

BEFORE THE
NEW MEXICO OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
EXAMINER HEARING

June 28, 1967

IN THE MATTER OF:)

Application of Continental Oil)
Company for a unit agreement,)
Lea County, New Mexico.)

Case No. 3603

Application of Continental Oil)
Company for a waterflood project,)
Lea County, New Mexico.)

Case No. 3604

BEFORE: Elvis A. Utz, Examiner.

TRANSCRIPT OF HEARING

MR. UTZ: Case 3603. Are you going to ask for consolidation of the next two cases?

MR. KELLAHIN: Yes, Case 3603, 3604.

MR. HATCH: Case 3603: Application of Continental Oil Company for a unit agreement, Lea County, New Mexico. Case 3604: Application of Continental Oil Company for a waterflood project, Lea County, New Mexico.

MR. KELLAHIN: Jason Kellahin, Kellahin and Fox, Santa Fe, appearing for the Applicant. I have two witnesses I would like to have sworn, please.

(Whereupon, Applicant's Exhibit A 1-1 through 2-10 was marked for identification.)

(Witnesses sworn.)

VICTOR T. LYON

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

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q Will you state your name, please?

A Victor T. Lyon, L-y-o-n.

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

A I am employed by Continental Oil Company as Supervising Engineer in the Hobbs District Office.

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

A Yes, I have.

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

MR. UTZ: Yes, sir, they are.

Q Mr. Lyon, are you familiar with the application of Continental Oil Company in Case No. 3603 and 3604 presently before the Commission?

A Yes, sir.

MR. KELLAHIN: I assume that the record shows that these two cases are consolidated for purposes of testimony, is this correct?

MR. UTZ: Yes, sir, for purposes of testimony and separate orders will be written.

Q (By Mr. Kellahin) Briefly stated, what is proposed by Continental Oil Company in these applications?

A Continental Oil Company is asking for approval of the unit agreement for the Langlie-Jack Unit in Lea County, New Mexico, and for the installation of a waterflood project in that unit.

Q Now, your testimony, as I understand it, will be confined to that portion pertaining to the unit agreement,

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is that correct?

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 a copy of the unit agreement which we are proposing for the Langlie-Jack Unit. It is more or less standard modified federal form. It has attached to it two exhibits, Exhibit A, which is a plat of the unit area, and immediately surrounding area, and Exhibit B, which is a schedule of the tracts and the ownership of them which are a part of the unit.

The unit area is shown on Exhibit A and is described in the unit agreement as consisting of in Section 17, the South Half of the Southeast Quarter; in Section 20, the East Half, the North Half of the Northwest Quarter, the Southeast Quarter of the Northwest Quarter; in Section 21, the West Half of the Southwest Quarter, the Southwest Quarter of the Northwest Quarter; and in Section 29, the Northeast Quarter of the Northeast Quarter, all in Township 24 South, Range 37 East and containing a total of approximately 680 acres.

Q Is this unit offset by other units in the area?

A Yes, sir. It is offset to the southeast by the Langlie Mattix Woolworth Unit. There are waterflood projects on non-unitized leases immediately to the east.

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Q And that's immediately offsetting the proposed unit, is that correct?

A Yes.

Q That is designated as the Buckles et al. Operation, is that right?

A Well, the Buckles Operation is a little farther east. Those immediately adjoining are the Texaco and Shell Black Lease waterfloods.

Q Those are two separate waterfloods, is that correct?

A Yes.

Q On Exhibit B, is there a tabulation of the data showing the lease ownership?

A Yes, sir.

Q What percentage of the unit area is federal, state and fee?

A There are three tracts, Tracts 1, 2 and 3, which are federal and contain 480 acres or 70.59 percent of the unit area. The remaining acreage, three tracts No. 4, 5 and 6 are fee and contain 200 acres or 29.41 percent of the unit area. There is no state land in the proposed unit.

Q Now, what is the unitized formation?

A The unitized formation is defined in Section 2, paragraph (f) as the Seven Rivers and Queen formations found between the subsurface depth of 2737 feet and 3503 feet as

shown on the Lane-Wells acoustic log run January 7, 1965 and the Continental Oil Company's Jack B-26 No. 2 well located 1980 feet from the north line and 660 feet from the west line, Section 26, Township 24 South, Range 36 East, N.M.P.M.

I might point out that this log was run in a well which is outside of the unit area and the reason for this is that no well inside the unit area completely penetrated the Queen formation and consequently, in order to give a footage definition of the entire unitized interval, we selected the nearest well which had penetrated the entire Queen.

