was to determine the benefits to be derived from a partial maintenance of the reservoir pressure, and third was to increase the vaporization tendency

of the reservoir fluid at original reservoir conditions when treated with lean gas.

Q What were the results of these studies, and what conclusions, if any, were drawn?

A We found that by injecting the separated gas plus a naptha topped from the crude oil, that we could increase our recovery greatly by initiating a miscible flood. By miscible, I mean that we transfer or convert the volatile ends of the liquid from a liquid to a gas, thus causing high sweep efficiencies. We found that by partial ASTM distillation, that we could top out our crude, and we can produce a naptha of fifty-one percent of the stock tank liquid with this naptha having a gravity of 71.9 degrees, and the remaining forty-nine percent residual ends would end up with an API gravity of oil at 43.9 degrees API. With these results that we obtained from this experimental study, then we continued our investigation and our final study to see that, if it was feasible to put in a partial miscible flooding program in this field.

Q At this stage of the study, Mr. Robinson, did Texaco propose to install cycling facilities?

A Yes, sir, we did. At the time of this study, we were waiting to see the extent of the field, how large it was, before we could actually design our equipment to install cycling facilities.

Q As the Pool was developed, did it prove to be adaptable

to cycling operations?

A No, quite to the contrary. This is a four-well field under a very active water drive. In order to maintain miscibility, and we would have to maintain injection to equal reservoir withdrawals to prevent the water from the water drive from by-passing the wells and causing premature watering out and abandonment of the pool, we could not select any wells that we could convert to injection and keep up by injecting the amount to equal reservoir withdrawals.

Q Has Texaco been selling any of the casinghead gas that has been produced?

A No, sir,we have not.

Q Why?

A When we first started our studies on this, and we thought that the reservoir was adaptable to miscible flooding, we wanted to use a separator gas to inject back into the reservoir, and so, therefore, we would not enter into a gas contract with anyone because later, if we did go to a miscible flooding, we would have to either try to break the contract or attempt to get our gas from some other source. We did not enter into any contract for sale of gas.

Q In view of the fact that the reservoir does not lend itself to cycling or miscible flooding, in what position does Texaco now find itself?

A Well, we have reached the end of the road in our studies,

in our conclusions, and we find that we must now deplete the reservoir as effeciently and economically as possible. It is our firm judgment that this can only be accomplished by the proposed processing plant.

Q Did you bring with you any samples of the standing tank liquids?

A Yes, sir, I did. I have some souvenir samples of the liquid.

Q Will you explain how you obtained them?

A This sample here was obtained last week by dipping a container into the stock tank and filling the container and putting a lid on it and bringing it home. I might say that this fluid has been setting in the stock tank and it has been weathering. How long this crude had been weathering when I got it, I do not know. We truck this oil, and actually they don't fill any tanks up, they just select what oil they want to take out. But what I did even though this is a weathered oil you have, last Sunday when I bottled this up in prescription bottles, I took another bottle, I poured 80 cc's into each bottle, and I left the top off of this bottle, and I put it outside where it could weather. I would say that the temperature in Midland at that time was probably 95 to 98. It was allowed to weather for two hours,from three o'clock until five o'clock. Then it was capped approximately -- there's about 71 or 72 cc's of fluid left in the bottle, which is approximately ten percent weathering loss.

Q That's within a two-hour period?

A Within a two-hour period, and you will also note that the lighter ends have weathered off and left this sample with a darker color. Now, if I would have taken a sample directly from the separator, it would have been a much clearer sample, however --

Q Why didn't you do so?

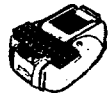
A It wouldn't be safe to handle. The bottle would probably blow up. I don't know what the exact mole content coming from the separator would be, but propane has a vapor pressure of approximately 180 to 190 pounds per square inch. It would probably have blown up the bottle if it was handled at a higher degree temperature.

Q You stated that these liquids were trucked off the lease. Are they trucked in the daytime or at night?

A We have to truck this at night after the ambient temperature lowers. We can't truck it in the daytime, the pumps will vapor-lock, and we have a very high loss in weathering loss when trying to handle this during the daytime, so we wait until night when the temperature lowers, and we truck all our liquid at night.

Q Did you come here prepared to conduct a simple experiment to show and demonstrate how volatile the liquid actually is?

A Yes, sir, I did, but I believe I'll tell the Commission what I had in mind to show them, and I am proposing that I not do it. I don't know if this should go in the record or not, but last night I had a container that contained the liquid --



Q The same liquids that are in the samples?

