BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
July 10, 1963

EXAMINER HEARING

IN THE MATTER OF:

Application of Standard Oil Company of Texas for special pool rules, Rio Arriba County, New Mexico. Applicant, in the above-styled cause, seeks the establishment of special pool rules for the Boulder-Mancos Oil Pool, Rio Arriba County, New Mexico, including provisions for 80-acre spacing therein. CASE 2857

BEFORE: Elvis A. Utz, Examiner

TRANSCRIPT OF HEARING

MR. UTZ: The hearing will come to order. Case No. 2857.

MR. DURRETT: Application of Standard Oil Company of Texas for special pool rules, Rio Arriba County, New Mexico.

MR. KELLAHIN: Jason Kellahin, Kellahin and Fox, Santa Fe, representing the Applicant, in association with Mr. Dick McGannon of the Texas Bar. We have two witnesses I would like to have sworn.

(Witnesses sworn.)

(Whereupon, Standard Exhibits Nos. 1 through 13 marked for identification.)

ROBERT MURPHY

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 Robert Murphy.

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

A Standard Oil Company of Texas, as geologist.

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

A I have.

Q And your qualifications have been made a matter of record?

A Yes, sir.

MR. KELLAHIN: Are the witness' qualifications acceptable?

MR. UTZ: Yes, sir, they are.

Q (By Mr. Kellahin) Are you familiar with the area involved in the application of Standard Oil Company of Texas in Case 2857?

A I am.

Q Did it come under your jurisdiction as geologist?

A Yes.

Q Are you familiar with the application in this case?

A Yes, sir.

Q Would you state briefly what is proposed here?

A Standard is attempting to establish 80-acre spacing in this pool.

Q Have you made a study of this pool from a geological point of view?

A I have.

Q Referring to what has been marked as Exhibit No. 1, would you identify that exhibit and discuss the information shown on it?

A Yes, sir. Exhibit No. 1 is a structure map of the Boulder-Mancos Field, Rio Arriba County, New Mexico; the scale is one inch to a thousand feet, contour interval is 100 feet.

The heavy contour lines are 500 foot contours. The blue outline represents the limits of this pool as established by an order March, 1963. The yellow area represents Standard's acreage in the immediate area of this pool. The red outline that you see at the southern end of the pool contains approximately 400 acres about which the engineering witness will discuss economics later.

This pool was discovered in early 1961 by the P. M. Bayless located in Section 15, 28 North, 1 West. As of the June proration schedule, June, 1963, there were 22 completed oil wells in the pool, 14 of which are capable of making top allowable. There are three dry holes in the pool, one on the west side, two on the east side. Three oil wells have been completed since, in the latter part of June or early July. The total depth of these

wells ranges from 3100 feet on the east to about 6,000 feet on the west side of the field. The mapping point is the top of the Gallup member of the Mancos formation. This point is equivalent to the points that we use in our maps in the Escrito-Gallup and other fields to the southwest.

Although no Gallup sands are developed in this area, we consider this still a reliable correlative point on which to map. The production in this pool is from fractured shale in the 150 feet immediately above and below this mapping point. This area is located on the east rim of the San Juan Basin. We have a steep, relatively steep dip to the west. The dip ranges from 5/8ths degrees on the east to a maximum of 35 or 40 degrees in the field itself. The maximum limits of the field have been fairly well-defined on the west and east; however, the north and south limits have not been defined at all. I believe that's all I have on this.

Q During the course of the development of this pool, what has been the spacing pattern?

A The spacing is mainly on 80-acre spacing.

Q Are there any exceptions to that?

A In the East Quarter of 27, there are two wells that are not on it.

Q Do you know what the productivity of those wells is?

A The two in 27?

Q Yes.

A It's very low, I'd say in the neighborhood of 10 barrels per day a well.

Q They would both be considered marginal wells?

A That's right.

Q Referring to what has been marked as Exhibit 2, would you identify that exhibit and discuss the information shown on it?

A The Exhibit 2 is the east-west cross-section hanging on the wall. This is drawn at right angles to the strike of the formation, and the section runs through the southern portion of the pool. The scale is one inch to 400 feet, both vertically and horizontally. In other words, there is no exaggeration, that's a true scale cross-section.

