STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BLDG.
SANTA FE, NEW MEXICO
4 November 1981

EXAMINER HEARING

IN THE MATTER OF:

Application of Texaco, Inc., for a Unit Agreement, Lea County, New Mexico.
and
Application of Texaco, Inc., for a pressure maintenance project, Lea County, New Mexico.

CASE 7399 and 7400

BEFORE: Daniel S. Nutter

TRANSCRIPT OF HEARING

A P P E A R A N C E S

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ROBERT J. ANTHONY

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MR. NUTTER: Call Case Number 7399.

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

MR. BATEMAN: Mr. Examiner, I'm Ken Bateman of White, Koch, Kelly, and McCarthy, appearing for the applicant, and if I might, I'd like to suggest that we hear Case 7400 combined with 7399.

MR. NUTTER: We'll now call Case 7400.

MR. PEARCE: Application of Texaco, Incorporated for a pressure maintenance project, Lea County, New Mexico.

MR. NUTTER: Cases Numbers 7399 and 7400 will be consolidated for purpose of testimony. Please proceed.

MR. BATEMAN: Thank you. I have one witness.

(Witness sworn.)

MR. BATEMAN: Mr. Examiner, before we proceed, I've noticed a minor error in the publication of Case 7400. I believe there's a 40-acre tract, if I'm not mistaken in Section 33.

MR. ANTHONY: 80 acres.

MR. BATEMAN: 80 acres, excuse me, an 80-acre tract in Section 33 of Township 17 South, Range 34 East, included both in the unit and in the pressure maintenance project application.

MR. NUTTER: Well now, the 80-acre tract in Section 33 does have an injection well on it, is that correct?

MR. ANTHONY: No, sir. That injection well is in the San Andres pay.

MR. NUTTER: Well, where is the error the then, Mr. Bateman? We didn't describe the project. We described the location of the wells, the thirteen wells are located in these sections.

MR. BATEMAN: I stand corrected. I'm sorry.

MR. NUTTER: So that are all the wells in the named sections?

MR. ANTHONY: Yes.

MR. BATEMAN: Apparently they are.

MR. NUTTER: Okay, we don't have an error, then.

MR. BATEMAN: All right, thank you.

ROBERT J. ANTHONY

being called as a witness and being duly sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. BATEMAN:

Q. Would you state your full name and place of employment for the record, please?

A. My name is Robert J. Anthony. I'm employed by Texaco, Incorporated.

Q. And in what capacity are you employed?

A. I am District Reservoir Engineer, located in Hobbs, New Mexico.

Q. And in that capacity are you familiar with the two applications that we have before us today?

A. Yes, in my capacity I chaired the Engineering Committee that developed the studies for the unit in question today.

Q. Have you previously testified before the Division?

A. Yes, I have.

Q. And made your qualifications a matter of record?

A. Yes, I have.

MR. BATEMAN: I offer Mr. Anthony as an expert.

MR. NUTTER: Mr. Anthony is qualified.

Q. Would you proceed, then, with what's been marked Exhibit Number One in Case Number 7399, the proposed unit agreement.

A. Exhibit Number One is the unit agreement. We have 100 percent working interest approval of this agreement. The royalty interest is owned 100 percent by the State of New Mexico.

Exhibit Number Two is a letter from the Commissioner of Public Lands approving this unit agreement as to form and content. You will note in the middle of the page there he indicated some advised changes. These changes were made, are incorporated in this unit exhibit -- unit agreement, Exhibit One, and were approved by the working interest owners.

Q. Mr. Anthony, the ipso facto termination date as initially expressed has been reached, is that correct?

A. Yes. I'd like to bring your attention to Article 26, page ten, which is the ipso facto termination date; was to have expired on September 1st, 1981.

In August of 1981 Texaco approved 100

percent working interest owner approval to extend that termination date to September 1, 1982.

Now, Exhibit Number Three, then, is a letter to the Commissioner of Public Lands apprising him of the fact that the working interest owners had extended the ipso facto termination date of this unit agreement.

Q. Were Exhibit One through Three prepared by you or under your direction?

A. That's correct.

MR. BATEMAN: I offer at this time Exhibits One through Three in Case Number 7399.

MR. NUTTER: Exhibits One through Three will be admitted in evidence.

