BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
June 26, 1963

EXAMINER HEARING

IN THE MATTER OF:

Application of Continental Oil Company for a unit agreement, Chaves County, New Mexico. Applicant, in the above-styled cause, seeks approval of the Eastcap Queen Pool Unit Area comprising 1480 acres of State and Fee lands, located in Township 14 South, Range 31 East, Chaves County, New Mexico. — Case 2837

Application of Continental Oil Company for a waterflood project, Chaves County, New Mexico. Applicant, in the above-styled cause, seeks authority to institute a waterflood project by the injection of water into the Queen formation, Caprock Queen Pool, through 17 wells located in Sections 22, 23, 27, 34, and 35, Township 14 South, Range 31 East, Chaves County, New Mexico. — Case 2838

BEFORE: Daniel S. Nutter, Examiner.

TRANSCRIPT OF HEARING

MR. NUTTER: The hearing will come to order, please. We will call Case 2837. Application of Continental Oil Company for a unit agreement, Chaves County, New Mexico. We will also call Case 2838. Application of Continental Oil Company for a waterflood project, Chaves County, New Mexico.

MR. KELLAHIN: If the Examiner please, Jason Kellahin, Kellahin & Fox, Santa Fe, representing the applicant. I would like at this time to move that the two cases are consolidated for the purpose of receiving testimony only.

MR. NUTTER: Is there objection to consolidation of Cases 2837 and 2838 for the purposes of taking testimony? The cases will be consolidated.

MR. KELLAHIN: We have two witnesses we would like to have sworn, please.

(Witnesses sworn.)

(Whereupon, Applicant's Exhibits 1, 2 & 3-c were marked for identification.)

VICTOR T. LYON

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

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q Would you state your name, please?

A Victor T. Lyon.

Q By whom are you employed and in what position, Mr. Lyon?

A Continental Oil Company, as Senior Engineer located in Roswell, New Mexico.

Q Have you previously testified before the Oil Conservation Commission and made your qualifications a matter of record?

A Yes, sir.

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

MR. NUTTER: They are.

Q Mr. Lyon, are you familiar with the application of Continental Oil Company in Case No. 2837 pertaining to the Eastcap Queen Pool unit agreement?

A Yes, sir.

Q Are you familiar with the unit agreement?

A Yes, sir.

Q Referring to what has been marked as Exhibit No. 1, would you identify that exhibit, please?

A Exhibit No. 1 is the unit agreement for the Eastcap Queen Pool Unit. The copy which I am submitting today differs slightly from the one which was forwarded with the application in that Exhibits A and B have been revised.

Q What was the character of the revision of those two exhibits?

A Several of the tracts have changed their designation due to the fact that Gulf Oil Corporation exercised a preferential

right that they had to take over some of the properties, and these changes in ownership have been shown.

Q They amount only, then, to changes to reflect the change in ownership?

A Yes.

Q It didn't materially change the unit agreement itself, did it?

A No, it did not.

Q Would you refer to what has been marked as Exhibit 2 A and identify that exhibit, please?

A Exhibit 2-A is a copy of the plat which was submitted with the application with some slight additions.

Q Was the exhibit attached to the application marked Exhibit 2 on the application, is that correct?

A Yes, it was.

Q And 2-A, then, is a revision of Exhibit 2 submitted with the application?

A Yes, sir. Exhibit 2-A shows the unit area and the lands within two miles of the unit. The unit is outlined in red. There are two other units adjacent to the proposed unit, the Dricky Queen Sand Unit is shown outlined in yellow and the South Caprock Queen Unit is shown outlined in green.

Q Then the proposed Eastcap Queen Unit fits in with the

other units in the immediate vicinity, is that correct?

A Yes, sir. The Eastcap Queen Pool Unit occupies a portion of the area which was, by the wording of Order R-1728, I believe it is, which established the South Caprock Queen Unit. This unit which we propose was included in the lands described as a part of that unit, but the acreage which we are proposing to unitize here in this application are tracts which are non-qualified tracts for that unit and Union Oil Company of California, the operator of the South Caprock Queen Unit is preparing to reduce their unit area to conform with what we show on here.

Q Now, the Eastcap Queen Unit -- first, would you describe the unit area in general terms, Mr. Lyon?

A Yes. The unit area is proposed to consist of the East Half of the Southeast Quarter of Section 22, the West Half of the Southwest Quarter of Section 23, all of Section 27, the East Half of Section 34, the Southwest Quarter of Section, let me describe Section 34 again, the East Half, the Southwest Quarter, the South Half of the Northwest Quarter and the Northeast Quarter of the Northwest Quarter of Section 34, and the West Half of the Northwest Quarter of Section 35, all in Township 14 South, Range 31 East.

