BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
October 25, 1961

EXAMINER HEARING

IN THE MATTER OF:
Application of Texaco Inc. for a quintuple completion, Lea County, New Mexic. Applicant, in the above-styled cause, seeks permission to complete its G. L. Erwin "b" NCT-2 Well No. 2, located in Unit J, Section 35, Township 24 South, Range 37 East, Lea County, New Mexico, as a quintuple completion (tubingless) in undesignated Ellenburger, McKee, Fusselman, Siluro-Devonian and Drinkard pool, with the production of oil from the McKee, Fusselman, Siluro-Devonian and Drinkard zones to be through parallel strings of 2 3/8-inch tubing and the production of oil from the Ellenburger-zone to be through a string of 2 7/8-inch tubing, all strings of tubing to be cemented in a common well bore.

CASE NO. 2409

BEFORE: Dan S. Nutter, Examiner.

TRANSCRIPT OF HEARING

EXAMINER NUTTER: We will call Case No. 2409.

MR. MORRIS: Application of Texaco Inc. for a quintuple completion, Lea County, New Mexico.

MR. WHITE: Charles White, of Gilbert White & Gilbert, appearing on behalf of the Applicant.

C. R. BLACK

called as a witness, by and on behalf of the Applicant, having been

first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. WHITE:

Q Will you state your full name.

A C. R. Black.

Q By whom are you employed and in what capacity?

A Texaco, Inc., as a petroleum engineer.

Q Have your professional qualifications previously been accepted by the Commission?

A Yes, they have.

Q Are you familiar with the subject application?

A Yes, I am.

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

A This is the application of Texaco for a quintuple tubingless completion. The well will be completed in the undesignated Ellenburger, McKee, Fusselman, Siluro-Devonian and Drinkard formations in Lea County, New Mexico. All of these formations we expect to be oil productive and each zone will be produced through an independent string of tubing set in a common well bore as casing.

Q What is the present status of the well, Mr. Black?

A This well has been staked. However, drilling operations have not commenced.

Q Will you refer to Exhibit 1 and explain that to the

Examiner.

A Exhibit No. 1 is a plat showing the immediate area surrounding the Texaco G.L. Erwin "b" NCT-2 lease. This Exhibit shows the location of the proposed well, the G. L. Erwin "b" NCT Well No. 2. This well is located 1980 feet from the south and east lines of Section 35, Township 24 South, Range 37 East.

Q Does it show the offset wells?

A The offset well operators and their wells are also shown on the lease with the appropriate field designation being shown below each well and a legend at the base of the Exhibit to determine the appropriate field for each well. Also shown on this Exhibit is a list of the direct offset operators and their mailing addresses.

Q Will you refer to Exhibit 2 and explain that diagrammatic sketch?

A Exhibit No. 2 is a diagrammatic sketch of the proposed quintuple tubingless completion.

Q First, explain the hole size and casing program.

A It is proposed that we will drill a twenty-inch hole to 250 feet. At that point we will set sixteen-inch casing and cement will be circulated behind the casing. We will continue with a thirteen and three-quarters inch hole to 3450 feet. At that point we will set an 11 3/4-inch casing and cement will be circulated behind the casing. A ten and five-eighths inch hole will be drilled from 3450 feet to 8150 feet. At that point we

will reduce the pole size to eight and three-quarters inches and continue on to total depth of 8500 feet.

Q What is your cementing program?

A Upon reaching total depth we propose to run one string of two and seven inch OD buttress tubing. This string will be run to a total depth of 8500 feet. A string of two and three-eighths inch OD buttress tubing will be run and one string will be set at the total depth of 8500 feet. Another string will be set at approximately 7900 feet and the other two strings will be set at approximately 7300 feet. The two and seven-eighths string which is designated as string Z on Exhibit 2, will contain a drillable guide shoe and a casing cementing collar at the base of this string. The string designated Y will also contain a drillable guide shoe and cement collar. The other three strings will be plugged on the end. Now, the drillable guide shoe in string Z and W is equipped with a full flow guide shoe and will drop a ball and test the casing to ascertain pressure after the casing has been landed. The drill guide shoe is equipped so that at a certain pressure a pin will shear thus pulling this ball out of the bottom of the shoe. We will be able to cement through the full opening shoe.

Q Now, will you proceed about your primery casing program?