A Yes, that those samples were poured from. This was a tight container, and there were no vapors at all escaping from the container, but just from dipping it into the tank, and the liquids drying, it has a very strong odor. I left this in my motel room last night, and they started smelling gas, and I understand that the gas company was walking the Santa Fe River from two o'clock last night until early this morning trying to find out the gas leak, and the manager and everyone else, they had air-conditioning people, everyone trying to find the gas leak. But what I had in mind, this is just a sample taken from the stock tank. What I wanted to show, and if the Commission would like to see it, I can empty this container out into a glass and by the heat of my hand can make this liquid boil. When I took this sample and when we went out there, I merely opened the stock tank lid and stuck my finger in it, and the liquid starts boiling immediately around my finger. I stick my hand down in it, and I would say that bubbles the size of golf balls would come up all the way around your hand, and then when I stuck this container in there, it boiled very profusely. This is the only thing I wanted to show, that the heat of your body will make this liquid boil, and I would be glad later on, if the Commission would like to see it do it, but I prefer not to do it at this time.

Q Is this about the most volatile gas that your engineers have encountered?

A Yes, it is.

Q Would you step up there, and illustrate what experiments have been done with the fluid?

A This is a graph of the comparison of two highly volatile oils. When we sent the sample to our Bel Air Research Laboratories, our laboratories found that this was the highest volatile oil that they had ever examined in their laboratories. Previously, the highest volatile oil that they had ever examined was the Devonian oil that comes from the Headly - Devonian Field in Texas. This is a vaporization chart in comparing the two liquids. As curve B we start out with a reservoir volume of crude at the reservoir conditions. You might say that we start out with one cubic feet of oil. These experiments were done in the windowed cell where we had a window in there, and we could look in and actually observe the liquid. So we started out with a reservoir volume. You can call it one cubic feet, so we started injecting gas into this liquid. By the time that we had injected one-half of a reservoir volume or if you want to speak in cubic feet, by the time that we had injected one-half of the cubic feet of gas into this crude, a swelling took place. The gas is going into solution, increasing your formation volume factor. It increased by about forty percent or by injecting a half of a reservoir volume of gas into a reservoir volume of liquid, we now have 1.4 reservoir volumes of liquid. At this time we reach a critical state. By the injection of about another quarter of a reservoir volume or a quarter of a cubic feet

of gas, this thing, the behavior completely switches over, and you end up with about five-tenths of a percent of liquid, the rest of it being a rich retrograde gas. Then we pulled off some of the gas here that we had, and we found that the highest liquid content that it had was about forty percent at a pressure of 3600 pounds. Then we injected another one-quarter of a reservoir volume, and then we have a complete gas, we have no liquid present. This is a comparison of the Headly Devonian. We started out here with a reservoir volume and start injecting gas in it, it doesn't swell, it starts reverting then to a retrograde. It's acting as a two-phase reservoir here. After we inject about a half of a reservoir volume, we have about .36 reservoir volumes of fluid. We continue injecting gas into this highly volatile reservoir, and by the time that we inject six reservoir volumes of gas, we still have about ten percent liquids present whereas on the Little Lucky Lake-Devonian, by the time that we inject one reservoir volume of gas, we have a complete switch in phase now from a liquid to a gas reservoir.

Q Mr. Robinson, will you refer to Exhibit 3 and explain the present producing operations?

A Exhibit No. 3 is the present producing operations in the Little Lucky Lake-Devonian by the use of stage separation. We have four wells starting at the -- well, at one time during the winter, we had top surface chokes. We were having a lot of trouble with these chokes freezing up, so we have bottom hole chokes in the

well. The well with bottom hole chokes in it has a flowing tubing pressure of about 1750 pounds. We come into our flow line here. We go into a line heater. It's a water bath heater that we carry this water at 112 degrees Fahrenheit. The reason for putting this heater in here, there are several things that are very peculiar about this reservoir and very interesting. Our Peery-Federal Well No. 2 was making a little bit of water. We were having a lot of trouble with our separators freezing up and what not, but one day we couldn't get any liquid out of our stock tank. We opened the valve, and we couldn't get anything. We found a solid sheet of ice, this soft water was frozen in the stock tanks, large cakes of ice in the stock tank. So we put the line heater in. The liquid comes in, it makes one pass through the line heater, and then it comes back, and it goes through a choke where we have our maximum heat transfer at this choke. This is where it is finally choked down, and we get our maximum diffusion of our heater. Then it comes out into a high pressure separator. This separator works at about 250 pounds. These pressures we have found to be the optimum pressures that we can operate this stage separating from and get our maximum recovery. We have the four wells, and these four wells are producing a total of well fluid of 1,297 MCF of gas, plus 141 barrels of propane, plus 851 barrels of butane and heaviers. So it goes into the high pressure separator. Off this high pressure separator we vent to the atmosphere 1,184 MCF of gas, plus 81 barrels of propane. Of course, this propane actually goes off as