Q Do you know what the total acreage is?

A Yes, sir, the acreage is 1480 acres.

Q Now, none of this acreage has been actually committed to the unit operated by Union, is that correct?

A No, it has not.

Q What vertical interval is being unitized by this unit agreement?

A We propose to unitize the Artesia Red Sand which is found in the Continental Oil Company State R-34 Well No. 4 between the depth of 3,053 feet and 3,105 feet. This log we have and would like to introduce as Exhibit No. 3-c. By inadvertence we failed to include that log as one of the logs submitted with the application; since it is the type log described in the unit agreement we would like to offer it into evidence at this hearing.

MR. NUTTER: That's on the R-34 No. 4?

A Yes, sir.

Q The log submitted with the application was a different type log of the same well, was it not?

A No. It was a log we had submitted logs of two other wells which are injection wells.

MR. NUTTER: What is the top of the Artesia Red Sand?

A The top is 3,053 feet and the bottom is 3,105 feet.

MR. NUTTER: Thank you.

Q That's in the State R-34 Well No. 4 that you are

referring to?

A Yes, sir.

Q What is the purpose of this unitization, Mr. Lyon?

A The purpose is to place the working interest and the operation of the area in such a position there we can conduct waterflood operations.

Q Who is the unit operator?

A Continental Oil Company has been designated the operator.

Q Have all the working interest owners in the Eastcap Queen Unit been given an opportunity to join the unit?

A Yes, they have.

Q Have they joined the unit?

A All operators have joined the unit with the exception of R. W. Fair, who owns the tract which is the Northwest Quarter, Northwest Quarter of Section 35, and Bill Sheldon, who operates the West Half of the Southwest Quarter of Section 23.

Q What percentage of the working interest owners have agreed to join the unit?

A Approximately 91%.

Q Does the unit agreement provide for further expansion of the unit area?

A Yes, it does. Article 11, pages 5 and 16 of the

agreement provide for enlargement of the unit area.

Q Does it also provide for subsequent joinder of working interest and royalty interest in the unit?

A Yes, sir. Article 8.2 on page 13 provides for subsequent joinder of working interest and royalty owners to the unit.

Q On what basis do the various tracts in the unit participate?

A Article 8 on pages 11 and 12 set out the means by which the tract can qualify. The unit participation is based on a split formula, a primary phase and a secondary phase. The primary phase will extend from the formation of the unit until such time as 350,000 barrels of oil have been produced from the unit area subsequent to August 1st, 1960. The secondary phase will start from that point and continue until the dissolution of the unit.

Q Does the unit create an initial participating area which is different from the unit area?

A No, sir. All tracts which elect to join the unit will be in the initial participating area.

Q When does the unit agreement become effective?

A It becomes effective as of 7:00 A.M. on the first day of the month following the ratification of the agreement by

working interest owners of 80% of the unit area and the approval of the agreement by the State Land Commissioner and the New Mexico Oil Conservation Commission.

Q What lands in the unit are Federal, State and Fee?

A The State lands comprise approximately 1320 acres or 89.19% of the unit, and two tracts having 160 acres or 10.18% of the unit area are Fee lands. There are no Federal lands in the unit.

Q I believe you already stated that 91% of the working interest owners have tentatively approved the agreement, is that correct?

A Yes, sir.

Q Have you received approval as to form and content from the Commissioner of Public Lands?

A Yes, sir, we have.

Q Is the form of this unit agreement essentially the same as agreements previously approved by the Commission?

A It's my understanding that this form has been approved by the Commission previously. This is essentially the API standard form and it has been submitted to the Land Commissioner and certain changes have been made at his request.

Q I don't believe I asked you as to the approval of the royalty owners. What is the status of the agreement as to

royalty ownership?

A Well, of course, we have approval by the State Land Commissioner as to form which comprises the large majority of the acreage. I do not believe that we have approval from any of the royalty interest other than the State.

Q In your opinion does this agreement contain the elements normally found in agreements affecting State lands?

A Yes, sir.

Q Will it prevent waste in your opinion?

A Yes, sir. In my opinion it will prevent waste and improve efficiency, primarily due to the greater efficiency which is always possible by a compact area being operated by a single operator. Further, it will be more efficient in that we can collect the production into a central tank battery with the elimination of unnecessary equipment, the reduction of vapor losses and other savings which are possible by such an arrangement.