The yellow color on there outlines the Mancos-Gallup shale interval. Our mapping horizon is the line you see just above the word "Gallup" and the production in the field comes from a 150-foot interval immediately above and the 100 to 150 feet below this line, and you can see on this cross-section the rather steep west dip as well as the continuity of the Mancos shale interval across the field.

Q On the basis of your two exhibits, No. 1 and 2, would you conclude that the reservoir is continuous throughout the area involved here?

A Yes, sir.

Q Is the formation fairly uniform?

A Yes, sir.

Q Now this Mancos formation, does that include the Gallup marker?

A Yes, sir, it does. The Gallup name refers to sands which are generally present to the southwest. There is no sand developed in this interval in this area, but as I said earlier, we have mapped on the top of the Gallup in these fields to the south, Escrito,Bisti and other fields, and this is a good correlative point and we carried it further north into this area.

Q The production, as I understand your testimony,is from the Mancos, which includes the upper portion of what you call the Gallup interval of the Mancos?

A Yes. This interval in the Gallup is equivalent to the Gallup sands in the southwest.

Q There are no sands in the fractured shales?

A No, sir.

Q Were Exhibits 1 and 2 prepared by you or under your supervision?

A Exhibit 1 was prepared by me and 2 was under my supervision.

MR. KELLAHIN: At this time I would like to offer in evidence Exhibits 1 and 2.

MR. UTZ: Without objection, Exhibits 1 and 2 will be entered into the record of this case.

(Whereupon, Standard's Exhibits Nos. 1 and 2 admitted in evidence.)

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

MR. UTZ: Are there questions of the witness?

MR. DURRETT: Yes, sir.

CROSS EXAMINATION

BY MR. DURRETT:

Q Mr. Murphy, did you state that this P. M. Bayless Well located in Section 15 was a discovery?

A Yes, sir.

Q What's the exact location, do you have that?

A I do not have the exact footage. It's in the Northeast Quarter of the Northeast Quarter of the Northeast Quarter of Section 15, 28 North, 1 West.

Q Northeast Quarter of the Northeast Quarter of the Northeast Quarter?

A Yes.

Q Would you happen to have the date it was completed?

A It was completed in January of 1961.

Q January, 1961. Do you know the top of the perforations on that well?

A There are no perforations. These wells are completed open hole, and casing is set near the top of the Gallup, what we show as Gallup on the cross-section. I can't tell you the exact

in-hole depth, no, sir.

Q They all are open hole completions?

A Yes, sir. Casing is set by ourselves and other operators above the fractured interval in the Gallup. We drill a head with air to total depth and set a liner from the bottom of the casing, a slotted liner from the bottom of the casing to total depth.

MR. DURRETT: I think that's all I have right now.

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

(Witness excused.)

JOHN T. CAMERON

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

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q Will you state your name, please?

A John T. Cameron.

Q By whom are you employed and in what position?

A Standard Oil Company of Texas, petroleum engineer in the Proration Department.

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

A No, sir, I haven't.

Q For the benefit of the Examiner, would you outline

briefly your education and experience as a petroleum engineer?

A Petroleum Engineering and Geological Engineering degrees from Texas A & M College in 1955. Since that time I have been employed by Standard as a petroleum engineer, except for two years in the service.

Q Where have you worked as a petroleum engineer for Standard?

A I worked in Gainesville, Sherman, and Houston, Texas, in the Drilling Department as a production engineer and reservoir work.

Q Where are you located now?

A Houston.

Q In connection with your work in Houston, does the area involved in this application in the Boulder-Mancos Oil Pool come under your jurisdiction?

A It does.

Q Have you made a study of the Boulder-Mancos Oil Pool?

A I have.

MR. KELLAHIN: We submit the witness is qualified.

MR. UTZ: He is.

Q (By Mr. Kellahin) Mr. Cameron, referring to what has been marked as Exhibit No. 3, would you identify that exhibit and discuss the information shown on it?

A Exhibit No. 3 is a sheet of general reservoir data on the Boulder-Mancos Pool. Most of the information on it is

self-explanatory. It's taken from fluid studies of one of Standard's wells. Some of the pertinent points are original bottom hole pressures: first bottom hole pressures in our wells are 879 psig; the last bottom hole pressure, 764 as of April. Saturation pressure was 802 psi. The gravity is 32 degrees, and so far the cumulative production from Standard's five wells, as of April 30, was 50,714 barrels.

