

BEFORE THE
NEW MEXICO OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
November 23, 1965

EXAMINER HEARING

IN THE MATTER OF:)

Application of Texaco Inc. for a unit)
agreement, Lea County, New Mexico.)
Applicant, in the above-styled cause, seeks)
approval of the West Vacuum Unit Area)
comprising 2000 acres, more or less, of)
State land in Township 17 South, Range 37)
East, Lea County, New Mexico, and)
Application of Texaco Inc. for a waterflood)
project, Lea County, New Mexico. Applicant)
in the above-styled cause, seeks authority)
to institute a waterflood project in its)
West Vacuum Unit by the injection of water)

Case No. ~~3344 and~~
3345.

into the Grayburg-San Andres formations)
through six injection wells located in)
BEFORE: Sections 3 and 4, Township 18 South, Range)
34 East, and Sections 33 and 34, Township)
17 South, Range 34 East, Vacuum Pool, Lea)
County, New Mexico.)

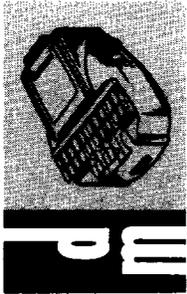
BEFORE: Daniel S. Nutter, Examiner.

TRANSCRIPT OF HEARING

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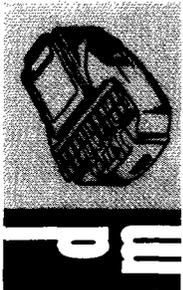
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MR. DURRETT: Application of Texaco Incorporated for a unit agreement, Lea County, New Mexico.

MR. WHITE: If the Examiner please, Charles White of Santa Fe, attorney on behalf of the Applicant. We have one witness, Mr. Yost, to be sworn.

(Witness sworn.)

(Whereupon, Applicant's Exhibits 1 through 8 marked for identification.)

MR. NUTTER: Are these cases closely enough related?

MR. WHITE: Yes, sir. I was going to ask if we could have them consolidated with case 3345.

MR. NUTTER: We will call the next case, 3345.

MR. DURRETT: Application of Texaco for a waterflood project, Lea County, New Mexico.

W I L L I A M P. Y O S T, having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. WHITE:

Q Mr. Yost, will you state your full name, please?

A My name is William P. Yost.

Q By whom are you employed and in what capacity?

A I am employed Texaco Incorporated as a petroleum engineer.

Q Are you familiar with the subject application?

A Yes, I am.

Q What is Texaco seeking in cases 3344 and 3345?

A In the first case Texaco seeks approval of a unit agreement. In the second case Texaco seeks authorization for a waterflood project in the West Vacuum Unit.

Q For secondary recovery operations?

A For secondary recovery operations, yes.

Q Now Mr. Yost, will you testify as to Exhibit Number 1?

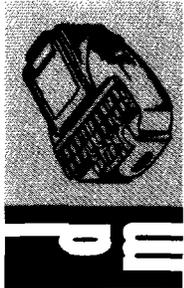
A Yes. Exhibit 1 is a plat of the over-all area outlining the proposed unit area and also indicating all properties, the operators of the properties, and the zones which have been completed within a two mile radius of the proposed unit area.

Q Does that also show the injection wells?

A Injection wells are indicated by the red triangle at each pertinent location. There are to be six of these injection wells in the initial stage and this initial stage which will be a pilot stage and this unit area consists of 2,000± acres.

Q If I'm not mistaken, in your original application didn't you say this would be a five spot.

A In the original application it was a five spot. However, since that time, this project has been re-evaluated and it appears as if an inverted nine spot would probably be



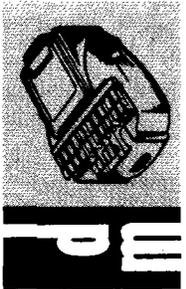
the most economical pattern. The six injection wells will be in a pilot stage. If in the event evaluation of this inverted nine spot pattern in the pilot stage indicates that a five spot pattern may be preferable, then this pattern will be converted to a five spot rather readily.

Q Now, referring to your proposed unit agreement, when did Texaco first undertake this study of the well area?

