

BEFORE THE
NEW MEXICO OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
April 7, 1968.

EXAMINER HEARING

IN THE MATTER OF:

APPLICATION OF TIDEWATER OIL COMPANY FOR A
UNIT AGREEMENT, LEA COUNTY, NEW MEXICO

Case No. 3233

APPLICATION OF TIDEWATER OIL COMPANY FOR A
WATERFLOOD PROJECT, LEA COUNTY, NEW MEXICO

Case No. 3234

BEFORE:

ELVIS A. UTZ

TRANSCRIPT OF HEARING

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MR. UTZ: Case Number 3233.

MR. DURRETT: Application of Tidewater Oil Company for a unit agreement, Lea County, New Mexico.

MR. MORRIS: Mr. Examiner, I am Richard Morris of Seth, Montgomery, Federici & Andrews, Santa Fe, appearing in behalf of the applicant; and at this time I move for the consolidation of this case with Case Number 3234.

MR. UTZ: Cases Number 3233 and 3234 will be consolidated for purposes of testimony, but separate orders will be written.

MR. MORRIS: We will have two witnesses, Mr. Jerry Jones and Mr. Bob Miller, and ask that they be sworn, please, sir.

MR. UTZ: Are there any other appearances in this case? You may proceed.

* * *

J E R R Y J O N E S, the witness, having been duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. MORRIS:

Q Please state your name, by whom you are employed and in what capacity.

A Jerry Jones; I am employed by Tidewater Oil Company as a landman.

Q Where are you located?

A Midland, Texas.

Q Are you familiar with the application of Tidewater Oil Company in Case Number 3233?

A Yes, I am.

Q What does Tidewater seek by that application?

A Tidewater seeks approval of a unit agreement for the East Eumont unit, which comprises an area of 5,535 acres consisting of federal, state and fee lands in Townships 18, 19 and 20 South, Range 37 East, Lea County, New Mexico.

Q For what purpose does Tidewater seek to unitize this acreage?

A For the purpose of conducting a secondary recovery operation.

Q Will the details of that secondary recovery operation be presented by Mr. Miller in Case Number 3234?

A Yes.

Q Referring to what has been marked as Exhibit 1 in this case, would you state what that is.

A Yes. This is a bound copy of a unit agreement and unit operating agreement for the East Eumont unit.

Q Referring first to Exhibit A to this Exhibit 1, will you state what that is.

A Yes. Exhibit A is a plat that denotes the outline

of the unit area by heavy hatched marks. The tracts within the unit are numbered. The federal, state and fee lands are appropriately marked on this plat.

Q Is each tract within the unit area keyed by a number inside a circle?

A Yes, it is.

Q And those tract numbers are keyed over to the Exhibit B, to the unit agreement just following Exhibit A?

A That is correct.

Q Since there are a considerable number of working interest owners in this unit agreement, I won't ask you to name all of them, Mr. Jones; but does a list of the working interest owners in the unit appear as a recapitulation at the end of Exhibit B, where each working interest owner's presumed unit participation in the unit area is shown?

A It is. That is Exhibit B, Part 2.

Q Who is the largest working interest owner in this unit?

A Tidewater Oil Company.

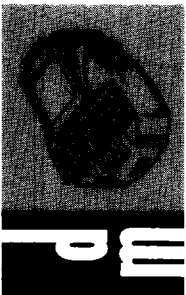
Q And that is with approximately 14½%?

A That's correct. And we will be the operator.

Q You will be the unit operator?

A Yes.

Q What is the status of the commitment of these



working interest owners to the unit agreement?

A Of the unit as a whole at the present time, 93.16% of the working interest owners have ratified. That is all of them, with the exception of three. Two of the three own less than 1%, and the third one is Texaco, with 6.8%. Texaco has indicated that they will approve this--they are at the present time circulating the instrument through their company for approval, and upon ratification by them we will have a working interest of 99.9%.

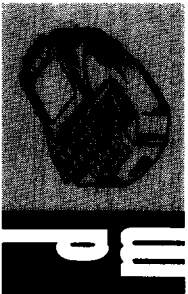
Q And are you continuing your efforts to secure joinder of the other working interest?

A We are, and we feel fairly confident that we will have 100%.

Q What is the status of commitment of overriding royalty and royalty interests?

A Well, insofar as royalty interest is concerned, of course, we have only contacted the fee royalty, which makes up 17.45% of the unit area. This fee royalty--we have acquired 75%, and we feel like we will obtain substantially all of it. We are continuing our efforts and will make personal contacts. There are a number of overriding royalty owners. All of them but two have signed up. Under one tract there is 1.36% yet to sign, and that is all of the overrides.

