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

EXAMINER HEARING

IN THE MATTER OF:
Application of Continental Oil Company for a waterflood expansion, Lea County, New Mexico.

Case No. 3274

BEFORE: Daniel S. Nutter

TRANSCRIPT OF HEARING

MR. NUTTER: Case Number 3274.

MR. DURRETT: Application of Continental Oil Company for a waterflood expansion, Lea County, New Mexico.

MR. KELLAHIN: Jason Kellahin, Kellahin and Fox, Santa Fe, New Mexico, representing the applicant. We have one witness I would like to have sworn, please.

(Whereupon, Applicant's Exhibit No. 1-S marked for identification.)

RONALD McWILLIAMS

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

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q Will you state your name, please?

A Ronald McWilliams.

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

A I am employed by Continental Oil Company as a Supervising Engineer in Hobbs, New Mexico.

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

A I have.

MR. KELLAHIN: Are the witness' qualifications acceptable?

MR. NUTTER: They are.

Q (By Mr. Kellahin) Are you familiar with the application of Continental Oil Company in Case 3274?

A Yes, sir, I am.

Q Would you state briefly what is proposed in this application?

A This is the application of Continental Oil Company for permission to expand to full scale the waterflood project in the Skaggs Pool located on Continental's Southeast Monument Unit, originally authorized by Order No. R-1701.

Q Now, Continental is apparently asking a departure from the administrative procedures set forth in Rule 701E. Why is this being done?

A This expansion calls for injection wells against the unit boundry. In order to protect correlative rights it will be necessary to negotiate lease line agreements with operators outside the Southeast Monumnet Unit. These agreements are being negotiated with Texaco and Amerada. The conversion to injection of the wells covered by this agreement cannot be accomplished under Rule 701E. This situation and the performance of the pilot project prompted us to request permission to install a full-scale flood.

Q Referring to what had been marked Exhibit 1, would you identify that Exhibit and discuss it?

A Exhibit 1 is a location plat of the Skaggs Pool area. The Skaggs Pool Wells are circled on the plat and the water injection wells are indicated by the triangles surrounding the well location. The present water flood project area as defined by Rule 701 of the New Mexico Oil Conservation Commission is outlined in red. The original six pilot water injection wells are colored in blue and the five wells converted to injection for the first expansion are colored red. The producing wells colored green have shown a response to waterflooding.

Q Would you, for the benefit of the Examiner, briefly review the history of the waterflood project?

A Water injection into the producing formation of the Skaggs Pool commenced on March 23, 1961. Initial injection was into the six-injection well pilot shown in Exhibit 1. The two eighty-acre five-spots were obtained by converting six producing wells to injection. The pilot waterflood was authorized by Order No. R-1710 of the Oil Conservation Commission dated June 10, 1960. The pilot was expanded on April 19, 1964 to include the five injection wells designated by the red triangles. The expansion as made under Administrative Order WFX 158 of the New Mexico Oil Conservation Commission.

(Whereupon, Applicant's Exhibit

Two marked for identification)

Q Now, referring to what has been marked as Exhibit Two, would you identify that exhibit and discuss it?

A Exhibit 2 is a performance curve for the Southeast Monument Unit Permian Participating Area. The oil production curve shows a drop in production at the time the six pilot wells were converted to injection due to six fewer producing wells. The normal rate of decline is shown to have been arrested and the lease is presently producing above the extrapolated primary decline. Water production shows a sharp increase during June, 1965, indicating the breakthrough of injection water in the general pilot area.

Q What briefly are the results of this pilot flood?

A The increased rate of oil production shown by Exhibit 2 indicates that the oil which would not be obtained by primary producing methods can be gained by water injection. The lease has produced an extimated 41,600 barrels of waterflood oil as of June 1, 1965. As previously mentioned, the wells which have experienced a response to water injection are shown colored green on Exhibit 1.