A Texaco commenced studying its property in the unit area and surrounding areas early in 1963 for the purpose of evaluating the feasibility of secondary recovery. During the course of this study it was determined that secondary recovery measures were a prospect and should be commenced in the near future. After this was determined, other operators' properties adjacent to Texaco properties were examined and it was felt that these properties were also prospective for secondary recovery and that Texaco should initiate a proposal to the operators to form a unit in this area. In the middle of 1965 a ballot letter was submitted by Texaco to these other operators requesting their approval or disapproval for further investigation under study and leading toward the study of the unit operation. All parties within the proposed area indicated an affirmative answer. From there Texaco conducted further work and arrived at various perimeters in which to unitize. Correspondence was mailed to these pertinent operators for their comments and

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approval or disapproval and after negotiations with these other operators, all perimeters were agreed upon and this unit agreement was circulated to these people for that application.

Q Is the unit agreement marked Exhibit 2?

A Exhibit 2 is the unit agreement.

Q Is it the standard API form of agreement?

A Yes. This is a model API standard form revised to meet the New Mexico State Land requirements and applicable to these specific areas.

Q Are there any amendments to be made to this unit agreement?

A Yes. Exhibit A, which is a plat of the proposed area, should be amended to exclude the southeast quarter of the southwest quarter of Section 28, Township 17 South, Range 34 East.

MR. NUTTER: Is that Tract 3?

THE WITNESS: That's Tract 3 on Exhibit A.

Q (By Mr. White) And your participation factors will be amended accordingly?

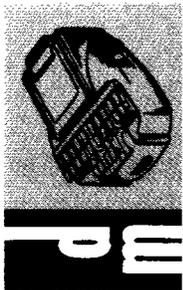
A We will delete this property.

Q What per cent of the working interests are committed?

A All of the working interests have been committed to the unit with the exception of those properties, tract numbers, in Continental owns and those in Mesa Retailers and those that

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Don Angle owns.

Q Now, where would they be indicated on your unit agreement that you referred to, where are they reflected?

A The Continental properties are indicated on the agreement as being Tract Number 6 and Tract Number 13. The Mesa Retailers and Don Angle properties are joint properties and that would be Tract Number 17 and Tract 19.

Q Do you have every reason to believe that they will be committed to the unit later on?

A Yes. Continental advised last Friday that their district office recommended that they ratify. Texaco's land department advised last Friday that the Mesa Retailers and Don Angle properties would be coming into the unit.

Q The percentage interests and the kind of ownership are reflected on Exhibit B of the unit agreement?

A They are reflected there on Exhibit B.

Q The area comprises approximately 2,000. Is that all State land?

A Yes, that's all State land.

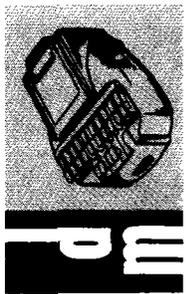
Q Do you know whether or not the State Land Commissioner will approve the unit agreement?

A The State Land has advised Texaco that they would ratify the agreement subsequent to the Oil Conservation Commission's approval of the agreement.

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Q Does that complete your testimony in reference to the unit agreement?

A There is one item there in overriding royalty interest. As indicated on Exhibit B of the proposed agreement, Martin Yates and Lillie M. Yates have an overriding royalty in Tract 17 and also Tract 19 who have not signed the agreement but we have been advised that they will be signing in the very near future.

Q Now, will you refer to your diagrammatic sketches, Exhibit Number 3, and explain the exhibit?

A Yes. Exhibit 3 illustrates what will be a typical injection well. And the log portion reproduced is a log on this well. This well being Texaco State of New Mexico "V" Well Number 6.

Q Is that the only log you have?

A This is the only log we have and also this particular well is not to be an injection well. This was submitted for the purpose of having a log to indicate the pay zones but this well will be typical of all the injectors.

Q Well, will each well that's going to be transferred to water injection be logged prior to its being converted?

A Yes, sir, it will.

Q Will this casing program include contamination?

A Yes, it will.

Q And what will be your source of water supply?

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A Exhibit 4 indicates a description of the water rights and I'll not go into the detailed description since it is spelled out on this exhibit.