a gas. Propane is a gas at reservoir conditions as long as the temperature is above a minus 44 degrees Fahrenheit. Actually, it goes off as a gas. Then, we have our butanes and heavier another 39 barrels of butane and the heavier crude goes off. The butane carries with it additional hydrocarbon. The butane has,it is a gas at atmospheric pressure at any temperature above 51 degrees Fahrenheit, so actually,off our higher stage separator, we have 1134 of gas and 82 barrels of propane, and 39 barrels of butane, plus heavier.

Then, the effluent passes into the low stage separator, which operates at 50 pound gauge. Off the low stage separator we vent additional 96 MCF of gas, plus 33 barrels of propane, plus 20 barrels of butane. Then the effluent goes into the stock tank. The liquid still exists as an unstable crude, weathering losses take effect here off of the tank another 17 MCF of gas, 27 barrels of propane, and 27 barrels of butane, plus heaviers will be vented off. We end up with a stock tank liquid of 765 barrels a day. This is what we try to get to the pipe line. Our total loss that we have actually vented to the atmosphere is all the gas that the reservoir produced. The 1297 MCF of gas, plus 141 barrels of propane, and 86 barrels of butane and heavier.

Q That's per day?

A That's per day. It's on a daily rate.

Q How many barrels of fluid are actually produced today?

A Actually produced today? We produce about 992 barrels

of oil a day.

Q Of this amount, how many barrels are vaporizing the atmosphere?

A Of the 992, we vent about 227 barrels a day.

Q Mr. Robinson, will your proposed plant materially reduce this waste?

A Yes, sir. Under the present conditions, approximately, on the barrel basis, we are venting about twenty-three percent of our well effluent into the atmosphere. By our proposed installation, we will completely, one hundred percent, eliminate waste.

Q Does that conclude your part of the testimony?

A Yes, sir, it does.

MR. PORTER: Does anyone have a question of Mr. Robinson? Mr. Nutter.

CROSS-EXAMINATION

BY MR. NUTTER:

Q Mr. Robinson, you stated that the reason that you didn't have a casinghead gas connection for the gas in this area was because you had considered the repressuring project, and you hadn't contracted the gas because if you did go to the repressuring project you would have to take the contract away from the purchaser; is that correct?

A Yes, sir.

Q Now that you have decided that you are not going to repressure, is there anything wrong with getting the casinghead gas

contract now?

A Yes, sir, there is. It is economics. I have Mr. Douthit, a gas engineer, here that will testify to that extent. We have our choice now.

Q And you could put in a casinghead gas connection at this time?

A Yes, sir, we could.

Q Then, you wouldn't have all these losses that you've talked about, which are presently being vented?

A No. No, not actuallylosses, no.

Q Now, the allowable for the four wells is equal to what at the present time?

A At the normal unit allowable, plus the depth bracket between 11,000 and 12,000 feet, which is -- the factor is 5.67.

Q This 765 barrels which you stated that you were trying to achieve in your stock tank, is that equal to the allowable?

A Yes, that's correct.

Q So in order to make the allowable, you have to produce the 992 barrels of liquid, is that correct?

A That is correct.

Q What is it that you are acually proposing?

A We are proposing to put a plant in to completely eliminate what we have here, and by putting this plant in, we wish to maintain the present reservoir withdrawals that we have. Texaco has all of the wells in this field, and we would like to put this

plant in to maintain the present reservoir withdrawals.

Q In other words, you would reduce the 992 barrels that you are presently producing, and you are requesting that you be able to market that amount, rather than the allowable of 775, is that correct?

A Yes.

Q What is the purpose of that? Why do you request an allowable of 775 and put the plant in?

A Mr. Nutter, Mr. Douthit will testify to that extent. Actually, we could do this, but it steps up the cost of our plant, and I'm sure that he can answer your question later on to your satisfaction, or I can do it now, but I think that it would be taking away a little bit of the testimony that he proposes.

Q In other words, he's going to go into the actual mechanics of the plant and the necessity for the excess allowable and so forth --

A Yes, sir.

Q -- in his testimony?

A Yes, sir.

MR. PORTER: As I understand it, his testimony will deal with the proposed operation?

A Yes, sir.

Q (By Mr. Nutter) Mr. Robinson, you mentioned the samples you have taken from this well. They were all recombined samples. Have any bottom hole samples been taken?