The pilot has futher shown that, 1) water can be injected in sufficient quanities and under reasonable pressures to stimulate production in offsetting wells, 2) that the productive intervals are continuous across the pool such that

oil can be swept from one well to the offsetting well and, 3) no adverse problems which will be detrimental to a waterflood, such as channeling or premature water breakthrough or plugging of injection wells should occur.

Q Now, in what part of the Skaggs Pool do you propose to expand, at this time?

(Whereupon, Applicant's Exhibit No. Three marked for identification.)

A Our Exhibit 3, a location plat of the Skaggs Pool Area, shows the proposed water injection wells. Wells to be converted by Continental are circumscribed by green circles. The proposed water injection wells are:

SEMU Permian Number 35, Southwest Quarter Northeast Quarter of Section 24, Township 20 South, Range 37 East, SEMU Permian Number 36, Northeast Quarter Northeast Quarter of Section 24, Township 20 South, Range 37 East, SEMU Permian Number 44, Southwest Quarter Southwest Quarter of Section 13, Township 20 South, Range 37 East, SEMU Permian Number 45, Southwest Quarter Southeast Quarter of Section 13, Township 20 South, Range 37 East, SEMU Permian Number 46, Northeast Quarter Southeast Quarter of Section 14, Township 20 South, Range 37 East, SEMU Permian Number 75, Southwest Quarter Southeast Quarter of Section 18, Township 20 South, Range 38 East, SEMU Permian Number 76, Southwest Quarter Southwest Quarter of Section 18,

Township 20 South, Range 38 East, SEMU Permian Number 78, Northeast Quarter Southeast Quarter of Section 13, Township 20 South, Range 37 East, SEMU Permian Number 79, Southwest Quarter Northeast Quarter of Section 13, Township 20 South, Range 37 East.

The proposed expansion will complete waterflood development in the Skaggs Pool on Continental's Southeast Monument Unit. The pattern described will result in a continuation of the eighty-acre five-spot pattern started in the pilot area.

Q What is the average daily production in this Skaggs Area, at this time?

A For an expansion area defined as the wells northeast of an imaginary line drawn through Southeast Monument Unit Permian Numbers 37, 29, 33, 31 and 73, the daily average production for May, 1965 was 67 barrels of oil per day, six barrels of water per day and 669 MCF of gas per day. This is an average of 4.46 barrels of oil per day per well. The average GOR is 10,022. The largest producer not directly offset by an injection well, is well Number 35 which produced approximately eight barrels of oil per day during May.

Q Would this indicate that production in this area is at an advanced stage of depletion and stripper type of production?

A Yes, I think it would. With the daily production being only four barrels per well and with two wells, Southeast Monument Unit Permian Numbers 46 and 47, shut-in due to uneconomical production, it is evident that little additional oil will be recovered by primary methods.

Q How do you propose to complete your water injection wells?

(Whereupon, Applicant's Exhibit Nos. 4A through 4I and 5A through 5I marked for identification)

A Exhibits 4A through 4I are schematic drawings showing the existing casing and cementing program in the proposed injection wells and the proposed method of completion. The water will be injected through plastic coated tubing with a packer set a short distance above the casing seat in the open hole completions or above the perforations in the cased holes. Exhibits 5A through 5I is a copy of a Gamma Ray-Neutron log and well data for each injection well. This exhibit shows that the invervals open to water injection are limited to the Grayburg formation and in some cases, a portion of the lower Penrose formation.

Q This is the interval that has been open throughout the producing life of those wells?

A Yes, sir.

Q Is that same interval open in the waterflood projects

which are presently being injected?

A Yes, sir.

Q What is the anticipated injection rate?

A An injection rate of approximately 4500 barrels of water per day is anticipated. For the nine wells in this expansion, the average daily rate would be 500 barrels per day, per well.

Q Will the injection be under pressure or will the wells take it on vacuum?

A It will be under pressure. Based on the performance of the present flood, injection pressures from a 1000 to 2300 PSI will be required. The higher pressures will be required for the well located along the edge of the pool.