Q What do you anticipate your initial injection rates to be?

A We anticipate a maximum of 600 barrels per day of water into each injection well at a maximum pressure of 2,200 psi. The initial injection rate has not been determined since these initial injection wells will be in the pilot stage and evaluation for -- the injection rate will have to be determined.

Q Are there similar waterflood projects within the area?

A Yes.

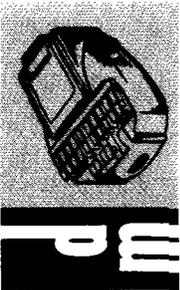
Q Is that shown by Exhibit 5?

A Yes. Exhibit 5 indicates the performance data of both pilot waterflood approximately two and a half miles northeast of the proposed unit area. They commenced their operation injecting water early in 1959 on a five spot pattern. For a while there it seemed as if this project might be somewhat questionable in its ultimate economics. However, early in 1963 Mobil increased, as indicated on these curves, their injection rate into the injection wells and the pressures thereby the oil production correspondingly increased. The water to oil ratio decreased. The gas/oil ratio decreased so that data lead

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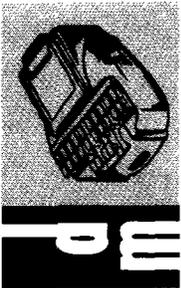
us to believe that probably a high injection rate might be the optimum method to go at rather than a lower injection rate.

Q Now, will you explain Exhibit 6 which is a structure map?

A Yes. Exhibit 6 indicates contours in the area of the proposed unit. These contours being based on the top of the San Andres formation and it also indicates a water/oil contact on the southern portion of the pool as well as the southern portion of the unit area and this structure is indicated by the contours as a continuous structure throughout the entire proposed unit area as well as the area surrounding the proposed unit which is similar to the Mobil's waterflood to the north.

Q Have you conducted any studies as to your productive performance in the area?

A Yes. Exhibit 7, referring to the lower curve on that exhibit which is a refinement of the upper curve, production decline curve extrapolated from the year commencing in 1950 to the year ending in 1958 indicated that an average of 10 barrels of oil per day per well within the unit area would reach 10 barrels a early in the year in 1962. However, as indicated on this lower curve extensive remedial work was performed on wells within the unit area in order to increase the primary producing rate. During this period of time commencing early in 1959 and ending in December of 1963 some 27 wells had remedial



work performed on them and now the production is back on decline and the remedial work has served its useful purpose. The next logical step since remedial work has served its usefulness is to commence secondary recovery operations in order to increase production.

Q In other words in your opinion it is not economically feasible to continue this remedial work?

A That is correct. The wells that can be considered responsive to remedial work have been treated.

Q Have you made a study of the daily production of each well?

A Yes. Exhibit 8 indicates the average daily production for each of these concerned wells within the unit area for the month of September, 1965.

Q How many wells are making their top allowable?

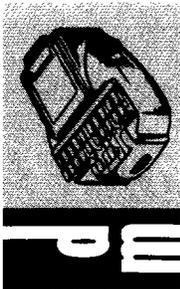
A There are currently six wells producing top allowable; four of these wells were of the later group on which remedial work was performed in order to increase production but these four should decline to considerably less than top allowable in the very near future. Also indicated on this you may see that most of the wells produce less than 10 barrels per day.

Q What per cent of the wells produce less than 10 barrels per day within the unit?

A It's 56.3 per cent or 27 of the 48 wells produce less

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than 10 barrels per day.

Q What per cent of the wells produce between 10 and 20 barrels per day?

A 29.2 per cent or 14 of the 48 wells produce between 10 and 20 per day.

Q Would you say that 87 per cent of the total wells are incapable of producing their top allowable?

A Yes, sir, that is correct. There is one well that produces 22 barrels per day so included approximately seven and a half per cent of the wells are in the later life for primary recovery.

Q Mr. Yost, did you file a copy of the application with the State Engineer, and if so, what result did you obtain?

A We filed with him. We received a copy of a letter which he submitted to the Oil Conversation Commission advising certain stipulations he would like to have incorporated and insured in the injection wells.