In addition to this it will permit us to waterflood this area, which will result in the recovery of a considerable amount of oil, which otherwise would not be recovered.

Q Mr. Lyon, Exhibit No. 1 is the form of unit agreement as it has been amended and were Exhibits 2-a and 3-c prepared by you or under your supervision?

A Yes, sir.

MR. KELLAHIN: At this time I would like to offer in evidence Exhibits 1, 2-a and 3-c.

MR. NUTTER: Exhibits 1, 2-a and 3-c are admitted in evidence.

(Whereupon, Applicant's Exhibits 1, 2-a & 3-c were offered and admitted in evidence.)

MR. KELLAHIN: That's all the questions I have of this witness.

MR. NUTTER: Are there any questions of Mr. Lyon?

MR. DURRETT: Yes, sir.

MR. NUTTER: Mr. Durrett.

CROSS EXAMINATION

BY MR. DURRETT:

Q I want to get straight on the status as to this acreage formerly being approved as a part of a unit, am I correct it was part of the South Caprock Queen Unit as approved by the Commission?

A As described by the Commission's order.

Q As described by the order?

A Yes, sir.

Q Would you give me that order number?

A I believe it was R-1728.

MR. KELLAHIN: That's correct.

Q 1728?

MR. KELLAHIN: Yes, sir.

Q You stated that Union Oil is the operator?

A Yes, sir.

Q And that they will be willing not to include this acreage within their unit, is that correct?

A Yes, sir, that is correct.

Q Have you requested from them a letter or anything, what I'm interested in, I want to get something in the Commission's official files to show that they will not go ahead and try to unitize this area and that you can go ahead and proceed with it. Do you have a letter or anything to that effect?

A I have a letter which they have furnished us which is a proposed letter to the United States Geological Survey, which since they're Federal lands in their unit, the contraction of the unit must be approved by the United States Geological Survey. This has not been mailed as yet, but they have advised us that they will furnish you a copy at our request.

Q Would you request that they furnish us a copy and also I imagine the State Land Office would like to have a copy of the letter showing that they're going to contract their unit?

A Yes, sir.

Q Would you have any objection from the standpoint of your company, for us to withhold approval of this unit until we do have such a letter in our file?

A That will be satisfactory.

BY MR. NUTTER:

Q Mr. Lyon, the participation in this unit is going to be, in other words, the entire unit area is a participating area?

A Yes, sir.

Q That is the acreage which is committed to the unit. You said that you had two tracts in which you haven't had agreement by the operators to join the unit?

A Yes.

Q That would be Tract No. 1 in the West Half of the Southwest Quarter of Section 23, that's the Shelton tract?

A Yes, sir.

Q And Tract No. 5, the Fair tract in the Northwest, Northwest of 35?

A Yes, sir.

Q Have those operators indicated that they wouldn't join the unit or they just simply haven't done it yet?

A They simply haven't done it yet.

Q Do you anticipate that they will come in, or do you

know about that?

A We think that they will, but of course, this unit provides if they do not, they can come in within six months after the effective date of the unit. On the same basis that they can at the present time, or until the effective date.

Q If they come in after the six months-period, then the perimeters have to be renegotiated for them?

A That's true. They would have to be negotiated into the unit. As far as those tracts which are unitized within the effective date and six months thereafter, their participating interest will be proportional to that shown on Exhibit A.

Q Now, Exhibit A divides up the participation among the tracts both primary phase and secondary phase?

A Yes.

Q And it includes Tracts No. 1 and 5?

A Yes.

Q Would this participation have to be revised upward in the event that these two operators don't dedicate these two tracts?

A Yes, sir, they would be revised up in proportion to their present participation so that the total interest of the unit would total 100%.

Q I see. The only thing that is being unitized is the

Artesia Red Sand between the marks on the log of the R-34 No. 4 at 3053 and 3105?

A Right.

Q Referring to Exhibit No. 2-a, Mr. Lyon, this area to the Northwest of your proposed unit which lies between the Dricky Queen Unit and the South Caprock Queen Unit, is that contained in a unit at the present time?

A Not at the present time. It is my understanding that a unit is being formed in there by Phillips. I couldn't say at what time they would be up here, but it is my understanding that it is actively forming at this time.

Q If that's the Phillips Unit, I think that has already been formed, if I can testify.

MR. KELLAHIN: I think it has.

MR. NUTTER: Any further questions of Mr. Lyon? He may be excused.

(Witness excused.)

(Whereupon Applican'ts Exhibits 4 - 11, with & A through Q were marked for identification.)