Q For what reason is that?

A Well, the formation is the- - The limits are, approximately, are controlled by a permeability and the porosity pinchout and the wells along the edge have this reduction in permeability and subsequently it's harder to put the desired volume of air into the well.

Q Will this permit you to use the higher pressure and still protect against any damage to the other formation?

A Well, there it will.

Q What is the source of the injection water?

A Produced water from the Pennsylvanian formation of

the Cass Pool, located 12,000 feet west of the Skaggs Pool will be used. Reda pumps are presently installed in two Cass Pool wells to supply the flood now in operation. The present capacity is 9,000 barrels of water per day. An additional Reda will be installed to supply the 4500 barrels of water per day requirement of the proposed expanded flood.

Q What will you do with the production water?

A Produced water will be re-injected into the formation to supplement water obtained from the Cass Pool.

Q Now, as I understand, this is a salt water well, is that correct?

A That is correct.

Q And you are using a plastic coated tubing in the injection pumps?

A Yes, sir.

Q And will that be through closed systems?

A Yes, it will.

Q What steps will be taken to protect correlative rights across the lease line along the north boundry of the Southeast Monument Unit?

A Lease line agreements are being negotiated with the two offset operators, Amerada Petroleum Corporation and Texaco, Inc. It is proposed that these operators will convert the wells circled in red on Exhibit 3. These wells are

described as?

Texaco-Kershaw Number 5, Northeast Quarter Southwest Quarter of Section 13, Township 20 South, Range 37 East, Texaco-Weir Number 2, Southwest Quarter, Northwest Quarter of Section 18, Township 20 South, Range 38 East, Amerada-Turner Number 1, Northeast Quarter Northeast Quarter of Section 19, Township 20 South, Range 38 East, Amerada-Turner Number 2, Northeast Quarter Southwest Quarter of Section 18, Township 20 South, Range 38 East.

The Continental wells to be converted under these agreements are Southeast Monument Unit Permian Numbers 75, 78, and 79. Under this agreement of injection wells along the lease line, each working interest owner and royalty owner will obtain an equitable share of the oil.

Q Now, according to the location plats, there is an open location located in the Southeast Quarter of the Southeast Quarter of Section 13, Township 20 South, Range 37 East. Do you propose to drill a well at this location?

A Yes, sir, we do. This location was originally developed in the Skaggs Pool by the Southeast Monument Unit Permian Number 41 but the hole was lost due to mechanical conditions. A well will be drilled to replace the No. 41 at the time the flood is expanded.

Q Now, under Rule 701E what will be the maximum daily

allowable for the Southeast Monument Unit Permian Participating Area?

A There are forty-four proration units within the deve developed limits of the Skaggs Pool in the Southeast Monument Unit which will have one well each. This would be calculated to be a 1848 BPD maximum allowable.

MR. NUTTER: Is that included in the section that will be drilled?

A Yes, sir.

Q (By Mr. Kellahin) Do you anticipate, on the basis of your experience with the pilot flood that you will achieve maximum production?

A No, we don't.

Q Now, what advantage does a full scale water flood project offer over expansion of Rule 701E?

A Continental feels that the pilot flood has demonstrated that the pay intervals are continuous between wells and no unusual problems will be encountered. The next expansion would call for injection of water in wells offsetting leases outside the Southeast Monument Unit. In order to protect correlative rights a lease line agreement is necessary, the application of which is not compatible with Rule 701E.

Secondly, the expansion of the total lease will enable better control of the water fronts. It will be possible to keep

the five-spot patterns balanced and assure maximum areal sweep. Thirdly, total expansion will shorten flood time by approximately five years. The pay interval is approximately forty feet thick in most areas. A period of eighteen months was required to obtain a response in outside wells in the pilot flood.

Q Now, referring to what has been marked as Exhibits 5A through 5I, would you identify those exhibits, please?