Q Now, are you willing to meet these requirements?

A Yes. Texaco will more than meet these requirements insofar as setting the packer at the proper depth and the cement tops and the other specifications he desires.

MR. WHITE: Did the Examiner receive --

MR. NUTTER: We have a letter dated October 29, would that be the one, Mr. Yost?

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THE WITNESS: Yes, that would be the one.

Q (By Mr. White) In your opinion would the proposed project be in the interests of conservation and tend to protect correlative rights?

A Yes. It is estimated within the unit area that the calculated secondary recovery oil will be 6,160,811 barrels.

Q And by this application you are seeking secondary rights pursuant to Rule 701?

A Yes, we do.

Q And would you like administrative approval to expand your area in accordance with the present rules?

A Yes, that is correct.

Q And is it possible that you may convert to five point instead an inverted nine?

A Yes, it's possible after the evaluation of the nine spot pattern has been performed.

Q Does that complete your testimony?

A Yes.

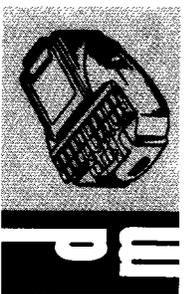
MR. WHITE: At this time we offer exhibits 1 through 8.

MR. NUTTER: Texaco's Exhibits 1 through 8 will be admitted into evidence.

(Whereupon, Applicant's Exhibits 1 through 8 were offered and admitted in evidence.)

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MR. WHITE: That completes our direct.

MR. NUTTER: Does anyone have any questions of Mr. Yost?

CROSS EXAMINATION

BY MR. PORTER:

Q Mr. Yost, these wells have been producing for quite a few years, have they not?

A Yes, sir, Mr. Porter. The initial well within the unit area I believe was completed by Ohio Oil Company in November of 1938 and during the 1940's some 23, I believe, or some 21 wells were developed during the year 1940.

Q I see.

A The remaining 23 were in the late 40's and early 50's and four were drilled during the year 1961.

Q You testified that you would expect to recover a little bit in excess of 6 million barrels on secondary recovery?

A Yes, sir.

Q Do you have the figures for the primary recovery for this particular area?

A Yes, sir, I do. The estimated primary reserve as of December 1, 1963; 2,279,000 barrels of oil.

Q And do you know much has been recovered up to now by these wells in this area?

A No, sir, I do not have that number.

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Q I see.

A I don't have that with me.

MR. PORTER: Okay. Thank you.

BY MR. NUTTER:

Q What is the participation formula for the various tracts, Mr. Yost?

A It's a two-phase formula: Phase one being based on 100 per cent on the current producing rate for the period from June 1, 1963 to December 1, 1963. This phase one formula is the remaining primary reserves and is to remain in effect approximately estimated to January 1, 1975. At that time we expect that the total primary reserves of 10,268,019 barrels of oil shall have been recovered.

Q In other words, phase one remains in effect until this amount of primary oil being 2,679,000 barrels has been recovered?

A That is correct.

Q And you expect that to be in 1975?

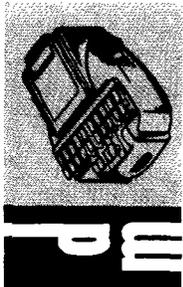
A Early in '75, yes.

Q And then it goes into phase two?

A Yes, sir.

Q And actually how do the tracts participate under phase one or phase two?

A These tracts have their formula calculated in their



percentage of current production during this six-month period, the latter part of 1963 times their remaining reserves gives their percentage for phase one participation. In phase two --

Q Well, I see it here in the unit agreement, "tract participation", under phase two would be the ratio of the ultimate primary oil production underlining each tract to the primary oil underlining all tracts.

A That's it.

Q And the participation formula is in this agreement and has been agreed to by the various working interests?

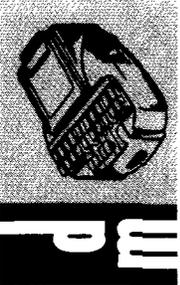
A Yes, sir, that is correct.

Q Now, in your Exhibit 3, you show a schematic diagram of one injection well. Is this a typical well?