Q As to the State Land Office and the United States



Geological Survey, where do you stand with respect to their tentative approval of the agreement?

A Agreements have been submitted to both the State Land Office and the United States Geological Survey, and they have both indicated that they will approve it, and they have given tentative approval of the contents of the agreement, and we anticipate no problem there.

Q What is the form of the unit agreement?

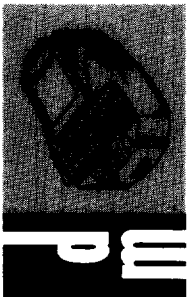
A The form of the unit agreement is a general form that is widely used within the industry to effect secondary recovery operations wherein federal, state and fee lands are embraced.

Q Under the unit agreement, what formations are unitized?

A We are unitizing a formation from the top of the Yates to the top of the Grayburg, which is an interval classified by the Commission as the Eumont pool.

Q What is the participation formula in this unit agreement, just generally?

A Well, the participation formula is set out on page 10, and it is a one-phase formula, and the parameters are 5% surface acres plus 5% current production plus 90% cumulative production. In other words, the field is nearing its primary limit, and this 90% cumulative production is pretty close to



primary production.

Q Also on page 10 of the unit agreement in Section 13 there is a provision concerning how tracts within the unit will qualify for participation in the unit. Do you anticipate that there will be any substantial problems of tracts qualifying for participation?

A No, I don't think so at this time. Assuming that the Federal Government and the State of New Mexico join, we will have 60 out of 64 tracts qualified, and we lack a small percent on those four that don't as yet qualify.

Q Will the formation of this unit facilitate the institution of secondary recovery operations in this area?

A Yes, it will.

Q What is the effective date of this unit?

A July 1, 1965.

Q Did you make any special request to the Commission for prompt approval of this unit, due to the effective date?

A Yes. We have to revise our agreements and make our applications with the USGS and the State Land Office, and we would appreciate as prompt a decision as possible.

MR. MORRIS: At this time we offer in evidence Applicant's Exhibit 1 in Case 3233, and that is all I have of this witness.

MR. UTZ: Without objection, Exhibit 1 will be

accepted into the record of this case. Are there any questions of the witness? The witness may be excused.

(The witness thereupon withdrew from the stand.)

* * *

R. N. M I L L E R, the witness, having been duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. MORRIS:

Q Mr. Miller, will you please state your name, by whom you are employed and in what capacity, and where you are located.

A My name, R. N. Miller; employed by Tidewater Oil Company as district engineer, Midland, Texas.

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

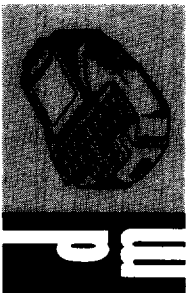
A Yes, sir, I have.

Q Are you familiar with Tidewater's application in Case Number 3234?

A Yes, sir.

Q What is it that Tidewater seeks by this application?

A Tidewater seeks authority to institute a waterflood project in the East Eumont unit area by injection of water into the Yates Seven Rivers and Queen formations through 69 wells in the unit area.



Q Referring first to what has been marked Exhibit 1 in this case, state what it is and what it shows.

A Exhibit 1 is a map of the northeastern portion of the Newmont multipay area, showing ownership of the working interest and royalty interest within a $2\frac{1}{2}$ -mile radius of each injection well in the producing formation from which these wells are produced; the unit outline of the proposed East Eumont unit area, proposed injection wells, the initial 80-acre five-spot pattern, and location of cross-section AA Prime and BB Prime through the East Eumont area. The designation of Eumont wells is by a capital "Q," small "n," for "Queen."

Q Referring next, Mr. Miller, to Exhibit 2, does this exhibit reflect the current and cumulative production from the wells in this unit area?

A Yes, sir, it does.

Q What does that exhibit show?

A This exhibit shows that the 131 producing wells in the East Eumont unit area in December, 1964 produced just slightly above 5,000 barrels of oil for the month. The average per well production is less than two barrels per day. The best well in the unit area in December produced 382 barrels. Cumulative production has been 2.9 million barrels for an average of 22,000 barrels per well. At the present time there are, out of the 131 wells, 34 NIO wells. For all practical

purposes the East Eumont unit area can be considered 100% depleted. Although there may have been a few wells operating above the economic limit, the area as a whole produced below the economic limit.

Q The wells would be classified properly as stripper wells, then?

A Yes.

Q Referring next to Exhibit 3, state what that exhibit is and what it shows.