Q Has there been any decline in the production from your wells?

A No, sir. The five wells that we did have, I believe we have one extra well now, but the five wells that we had before June the 15th, three of them were top allowable and had not declined, and the other two were limited capacity wells and they had not declined either.

Q In connection with this case, have you conducted any interference tests in the Boulder-Mancos Pool?

A Yes, sir, we have. I think we have that numbered as Exhibit No. 4 so far. Exhibit 4 is an interference test. There is a plot plan on the Exhibit No. 4 showing the location of the wells concerned. Wells No. 2, 3, and 4 were the ones on which the interference test was run. No. 2, 3, and 4 were shut-in for 72 hours and build-up pressures were run in No. 4. The No. 2 and No. 3 were opened up and produced approximately 105 barrels per day per well after getting approval from the New Mexico Oil Conservation Commission and using the transferred allowable from

No. 4. The interference from No. 2 and No. 3 was seen in No. 4 at the point on the exhibit where the pressure in No. 4 begins falling. So you can see a fairly sudden indication of interference in No. 4. We continued this test for four months, measuring the pressure in No. 4 while No. 2 and No. 3 produced.

Q Before we go any further, in referring to these Wells No. 2, 3, and 4, would you identify and locate those wells by Section number, please?

A Yes, sir. These are Jicarilla 4-26 Nos. 2, 3, and 4. They're all in Section No. 26.

Q If you'll continue your discussion of the information gained by this interference test.

A Right. The pressure in No. 4 showed a drawdown over this test period of 47 psi; from extrapolated reservoir pressure it showed a drawdown of 40 psi from the maximum recorded in No. 4 before interference was noted. We feel that this shows a substantial interference between these three wells and that it shows further that one well will drain 80 acres, since these wells are on essentially 80-acre spacing.

Q This test was conducted by authority of the Commission, was it not?

A That's correct.

Q Was there a transfer of allowables involved?

A Yes, the allowable from Well 4 was transferred to 2 and 3, half on each well.

Q The wells were produced continuously throughout the period of the test?

A That's right.

Q Your conclusion is that indicates that one well will drain in excess of 80 acres?

A That's correct.

Q Have you conducted any pressure build-up tests?

A Yes, sir. As I mentioned, we took a build-up on No. 4 at the commencement of this test. In addition, we have build-up tests on No. 2 and 3 taken at the end of this interference test. I think we have those numbered what?

Q 5, 6, and 7.

A Right. These build-up tests were run primarily to gain some knowledge of permeability in these three wells. As you will note, the permeability calculates in No. 2, 293 millidarcies; and No. 3, 258 millidarcies; and No. 4, 54 millidarcies, which we feel is substantial.

Q Do you consider those as rather high permeabilities?

A Yes, I surely do.

Q What are they the results of?

A You would expect high permeabilities if you had a good fracture system.

Q Is that the type of reservoir you have here?

A This is a fractured shale.

Q Does that indicate then that a well will drain a wide

area?

A Yes, it does confirm this interference test.

Q Have you made any reserve calculations?

A Yes, sir.

Q Referring to what has been marked as Exhibit No. 8, will you discuss that exhibit?

A Exhibit 8 is an estimation of reserves underlying the 400 acres which is outlined in red on Exhibit No. 1. This is an extrapolation of pressure decline as measured in three of these five wells that are on this 400 acres. The cumulative production which was contributed to by all five wells is plotted versus pressure. An extrapolation of that pressure to 100 psi yields an ultimate recovery of 319,500 barrels, which we predict will be the recovery from that 400 acres.

Q You said first that you had used this specific area of 400 acres. Why did you use that area?

A Well, this is an area that is completely developed by Standard of Texas wells on which we have all the production information, cost information; and it's handy to calculate reserves and economics from this area.

Q Is the area representative of the pool as a whole, in your opinion?

A I feel that it is. We have three top allowable wells and two capacity wells and this is a similar ratio to the field.

Q I believe in your testimony you said you made the

pressure decline curves on three of the five wells?

A That's correct.

Q Is that because only three of them were top allowable wells?

A That's right, 2, 3, and 4.