A I believe I mentioned before this diagram is not of an injection well. This is the only well on which we have an adequate log but all injection wells will be typical of this particular installation.

Q What about the top of the cement in each of these injection wells? I notice one of the conditions of approval stated in there in their letter that was the packer should be set well below the top of the cement surrounding the 5-1/2" casing?

A Yes, sir, in all cases that will be the case. We propose to set the packer within 50 feet or less from the casing



shield. Each of these injection wells were cemented with 200 to 300 sacks of cement and that percentage would vary from say 200 per cent from base of the casing shield to the base of the salt so this should insure a good cementing program throughout the entire area.

Q And the packer will be set within 50 feet of the shield?

A Yes.

Q So it would be below the base for the top of the cement?

A Yes.

Q Now, on your production decline curves in Exhibit Number 7 you had a kick in production there in the beginning of 1964 but evidently three wells were worked over about that time?

A Three wells were treated in December of 1963 and this increased production in '64 as a resulting factor in the program.

Q Now, in 1964 you had another production kick but there is no evidence of any workovers. What do you attribute that to?

A Not knowing definitely, probably it was due to subsurface equipment repairs being made.

Q Now, of these area wells that are top allowable, you states that four are top allowable.

A There are six top allowables now, yes, sir.

Q Which would they be, Mr. Yost?



A Texaco's State of New Mexico "X" and NCT-1, Well Number 5, Texaco's "X", NCT-1 Well Number 2, and the Texaco's State of New Mexico "V", Wells Number 2, 4 and 5.

Q In other words those six wells are the six highest producers shown on Exhibit A?

A Yes, sir.

Q Well now, were any of these six wells some that were subject to remedial work back here in this period shown by Exhibit 7 or are these new completions?

A All of these production increases were realized by remedial work.

Q I see. Now, you have an inverted nine spot. What pattern is Socony-Mobil following on their flood?

A They have a standard five spot pattern.

Q They have a five spot?

A Yes, sir.

Q And the Union tract is being excluded. That well is plugged and abandoned?

A It's plugged and abandoned. It has no useful purpose really to the secondary recovery operations.

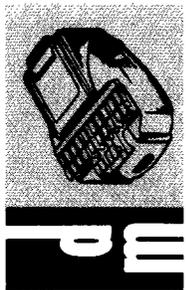
MR. NUTTER: I see. Are there any further questions of Mr. Yost? You may be excused.

Do you have anything further, Mr. White?

MR. WHITE: That concludes our presentation.

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MR. NUTTER: Does anyone else have anything they wish to offer in this particular case or either of these cases?

MR. DURRETT: If the Examiner, please. I have a statement that was left with me by Mr. Richard D. Seba, representing Shell Oil Company, from Midland, Texas. He had a statement in each case; case 3344 his statement reads: "Shell Oil Company as a working interest in the proposed West Vacuum Unit concurs with the unit area as proposed by Texaco, Inc. which comprises 2,000 acres more or less of State lands in Township 17 South, and Township 18 South, Range 34 East, Lea County, New Mexico." His statement in Case 3345 reads as follows: "Shell Oil Company as a working interest owner in the West Vacuum Unit supports Texaco's proposal to institute a waterflood project in the aforementioned unit by injecting water into the Grayburg-San Andres formation through six injection wells in Sections 3 and 4 of Township 18 South, Range 34 East and in Sections 33 and 34 of Township 17 South, Range 34 East, Lea County, New Mexico." The Commission has received a letter from Dalport Oil Company referring to case 3334, the unit agreement, stating that they request approval of the unit agreement and waterflood program. We have a letter from Gulf Oil Corporation concurring with Texaco. We have a letter from Phillips Petroleum Company concurring with Texaco in both of these applications.



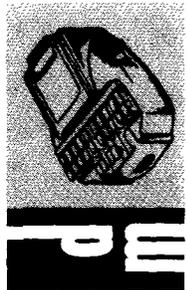
MR. NUTTER: Thank you. Is there anything further in Case 3344 or 3345? We will take the cases under advisement and call case 3346.

(Whereupon, Case Numbers 3344 and 3345 were concluded.)

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E X H I B I T S

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