A No, sir, they haven't. It's been Texaco's experience that a recombined sample is much more accurate than a bottom hole sample unless the bottom hole sample is actually taken at the virgin reservoir conditions. Later of, if a well has been allowed to produce, you have to reach stabilized pressure in the well, and then flow the well slowly to bring in a fresh supply of gas into your pressure bomb thief, and we find that if taking actual conditions by accurately measuring the gas produced and taking the sample out of the separator, take the separator gas and our stock tank liquids, that we have much better results of recombining our samples.

Q Now, the accuracy of an analysis on a recombined sample depends on the accuracy of recombining the sample, doesn't it?

A That is correct, it does.

Q Did you recombine stock tank liquids or effluent from the separator?

A We recombined the effluent from the separator, from the stock tank and our separator gasses, different tests were made on all of these. We recombined them to reach our bubble point and what not under the actual conditions that we were producing.

Q It is your opinion that this liquid is a liquid in the reservoir?

A Oh, yes, sir. There isn't any doubt about it, in our judgment. I think if you will notice, the gravity there where we started out with a reservoir volume and started injecting gas in

it and it started swelling, well that is proof in itself that actually we have an unsaturated single phase reservoir.

Q What is the gravity of the liquid when it's first produced?

A 60.6 degrees.

Q What is the gravity of the liquid you are marketing?

A Roughly, after weathering, around 59 degrees.

MR. NUTTER: Thank you.

MR. PORTER: Anyone else have a question of Mr. Robinson?

MR. MORRIS: Yes, sir.

MR. PORTER: Mr. Morris.

BY MR. MORRIS:

Q Mr. Robinson, as I understand it, then, your proposal is that because of this unusual and costly process that you'll have to go through to recover what's now being vented, that you are asking for special allowable treatment?

A We don't like to put it in the words that you say. We are not asking for special allowable treatment in a sense, we are requesting that we be allowed to maintain our present reservoir withdrawals. Now, if the Commission, after Mr. Douthit enters his Exhibit, if they do not grant our application as requested, then we have the choice of selling our gas under a casinghead gas contract, which we will, because we have to show a payout on installation that we do. If we do sell our gas as a casinghead

gas contract, then we will maintain the present reservoir withdrawals that we have at this time. So if we go to a casinghead gas sales, we will continue producing at the rate that we have now.

Q You don't feel that it would be economical to go ahead and put in your plant even in the event the Commission would turn down your request for the additional allowable?

A This will be covered later on, I'm sorry. We have another witness, and I'm sure Mr. Douthit can answer it, or I can answer it at the present time.

Q I'll just wait. What I'm worried about, Mr. Robinson, in a sense, is the precedent that might be involved in a case of this sort, where we would, in effect, be giving some allowable, special allowable consideration where a company is going to install unusual or costly equipment to prevent waste. In some cases, perhaps not this one, he might be giving a bonus for the prevention of waste that should have been prevented all along.

A What you say is true, Mr. Morris. However, I believe that any application should stand on its own merits. As far as granting any incentives to eliminate waste, we realize that water flooding eliminates waste and that we get additional recovery from waterfloods, and waterfloods enjoy a certain incentive. The operators in secondary recovery projects enjoy a certain allowable incentive to give these people the advantage to going ahead and installing these projects.

MR. MORRIS: Thank you, Mr. Robinson.

MR. PORTER: Mr. Robinson, as I understand it, because of the nature of this fluid, you are only asking to continue withdrawals at present, but you are asking permission to sell your total withdrawals?

A Yes, sir, that is correct.

MR. PORTER: Anyone else have any questions? The witness may be excused.

(Witness excused)

JESSE DOUGLAS DOUTHIT,

called as a witness, having been first duly sworn on oath, testified as follows:

DIRECT EXAMINATION

BY MR. WHITE:

Q Mr. Douthit, will you state your full name?

A Yes, sir. My name is Jesse Douglas Douthit.

Q By whom are you employed and in what capacity?

A I am employed as a gas engineer by Texaco, Incorporated.

Q Have you previously testified as an expert witness by this Commission?

A No, sir, I have not.

Q Will you briefly state your educational background and your professional experience?

A Yes, sir. I graduated from Texas A & M College in 1954 with a B.S. in chemical engineering. I have been employed for

approximately seven years by Texaco, Incorporated, in that capacity.

Q Are you familiar with the subject application?

A Yes, sir, I am.

MR. WHITE: Are the witness' qualifications satisfactory?

MR. PORTER: Yes, sir, they are.

Q (By Mr. White) Will you step up and explain Exhibit No. 4, being Texaco's proposed processing plant?