A The prime cement job will be through two strings of tubing. Initially, we will commence pumping through the two and seven-eighths string and at the time returns have reached the base

of the string designated as string Y we will then commence pumping through both strings simultaneously. We will pump 1700 pounds and core eight per cent yield with a retarder. This has a yield of 2.19 cubic feet per sackand based on 65 per cent, fill-up will be 3000 feet, which will be up into the 11 3/4-inch casing.

Q Will you state in detail the squeezing cementing operations?

A Texaco feels that it is of primary importance to obtain complete zone isolation between each of the prospective pay zones before any or all of the zones are perforated. We propose to do this by squeezing above and below each prospective pay zone with 55 to 100 sacks of cement. Now, this squeezing operation will be conducted through an Otis type door, a sliding side door. On Exhibit 2 the side doors are set at 8380 feet, 8160 feet, 7860 feet, 7580 feet, 6980, 6780 feet and 6750, 6680, 5900 and then, that is above and below the prospective pay zones. We will set a sliding side door at approximately 4600 and another at 5000 feet. The queen formation is productive. However, the queen formation will be kicked off with the eleven and three-quarters inch casing. The Blinebry formation is productive in a well three quarters of a mile away. The Paddock or Glorietta has been found on drill stem test to be productive in the area. Also, the upper two sliding doors will be located between those zones and will afford complete isolation of all known productive zones in the area.

To explain and possibly clear up somewhat the Otis type door

in the actual procedure we plan to go through, we will be working in this string labelled V, with a string of one and five-eighths inch drill pipe and on the bottom of this drill pipe we will have a string of tools consisting of tail pipe. We will have an Otis Type A tool to close these sliding doors on the bottom. We will open on bottom and have a six to ten foot sub and then we will open the tool at that point. We will go in the well all the way to bottom through each of the sliding doors. This is a cut away model of the Otis Type A sliding side door. It will be run in the well in this position. This is in the closed position. We will go through all the way through each of these to the lower most one with the closing tool. The closing tool will be run through it and then we will tick up on it and this sliding side door will be open. Once it is opened you can go all the way up out of the well, squeeze through these ports and as I said previously, squeeze with approximately 50 to 100 sacks of cement with 3000 to 3500 psi. We will then close the sliding side door with the closing tool which will be on the bottom. It will be required that we set back down through the tool closing the door at that time. We will circulate any excess cement left in the tubing string out of the hole.

Q Will that completely isolate your zone?

A Yes, in each of the twelve positions.

Q Will you point out the radio active couplings which are marked in red on Exhibit 2 and explain them?

A They are installed on the tubing collars as they are run in the hole. The purpose of these couplings is to allow us to run one gama correlation log in the two and seven-eighths tubing which is designated as string Z. These couplings will give us a sharp increase in gama ray count when we pack them and therefore by running this one log in string Z we will have the collar location in regard to the formation we intend to perforate in each of the other four strings. This will eliminate the necessity of running a correlation log in each of the five strings.

Q Mr. Black, will you give us the crude characteristics of each zone?

A In the Ellenburger formation we anticipate an intermediate sweet crude with an API gravity of from 40 to 45 degrees. The GOR is 1000 to 1, the bottom hole pressure is approximately 2800 psi. It is anticipated that this will flow for approximately six or seven years. The Ellenburger formation will be perforated from 8300 to 8050. The McKee is expected to be an intermediate sweet crude with a 43 to 44 degree API gravity. The GOR should be 1400 to 1. The bottom hole pressure should be approximately 3200 psi and we anticipate that this zone will flow for approximately three years. The McKee will be perforated from 7750 to 7830. The Fusselman is expected to be an intermediate sweet crude with an API gravity of 36 to 37 degrees. The GOR should be approximately 1100 to 1. The bottom hole pressure should be approximately 2500 psi and we expect this zone to flow for about

three years. It will be perforated from 6950 to 7050 feet. The Siluro-Devonian, which is the only zone in the area that is not productive in the immediate area is the dark horse zone of this well. We expect an intermediate sweet crude, the gravity is unknown, the GOR is unknown, and the bottom hole pressure and flowing life of this zone is unknown. We estimate our perforations at 6700 to 6720 feet. The Drinkard formation will be an intermediate sweet crude with an API gravity of 36 to 37 degrees. The GOR is approximately 750 cubic feet per barrel. Bottom hole pressure is estimated to be 2500 psi with a flowing life in this zone of three years. The Drinkard will be perforated from 5950 to 6050 feet.

Q Mr. Black, will it be possible to artificially lift any or all of these zones should the need arise?