DAVID L. BOWLER

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

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q Would you state your name, please?

A David L. Bowler.

Q By whom are you employed and in what position?

A By Continental Oil Company as a production engineer in Hobbs, New Mexico.

Q Have you ever testified before the Oil Conservation Commission of New Mexico?

A No, sir.

Q For the benefit of the Examiner would you outline your education and experience as a professional engineer?

A I received a degree of Petroleum Engineer from Colorado School of Mines in May, 1958. Since that time I've worked for Continental Oil Company in production engineering, the last three and a half years of which have been in Southeast New Mexico.

Q Have you been working in the area that is involved in the application in Cases 2837 and 2838?

A Yes, sir, for the last three and a half years I have.

Q Have you actively participated in the study of this area in connection with this case?

A Yes, sir.

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

MR. NUTTER: Yes, sir.

Q Are you familiar with the Eastcap Queen Pool Unit area, Mr. Bowler?

A Yes, sir. I've had experience in the area for the last three and a half years.

Q Now, referring back to what was marked as Exhibit No. 2-A as presented by Mr. Lyon, would you explain that exhibit a little further?

A Exhibit 2-A is a lease plat of the Eastcap Queen Pool Unit area and surrounding areas. The outlines of the Eastcap Queen Pool Unit and the two adjacent units, the Dricky Queen Sand Unit and the South Caprock Queen Unit are shown also on this plat.

Q Could you give us a brief history of the Eastcap Queen Pool Unit area?

A Referring to the area map marked Exhibit 2-A, the J. J. O'Neil No. 1 Midland A located 1980 feet from the North line and 1980 feet from the West line of Section 8, Township 15 South, Range 31 East was completed November 19, 1954 as a discovery well in what was then called the South Dricky Queen Pool. This well was drilled to a total depth of 3131 feet and completed for an

initial potential of 461 barrels of oil per day flowing. This was after being fractured with about 8,000 pounds of sand and 8,000 gallons of refined oil.

In 1955 the Oil Conservation Commission combined the South Dricky, the Dricky and the Caprock and North Caprock Queen Pools and consolidated this as the Caprock Queen Pool. The Eastcap Queen Pool Unit is a portion of what was originally the South Dricky Queen Pool.

In the Eastcap Queen Pool Unit area itself the Gulf BKC No. 1, located 660 feet from the South and West lines of Section 34, Township 14 South, Range 31 East was the first well drilled within this area. It was completed November 7, 1955 for an initial potential of 100 barrels of oil per day. This well was also fractured with 8,000 pounds of sand and 8,000 pounds of crude oil. Since that time 32 producing wells have been completed within the unit area, also three non-commercial wells were drilled within this area.

Development in the Eastcap Queen Pool Unit area was completed by July, 1958. Of the 32 producing wells within the unit area, 13 wells were cased through the pay and perforated, the remaining 19 wells were completed open hole by setting casing just above the Artesia Red Sand. Ten of these 32 producing wells were fractured upon completion with 6 to 15,000 gallons of sand

oil treatment, reported initial potential ranged from 41 to 900 barrels of oil per day. Most of these wells were completed flowing, but were put on pump early in their life due to rapid loss in bottom hole pressure.

Q What is the current daily average production in the unit area?

A During April of 1963 the unit area averaged 148.5 barrels of oil per day with 27.4 barrels of water, and 81.8 MCF of gas per day. This gave an average GOR of 550 cubic feet per barrel. The per well average is 4.7 barrels of oil per day. Also the maximum daily production from any one well within the unit area was 14.8 barrels per day during the same month.

Q At what stage of production would you say this area is at the present time?

A I would say that it is in the advanced stages of primary.

Q Calling your attention to what has been marked as Exhibit 4, would you identify that exhibit and discuss it?

A Exhibit No. 4 represents the primary producing history of the Eastcap Queen Pool Unit area. As can be seen on this decline curve, the decline has been rather rapid, approximating about 33% decline per year. The relatively low cumulative production in this rapid decline indicates that production within

this unit area is primarily by means of solution gas drive. As is shown on the latest production shown on this cruve, which was for February, I believe, of 1963, the monthly production within the unit at that time was about 4600 barrels per month.

Q Are the wells approaching their economic limit, in your opinion?

A Yes, sir, in my opinion they are.

Q What's the cumulative production within the unit area, did you discuss that?

A As of May 1st, 1963, the unit area had produced 1,363,353 barrels of oil, an estimated 914,000 MCF of gas.