A Exhibit 3 shows the East Eumont unit area and the proposed unit well designations, the wells which will be converted to injection to form the 80-acre five-spot pattern, and the 80-acre five-spot which will be the initial pilot area.

Q As a companion exhibit to Exhibit 3, would you refer also to Exhibit 4. Is that exhibit a tabulation of the proposed injection wells as designated on Exhibit 3?

A Yes, sir, it is. It is a corrected exhibit to one previously furnished the Commission and the State Engineer's Office when the application was filed. This exhibit shows the unit well designation, the current operator and the lease, the well number with the distance from the section lines, the NMOCC unit in which the well was drilled, the section, township and range, the size surface pipe and depth, size of production casing and depth, the amount of cement, the top of

cement when surveys were run and the estimated top of cement when surveys were not run, the existing perforations in each well, the total depth of the well and the plug-back total depth of the well. It further shows the well unit designation for proposed injection wells to be drilled, which will have a casing program such that surface pipe would protect fresh water sands in the area, and the production string would be either 4½ or 5½-inch casing set to total depth and perforated. A complete set of logs, inasmuch as we had them available, have previously been furnished to the New Mexico Oil Conservation Commission and the State Engineer's Office, of these injection wells.

Q Those were furnished with the application?

A Yes, sir, they were.

Q Referring next to Exhibit 5, what does that exhibit show?

A Exhibit 5 shows the injection distribution system that will be utilized in the East Eumont unit, with the locations of the three injection stations, whereby this would have a north segment, a center segment and a south segment, with each plant probably having their own source well. Upon favorable response from the pilot area, the south segment would be put under waterflood and expanded northward, as performance and economics indicated.

Q What will be the source of the water to be used in this project?

A We have an application before the State Engineer's Office to drill a San Andres water supply well in the southeast southeast of Section 35, 19-37, the San Andres being non-potable brackish sour water.

MR. UTZ: What was the location again?

A Southeast southeast--it's going to be very close to the south plant, Mr. Utz. Southeast southeast of Section 35, 19-37.

MR. MORRIS: What will be your anticipated water requirements for this project?

A Makeup water requirements from the San Andres will be in the neighborhood of 16,000,000 barrels, with all produced water re-cycled and re-injected, with 40,000,000 injected.

Q What will the rate of injection per well per day be?

A 350 barrels at a well pressure of approximately 2200 pounds. The plant will be designed to be up to 2200 pounds at the well head.

Q As I understand it, your pilot project will be put on first, and then if that is successful you will then put into operation the water system, which is the most southerly one shown on Exhibit 5?

A That is correct.

Q And then the project will be expanded northward from that?

A Yes, sir, that's correct.

Q Referring next to Exhibit 6, would you state what that is.

A Exhibit 6 is Cross-Section AA Prime which was shown on Exhibit 1, and is a north-south cross-section through the unit area. This shows the top of the Queen formation, the top of the Penrose and the Penrose section subdivided into Zones 1, 2, 3, 4, 5 and 6. The main pay zone in the East Eumont area is Zone 4 and is continuous over the area. Zone 2 and Zone 3 are productive over a limited area of the unit area. Zones 1, 5 and 6 are not continuous over the field and are not considered to be floodable. So primarily we are concerned here today with the flood of Zones 4, 2 and 3.

Q That was the north-south cross-section, the line which was shown on Exhibit 1?

A That's correct.

Q Also on Exhibit 1 you had designated Cross-Section BB Prime. Do you have that cross-section?

A Yes, sir--that is Exhibit 7, and is an east-west cross-section through the unit area, and shows the top of the Queen, the top of the Penrose, the six zones in the Penrose;

it shows Zone 4 to be the main pay and Zones 2 and 3 which will also be flooded.

Q Just briefly, what are the reservoir characteristics of Zone 4 and Zones 2 and 3?

A Zone 2 has an average thickness of five feet, a porosity of 10.8% and permeability of six millidarcies. Zone 3 has a thickness of four feet, average porosity of 10.2% and permeability of 1.7 millidarcies. The main pay zone, Zone 4, has a thickness of 7.3 feet, porosity of 14.6% and permeability of 9.2 millidarcies, based on core analyses through the unit area.

Q Do you expect to be able to drill an injection well and inject into Zones 2, 3 and 4 simultaneously?

A Through one stream of water?

Q Yes.

A We don't know at this time.

Q Are Zones 2, 3 and 4 all continuous over the field?

A No, sir, they are not. Zone 2 and Zone 3 are limited in areal extent, while Zone 4, the main pay zone, is continuous over the unit area.