Q In your opinion would the production from this unit be the same if it were developed on 80 acres as if it were developed on 40 acres?

A Yes, substantially the same.

Q Would there be any loss in the oil in the reservoir if developed on 80 acres as contrasted to 40 acres?

A No, I don't believe so.

Q Have you made a study of the economics of the development of this pool on the basis of 80-acre as against 40-acre spacing?

A Yes, I have, and we have three exhibits to support these economics.

Q Referring first to what has been marked as Exhibit No. 9, would you identify that exhibit and discuss it?

A Exhibit 9 is a write-up of the economics on this 400 acres that's outlined in red on Exhibit No. 1. First, on 80-acre spacing we've assumed actual cost of the five wells that are currently producing on that 400 acres. We have used the ultimate recovery that was calculated from this pressure decline. We have assumed that they would get an 80-acre allowable, which would be

140 barrels per day per well. Three of those wells will make that and the other two, we have assumed they would produce at capacity and decline at such a rate as to produce this 319,500 barrels. In the second case we assumed the same 400 acres would be developed on 40-acre spacing which would mean 10 wells. We just used twice the actual cost of the five wells that are already on the 400 acres. We used the same ultimate recovery as we used on 80 acres; we used a top allowable of 70 barrels per day per well for the three wells, and capacity for the other two.

The results of those economics show on 80-acre spacing a well will pay out in 2.183 years with a rate of return of 38.119 percent, net profit of $123,611 on investment of $225,647, for a profit-to-investment ratio of 0.548.

On the 40-acre spacing, the well would not pay out, naturally there would be no rate of return, would result in a net loss of $122,624 on an investment of $451,294.

Q In your opinion, do you feel this is an economic operation to develop this pool on 40-acre spacing?

A No, sir, I do not.

Q You recommend that it be developed on 80 acres?

A Yes.

Q Have you made a study of the economics as to 80-acre spacing?

A Yes, Exhibits 10 and 11 simply support Exhibit No. 9. They are machine calculations of the pay-outs which give the

results shown in Exhibit No. 9.

Q They're the underlying data on which No. 9 is based, is that correct?

A That's correct.

Q On the area in which you made the test, you stated there are three top allowable wells and two marginal wells?

A That's right.

Q Will the top allowable wells make an allowable which would be assigned to them on the basis of 80 acres?

A Yes, sir, they will. We tested these wells in June with the concurrence of the New Mexico Commission. All three wells showed that they will be capable of making in excess of 140 barrels a day, which will be the 80-acre allowable.

Q Is that shown on Exhibit No. 12?

A That is shown on Exhibit 12.

Q How many wells are there in this pool at the present time?

A Twenty-two wells. That was as of the June proration schedule there were 22 wells.

Q Of the 22 wells, how many are top allowable wells?

A Sixteen of them have top allowables assigned, according to our information only 14 are capable of making their top allowable.

Q Would those 14 make an allowable that would be assigned to an 80-acre unit, or do you know?

A I can't say for sure on the other operators' wells, but I would assume that it would be similar to our own, and ours do, ours will make in excess of 140.

Q Have you prepared a set of proposed rules?

A Yes, sir, we have.

Q Referring to what has been marked as Exhibit 13, will you identify that exhibit and discuss it briefly?

A Yes, sir. This is the proposed rules for the Boulder-Mancos Pool. In summary, we're proposing the 80-acre rules, with the 80-acre unit to consist of any two contiguous quarter-quarter sections of a single governmental quarter section, with the location of the well to be within 200 feet of the center of either quarter-quarter section in the unit.

Q Any other recommendations you want to point out at this time?

A Well, I might mention that nothing in the rules will prohibit the drilling of a well on a single quarter-quarter section.

Q Now what is the basic risk in developing this pool on 40 acres, Mr. Cameron, in your opinion?

A Well, as I've shown on the economics here, we have three top allowable wells and two marginal wells or capacity wells, and that is really the risk involved is that you can either have a real good well or you get a marginal well that has just very minimum economics.

Q Do you have 22 wells with 16 assigned top allowables?

A That's right.

Q So your ratio would be similar for the pool as a whole?

A That's right.

Q In your opinion, would approval of an order for 80-acre proration units encourage further development in this pool?