Q Was this log filed with the Commission?

A Yes, sir.

Q It was attached to the application, was it not?

A Yes, it was.

Q What is the basis for tract participation under the unit agreement?

A The basis of tract participation is described in Section 13 and is based 25 percent on tract acreage plus 75 percent tract cumulative production. There is an exhibit designated Exhibit 1-1 which shows this data for each of the tracts in the unit area and reduces this to the over-all tract participation.

Q You stated in your previous testimony that this was a more or less standard form of unit agreement. Would you

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discuss briefly the salient points covered by the agreement?

A Yes, sir. The agreement covers most of the, I suppose all of the standard provisions. Section 2 has the definitions, Section 4 describes the method for expanding, Section 6 designates the unit operator, Continental Oil Company, Sections 7 and 8 provide for the resignation or removal and the election of a successor operator. Section 13 describes the method of tract participation, Section 24 provides the effective date and term, the effective date being upon the accomplishment of three objectives, one is the commitment by the working interest owners of 85 percent of the unit area to the unit agreement, two, approval by the Oil Commission and the U.S.G.S., and three, the filing of a counterpart copy of the agreement in the Lea County records.

Q Now, has preliminary approval of this agreement been given by the U.S.G.S.?

A Yes, sir, the U.S.G.S. gave preliminary approval to this unit by letter dated November 21, 1966.

Q What percentage of the ownership have ratified or joined the unit?

A At the present time 47 percent of the working interest owners have ratified, 18 percent of the royalty owners have ratified other than the U.S.G.S., and 16 percent of the overriding royalty owners have ratified. This is really

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a pretty good response, I think, considering the fact that the agreements were mailed to the royalty owners and overriding royalty owners a week ago yesterday.

Q Do you have any commitment from the other working interest owners as to joining the unit?

A No, we have no firm commitment. We have had no objections to date.

Q Do you anticipate that you will get 100 percent of the working interest ownership signed up?

A Yes.

Q In the event that you don't, is there provision in the unit agreement for subsequent joinder?

A Yes, there is.

MR. KELLAHIN: At this time I would like to offer in evidence Exhibit A.

MR. UTZ: Without objection, Exhibit A will be entered into this case.

(Whereupon, Applicant's Exhibit A was offered and admitted in evidence.)

MR. KELLAHIN: We would like also to offer into evidence Exhibit A-1-1, being the tabulation of parameters which is attached to the exhibit.

MR. UTZ: Exhibit A and Exhibit A-1-1 will be admitted.

(Whereupon, Exhibit A-1-1 was offered and admitted in evidence.)

MR. KELLAHIN: That's all I have on direct examination of this witness.

MR. UTZ: Your other witness will be the one who will take care of the waterflood?

MR. KELLAHIN: Yes, sir.

MR. UTZ: Any questions of Mr. Lyon? The witness may be excused.

(Witness excused.)

C. C. WOODWARD

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

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q Would you state your name, please?

A Clifton C. Woodward, Junior.

Q By whom are you employed and in what position?

A Senior Reservoir Engineer, Continental Oil Company, Hobbs District Office.

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

A No, sir.

Q For the benefit of the Examiner, would you review briefly your education and experience as an engineer?

A I have a Bachelor of Science Degree from

Pennsylvania State College in Petroleum Engineering. I have been employed by Continental Oil Company for nineteen years in various engineering capacities in New Mexico and Texas. Presently employed in the Hobbs District Office as Senior Reservoir Engineer.

Q In connection with your work as Senior Reservoir Engineer, have you made a study of the Langlie-Mattix area?

A Yes, sir.

Q Which is under consideration in this application?

A Yes, sir.

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

MR. UTZ: Yes, they are.

Q (By Mr. Kellahin) You heard the testimony just given by Mr. Lyon in regard to the Langlie-Jack Unit Agreement. What is the purpose of this unit agreement?

A This is being formed for the purpose of conducting waterflood operations in the unit area.

Q Referring to what has been marked as Exhibit 2 attached to Exhibit A, would you identify that exhibit, please?

