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BEFORE THE
NEW MEXICO OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
November 18, 1970

EXAMINER HEARING

IN THE MATTER OF:

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

Case 4458

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

Case 4459

BEFORE: Elvis A. Utz, Examiner.

TRANSCRIPT OF HEARING



I N D E X

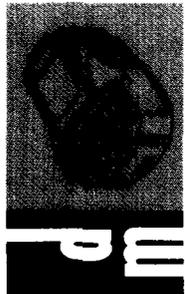
WITNESS

PAGE

VICTOR T. LYON

Direct Examination by Mr. Kellahin

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MR. UTZ: Case 4458.

MR. HATCH: Case 4458. Application of Continental Oil Company for a unit agreement, Lea County, New Mexico. Do you want Case 4459 called too?

MR. KELLAHIN: Let's consolidate them for the record with separate Orders.

MR. UTZ: Request has been made for consolidation for the purpose of testimony of Cases 4458 and 4459. We'll consolidate these cases for purpose of testimony with separate Orders to be written on the cases.

MR. KELLAHIN: If the Examiner please, Jason Kellahin, Kellahin and Fox, appearing for the Applicant. We have one witness I'd like to have sworn.

(Witness 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 Would you state your name, please?

A Victor T. Lyon, L-Y-O-N.

Q And you're the same Mr. Lyon who testified before this Commission this morning and made your qualifications

of record; is that correct?

A That is correct.

Q Are you familiar with the Application of Continental Oil Company in Cases 4458 and 4459 presently before the Examiner?

A Yes, sir.

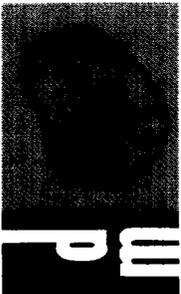
Q Briefly, what is proposed by the Applicant in these two cases?

A Case Number 4458 is the Application of Continental Oil Company for approval of the South Eunice Unit Agreement and Case Number 4459 is Application for Continental for authority to install and operate a waterflood project in the South Eunice Pool within the boundary of that unit.

MR. UTZ: Excuse me just a moment, Mr. Kellahin. I didn't ask for other appearances. Are there any? There are none? You may proceed.

Q (By Mr. Kellahin) Mr. Lyon, directing your attention to what has been marked as Applicant's Exhibit No. 1, would you identify that Exhibit, please?

A Yes, sir. Exhibit No. 1 is a copy of the unit agreement for the South Eunice Unit. It is a modified federal form, and I should like to direct the Examiner's attention to a few of the provisions. Section Two on Page Two defines the



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unit area which is also shown on Exhibit "A" and comprises 2720 acres described as the East half of the East half of Section 20, all of Section 21, the South half of the North half, Northwest quarter of the Northwest quarter, and Northwest quarter of the Northeast quarter, Section 22, all of Section 28, East half of the Northeast quarter and the Northeast quarter of the Southeast quarter, Section 29 North half, Southeast quarter, North half of Southwest quarter and Southeast quarter of the Southwest quarter. Section 33. All in Township 22 South, Range 36 East.

Q Does the unit agreement define the unitized formations?

A Yes, sir. The unitized formation is defined in Paragraph "F" of Section Two on Page Three, and it is defined as the interval between the base of the Queen and a point 232 feet above the top of the Queen, with a further provision that it shall not extend below a depth of 4,000 feet from the surface of the ground. The top and base of the Queen are shown on what we have designated, Exhibit No. 3, which will be discussed later.

Now, the South Eunice Pool as defined by the Oil Conservation Commission consists of the Queen formation and the lower 100 feet of the Seven Rivers. Therefore, the

unitized formation as we have defined it herein extends 132 feet above the top of the South Eunice Pool boundaries. It was necessary to do this in order to include all of the perforations in the oil wells which will be a part of the unit area.

MR. UTZ: Just a moment. Base of the Queen, and where did the 232 come in now?

A 232 feet above the top of the Queen.

MR. UTZ: Okay.

Q (By Mr. Kellahin) Are all of the substances unitized in this interval?