CROSS EXAMINATION

BY MR. NUTTER:

Q. Mr. Anthony, now what was that last statement you said, that the Texaco and the working interests extended that termination date, and you advised the Land Office.

Has the Land Office approved that extension?

A. We have not received a letter from the Land Office approving the extension of the date, nor have

we received a letter disapproving. We have assumed approval since they did not advise us otherwise.

Q. But that would have to be more or less an amendment to this unit agreement, then, wouldn't it, because the unit agreement states that the thing is terminated, in effect.

A. Yes, I believe that would be the legal procedure, yes, sir.

Q. Since you haven't received any communication from the Land Commissioner as yet.

A. No, sir, we have not.

MR. NUTTER: Are there any other questions of Mr. Anthony? He may be excused.

MR. BATEMAN: Mr. Anthony is going to proceed with testimony in Case 7400.

MR. NUTTER: Oh, okay.

Q. Mr. Anthony, would you then proceed with what's been marked Exhibit Number One in Cause No. -- Case Number 7400?

A. Exhibit Number One is a map of a portion of the Vacuum Field in Lea County, New Mexico, indicating all the completions within a two-mile area of the proposed unit boundary. It also indicates the completions within a half mile radius, as indicated by the circles, around each

proposed injection well.

You'll note at the bottom of the page an index of abbreviations indicating the zone that each of the wells is completed in.

Q. There are quite a number of productive horizons in this area, then.

A. That is true.

Q. Would you proceed then with Exhibit Number Two?

A. Exhibit Number Two is a listing of all of the wells within the half mile radius of the injection wells in the proposed unit. This listing gives the well name and number; the casing sizes and setting depths; and the cement program; and the top of the cement behind each string of casing. It also gives the total depth, completion interval, the location of the well, the completion date, and the initial stimulation treatment.

I'd like to call attention to the center of the page under production casing cement top. You will note some numbers there with "see remarks" beside each. These refer to some remarks on the second page of this exhibit wherein the original cement top behind the production string was not sufficiently high to protect the salt section and isolate it from the Ogalalla formation near the surface here,

and in each of these cases a remedial procedure was performed on these wells to perforate the production casing at the indicated depth and bring cement from that point up to the surface behind the production pipe.

This effectively isolates the salt section from the Ogalalla formation at the surface.

MR. NUTTER: And this was done as the result of surveys --

A. That's right.

MR. NUTTER: -- or possible problems resulting from the other waterflood in the area, is that correct?

A. That's right. The bradenhead surveys indicated pressure or fluid flow from the bradenhead on these wells and they were subsequently re-cemented.

MR. NUTTER: Didn't have anything to do with this flood; it was a previous flood.

A. That's true. That's true.

Q. Mr. Anthony, for the record, there are other pressure maintenance projects in the immediate area, is that correct?

A. Yes. Almost all the San Andres in the Vacuum Field is under waterflood or pressure maintenance operations and the remainder of the Abo North Field is under pressure maintenance operations at this time.

Q. Would you proceed then with Exhibit Number Three?

A. Exhibit Number Three is a structure map underlying the proposed unit area of the Upper Abo zone, indicating a structural dip to the west of approximately 100 feet per mile. The productive limits in this area have been defined by a permeability pinchout to the west. This was determined by a couple of noncommercial wells drilled just to the west of the proposed unit area.

Q. Would you give the Examiner a brief development history of the proposed unit area?

A. Drilling in the unit area began in late 1971 with Southland Royalty's "NV" State No. 2, which is located in the southeast quarter of the northeast quarter of Section 28. Development continued, then, through 1972 and into early 1973 throughout the area.

Q. Let's proceed, then, with Exhibit Number Four.

A. Exhibit Number Four is a porosity log, Sidewall Neutron Porosity Log on Texaco's New Mexico "T" State Noncontiguous Tract No. 4 Well No. 3.

This indicates the proposed unitized interval from a subsea depth of -4500 feet to -4850 feet. The completions in the proposed unit area are in the porous

interval indicated on this log from 8800 to 8900 feet. This porosity interval does correlate with the interval being injected into the Mobil's offsetting North Vacuum Abo Unit.

Q. What is the production history of the wells in the proposed unit?

A. Exhibit Number Five indicates the primary production of the proposed unit area, which encompasses 2000 acres, 25 active producing wells.

As of August 1st, 1981, the cumulative primary production from this area was 1,666,000 barrels.