A Exhibit 2 is a plat of the Langlie-Jack Unit Area and an area two miles in each direction from the unit boundary. Lease ownership and location and identification of the wells

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are shown in the usual manner. The pool from which each well is producing is shown by a letter and color symbol which is explained in the legend. The unit area is shown within the red outline which depicts the unit boundary. The boundary of the Langlie Mattix Woolworth Unit to the southeast, operated by Amerada Petroleum Corporation, is shown by a dashed line. The proposed unit is also offset to the east by a cooperative waterflood operated by individual lease owners. Shell Oil Company operates the Black Lease in Units J, N and O in Section 21. Texaco operates their Black Lease in Units B, F, G and K of Section 21.

Q According to Exhibit No. 2 there appear to be three injection wells along the east boundary of the Langlie-Jack Unit. Are those wells in operation?

A Two of the wells, Shell Oil Company Black Numbers 4 and 5 have been in operation since December, 1964. Cumulative water injection to April 1, 1967 was 110,752 barrels for Well No. 4 and 144,149 barrels for Well No. 5. The third well, Texaco's Black No. 6, has not been put in operation as of April 1st, 1967.

Q That would be the northernmost well?

A Yes.

Q Do you have a line agreement with the operators there or do you contemplate having one? Do you know that?

A I believe these wells were drilled for the purpose of injection into both units.

Q For the purpose of operating both units, is that correct?

A Well, there's a -- but not cooperative.

Q Would you turn to Exhibit No. 3 and describe the information shown on that exhibit?

A Exhibit No. 3 is a type log for the Langlie-Jack Unit. As shown on the log, the top of the Seven Rivers formation is at a depth of 2737 feet and the base of the Queen or the top of the Grayburg formation is found at a depth of 3503.

MR. UTZ: What are those two zones again that you marked on the exhibit?

A The top of the Seven Rivers at 2737 and the base of the Queen or top of the Grayburg at 3503.

Q (By Mr. Kellahin) This well is not in the unit area, is it?

A No, sir.

Q Do you have a typical well from within the unit area?

A Yes, sir. Exhibit No. 3-A is a copy of the radioactivity log run on Continental's Jack A-20 Well No. 5 located in the Northwest Quarter of the Southeast Quarter of Section 20, Township 24 South, Range 37 East.

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Q Is that in the Southwest of the Southeast though?

A No, Northwest of the Southeast.

Q Would you continue, please?

A This exhibit is a type log of the productive interval from within the unit boundary. The log shows, by the horizontal red line, the top of the Seven Rivers formation at a depth of 3165 feet and in a similar manner the top of the Queen formation is shown at a depth of 3525 feet. The productive interval in the Langlie-Jack Unit Area consists roughly of the top 50 to 100 feet of the Queen formation and the lower 50 to 100 feet of the Seven Rivers formation. Because of lack of reservoir and completion data it is difficult to find the exact producing interval.

Q Would you give a brief history of the Langlie-Jack Unit Area?

A Initial production from the unit area was from the Continental Jack A-21 No. 1, completed December 1st, 1937. Development of the remaining area continued through 1938 and 1939 until 15 of the 17 wells in the unit area had been completed. The King, Warren & Dye - Harrison No. 3 was completed in 1947 and the Citgo Thomas "F" No. 1 was completed in 1952. All of the completions were made in open hole with casing seats ranging from 51 feet above sea level to 118 feet below sea level. All of the wells were shot with nitro-

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glycerine, the treatment size ranging from 20 to 580 quarts at the initial completion or shortly thereafter. Five of the wells are currently producing, nine are shut in and three have been plugged back and completed in the Yates formation for Jalmat gas. One of the current producers has been dually completed for Langlie-Mattix oil production and Jalmat gas production.

Q What is the daily average production for the unit area?

A During the month of March the unit area averaged ten barrels of oil and two-tenths water per day with over-all gas-oil ratio of 14,250 feet per barrel.

Q Would you consider that this reservoir is at a stripper stage?

A It indicates that the reservoir is at a depleted stage.

Q And it is ready for secondary recovery operation?

A Yes.

Q What's the cumulative production for the unit area?

A As of April 1st, 1967 cumulative production for the unit area was 1,117,249 barrels of oil.

Q What was the reservoir drive mechanism during the primary recovery?

A The reservoir drive mechanism for the Langlie-Jack

area is a solution gas drive.

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

A Exhibit No. 5 is a map showing the structural configuration on top of the Queen formation. The Langlie-Jack Unit is located on the western slope of a large regional north-south trending anticline. A small secondary high centered in the Southwest Quarter of Section 20 retards the westward dip of the formation over most of the unit area. This map illustrates that a permeability pinchout and not structure, controls the limits of production. The Queen completions were unsuccessful in the Late Oil Company - Thomas No. 1, Unit M of Section 17, and in the Sinclair - Harrison No. 3 in Unit L of Section 20. Below average completions were obtained in the Cities Service - Thomas "F" No. 1, Unit O of Section 17 and Southern Petroleum Exploration's Calley No. 1 in Unit N of Section 20.