A Yes, sir. If I might digress just slightly here and have a little -- how we got into the act.

Q Proceed.

A After the Petroleum Engineering Department had exhausted all the possibilities for secondary recovery in this particular pool, they turned it over to us. We thought, in mind, that we would try to save what was actually coming out of the ground. We realized at that point we didn't have much alternative with regards to the actual reservoir, but we hoped by installing some sort of a gas processing facility, or in this case, a full well stream processing facility, that we would be able to save the majority of the material that was now being wasted. We looked at several different possibilities, and this is the one up here in Exhibit 4 that we finally decided would be the optimum way to cut down waste and to recover material that was not going to the atmosphere, as shown in Exhibit 3. The first thing I would like to point out about Exhibit 4 is that we've already mentioned the fact

that in each case the proposed operation and the present operation we have exactly the same amount of fluid coming out of the ground. We started off with that premise, and I think that will become evident later on in the economics why we based our study on exactly the same reservoir withdrawal rate.

The first thing that we did, we brought this material in and we three-staged flashed it much as we did over here except that we added another high pressure stage in front of the 250 pound flash separation shown. We took all the gas off of these stages of separation and compressed them to approximately a thousand pounds, treated them for sourness, and dehydrated this gas, and then we would have available here a high pressure gas transmission sale. The next step was to come over here and remove the offending light ends; in other words, we wanted to put a piece of equipment in here that would selectively remove the methane and ethane left at this point so it would no longer have the ability to carry off the heavy ends with it. We decided on a conventional fractionating tower. This is much more efficient than stage separation. Consequently, we were able to take the methane and ethane in the stream at this point and reject it overhead without touching the butane and propane and crude components. We also took a field stream off at that point. Then, what was left was propane and heavier material. We brought this material over to a second fractionating tower and again selectively removed the propane and sent it overhead to separate storage tanks where it can be sold

as a separate product. The material that was left was then crude components. It was butanes, pentanes and heavier material that was stable at stock tank conditions, so that we've completely eliminated our waste at this point whereas even over here after this material gets to the stock tank, it can still weather. After it gets into a tank truck this material will go directly from the stock tank to the final point of disposition without any further losses. So, briefly, this is our setup. As you can see by comparative material balances, by starting out with the same stream, we have ended up with a gas sale which is 1250 MCF D with a small amount of propane sold at sixteen cents per MCF as gas. We use a small amount of our leanest stream for plant fuel. We bring another saleable product over here, propane, 110 barrels a day, and then we end up with 851 barrels per day of stabilized crude, as compared to 765 barrels in this case. This appears to be an advantage that might have come out of the reservoir, but actually this additional 86 barrels was going to the atmosphere. We have taken it out of the air and put it into the stock tank here, holding our reservoir withdrawals constant.

Q How many stages of separation are there in the proposed operation?

A Well, if you would compare this to what we have presently, each one of these two towers has thirty trays in it, so that in reality we have substituted sixty trays of separation for two, and this is why we're able to selectively remove the light ends

so much more effeciently. Of course, this equipment is quite a bit more expensive.

Q What do you anticipate the cost of this installation will amount to?

A Approximately a quarter of a million dollars.

Q What are the economics of this plant and the various schemes you have studied, and how they compare to the present operations?

A I would like to refer to Exhibit A as marked up here, actually Exhibit 5. This represents the extent of the waste under present operating conditions. The basis for these figures are the well effluent brought to the surface under the present allowables which would be as shown in each of these cases up here.

MR. WHITE: Just a minute, please. If the Commission please, you each have a copy of the Exhibit.

A We are covering in the stock tanks at the present time. Approximately 765 barrels per day of crude at two dollars and fifty-five cents per barrel net, for a total of nineteen hundred fifty dollars per day. At the present time we're venting 1297 MCF of natural gas at sixteen cents per MCF. We are venting propane 141 barrels per day at a dollar forty-seven cents per barrel, and venting 86 barrels per day of crude components at two fifty-five per barrel,for a total vent loss of six hundred thirty-four dollars per day. Translating this into terms of recovery efficiencies, we are venting twenty-five percent of the dollar value of the fluids

that are brought to the surface. Since this is a four-well field, this is the equivalent of one of four wells going to the atmosphere on a continuous basis. Just as efficiently as if we had gone out there and opened one well and let it blow to the atmosphere, our actual operation is equivalent to that. This is what we have to work with. We start with this amount of waste, and we try to eliminate it. Up here we'll have to call your attention to Exhibit No. 6, which is marked Exhibit "B."

MR. PORTER: You have changed Exhibit "A" to Exhibit 5, did you not, Mr. Douthit?