A No, sir. In Paragraph "G", we have defined unitized substances as being the oil gas, gaseous substances, et cetera, produced from the land, but it specifically excludes dry gas and associated hydro carbons so that we have -- that is from Jalmat gas wells so that we have excluded Jalmat gas wells within the unit area.

Q But you do include all of the oil produced from the South Eunice Pool?

A Yes, sir.

Q Is that correct? And from the lower limits of the Jalmat Oil Pool?

A That is correct.



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Q Now, is there a provision in the unit agreement for future expansion?

A Yes, there is.

Q Would you discuss that, please?

A Yes, sir. This is Section Four, it provides for the manner in which the unit can be expanded. This is more or less standard language.

Q And is Continental Oil Company, the Applicant here, designated as a unit operator?

A Yes, sir. In Section Six Continental is operated as a unit operator. Section Seven provides for the resignation or removal of the unit operations. Section Eight provides for a successor unit operator, and these again, are standard provisions.

Q Well, what is the tract participation in this unit?

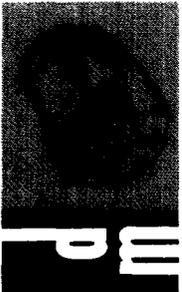
A Section 13 provides for the basis of tract participation. There are two phases in this formula. Phase One extends from the effective date until 116,910 barrels of oil have been produced from the unit area after October 1st, 1968. Participation during this phase is based 100 percent on tract current revenue as defined in Section Two. In Phase Two, participation is based on a formula 55 percent tract ultimate primary oil production plus 55 percent usable wells, plus 5

percent tract remaining gas value and 5 percent acreage.

Q Well, how will the tracts qualify in this unit?

A The qualification of tracts is set out in Section 14. And this, again, is standard language and under the provisions of this Section we have 96.81 percent in Phase One and 97.52 percent in Phase Two of the working interzoners, having ratified the agreement. Ratifications have been signed by the Royalty and Overriding Royalty interest as follows:

In Tract One, 100 percent of the Royalty and 95.8 percent of the Overriding Royalty. Tract Two, 100 percent of the basic Royalty. Tract 2A, 100 percent of the basic royalty. Tract 3, 64.05 percent of the basic royalty. Tract 4, 85.82 percent of the basic royalty and if I do not mention overriding royalty, this means that there is no overriding royalty in the tract. Tract 5, 78.47 percent of the basic royalty. Tract 6, 92.36 percent of the basic royalty. 6-A, 60.34 percent of the basic royalty. 7, 95.13 percent of the basic royalty, and 100 percent of the overriding royalty. Tract 8, 54 percent of the basic royalty, within 100 percent of the overriding royalty. Tract 9, 82.4 percent of the basic royalty. Tract 10, 99.79 percent of the basic royalty. Tract 10-A, 87.5 percent of the basic royalty. Tract 10-B, 24.72 percent of the basic royalty. Tract 10-C, 87.24 percent of the basic royalty.



Tract 11, 82.83 percent of the basic royalty, 100 percent of the overriding royalty. Tract 12, 100 percent of the basic royalty and 80 percent of the overriding royalty. Tract 13, 87.36 percent of the basic royalty and 100 percent of the overriding royalty. Tract 14, 98.44 percent of the basic royalty and 100 percent of the overriding royalty. Under the provisions of this Section, all tracts except 3, 6-A, 8, 10-B, 11, 13 and 14 are qualified for participation. And we have contacted sufficient numbers of the parties that we're confident that all tracts will be qualified for participation by January 1st, 1971.

Q Is the ownership reflected in the usual fashion on Exhibit "B" of this --

A Yes, sir.

Q -- unit agreement?

A Exhibit "B" shows the new ownership of the tracts within the unit area.

Q Now, what acreage and percentages are Federal, State and fee lands?

A The unit area includes 1,040 acres of Federal land, which is 38.24 percent of the unit area and 680 acres of Federal land, which is 61.76 percent of the unit area. There is no State land within the unit area.



Q Now, referring to what has been marked as Exhibit No. 2, would you identify that Exhibit?