Q Referring to what has been marked as Exhibit No. 6, would you identify that exhibit?

A Exhibit 6 is a tabulation of data in regard to the reservoir rock, fluid characteristics and the estimated waterflood performance.

Q Is there anything unusual or significant in there that should be called to the attention of the Examiner?

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A No, sir.

Q It's self-explanatory, is it?

A Yes.

Q In your opinion, is waterflooding feasible in the Langlie-Jack Unit?

A Yes, sir. After reviewing the available reservoir data and the oil recovery under primary operations and calculation of waterflood performance by accepted standards and the performance of the offsetting floods, my opinion is that the unit area can be flooded successfully and economically.

Q Other waterflood operations in the area have been successful, have they not?

A Yes, sir, as far as I know.

Q Will waterflooding in the unit area result in the recovery of oil that would not otherwise be recovered?

A Yes. It's estimated that approximately 846,000 barrels of oil will be recovered by waterflooding, which would not otherwise be recovered.

Q That would result in the prevention of waste, is that correct?

A Yes, sir.

Q Referring to what has been marked as Exhibit No. 7, would you explain what is shown on that exhibit?

A Exhibit No. 7 is a map of the unit area showing the

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proposed waterflood pattern. Injection wells are shown by a triangular symbol. The injection pattern is a modified peripheral arrangement which utilizes maximum advantage from the three lease line injection wells. It also simplifies conversion of the offsetting 40-acre five spot pattern to a 40-acre well spacing development in the Langlie-Jack area. Conversion of wells inside the pattern to injection during the latter stages of the flood is anticipated to obtain maximum sweep efficiency.

Q Referring back to what was marked as Exhibit 4, would you describe the information shown on that exhibit?

A Exhibit 4 is a tabulation of the wells which are proposed to be converted for water injection. The size and setting depth of each casing string, the amount of cement used and the interval open to the formation are shown for each well. We have Exhibits 4-1 through 4-8 which are schematic diagrams for each well showing the same information as that tabulated in Exhibit 4. Exhibits 4-1 through 4-8 also show the proposed completion technique. Injection initially will be through tubing with a packer set a short distance above the casing shoe. This procedure will serve to protect the casing against corrosion and the high injection pressures. Subsequent injectivity profiles may make it advisable to lower the packer.

Q You refer to high injection pressures. Do you have

any idea what those pressures might be?

A I expect them to be in the range of 1500 to 2000 psi.

Q And the type of completion you are using in your injection wells, in your opinion will adequately protect against any migration of water to any other zone, is this correct?

A Yes.

Q Are all of your cementing programs shown on all of these wells?

A Yes, they are on a tabulation.

Q How much water do you anticipate will be injected in this waterflood project?

A Initially we expect to inject approximately 4800 barrels per day into the eight injection wells. The total water requirements for the Langlie-Jack waterflood will be approximately 15,000,000 barrels.

Q What source of water will you use?

A Currently three sources of water will be considered, a primary source and two alternates. Our primary source is produced water from Continental Oil Company's Wells B-1 No. 3 well located in Unit C of Section 1, Township 25 South, Range 36 East, approximately three miles southwest of the unit boundary. The Wells B-1 No. 3 is a producing oil well completed in the Seven Rivers formation of the Jalmat Pool.

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The first alternate source is the purchase of water from Skelly. Skelly has proposed a water line from their source water used in the Skelly Penrose "B" Unit to the Dollarhide field, and this line will probably run within a mile of our unit boundary. The second alternate source is the development of Santa Rosa water. Produced water from the unit area will be reinjected.

Q Do you have a chemical analysis of the sources you have mentioned?

A Yes.

Q Other, of course, than the produced water?

A Yes. We have three exhibits, Exhibit No. 8 is an analysis of a representative sample of water produced from Continental's Wells B-1 No. 3 well and Exhibit No. 9 is an analysis of a representative sample of the water which will be supplied by Skelly Oil Company, and Exhibit No. 10 is an analysis of a representative sample of Santa Rosa water from the Langlie-Jack Unit Area.

Q Do you propose to use some water from the Langlie-Jack Unit Area?

A At present we expect to use a primary source from the Wells B-1 well which should serve as an adequate source.