A Yes, sir.

Q Exhibit "B" is now Exhibit 6?

A Exhibit "B" is now Exhibit 6, yes, sir.

Q Now proceed with Exhibit 6.

A When we first looked at this present operating case, we considered various ways of eliminating waste starting with the simplest, so the first thing that we came up with was a straight sales gas installation. We reasoned that we could pick up the vapors of these different separators plus the stock tank, compress them to a sales gas pressure, and then make a sale to a transmission company, and we hoped that that would make us a little more money than a straight casinghead sale. So you can see we didn't do too well in this case. We have figured that it would require approximately one hundred thousand dollars just to make a gas sale. We figured that we could get sixteen cents gross from a transmission

company for this gas once we had treated it and compressed it to a sufficient pressure to put it into their pipe line. The net income from a casinghead sale for both gas and liquids would amount to thirteen cents, roughly, per MCF, 13.7 cents per MCF. Subtracting that figure from the gross earnings for the gas facilities, we came up with 2.3 percent MCF income before operating expenses to pay out the installation. We calculate that it would cost us approximately two cents per MCF to operate the sweetening and dehydrating facilities we contemplated at first. This gives you three-tenths of one cent per MCF to pay out sweetening and dehydration and compression facilities. Translated into payout terms, we came up with a very unsatisfactory payout of seventy-three years to go this route. Well, obviously, there's no economic incentive to install these facilities.

I would like to call your attention to Exhibit 7, also marked Exhibit No. "C." Now, this particular Exhibit here represents what would happen if we maintained with these facilities this volume 765 barrels per day of stock tank production. In this case we would not have these figures representing our reservoir withdrawal rate. We would actually be penalizing ourselves, and have to cut back to approximately ninety percent of each of these figures in order to install the plant on this basis, that is, maintaining this 765 barrels per day. As I've mentioned, the reservoir withdrawal rate is reduced. Our investment in this case has jumped up to roughly a quarter of a million dollars. The

additional one hundred fifty thousand dollars above sweetening and dehydration and compression goes to liquid recovery facilities. Now, in figuring the economics, we can take no credit for any crude gains because we kept our stock tank recovery the same as it is now. So we had to pay this facility out on propane and sales gas at approximately ninety percent of the rate that it's now coming out of the ground. So looking at the economics, we would sell approximately 99.2 barrels per day as opposed to 110 up here. For one hundred forty-six dollars per day we would sell 1125 MCF per day of residue gas at sixteen cents per MCF, which is a reduction again, and we would end up with a gross income of three hundred twenty-six dollars per day from which we must subtract our casinghead gas sale from which we could realize one hundred seventy-eight dollars per day. Subtracting again another fifty-five dollars per day for operating expenses, we come up with a net income to pay out a quarter of a million dollars worth of facilities of ninety-three dollars per day. Translating this again into a payout, we come up with what we consider a poor 7.36 years, keeping in mind that this is before taxes and assuming that we had to invest the money in this particular spot, we don't think that this is a very attractive installation since we could no doubt invest our money in a number of other places which would yield a larger return and shorter payout.

Q In other words, it would be seven years until you can realize anything on your investment?

A Right. It would be seven years before we would realize --

Q Would you refer to Exhibit 8?

A Yes. Exhibit 8 represents what we would like to do with this particular pool. The basis is maintaining the reservoir withdrawal rate at its present level. The investment breakdown here, again, is the same as in the previous case. In this case, however, we have an additional crude recovery of approximately 86 barrels per day of vapors that have been converted into liquid. This material is the difference in the payouts between the two cases. We have been selling our other products plus this differential crude at a gross income of five hundred eighty-two dollars per day. From that, we again deduct our income from the casinghead sale, our operating expenses, and we come up with three hundred forty-nine dollars per day of net income to pay out this two hundred fifty thousand dollar investment with. Now, this is an attractive investment of 1.96 years. Under this type of scheme, we could install the facility and no doubt would.

Q Mr. Nutter inquired of Mr. Robinson as to the possibility of merely selling the casinghead gas, which I believe has been fully answered. However, would it be possible for you to obtain the same recoveries without requesting a hearing today?

A Yes, sir. We could retain the same recoveries without requesting a hearing by installing a third tower right here.

Q That would be what?

A A deethanizer tower which would cut out the remaining

butane and some of the pentanes and bring this material down from 851 to 765. We would take the overhead from that tower and run it over to a separate tank.

Q And sell it as butane?

A Well, we would try to sell it as butane. We would run into this additional investment, plus the fact that we might not have a market for this third product.