A If and when it becomes necessary they can be lifted by one of three methods: We can use hollow sucker rods or we can use a hydraulic pumping arrangement by using a string of three quarter inch power oil tubing or we can run a string of one inch tubing inside the casing string with gas lift valves installed and gas lift these zones.

Q Do you expect any corrosion or paraffin problems and if so, how will you cope with them?

A As far as corrosion in the Ellenburger, McKee and Fusselman formations, we don't anticipate any corrosion problems at all in these zones. As for the Siluro-Devonian zones, since it is an

unknown zone, and the Drinkard we anticipate mild if any corrosion problems here. During the flowing life of these zones, the corrosion can be controlled by the inhibitor squeeze type treatment wherein you squeeze the corrosion inhibitor back into the formation. During the ordinary lifting period we will use the hollow sucker rods down the annulus. If we are using gas lift method, we can inject the inhibitor in the gas supply and if we are using the hydraulic pumping method we can inject the inhibitor down to the power oil supply.

As far as paraffin, the Ellenburger and McKee present no paraffin problem at all. The Drinkard and Siluro-Devonian we anticipate that if there are paraffin problems, they will be mild and we plan on plasticoating the upper portion of the Siluro-Devonian tubing. However, the Drinkard tubing will be the string designated as string V. You can see we will be working in this string of tubing and we fell that plasticoating above running in the well would not be beneficial. At the time the well is completed most of the plastic would probably be knocked off the tubing. The Fusselman we do expect paraffin problems and we plan on plasticoating the upper portion of this tubing string to cope with the problems.

Q Mr. Black, will you refer to Exhibit 3 and explain that, please.

A Exhibit 3 is an induction lateral log of our G. L. Erwin Well No. 1 which is located on Exhibit No. 1 660 feet from

the south and east lines of Section 35, Township 24 South, Range 37 East. Exhibit No. 3 has the tops of the known producing or believed to be producing formations in the area. This is the queen formation, the Glorietta, the Drinkard, Blinebry, Fusselman, Siluro-Devonian, McKee and Ellenburger.

Q In your opinion, will this proposed installation protect correlative rights and also be in the interests of conservation?

A In my opinion, I believe it is, yes.

Q Who does Texaco intend to employ to perforate?

A Just Go Perforators to do the perforating in this well.

EXAMINER NUTTER: How do you spell "go"?

THE WITNESS: Just G-o.

EXAMINER NUTTER: Does that conclude your testimony on direct?

MR. WHITE: Yes, it does.

EXAMINER NUTTER: Are there any questions of Mr. Black?

EXAMINATION

BY EXAMINER NUTTER:

Q Mr. Black, these upper sliding doors will squeeze from 4600 to 5000, is that correct?

A That's correct.

Q The queen is 3100?

A It will be protected by the 11 3/4-inch casing string. That will be set at 3450.

Q And then the Blinebry is present in this area. What's the top of the Blinebry?

A Around 5000.

Q It's just below this lower sliding door?

A Yes, it is.

Q And there was one other formation, the Paddock.

A The Paddock is above the Drinkard and Blinebry.

Q It will be protected by the sqeeze through the sliding door on the 5900, is that correct?

A That's correct.

Q All of these sliding doors will be installed in one tubing?

A Installed in tubing V which will be a two and three-eighths inch OD buttress tubing.

Q You will operate this man drill through the doors with a string of one inch pipe?

A One and five-eighths inch drill pipe.

Q One and five-eighths?

A Yes.

Q Now, you mentioned the name of the company - - Is this also the name of the company that makes the radio active couplers?

A They furnish these radio active couplings to the Go Perforators.

EXAMINER NUTTER: Are there any further questions of Mr. Black?

He may be excused.

(Witness excused)

MR. WHITE: We have one other witness, Mr. Gearhart.

MARVIN GEARHART

called as a witness by and on behalf of the Applicant, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. WHITE:

Q Mr. Gearhart, will you state your full name.

A Marvin Gearhart.

Q By whom are you employed, Mr. Gearhart, and in what capacity?

A I am employed by Go Perforators and I am Vice President.

Q Where are your offices located?

A Fort Worth, Texas.

Q Have you previously testified before this Oil Conservation Commission in New Mexico or the Commission itself?

A No, I haven't.

Q Will you state your educational background, please.

A I received a BS degree in mechanical engineering from Kansas State College in 1949.

Q Would you state your professional experience as an engineer?

A At that time I went to work for Well-Ex as a field

engineer, and at the time I left Well-Ex, I was a radio activity logging engineer. I left to help form Go Perforators. We get the Go from the G in Gearhart and the O in Owen. We have been in business since 1955.