A Exhibit No. 2 is a location and ownership plat showing the proposed unit area and an area two miles in radius surrounding the unit area. The wells within the unit area are designated as to the pool from which they are producing by a letter symbol, the legend for which appears at the bottom of the Exhibit. The South Eunice Wells do not have any letter symbols, so those wells which don't have a symbol are South Eunice Wells.

Q Now, the outline of the unit is shown with a dotted line, is that correct?

A Yes, sir.

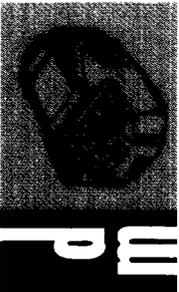
Q And within that unit area are there some Jalmat Wells?

A Yes, sir, there are some Jalmat Oil Wells, one located in Unit "E" and one Unit "N" of Section 22. There is a dual completion in Unit "K" of Section 21.

Q Will that be used in connection with the unit operations, that dual completion?

A Yes, sir.

Q The South Eunice completion will be used as an injection well. There is also a well in Unit "J" of Section 33, which -- these wells that I have discussed are Jalmat Oil



Wells which produced from the Yates formation. Consequently, they are not included within the unitized interval and will not be unitized. Now, the well in Unit "L" of Section 33, which is Continental Oil Company's Mira B 33 No. 9 is completed in the lower Seven Rivers and will be used as an injection well, because it is in fresh communications with the zones which are being waterflooded.

Q Now, referring to what has been marked as Exhibit No. 3, would you identify that?

A Yes, sir. Exhibit No. 3 is the copy of Gamma Ray Sonic Log which was run in the Continental Oil Company West Area Deep Well No. 1. This is the type log which I introduced before. It shows the tip of the Queen as 3821, the base of the Queen at almost 4,023 feet. Therefore, the unitized interval would extend in this well, if it were in the unit. Now, I might point out that it is located three-fourths of a mile northwest of the unit area. Would be 232 feet above the top of the Queen or 3,589 is what it ought to be. However, if this well were in the unit area, the unitized formation would be cut off at 4,000 feet because of this provision in the unit agreement. I might point out that there is no well within the unit area which has penetrated as deep as 4,000 feet, and we do not anticipate deepening any wells to that depth. So we don't believe that

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this restriction will give us any problem.

Q Would you discuss the next series of Exhibits marked Exhibits 4-1 through 4-30, inclusive, as a group, pointing out any particular differences that should be brought to the attention of the Examiner.

A We attached to the Application a list of the injection wells, which we designated Exhibit 4. That tabulation showed the size setting depth, amount of cement used, etcetera, on the surface casing, the intermediate casing, if any, and the production casing. These diagrams show the same information plus the producing interval, the approximate location of setting the packer, the description of the tubing which will be in all cases, I believe, two and three-eighths-inch cement lined tubing with a Baker Model A equivalent tension-type-retrievable-production packer.

¹
insert
Q Will you fill the casing tubing length, with an inner fluid?

A Yes, we will.

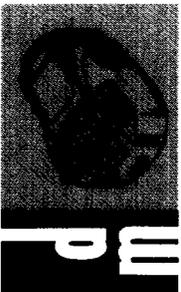
Q And will you put a pressure gauge at the surface?

A Yes, sir.

Q Now, directing your attention to Exhibit 4-7.

A Yes, sir.

Q Now, that is a dual completion; is it not?



A Correct.

Q Would you --

A This is the schematic diagram of the Gulf Greer No. 1, which is a dual completion. We'll install the cement-lined tubing in this well as were the others, but because of the fact that it is a dual completion and produces Jalmat gas above the packer, we, of course, will not install or will not put an inner fluid in that well.

Q Is this a type of completion that has been used for injection purposes successfully elsewhere?

A Yes.

Q And has been approved by this Commission in other cases?

A Yes.

Q And as to all of the other wells, they will be completed as you described?

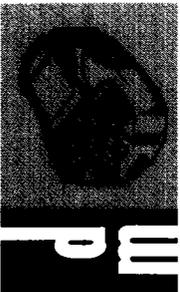
A Yes, sir.

Q And that is a type of completion that has been approved by this Commission --

A Yes, sir.

Q --in other cases?