Q What would the cost of that installation be in addition to your proposed operation?

A That would cost an additional fifty thousand dollars, and we think that would probably kill the project.

Q Is there any other way that you could have done it?

A Yes, sir, there's another way. We could have simply operated the depropanizer as a deethanizer and again put more material over into the propane and reduce the 851 back to the 765, and we'd end up with a conglomeration of butanes, propanes and pentanes, which we probably couldn't find a market for either.

Q Do you have a proposed formula to offer the Commission at this time which would permit Texaco to continue their withdrawals at the present rate?

A Yes, sir, I do. We feel that by multiplying the depth factor for this particular reservoir by the normal unit allowable, by 1.11, that we will come up with our actual present reservoir withdrawal rate, that in addition, be allowed to take credit for the additional liquids that are now going to vapor.

Q Now, will you describe Exhibit No. 9?

A Actually, this is just a brief look of the economics. One aspect of it is the tax angle, the money that would be received by the State under each of the operations that we have outlined. I think it's self-explanatory.

Q Mr. Douthit, were Exhibits 1, 3, 4, 5, 6, 7, 8 and 9 prepared by you or under your direction?

A Yes, sir. As a team effort between myself and Mr. Robinson.

MR. WHITE: At this time we offer the Exhibits.

MR. PORTER: Without objection, the Exhibits will be admitted into the record.

(Whereupon, Texaco's Exhibits 1, 3,4,5,6,7,8 and 9 were received in evidence.)

MR. PORTER: The Exhibit 9 represents a yearly figure, Mr. Douthit?

A Yes, sir.

MR. WHITE: At this time we conclude our examination of Mr. Douthit.

MR. PORTER: Anyone have a question?

CROSS-EXAMINATION

BY MR. NUTTER:

Q You take a gross income from gas sales to transmission and deduct net income from casinghead sales. Just what are you doing here? What is the casinghead sale at 13.7?

A This represents the amount of money that we would get for our full well stream, or all of the well stream that was connected into a gasoline plant. In other words, that would contain butanes, propanes, pentanes, plus sales gas.

Q In other words, this is casinghead gas that would be sold without the installation of any treating plant?

A Yes, sir.

Q And so the difference between the price of the gas with the treating plant and the raw gas without the treating is what you are after here to look for a payout, is that it?

A Yes, sir, the incremental income.

Q You come up with a net income of three-tenths percent per MCF?

A Yes, sir.

Q Then in your payout, you calculated three cents per MCF?

A That's a misprint. We put a dot up here, but they didn't show up on the original.

Q Down in the formula it's three-tenths of a cent?

A Yes, sir.

Q I presume that on the other Exhibits, both 7 and 8, where you deduct the income from casinghead sales, you are talking about the difference in the values of the product being sold under your proposal versus sale of raw gas to the pipe line without treating?

A Versus sale under a casinghead type contract. The 13.7 cents represents in each instance the amount of money that

Texaco would receive for the gas and liquids that are now venting that could be put into a gathering system going to a gasoline plant.

MR. WHITE: Without a processing plant.

A Without a processing plant.

Q You mentioned by installation of the deethanizer downstream from the second fractionating tower that you might kill the project. Would you go into that a little further, please?

A Yes, sir. We've figured the economics of this plant fairly closely, and we've had some difficulty in other aspects of this project along the way. We have come up with several price quotations that are considerably above two hundred fifty thousand dollars. We still feel that we can put this installation in for that amount of money, but the contractors that we went out to quoted figures substantially higher than this. Consequently, we feel that this plant is now hanging by its proverbial thumbs or something; at least, another amount of money added to this would probably kill it.

Q Is this field completely developed?

A Yes, sir, to my knowledge.

Q You don't anticipate any additional wells in here?

A No, sir.

Q This formula that you suggested to the Commission, of depth factor times normal unit allowable, times 1.11 is based on theoretical computation of the amount of propane and the amount of

gas that will be available and also on a stabilized crude in the stock tanks. What happens if this theoretical computation turns out to be in error, and the yield is more or less? What would Texaco do then?

A Well, I think that we would be willing to readjust it after it was determined that it was, say, substantially more or substantially less.

Q There will be a means of determining how much is actually being produced from the wells and how much is being produced by the processing plant, I presume.

A It would be a little difficult. Actually, we would have to meter all of the streams into the plant. It could be done. This theoretical basis was the simplest way to approach it.

Q But the 1.11 is based on theoretical computations of yield, is that correct?

A Theoretical slash computations.