Q Is it proposed compatible with the water formation, I mean?

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A Yes, these waters are reported to be compatible. Skelly is currently injecting the water to be supplied by them in the Skelly "B" Unit in the Langlie-Mattix Pool and this water is from the same formation as the proposed water from Continental's Wells B-1 No. 3. Santa Rosa water is being injected into the Queen formation of the Langlie Mattix --

Q That's operated by Amerada?

A By Amerada.

Q Have these operators encountered any problems to your knowledge?

A No. We are not aware of any problems so far.

Q What waterflood allowable would you anticipate for this unit?

A There are 17 wells that will be in operation in this waterflood, each on a 40-acre tract, and based on the minimum waterflood allowable of 42 barrels per day as provided under Rule 701-E, a minimum waterflood unit allowable of 714 barrels per day would be anticipated. Under current regulations, a higher normal unit allowable would, of course, make the allowable proportionately higher. A normal unit allowable of 47 would provide a total allowable of 799 barrels of oil per day.

Q I take it, then, that you don't expect to use a pilot program in this waterflood project, do you?

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A No. The adjoining waterfloods have demonstrated the floodability of the Queen and Seven Rivers formation in the area. There appears to be no useful information which can be gained by installing a pilot.

Q In your opinion, will the granting of this application result in the protection of correlative rights and the prevention of waste?

A Yes. It is well recognized that unit operations protect correlative rights and that secondary recovery operations recover additional oil which otherwise would not be recovered.

Q Were Exhibits 2 through 10 prepared by you or under your supervision?

A Yes, sir.

MR. KELLAHIN: At this time I would like to offer Exhibits 2 through 10 inclusive.

MR. UTZ: Without objection, Exhibit A's attachments 2 through 10 will be entered into the record of this case.

(Whereupon, Applicant's Exhibit A's attachments 2 through 10 were offered and admitted in evidence.)

Q (By Mr. Kellahin) Do you have any other comments for the Examiner, Mr. Woodward?

A Yes. As previously mentioned, it is anticipated that a few wells within the boundary of the proposed peripheral

occurring?

A Well, we will run regular periodic tests on the water for both corrosion and bacteria and all other treatment.

Q And all the water that you utilize will be treated before injection?

A Yes, sir.

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

CROSS EXAMINATION

BY MR. UTZ:

Q Could you state whether or not, Mr. Woodward, you would reinject produced water?

A Yes, sir. As soon as the line becomes sufficient we will reinject all the produced water.

Q How will that water be as far as salinity and corrosive characteristics are concerned?

A We will already be treating and it may be necessary to alter out inhibition treatment of the commingled waters for reinjection; if we find that the problem does become more severe, then naturally we will take other measures.

Q As I understand it, all these injection wells will have tubing or will be injecting water under a packer?

A That is correct.

Q Do you intend to use any inert fluid in the annulus?

A We are not intending to do that unless we find it

becomes necessary from our analysis of our performance in water handling.

Q Do you have any objection to using inert fluid in the annulus?

A No, sir.

MR. UTZ: Other questions of the witness? I notice you have a letter in the file from the State Engineer saying that they received all your exhibits and gratefully acknowledge them. I presume that he has no objection since he's not here.

Are there any other questions? The witness may be excused.

(Witness excused.)

MR. UTZ: Are there any statements in the case?
The case will be taken under advisement.

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I N D E XWITNESSPAGE

VICTOR T. LYON

Direct Examination by Mr. Kellahin

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C. C. WOODWARD

Direct Examination by Mr. Kellahin

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Cross Examination by Mr. Utz

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EXHIBITSMARKEDOFFERED AND
ADMITTEDApplicant's Exhibit A,
A-1-1 through 10

2

A & A-1-1
2-10

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STATE OF NEW MEXICO)
) ss
COUNTY OF BERNALILLO)

I, ADA DEARNLEY, Notary Public in and for the County of Bernalillo, State of New Mexico, do hereby certify that the foregoing and attached Transcript of Hearing before the New Mexico Oil Conservation Commission was reported by me; and that the same is a true and correct record of the said proceedings, to the best of my knowledge, skill and ability.

Witness my Hand and Seal this 3rd day of July, 1967.

Ada Dearnley
NOTARY PUBLIC

My Commission Expires:

June 19, 1971.

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 36-030-4 heard by me on June 2, 1967.
Theresa J. [Signature], Examiner
New Mexico Oil Conservation Commission