Q A thousand MCF?

A Yes, sir, and 69,669 barrels of water.

Q What is the API gravity of the oil produced in this Eastcap Queen Unit area?

A Gravities as reported to the New Mexico Oil Conservation Commission range from 36 degrees to 38 degrees API.

Q Referring to what has been marked as Exhibit No. 5, would you identify that exhibit and discuss it?

A Exhibit No. 5 is a structure map contoured on top of the Artesia Red Sand section; as shown on this structure map, the structure is dipping to the east at approximately 40 to 50 feet per mile in the area of the Eastcap Queen Pool Unit.

Q Have you made a volumetric study of the reservoir underlying the unit area?

A Yes, sir. Exhibit No. 6 represents an isopach map contoured through the Artesia Red Sand and this represents a pay section in that area. By plenimetering this isopach map, a total acre feet of pay sand within the unit area of 5,491 acre feet of pay was obtained.

Q What's the average reservoir thickness in the unit area?

A Approximately 3.7 feet.

Q And on what do you base this estimate?

A This is the total acre feet as plenimetered divided by the number of acres within the unit area.

Q What other information did you have, Mr. Bowler, in arriving at that?

A The acre feet of pay, 5,491 acre feet, is stated; also average porosity core analysis of 21% was determined; the water saturation of 26.2% average from the log calculation, and initial formation volume factor of 1.125 was obtained from a reservoir fluid sample.

Q What percent of the original oil in place has been produced in your opinion?

A As of May 1st, 1963, approximately 23.3% of the

original oil in place was produced.

Q What's the average permeability of the Queen pay?

A The Queen sand reservoir averages approximately 230 millidarcies permeability. This average is obtained from an analysis of 89 cores from 89 wells in and immediately surrounding the Eastcap Queen Pool Unit.

Q What's the present reservoir oil saturation?

A The present saturation is calculated to be approximately 53.8% of the pore volume.

Q Is waterflooding of the Artesian Queen sand in the Eastcap Queen feasible in your opinion?

A Yes, in my opinion it is. Such factors as the oil saturation, at the present time the permeability, the porosity, and primary performance and water saturation and depth are generally favorable factors toward waterflooding.

Q Are there other successful waterflood operations in the immediate vicinity of this unit?

A As I understand, there are several floods being conducted in the Queen sand that are successful.

Q Will waterflooding tend to prevent waste and conserve natural resources, in your opinion?

A In my opinion it will, because by waterflooding reserves will be recovered that could not be produced economically

or by any other means in the primary production.

Q You mean they just wouldn't be produced at all unless there is a secondary project, is that correct?

A Yes, sir.

Q How much oil will be recovered by waterflooding the Eastcap Queen Unit area?

A It's been estimated that approximately 1.1 million barrels of oil will be recovered by secondary recovery by waterflood and this approximates about 80% of that recovered by primary life.

Q What is the predicted life of this waterflood?

A Approximately six and a half years.

Q What type of injection pattern do you propose to utilize?

A A modified 80-acre five spot. This is shown on Exhibit 7, the green triangles representing the injection wells in the area. As shown on here, there will be 16 producing and one temporarily shut-in well converted to water injection in this pattern.

Q What type of flood is this going to be?

A We intend to put in a full-scale flood.

Q There will be no pilot flood program in this area, is that correct?

A No, sir.

Q Will there be adequate protection of all underground water sources from contamination by water injection?

A In my opinion there will be.

Q Now, referring to the exhibits marked as Exhibit No. 8-A through Q, would you identify those exhibits, please?

A Exhibits 8-A through 8-Q are schematic diagrams of the casing programs of all proposed injection wells in the Eastcap Queen Pool Unit. The size of the surface casing, the depth set and the amount of sacks of cement used are shown, the oil string, the depths set, the amount of cement used to cement it with, the total depth is shown, and also the cement top behind the production casing is shown.

These cement tops were obtained by temperature survey or calculated as indicated on each one of these exhibits. The method crossed out, or the method not crossed out to determine the cement top is the one by which it was determined on those particular wells.

Q In your opinion does the casing and cementing program of each of these wells protect adequately producing formations and fresh water zones encountered in this area?

A In my opinion, yes, sir.

Q What facilities will be provided for quantity and

pressure measurements of the injected water?

A Meters to measure the volume of water going to each injection well will be installed, and also a system to measure the injection pressure, surface injection pressure to each injection well will be installed.

Q What injection pressures do you anticipate will be necessary in this area?

A We anticipate a maximum pressure of 1500 pounds.