Q Have you been in personal charge of the perforation operations of your company and if so, to what extent?

A Yes, I have. I was in charge of the development of our device and the techniquesused in using it. I have supervised jobs in Texas, Oklahoma, off the Gulf Coast, off-shore California, and Canada.

Q Are you familiar with the subject application of Texaco?

A Yes, I am.

MR. WHITE: Are the witness's qualifications acceptable?

EXAMINER NUTTER: Yes, they are.

Q (By Mr. White) Mr. Gearhart, do you personally intend to direct and supervise the perforation operations on this particular well?

A Yes, I do.

Q Will you describe the techniques which will be employed on this well?

A We intend before we do any perforating to establish relative position of the pipes in the upper three zones that are to be perforated.

Q Refer to Exhibit 2.

A Referring to Exhibit No. 2, we will begin in the lower most string of the upper three zones and determine the relative position of the pipes at that depth and then proceed up the hole to the 6600 foot zone and on up to the upper zone.

Q You will determine the location of all five strings?

A That's right.

Q And then which string will be first perforated?

A We would perforate string V, W and X, the upper three zones first.

Q How will you determine the respective locations of each of these five strings of pipe?

A Our device consists of a combination of two tools one ratcheting mechanism attached to a gama ray detector that is directional. The ratchet mechanism is operated by lowering and raising the cable that the tool is run on taking a stroke of approximately two feet in length to shift its position. In tension stroke the line will make one complete revolution. As the ratchet is rotated through the various positions, we will run a radio active pail down each of the other parallel strings that runs beside the string that we are in with our directional gama ray detector. As these radio active pails are lowered up and down the detector, we will record their radio active counting rate. This continuing rate is then plotted on the chart which is a polar coordinate type.

Q Do you have an example of a typical chart?

A Yes, I do. For purposes of making it easier we prepared an example with two strings using the same principles that are used.

MR. WHITE: Let the record show he is referring to what has been marked for identification as Exhibit 4.

EXAMINER NUTTER: The record will note it. You may proceed.

Q (By Mr. White) In your testimony will you make clear to which Exhibit you are referring to.

A From Exhibit 4, the simple two-string method, that position of the pipe when you lower the pail by the detector will cause a radio active high or peak that points toward the location of that pipe. We do the same thing in the other strings, plot by using various colors or dotted and dashed lines in plotting the relative position of each string of pipe.

Q So far, your testimony has been directed soley to determining the location of each string of pipe in the upper three zones. What is your next step in your procedure?

A Well, after it's been determined the relative position of the pipe it is preferrable to perforate a string of pipe that is right next to the formation rather than one possibly clustered between strings, so we would select the zones to be perforated and proceed to perforate.

Q And, what is your next step?

A We go back and this time with a directional gun attached to the device and repeat the previous procedure, only this time when we get our gun directed toward the formation away from the other strings of pipe, we perforate.

Q Will this operation verify the location which you previously determined?

A Yes, it will.

Q Proceed with the next step.

A Well, after doing the upper most zone we will proceed down the hole until all the zones have been perforated in this manner.

Q They will be perforated by the same procedure, in the same manner?

A Yes, over and over.

Q Mr. Gearhart, has this type of orienting procedure and the method of perforating proved successful in your other operations similar to this completion?

A Yes, very successful.

Q Have you had failures by using this type of procedure?

A No, we haven't. However, to this date four strings, or a quadruple, is the most we have directionally perforated in, but, in my opinion, there wouldn't be any other problems with the fifth string.

Q What additional difficulties, if any, would you encounter by completing five strings as opposed to, say, four

strings?

A It's about the same. It may take a little more equipment and more time and more money.

MR. WHITE: At this time, we offer the Exhibits in evidence and that concludes our direct examination.

Do you have any further testimony?

THE WITNESS: No, I haven't.

EXAMINER NUTTER: Exhibits 1 through 5 will be entered in evidence.

Are there any questions of Mr. Gearhart?

He may be excused.

(Witness excused.)

MR. WHITE: That concludes our case.

EXAMINER NUTTER: Does anyone have anything they wish to offer in Case No. 2409?

We will take the case under advisement.

STATE OF NEW MEXICO)
) ss
COUNTY OF SAN JUAN)

I, THOMAS F. HORNE, Court Reporter, in and for the County of San Juan, 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.

Thomas F. Horne
Notary Public

My Commission expires:
10-2-65

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 2409, heard by me on 10/25, 1961.

....., Examiner
New Mexico Oil Conservation Commission