A These are well data, plats of the injection wells showing a log of the well, the casing program and a short history of the well showing remedial work that has been performed, cumulative production from the wells and in general a complete history of each injection well.

Q In each case you do give the casing record, the cementing program, the cumulative production and the remedial work that has been performed on the well, is that correct?

A Yes, sir.

Q Were Exhibit's one through five I prepared by you or under your supervision?

A Yes, sir.

Q At this time I would like to offer in evidence, Exhibit's 1 through 5I.

MR. NUTTER: Continental's Exhibits 1, 2 and 3, 4 and 5A through 5I will be admitted into evidence.

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

MR. NUTTER: Does anyone have any questions of this witness?

CROSS EXAMINATION

BY MR. IRBY:

MR. IRBY: Frank Irby, State Engineer's Office. Mr. McWilliams, on your well 36, what is the top of the cement surrounding the five and a half?

A It is at 125 feet.

Q And does it come up into the ten and three quarters?

A Yes, sir, the exhibit is poorly prepared. It shows the top to be consistent with the depth scale.

Q But the top is actually 125 feet from the land surface?

A Yes, sir. These cement tops were determined by temperature surveys in the well.

Q And the top is actually at 125 feet?

A Yes, sir.

Q I don't know that it makes any difference to me but I notice that in your application you don't include section 24 of 20, 37 which is included in the advertisement, on the fifth line of your application.

MR. KELLAHIN: Eighteen, fourteen is what the application shows.

Q (By Mr. Irby) The advertisement says thirteen, fourteen and twenty-four in 20, 37 which is contrary to what is shown

in the application. As I said it doesn't make any difference to me but I though you might want- -

MR. NUTTER: The application has the 24 down here under twenty, thirty and it should have been 20, 37. We corrected that when we made the advertisement.

MR. IRBY: I have no further questions.

CROSS-EXAMINATION

BY MR. NUTTER:

Q What is the present rate of injection, Mr. McWilliams for the 11 wells that you have on injection at the present time?

A I am not sure of the exact injection rate. I believe it would be probably in the neighborhood of fifty-five hundred barrels of water per day, average.

Q Just about five hundred per day in each well?

A Some of the wells take more more than others, some will take as high as a thousand and some will only take, oh, one hundred fifty to one hundred barrels per day.

Q But this five hundred that you are talking about for these wells, would this be up until the time of fill-up and then another rate would be used or is this the overall rate of injection throughout the line?

A This would probably be the over all injection rate throughout the line. We are controlled by the limitation of our

pumping equipment more than formation. We don't anticipate any problems with allowables so we have no reason to cut back on injection rate. We doubt that we will ever reach our maximum allowable.

Q Now, you say you are injecting approximately fifty-five hundred a day now, and you will be needing another forty-five hundred, this would be a total of ten thousand a day, can you produce ten thousand a day over there in case- -

A Yes.

Q Under the present allowables?

A Yes.

Q These exhibits don't indicate it, Mr. McWilliams, but this tubing in each of these wells is two inch.

A Yes, it will be two inch tubing.

MR. NUTTER: Are there any other question of Mr. McWilliams? You may be excused. Do you have anything further, Mr. Kellahin? Does anyone have anything they wish to offer in this case?

MR. DURRETT: I would like to indicate for the record, the Commission has received a letter from Standard Oil Company of Texas stating that they support Continental's application in this case.

MR. NUTTER: Thak you, Mr. Durret. Nothing further in Case 3274, we will take the case under advisement and call

Case 3275.

STATE OF NEW MEXICO)
)
COUNTY OF BERNALILLO)

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

WITNESS my Hand and Seal this 24th day of August, 1964.

Denny Watts
DENNY WATTS

My Commission Expires:

June 9, 1969.

I do hereby certify that the foregoing is a ... the ... heard ... 7/28 ... 3274, 65.

... Examiner
New Mexico Oil Conservation Commission

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