Q What's the anticipated water injection rate for this flood?

A A maximum water injection rate of approximately a hundred and two thousand barrels per month, or 250 barrels of water per day per injection well is anticipated.

MR. NUTTER: What was that figure again, please?

A It's a hundred two thousand barrels per month for the unit, and 250 barrels of water per day per injection well average.

Q What is the source of this water?

A The unit will secure water from an outside source. The source, Continental has made an agreement to secure water for this unit at this time.

Q They have made an agreement. Is it your understanding that some negotiations are still being carried on in connection

with that?

A Yes, sir.

Q What's to be done with their produced water from the unit?

A This water will be reinjected into the formation.

Q What's the total estimated water injection requirement for the flood?

A Five million barrels of water will be required to complete this flood, of which two million barrels will be produced, water reinjected back into the formation.

Q So it will require something like three million barrels of water from outside sources?

A Yes.

Q How many tank batteries are presently in use in the Eastcap Queen Unit area?

A Presently there are 11 tank batteries.

Q Will all of these tank batteries be necessary for the operation?

A No. One central tank battery for the entire unit would be much more efficient, this would mean a total of 16 producing wells, or 33 proration units would be producing into this one central battery. Automatic custody transfer equipment would be installed at this central battery to serve these wells.

Q Referring to what has been marked as Continental's Exhibit No. 9, would you identify that exhibit, please?

A Exhibit No. 9 is a location plat showing the proposed location of this central tank battery, and also indicated on it are the flow lines to, schematically indicated reflow lines to the producing wells within the unit.

Q Referring to what has been marked as Exhibit No. 10, would you identify that exhibit, please?

A Exhibit No. 10 is a schematic diagram of the proposed central battery installation. On this are indicated the individual well test system, a normal production system, and ACT location.

Q Is that type of tank battery an installation that has heretofore been approved by the Commission?

A Yes, sir.

Q Referring to what has been marked as Exhibit No. 11, would you identify that exhibit, please?

A Exhibit No. 11 is a schematic diagram of the proposed ACT system for this central battery location.

Q Is that ACT installation one that is of a type heretofore approved by the Oil Conservation Commission?

A Yes, sir.

Q In your opinion will any inequities arise from the

installation of a central tank battery within this unit?

A No, since each lease or tract within the unit shares in the total unit production on the basis of the set participating percentages of the unit agreement, none would arise.

Q Will there be adequate test facilities to test the individual wells in the unit from time to time?

A Yes. Facilities to periodically test in each individual well production will be installed.

Q Will this unit be operated under the provisions of Rule 701 as a waterflood?

A Yes, sir.

Q What would be the maximum daily allowable for the unit according to your calculations?

A Based on the 33 proration units each having a producing well or an injection well in a unit area, the maximum allowable would be 1386 barrels of oil per day.

Q Were the Exhibits 4 through 11 prepared by you or under your supervision?

A Yes, sir.

MR. KELLAHIN: At this time we would like to offer in evidence Exhibits 4 through 11.

MR. NUTTER: Continental's Exhibits 4 through 11 are admitted in evidence.

(Whereupon, Applicant's Exhibits 4 through 11 were offered and admitted in evidence.)

Q Will the approval of this application for a waterflood project be in the interest of conservation and the prevention of waste?

A Yes, since oil that will not be recovered by any other means during primary life will be recovered, this will prevent oil from being left in the ground.

MR. KELLAHIN: That's all the questions I have on direct examination.

MR. NUTTER: Are there any questions of the witness?

MR. DURRETT: Yes, sir, I have a question or two.

CROSS EXAMINATION

BY MR. DURRETT:

Q I'm not sure I have your name correct, how do you spell your last name?

A B-o-w-l-e-r.

Q Mr. Bowler, did you say now in your opinion that the wells in this area are stripper wells?

A I believe I stated that they are approaching the economic limit here, they are in the advance stage of primary production.

Q Do you have any top allowable wells in there?

A No, sir.

Q What are your better wells making?

A The maximum production during April, 1963, from any one well was 14 plus barrels per day. I believe I have that.

MR. NUTTER: 14.8 I believe you said.

A I believe that's right, 14.8 barrels per day.

Q That's your best wells that you have in the area?

A That's the best well in the area.

Q What are your poorer wells making, the worst ones, some of the bad ones?

A Some of them have declined to nothing.

Q Just not getting anything out of them?

A That's right.

MR. DURRETT: Thank you, I think that's all.

BY MR. NUTTER:

Q This average of 14.8 barrels a day, was that the April average?