The ultimate primary for the area, as determined by the Engineering Committee from decline curve extrapolation was 2,449,000 barrels. Therefor, the remaining primary as of August 1st, 1981, is 783,000 barrels.

Our prediction of pressure maintenance recovery from this recommended unit is 1,837,000 barrels.

Q. What is the present production from the wells in the area?

A. July being the last date complete records were available, the producing rate was 296 barrels of oil per day. This breaks down to 12 barrels of oil per day per well, which is more than what is classified stripper; therefor, this unit area will be necessarily defined as a pressure maintenance project, also.

Q. And would you describe to the Examiner what the proposed plan of operation would be?

A. The plan of operation will be to inject fresh water into the Abo North zone into 13 wells, which are presently producing wells but will be converted to injection wells, on 160-acre 5-spot pattern. This pattern is a continuation of Mobil's North Vacuum Abo Unit pattern and it is compatible with that -- with that pattern.

Q. Is that shown on Exhibit Number Six?

A. Yes, that is Exhibit Number Six. Now, the -- on the east -- east side of the field, or the right side of this map, Mobil has the North Vacuum Abo East Unit, which is currently injecting water.

The center portion of the map, the larger portion of the field, is Mobil's North Vacuum Abo Unit, and the proposed unit, then, is on the left side of the map, or the west side of the field, and encompasses -- then this will encompass almost all the remaining Vacuum Abo North wells; therefor the entire field will be under pressure maintenance operations if this application is approved.

MR. NUTTER: Are those other projects also classified as pressure maintenance?

A. That's true.

Q. Will you proceed, then, with Exhibits

Seven and Eight?

A. Exhibit Seven is a map of the proposed unit area indicating the original well numbers, or the present well numbers within the unit area.

Exhibit Eight, then, is the same map with new well numbers indicated. These numbers will become effective upon the date of unitization of this unit.

Q. Would you continue then with Exhibits Nine, Ten, and Eleven, and describe the proposed completion of the injection wells?

A. In this unit area we have three different types of completions, therefor we've presented three schematics here indicating those three different types.

Exhibit Number Nine being a completion wherein a 5-1/2 inch liner was hung in the 8-5/8ths inch pipe. This indicates then that we will run our 2-3/8ths plastic-coated tubing on a packer approximately 15 -- 50 feet above the perforations and the annulus then will be loaded with an inhibited fluid.

Number Ten is the same type completion; however the 5-1/2 goes all the way back to the surface.

There is one well, Gulf's Ritz State Well No. 1, which is a dual completion, is presently downhole commingled. Gulf, as operator of this well, wishes to con-

tinue producing the San Andres completion here so that the proposed injection will be down a string of 2-1/16th tubing set in a packer 50 feet above the perforations with Gulf's San Andres production string, 2-1/16th tubing also, hung a tubing anchor at approximately 4650 feet.

Now, since we cannot load the annulus with an inhibited fluid here, we will continuously inject corrosion inhibitor down the annulus of this well to prevent corrosion of our injection string.

Q. Mr. Anthony, what injection pressures do you expect to encounter?

A. In the other two active units in the area the initial pressures required to inject into this formation were about 3000 psi. Now, in Case Number 6248, which was the hearing for pressure maintenance in Mobil's North Vacuum Abo East Unit, they developed a fracture pressure for the Vacuum Abo North Field, and we would like to use those data to justify a higher than the current standard .2 psi per foot maximum injection pressure in our unit. I believe in the North Vacuum Abo East Unit they were afforded a maximum injection pressure of 3500 psi, and we would ask for that same pressure based on the information that they developed as frac pressure for this reservoir.

MR. NUTTER: What case number was that?

A. 6248.

MR. NUTTER: And they were authorized 3500 psi, then?

A. That is correct.

MR. NUTTER: And the rule of thumb, .2 of a pound, would give you probably about 1700 psia.

A. That is correct. That is correct. And we feel that we could not inject more than say three to four weeks at that -- at that pressure, and probably less. We might not be able to inject for any length of time at all at 1700.

MR. NUTTER: What volume of water do you anticipate injecting into these wells?

A. We expect to average approximately 2500 barrels of water per day and our pressures will probably start out, as I indicated, at 3000 psi, and before the flood is depleted, it will probably reach 4500 psi. That's been the experience of Mobil in their floods.

MR. NUTTER: That's surface pressure you're talking about.