Q Will you attempt to inject water into these three zones simultaneously, where the three zones are present in a given area?

A In the pilot area we will inject with one stream of water, and injectivity profiles will be conducted. If it becomes necessary to split the streams of water so that we can inject the proper amount of water into Zones 2, 3 and 4, there will be dual or triple injection wells where deemed advisable.

Q Are the areas where you have more than just Zone 4 present, shown on Exhibit 8?

A Yes, sir.

Q How are those areas shown?

A The areal extent of Zone 2 is shown in red, and covers approximation a section and a half. Zone 3 is shown in blue--outlined in blue, and is located in the north central part of the unit, in an area of approximately three-quarters of a section; and in the extreme south part of the area in approximately one-half of the section.

Q And Zone 4 is continuous throughout the unit area?

A Yes, sir.

Q So as I understand your proposal, tests will be run to see whether by a single stream of injection you can flood Zones 2, 3 and 4, or Zones 2 and 4, or Zones 3 and 4, as they may exist in any given well, to see if that can be done without having to inject through a dual completion or a triple completion injection line?

A That's correct.

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Q But if it isn't successful through a singly completed well, then you would go to the dual and triple completions, is that right?

A That's right.

Q And this will depend upon the tests that are yet to be run?

A Yes, sir, it will depend on the performance of the injection wells themselves, as we put them under waterflood.

Q Do you have a diagrammatic sketch of typical injection wells for single, dual and triple completions?

A Yes, sir, Exhibit 9A would be a typical single zone injection well, Exhibit 9B a dual injection and 9C a triple. In each case water would be conducted to the producing string by means of tubing with packers set above and/or below the zone, as required. The tubing would be protected from corrosion by plastic coating. The packer would be protected by plastic coating and the packer fluid treated with a corrosion inhibitor, to be placed above the top of the packer.

Q With respect to the injection wells, will packers be located within the interval where cement is behind the pipes?

A Yes, sir, in all cases the uppermost casing packer will be located between 25 and 35 feet of the top perforation, and in no case will the packer be set above the top of the cement on the outside of the casing.

Q Mr. Miller, in your opinion will this project have the effect of preventing waste and protecting correlative rights?

A Yes, sir, it will. This project will recover an estimated 5.2 million barrels which would not otherwise be recovered.

Q Were Exhibits 1 through 9 A, B and C prepared by you or under your direct supervision?

A Yes, sir, they were.

MR. MORRIS: We offer Exhibits 1 through 9A, B and C into evidence.

MR. UTZ: Exhibits 1 through 9C will be entered into the record of this case.

MR. MORRIS: That's all I have, Mr. Examiner, of Mr. Miller.

CROSS-EXAMINATION

MR. UTZ: On Exhibit 8 the red outline was which zone?

A Zone 2.

Q And the blue?

A Zone 3.

Q And Zone 4 is throughout the entire area?

A Yes, sir.

Q Is Exhibit 4 a complete and accurate list of the

wells you desire to have approved as injection wells in this unit?

A Yes, sir, it is a complete list of the existing wells and numbers are shown where the proposed injection wells would be drilled.

Q That shows only the injection wells?

A Yes, sir.

Q And there are 131?

A No, sir, there are 131 wells in the unit. There would be 69 injection wells.

MR. UTZ: Are there other questions? I don't recall whether you stated this or not--you desire to operate this under Rule 701, do you not?

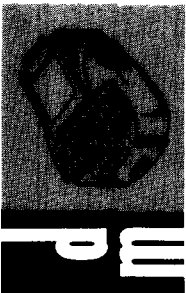
A Yes, sir.

MR. UTZ: Are there any further questions of the witness? Are there other statements to be made in this case? The witness may be excused. The case will be taken under advisement.

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STATE OF NEW MEXICO)
) ss
 COUNTY OF BERNALILLO)

I, ELIZABETH K. HALE, Notary Public and Court Reporter,
 do hereby certify that the proceedings in the foregoing case
 were taken and transcribed by me, and that the foregoing is
 a true and correct transcript of proceedings to the best of
 my knowledge, skill and ability.

IN WITNESS WHEREOF, my hand and seal of office this
 10th day of April, 1965.

Elizabeth K. Hale
 Notary Public

My commission expires
 May 23, 1968.

I do hereby certify that the foregoing is
 a complete record of the proceedings in
 the Boarder hearing of Case No. 3233,
 heard by me on *April 7*, 1965.

Shirley G. J. J. Examiner
 New Mexico Oil Conservation Commission

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