A Yes.

Q You stated that you expect a recovery of 1.1 million barrels, or 80% of primary, is this typical of the other floods in the Caprock Queen Pool?

A I don't know. I don't know what their anticipated recoveries are in these other floods.

Q This is an independent calculation made by Continental without particularly studying the other floods in the pool then?

A Yes, sir.

Q Through May 1st, 1963, the wells had made 1,163,000 barrels?

A I believe that was right. 1,363,053 barrels.

Q You computed that to be 1.23% of the original oil in place?

A Yes, sir.

Q I believe you said you would be injecting at the rate of 250 barrels per well per day?

A This is the maximum anticipated, or average anticipated rate, yes.

Q Is that during the period of time you are getting fill-up or is this after you have got fill-up and the stabilized rate of injection?

A This may occur during both times.

Q How long do you anticipate that it will take you to get fill-up here?

A I don't have that figure right at my command right now. I'm not really sure.

Q And you said that the source of water would be an outside source. What do you mean, you are going to purchase

water from one of these water companies that supply water or not?

A Possibly. We have had negotiations on a water source and have had an agreement in the past, actually our water will be determined by its availability when we start using it or needing it.

Q At the present time Continental, however, has no water rights and plans to drill no water wells in this particular area?

A We ourselves do not have any water rights or water permits in the area right now.

Q This injection pattern that's reflected on your Exhibit 7, is that a pattern that is a continuation of the existing pattern which is being used in the Union flood to the Southwest and by the Dricky Queen flood to the Northwest?

A To my knowledge, I believe that this pattern is compatible with the pattern being used in the South Caprock Queen Pool Unit, and also with the Dricky Queen Sand Unit.

Q Now, this O'Neill Well No. 4 in the Northeast of the Southeast of Section 22 --

A Yes.

Q -- it would normally be a continuation of the pattern that you've shown, but you don't anticipate using that well as an injection well?

A No, we do not.

Q Is that well actually drilled and abandoned or is it just an abandoned location, or what?

A It was a dry hole. It was drilled and abandoned.

Q It never did produce then?

A That's right.

Q I note that on the cement tops for the production casing they vary from several hundred feet below the surface of the ground down to fairly close to the shoe with the exception of the R-34 No. 3 well where the cement top is given as zero. Does that mean that the cement circulated on that production string?

A Yes, sir.

Q On the surface pipe most of the wells seem to have their surface casing set in the vicinity of 300 feet plus or minus a few feet. However, Gulf D No. 9-8M has its surface pipe at 203 feet, Cottage Bakers Gulf State No. 2 has its surface pipe set at 200 feet, and the Shelton Hardin Simmons No. 1 has its surface pipe set at 176 feet. Is that shallow surface pipe on those three wells adequate to protect any fresh water sands in this area?

A I believe it is. The exact depth of the fresh water in that area I'm not positive of; however, that is approximately through the depth that the water is normally encountered through

there.

Q Well, was the water more shallow in those wells than it was in the other wells, and for that reason they didn't need 300 feet of pipe in those particular three?

A I do not know.

Q None of those three were Continental wells, I presume?

A No, sir.

MR. NUTTER: Any further questions of the witness? Mr. Irby.

MR. IRBY: Frank Irby, State Engineer's Office.

BY MR. IRBY:

Q To go back to Mr. Nutter's line of questioning, Mr. Bowler, what is the source of this water that you are negotiating for?

A We, some two years ago, negotiated with Union Oil Company on their water rights over there. At the present time these are still in process.

MR. KELLAHIN: May I interrupt just a minute?

MR. IRBY: Yes.

MR. KELLAHIN: Would you go ahead and tell the Commission what has happened in connection with that water right, please?

A Some two years ago we went together with Union and,

well, as I understand it, to survey and determine a water source for the South Caprock Unit, at which time we were anticipating possibly joining it, and later on we did not join or commit our acreage to it, and so at that time I believe the Union said that they had water enough for the whole area, which initially had included ourselves, and we made a contract with them to supply us with water from a well just east of the unit area. As of this month Union has told us, or delivered to us in writing that they're cancelling the contract on that water, which if this contract is cancelled, we would have to find another source, but that is the status of that particular source right now.

Q (By Mr. Irby) Does the water appropriated by Union Oil Company cover the area? I mean do they have the right in their permit to cover the area covered by your Eastcap Queen Pool Unit?

A I would imagine so, since our area was initially included within their unit boundaries as defined by the New Mexico Oil Conservation Commission order.

Q This is pure speculation?