A. That's surface pressures I'm talking about at all times.

Now, I will state that Texaco, as operator of the unit, will as soon as possible after injection

is started in this unit, determine the frac pressure within the unit area and we will inject below that determined frac pressure or the maximum pressure afforded us by the Oil Conservation Division.

MR. NUTTER: Now, this -- in this Case Number 6248, you say Phillips obtained that 3500 pound limit and that was in what project?

A. In the North Vacuum Abo East Unit.

MR. NUTTER: Well, isn't that a Mobil project?

A. Mobil. Did I say Phillips?

MR. NUTTER: Yeah, you said Phillips.

A. I'm sorry. I'm sorry. It was -- it was Mobil. I don't know why I said Phillips.

MR. NUTTER: Okay. How about the central project there, the big one that they operate, what pressure are they using there?

A. Their maximum pressure currently is 4800, I understand.

They have, I believe, or I have heard that they have asked for permission to operate at this higher range and have shown by step rate testing that they are not fracing the reservoir at this pressure at this late stage in life of the flood. They've been injecting since August of

1973.

MR. NUTTER: So they probably got in before the door was shut on injection pressures, didn't they?

A. That is correct. That is correct.

MR. NUTTER: They started out with high pressures --

A. Yes.

Q. -- from the beginning.

A. Uh-huh.

MR. NUTTER: Maybe that's why they had that survey in that other one.

A. Yes.

Q. Mr. Anthony, to go back a little bit, the data introduced in Case Number 6248 by Mobil, I believe, was by data obtained from the North Vacuum Abo Unit, is that correct?

A. Yes, I believe they used a total of 62 step rate tests on various wells within the North Vacuum Abo -- North Vacuum Abo Unit. Some of those wells being very near the proposed unit. Well No. 220 in the North Vacuum Abo Unit was one of those wells which directly off-sets our unit boundary, one 80-acre location there in --

Q. That's shown on Exhibit Six, I believe, is it not?

A. Yes, Exhibit Six indicated that. That's in the southeast quarter of the southeast quarter of Section 22. And we feel that the pressure data that they arrived at would be extrapable to our unit area, since the reservoir is quite similar.

Q. Will you proceed then with Exhibit Number Twelve?

A. Exhibit Number Twelve is the one we were just talking about, Ken, in the -- where this --

Q. All right, but I don't believe we've described it for the record yet.

A. Exhibit Number Twelve is the frac pressure determination from these 62 step rate tests that Mobil ran in the North Vacuum Abo Unit. They were taken over a 3-year period starting immediately after injection was commenced in their unit.

Therefor the initial pressure of 3150 psi would probably be the minimum pressure that we would encounter in our unit since it is similar to the North Vacuum Abo Unit and it's about the same stage of depletion, I assume, that their unit was when they started the flood.

Q. Do you happen to have any data on what the frac pressure step test indicated on Well No. 220?

A. Well No. 220 was tested in December of

1974. It had been injecting -- on injection for approximately 18 months. The cumulative injection was approximately 100,000 barrels.

The step rate test on that well indicated a parting pressure of 4150 psi. I don't know what the bottom hole pressure was, which certainly affects the fracture pressure of the reservoir; however, it was probably increased above the initial bottom hole pressure at the commencement of injection, but it was at4150 psi after 18 months of injection.

MR. NUTTER: Is that all part of the record there in --

A. In Case 6248.

MR. NUTTER: -- Case Number 6248?

A. That is correct. That's part of the record.

MR. NUTTER: If you don't mind, Mr. Bateman, we'd like to make reference to that case in making an analysis of this case.

MR. BATEMAN: Certainly.

Q. Just one further question on Exhibit Twelve. It indicates that the fracture pressure increases over time. Would you expect that to occur also in this project?

A. Yes. As we -- as we inject water into this reservoir and raise the average reservoir pressure in the area, we expect the fracture pressure of the formation to increase at a corresponding rate.

Q. And what maximum pressure are you requesting at this time?

A. 3500 psi, as was afforded the North Vacuum Abo East Unit.

Q. Have you obtained a water analysis of fresh water in the area?

A. Yes. Exhibit Thirteen is a water analysis of two fresh water supply wells immediately adjacent to the proposed unit area, these being Duval water supply well and the Kerr-McGee water supply well. The locations of these wells are indicated on the analysis.