Now, directing your attention to Exhibits 5-1 through 5-30, would you discuss that series of Exhibits?



A Exhibits 5-1 through 5-30 are copies of the logs which are available on the wells. They are a major size on a scale one-inch to one hundred feet. We do not have logs available on all wells. Consequently, there is no Exhibit 5-4, 5-23 or 5-25. Now, let me explain that I have numbered these Exhibits in the second number following the hyphen. In the same sequence that Exhibits 4-1 through 4-30 so that you can cross refer to them. I have shown on these by a horizontal red line the top of the Yates, which is the uppermost horizontal red line, the top of the Seven Rivers and the top of the Queen. Exhibits 5-5, 5-26, and 5-30, do not show the top of the Queen since that formation was not penetrated in those wells. Conversely, Exhibits 5-27 and 5-28 do not show the top of the Yates, as it is covered up by the log heading.

Q Now, referring to Exhibits No. 6, would you identify that Exhibit?

A Exhibit No. 6 is a structure map on the top of the Queen formation with a contour interval of 20 feet. The South Eunice Pool occurs in a terrace-like situation on the West flank of a tremendous North-South trending anticlimb. You will note that there is a sink in the Western or the Southwestern portion of Section 22. Then there is a

ridge in the Northwestern portion of the Exhibit and another high area to the Southeast in the Southeast portion of the Exhibit. That Northeast portion and the Southwest portion are low areas, so there is a trough trending from northeast to Southwest which is in the nature of an embankment on this anti-climb. The oil occurs in the several members predominately by their relationship to sea level between a minus 300 and up to approximately a minus 100.

Q Now, do these sums appear to be continuous throughout the unit area?

A Yes.

Q Will they be capable of transmitting fluid from one well to another?

A Yes, all the information we have indicates that they will.

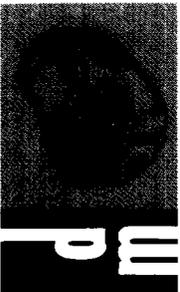
Q On that basis it would be possible to successfully waterflood the unit area?

A We believe that waterflooding can be carried out successfully.

Q Basically, what does the pay zone consists of here?

A It is primarily a fine grained sand interbedded with dense dolomite.

Q Now, referring to Exhibit No. 7, would you



identify that Exhibit, please?

A Exhibit No. 7 is a plat showing our proposed injection pattern. It is essentially an 80-acre-five-spot pattern modified as necessary. For instance, on the Southwest portion to supplement very slight water influx, which had occurred there and in other places, due to the pattern in which wells have been drilled.

Q Now, to complete your pattern, it will be necessary to drill two additional wells, will it not?

A Yes, provided that the project proceeds as we hope that it will. Final decision to drill these wells will be determined by the performance of the flood.

Q Now, is this area offset by production, the unit area offset to the east, by production?

A Yes.

Q Is that being unitized?

A In Section 27 and 28 there is a group of Atlantic Richfield Leases which are being unitized, and we have initiated negotiations for a lease-line agreement with them.

Q You anticipate that that will be completed?

A Yes.

Q And is there any necessity for a lease-line agreement anywhere else offsetting this waterflood project?

A There is no development to the East, that is East of Section 22. The development North is so scant that we have no hope of negotiating any lease-line agreements there, because there is no way that they could reciprocate. We have called Marathon's attention to the fact that we are proposing this, and they have offered no objection to our converting these wells to injection. Of course, there is no production to the West.

Q Now, referring to Exhibit No. 8, would you identify that Exhibit?

A Yes, sir. Exhibit No. 8 is a data sheet giving pertinent data on the unit area and the performance and our -- in essence, the result of our calculations on a waterflood.

Q Now, is this area at an advanced stage of depletion?

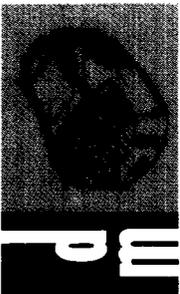
A Yes, sir.

Q Is it ready --

A The current daily oil production, or at least the production for August of 1970 was 1.5 barrels of oil per day, 1.6 barrels of water per day. Gas-oil ratio is 23,000.