A Yes, sir. At present our unit area is officially within this boundary of the South Caprock Unit.

Q To continue with Mr. Nutter's line of questioning, I

want to talk some more about these various wells which he has pointed out where the surface casing is set at shallow depths. As I understand your testimony, you don't know whether or not this casing is set entirely through the Ogallala formation into the red beds?

A No, sir, we did not drill those wells. They belong to other people or were drilled by other people, and our only assumption was that the casing programs had been approved and any further than that we do not know.

Q Then, you can't state with certainty that the surface waters in those specific wells which occur in the vicinity of these specific wells would be protected?

A Well, the production casing is set through them and separates any well bore fluids from them, yes.

Q What protection is afforded the Santa Rosa formation, which in many localities contains useable water?

A Again this production casing is set through all these upper zones of possible water zones and separates well bore fluids.

Q It's only a single casing wall?

A Yes, sir.

Q Is that right?

A As in the case of the Santa Rosa it is.

MR. IRBY: I would recommend to the Examiner that these points concerning the construction of these wells be taken into consideration insofar as they protect the useable waters in granting this application. I don't believe it's been stated into the record, but it's my understanding from them that it is planned to inject through the casing rather than through tubing and packer.

Q (By Mr. Irby) Is this correct, Mr. Bowler?

A Yes, sir.

MR. IRBY: That's all I have.

REDIRECT EXAMINATION

BY MR. KELLAHIN:

Q Do you know of any water production from the Santa Rosa in this area?

A Not personally.

RECROSS EXAMINATION

Q (By Mr. Nutter) Do you know the depth of the Santa Rosa formation?

A Only approximately.

Q What is the approximate top of it?

A Around 1200 feet.

Q What is the highest point that the cement came to on the production pipe on any of these injections wells, B has 1350 feet from the top and another one is circulated?

A Yes, sir, most of them I think are below 2,000 feet.

Q A few of them came up into the Santa Rosa and most of them, however it's below the Santa Rosa, is this a correct assumption?

A Yes, sir.

MR. NUTTER: Are there further questions of Mr. Bowler?

MR. DURRETT: Yes, sir, I have a question.

RECROSS EXAMINATION

BY MR. DURRETT:

Q Would your company be willing to inject through tubing installed in the packer in these specific wells that have been discussed here by the State Engineer's Office?

A If it were required we would do so.

Q One other question. If you can't negotiate your contract or continue it in force with Union outside of suing Union to obtain water in some way, what would your other source be, do you have any other tentative source of water?

A No, sir, this present situation just arose within the last week. We haven't made any other arrangements yet.

MR. DURRETT: Thank you. That's all.

BY MR. NUTTER:

Q I presume, Mr. Bowler, that you have no idea when the injection of water will commence in this area?

A Not exactly.

Q There are several matters that remain to be worked out?

A It would be as soon as we worked out those matters and get all the approvals and the securing of the water itself.

MR. NUTTER: Any further questions?

BY MR. IRBY:

Q If Union continues to resist or actually refuses to furnish water for this unit, would you immediately inform the State Engineer?

A I would suppose so, yes, sir.

MR. KELLAHIN: I think we would.

Q I need a definite answer on that.

MR. KELLAHIN: We will agree to do so. I think the State Engineer is entitled to know.

MR. IRBY: I would say this off the record.

(Whereupon, a discussion was held off the record.)

MR. NUTTER: Are there any further questions of Mr. Bowler? If not, he may be excused.

(Witness excused.)

MR. NUTTER: Do you have anything further, Mr. Kellahin?

MR. KELLAHIN: That's all I have.

MR. NUTTER: Does anyone have anything they wish to offer in Cases 2837 or 2838?

MR. KASTLER: Bill Kastler with Gulf Oil Corporation, representing Gulf. Gulf has substantial working interest in this unit area and concurs in the application. We believe it's feasible.

MR. NUTTER: Anyone else? We'll take the cases under advisement and recess the hearing until 1:15.

STATE OF NEW MEXICO)
) ss
COUNTY OF BERNALILLO)

I, ADA DEARNLEY, Court Reporter, do hereby certify that the foregoing and attached transcript of proceedings before the New Mexico Oil Conservation Commission at Santa Fe, New Mexico, is a true and correct record to the best of my knowledge, skill and ability.

IN WITNESS WHEREOF I have affixed my hand and notarial seal this 27th day of June, 1963.

Ada Dearnley
Notary Public-Court Reporter

My commission expires:

June 19,

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 2837-2838 heard by me on 6/26, 1963.

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