Q You are going to have three products for sale under your proposed operation. You will have gas to the high pressure gas pipe line. You'll have 110 barrels of propane, and you will have 851 barrels of stabilized crude. Is the market available for the high pressure gas at this time?

A It is.

Q Is there a high pressure gas pipe line in the vicinity?

A In the vicinity, yes, sir. It would require approximately eight miles of line to connect up.

Q And it is an economic venture to run that eight miles over to gather 1250 MCF of gas per day?

A Yes.

Q The 110 barrels of propane, do you have a market for that?

A I'd have to confirm that with our sales department, our LPG sales department. However, we feel like this is a pretty good area for marketing propane.

Q It won't be recombined with any crude or anything to market it?

A No, it will just be marketed locally.

Q As propane?

A As propane.

Q Is there any possibility of an oil gathering pipe line for this Little Lucky Lake area, or will the oil have to continue to be trucked?

A There is a possibility which is, we feel, one factor weighing for the plant. We have a pipe line running within approximately one mile of the Little Lucky Lake plant site. Now, they tell us that this wouldn't be available for approximately a year, at least, but they would just rather take this crude that's stabilized with all of the light ends removed into their pipe line than they would this material over here which still has some wild ends in it. It would be debatable whether or not we could get a pipe line market or pipe line outlet for this material, but it's quite likely that we can for this.

Q Will the value of the product go up if you have a pipe line, or will it continue to be this two fifty-five cents that you have used?

A We can't see any increase in the crude value, one way or the other.

Q Without having to pay a penalty for trucking?

A We do. We pay eighteen cents for trucking this material out per barrel.

Q If you have a pipe line connection, you won't have to pay that?

A If we get the connection, we won't, but we'll have to pay a pipe line tariff.

MR. NUTTER: I believe that's all.

MR. PORTER: Anyone else have a question?

MR. MORRIS: One question.

MR. PORTER: Mr. Morris.

BY MR. MORRIS:

Q Mr. Douthit, would you say, in summary, then, that there was no way in this area to prevent the waste that's occurring, under an economically attractive plan without marketing in excess of normal allowable?

A I think that's correct. Without maintaining a present reservoir withdrawals, I think that we would not install this plant.

Q And there would be no other economically feasible plan

that you could follow?

A None that we could follow as far as our own installation. We could sell the gas under a casinghead type contract. As Mr. Robinson pointed out, our reservoir withdrawals would continue at the same rate under a casinghead type contract.

Q Then, you don't feel that if the Commission granted this application, that it would be given a bonus for the discontinuance of wasteful practices?

A I would say, based on what comes out of the ground, no. I mean looking at strictly bringing material to the surface, we are going to bring the same amount up whether we put the plant in or whether we sell it under a casinghead type contract or whether we continue to operate as at present.

MR. MORRIS: Thank you.

MR. PORTER: Mr. Douthit, what did you say the price -- did you mention the price of your propane, what you expect to get a barrel?

A I notice it's calculated in here. That figure is 3.5 cents per gallon.

MR. PORTER: 3.5 cents per gallon?

A Yes, sir.

MR. PORTER: Anyone else have a question? The witness may be excused.

(Witness excused)

MR. PORTER: Does anyone have anything further to offer

in Case 2305?

MR. MORRIS: Yes, sir.

MR. PORTER: Mr. Morris.

MR. MORRIS: I have a telegram signed by Mr. C. A. Samples, producing superintendent, Socony Mobil Oil Company, Inc. It reads as follows: "Reference Case Number 2305, June 14, 1961 hearing. The Socony Mobil Oil Company, Inc. desires to enter their support of Texaco, Inc., request in this hearing, and urge that the Commission grant this request."

MR. PORTER: Is that all the communications you have?

MR. MORRIS: Yes, it is.

MR. PORTER: If nothing to be offered -- Mr. White, did you have a statement?

MR. WHITE: No, sir, that concludes our testimony.

MR. PORTER: If nothing further to be offered in the case, we will take the case under advisement. The hearing will recess until 1:15.

STATE OF NEW MEXICO)
) ss
COUNTY OF BERNALILLO)

I, ADA DEARNLEY, Court Reporter, in and for the County of Bernalillo, State of New Mexico, do hereby certify that the foregoing and attached Transcript of Proceedings before the New Mexico Oil Conservation Commission was reported by me in machine shorthand and reduced to typewritten transcript under my personal supervision, and that the same is a true and correct record, to the best of my knowledge, skill and ability.

WITNESS my Hand and Seal this, the 16th day of June, 1961, in the City of Albuquerque, County of Bernalillo, State of New Mexico.

Ada Dearnley
NOTARY PUBLIC

My Commission expires:

June 19, 1963