Q What was the cumulative production?

A Cumulative production to September 1st of 1970 was 3,135,218 barrels.



Q Do you estimate that additional production of oil will be achieved by a waterflood project?

A We estimate that an additional 3,310,000 barrels can be recovered by waterflooding in this unit area.

Q Now, is that in the interest of conversation and the prevention of waste?

A Yes, sir. In my opinion, it is.

Q In referring to Exhibit No. 9, would you identify that Exhibit, please?

A Yes, sir. Exhibit No. 9 is a copy of a water analysis of water which we believe to be typical of what we'll be using for injection water. This actually came from our Lynn "A" Lease approximately three miles to the South. But as you can see, the solids are quite low. So we believe this is typical of the water.

Q Well, where do you propose to get your water?

A The water is supposed -- I mean, we anticipate developing the Jalmat Section in leases which are immediately adjacent to the West of the unit area and it will be water we expect to be produced with oil from the Jalmat Pool.

Q Would that be Seven Rivers Reef water?

A Yes, sir.

Q And if necessary, would you drill additional wells

for the production of water --

A If it's necessary.

Q --to carry on this flood?

A Yes.

Q Do you have any estimate on the amount of water that will be injected?

A We expect to inject a maximum of 13,000 barrels per day into the 30 injection wells, and we think that the maximum injection pressure will be in the order of 1500 pounds.

Q And would the completion as you propose for your injection wells be able to handle that pressure without any danger?

A Yes.

Q Do you request an administrative procedure for adding or substituting injection wells in this waterflood project?

A Yes, sir. Referring back to Exhibit No. 7, I believe it is, the irregularities of the unit boundary and some of the locations of the wells indicate that there may be some reason to modify this injection pattern, and we would like to have administrative procedures in the order for substituting or adding injection wells.

Q Would they be at similar locations or would the location also be a factor?



A I'm sorry. I didn't understand you.

Q Would the location of your injection wells be a factor? I mean, would they be a similar location to those proposed or would you have them closer to the lease, the quarter-section lines or farther away?

A As we contemplate it now, they would be more standardized, more in the center of the quarter quarter section. We do not anticipate at this time that there would be any non-standard locations used for injection.

Q Turning back to the unit agreement, has that been submitted to the Department of the Interior for approval?

A Yes, it has. It has been submitted to them for preliminary approval and this approval was given -- I forget the exact date. I believe it was February 27th, 1970. I mean February 25th.

Q And there being no State land, no approval of the State Land Commissioner is required?

A That is correct.

Q Were Exhibits 1 through 9, including the multiple Exhibits 4 and 5, prepared by you or under your supervision?

A Yes, they were.

Q At this time I would like to offer into evidence the Exhibits in this case.

MR. UTZ: Without objection Exhibits 1 through 9

will be entered into the record in this case.

MR. KELLAHIN: That completes the Direct testimony.

MR. UTZ: Mr. Lyon, you submitted with your Application a list of 30 wells for which you seek approval?

A Yes, sir.

MR. UTZ: Do you have any changes in the locations or descriptions of those wells, that you know of?

A No, not that I know of.

MR. UTZ: In other words, do you vouch for their accuracy?

A Well, they are accurate to the best of my ability. I won't swear that there aren't some typographical errors, but I have not come across any.

MR. UTZ: The only deviation from your method of completing your injection well is the one well shown by Exhibit 4057?

A That is correct.

MR. UTZ: Questions of the witness?

MR. HATCH: Now, the two wells shown on Exhibit 7 to be drilled, they are not part of that 30?

A No.

Q They would other --

A No, they would be in addition to the 30 that we have.

MR. UTZ: Other questions? The witness may be excused.

The case will be taken under advisement. We'll take a short recess.

STATE OF NEW MEXICO)
) ss
 COUNTY OF BERNALILLO)

I, LINDA MALONE, Court Reporter 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.

Linda Malone
 COURT REPORTER

I do hereby certify that the foregoing is a complete record of the proceedings of the Executive hearing of case #4568459 heard by me on 11/18/70.
[Signature] . Member
 New Mexico Oil Conservation Commission