This analysis indicates that the chloride content of the Ogalalla water at date of this analysis was 82 parts per million and 67 parts per million, respectively; therefor, there is no salt contamination in this area at this time.

Q. Have you obtained a water supply for the proposed pressure maintenance project?

A. Texaco is currently negotiating with the City of Carlsbad, the owner of the Double Eagle Water Company

for a fresh water supply in the area. Upon completion of this contract we will purchase water from Double Eagle. This water will be from the Ogalalla aquifer from Double Eagle water rights in Lea and Eddy County.

Exhibit Number Fourteen is a water analysis of the supply water from Double Eagle's system, and an analysis of the formation water from the Vacuum Abo North Field. Under our direction Martin Water Labs of Midland, Texas, performed a compatibility test of these two waters and it indicates at the bottom of this analysis that there are no incompatibilities between these two waters that would pose any problems to our injection system.

Q. Mr. Anthony, do you believe that the approval of this application will be in the best interests of conservation, and will protect correlative rights and prevent waste?

A. I do.

Q. Were Exhibits One through Fourteen prepared by you or under your direction?

A. They were.

MR. BATEMAN: Mr. Examiner, I offer Exhibits One through Fourteen at this time and we have no further direct testimony.

MR. NUTTER: Exhibits One through Four-

teen will be admitted in evidence.

CROSS EXAMINATION

BY MR. NUTTER:

Q. Mr. Brooks, I notice down here at the bottom of this last exhibit that the Martin Laboratories indicate that if you combine produced water with this fresh water and allow oxygen into the water that you're going to have an iron oxide precipitate unless you treat the water.

Do you intend to recycle your produced water?

A. That's true.

Q. And you will treat it to avoid that?

A. We will treat the fresh water to --

Q. Remove the oxygen.

A. -- remove any oxygen from the fresh water. That's standard --

Q. To avoid the precipitate.

A. That's right. That's standard operating procedure.

Q. But you will be recycling your produced water.

A. That's true.

Q. Now are the injection wells also shown

on Exhibit Number Two?

A. Yes, sir, I believe every completion within that circle around each injection well, including the proposed injection wells, is included.

Q. Okay.

A. Yes, they are.

Q. Now on those figures you gave for production figures, those were through August of '81 or beginning of August of '81?

A. Up to August 1st; through July.

Q. Okay. That's at 8-1, then.

A. Yes.

Q. Now what was the cum at that time?

A. 1,666,000 barrels.

Q. And you estimated your total ultimate cum would be two four forty nine?

A. Yes.

Q. So you predict you have remaining primary reserves of 783,000.

A. That is correct.

Q. Now did you give us an estimate of what you expect on pressure maintenance to increase those?

A. That's right, we expect to recover an additional 1,837,000 barrels.

Q. That's additional on top of the remaining primary of 783?

A. That is correct.

Q. All right, now you say you're producing at about 296 barrels per day. You have, what is it, 25 wells in there?

A. Yes.

Q. What is the range of production on the individual wells in this area?

A. they run from 3 barrels a day up to maximum of 25, I believe.

The majority of the wells produce in excess of 10 barrels a day, which is normally classified as a stripper well.

Q. Well, it would be at a shallow depth.

A. Right.

Q. I don't think I'd say 10 barrels at this depth would be stripper wells. I think you could say 12 at this depth would be considered a stripper.

A. We would certainly accept that.

Q. You wouldn't have an objection to this being classified as a waterflood rather than a pressure maintenance?

A. No, sir, we would not. We would have

no objection whatsoever.

Q. It's simpler to administer.

A. Yes, sir, certainly is. Takes a lot less paper work.

MR. NUTTER: Are there any further questions of Mr. Anthony? He may be excused.

Do you have anything further, Mr. Bateman?

MR. BATEMAN: Nothing further, thank you.

MR. NUTTER: Does anyone have anything they wish to offer in Case 7399 and 7400, consolidated?

We'll take the cases under advisement.

(Hearing concluded.)

C E R T I F I C A T E

I, SALLY W. BOYD, C.S.R., DO HEREBY CERTIFY that the foregoing Transcript of Hearing before the Oil Conservation Division was reported by me; that the said transcript is a full, true, and correct record of the hearing, prepared by me to the best of my ability.

Sally W. Boyd CSR

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 7399-7400 heard by me on 11/4 1981.

Examiner
Oil Conservation Division

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