A I surely think it will. I think that the development of this field is at a virtual standstill. We have some undeveloped acreage to the south that could be developed, but because of the unfavorable economics on 40 acres, I doubt that they will be developed; and that all will be wasted otherwise.

Q Will that in your opinion then result in the recovery of oil that would not be ordinarily recovered?

A 80-acre spacing will provide for greater recovery of oil.

Q Were Exhibits 3 through 13 prepared by you or under your supervision?

A They were.

MR. KELLAHIN: At this time I would like to offer Exhibits 3 through 13.

MR. UTZ: Exhibits 3 through 13 will be admitted into the record of this case.

(Whereupon, Standard's Exhibits Nos. 3 through 13 received in evidence.)

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

examination.

CROSS EXAMINATION

BY MR. UTZ:

Q On your Exhibit No. 4 I note that you have a considerable lapse of time in order to accomplish significant build-up on these wells. How long was that time on this graph? I haven't had time to figure it out.

A Exhibit 4, is that the interference test?

Q Yes, sir. Close to 400 hours, isn't it?

A I don't think I have the question.

Q How long did it take you to get significant build-up after you shut in your No. 4 well? It was your No. 4 that you shut in?

A Yes. We shut in 2 and 3 and 4 for 72 hours. It had built up to about 855 pounds at the end of 72 hours. Then at the end of approximately ten days we went back in and took some more tests. That was the last that -- at that point we started noticing interference within the No. 4 well.

Q This 860-pound point, is that for an average of the three wells or is that a point just for the No. 4 well?

A Just the No. 4 well.

Q What's the length of time it took that well to reach this 860 pounds?

A Yes, sir, that's 400 hours.

Q You state this is a fractured reservoir, is that correct?

A Yes, sir.

Q In a fractured reservoir, why would it take 400 hours to get significant stabilization?

A Well, these build-up tests that I've entered here, if you'll note, Well No. 4 had 2872 barrels produced before it was shut-in for this build-up. With that much fluid produced, it takes us a long time for it to build back up to its maximum. In other words, if you only produce a small amount then you don't interfere with your reservoir back to a considerable distance from your well bore. If you produced it for a matter of years before you shut it in, your external boundary of your reservoir would be affected well out from your well bore, and it would take that much longer to build back up to maximum. This build-up test on No. 4 showed a permeability of 54 millidarcies. By Horner's build-up technique, even though at first glance it might look like it takes a long time for a pressure to build up, when it's considered that this amount of production preceded this build-up that's a fairly rapid build-up.

Q How many points did you take to affect your curve on your Horner method?

A Seventeen.

Q Was the No. 2 and 3 producing at the time that you read this 860 pounds?

A Yes, sir, they were.

Q It could account for your decelerated rate of build-up,

too, couldn't it?

A Well, it could have, except if you'll notice on the build-up of No. 4, the points taken after opening up No. 2 and 3 were right on the straight line portion, continuation of the straight line portion of that curve, so it leads us to believe that interference didn't start until after that point. So actually it falls right on the line and we felt like that was a valid pressure.

Q On your Exhibit 9, you've used the entire -- what was it, 400 acres?

A That's right.

Q In both of your examples, right?

A Right.

Q So the only difference actually between the two is your twice the cost of development?

A That's correct. Well, the rate of producing these reserves would be a little different because you have a 140-barrel allowable in one case and 70 in the other. I take that back, it would be the same.

Q Maybe you can tell me without having to look it up, what is the casing shoe point on your discovery well?

A I don't have it in the discovery well, which is a foreign well. I have it in our well. 4147 is the depth of the casing, T.D. 4429, open hole.

Q So this pool will have an allowable consistent with

5000-foot wells?

A That's correct.

Q Now in your proposed rules, did you pull these rules from some previous Commission order?

A Yes, sir. There are several fields that have very similar orders in Northwestern New Mexico. Unfortunately, I failed to list the fields that have those type of rules, but they are similar to rules in effect now.

Q Namely, the Cha Cha and those Gallup pools?

A I looked at the Cha Cha and the Bisti and Escrito. Many of them are a little different because they have gas rules and other special cases, but these are in general similar to them.

MR. UTZ: Are there any other questions of the witness? The witness may be excused.

(Witness excused.)

MR. UTZ: Are there any statements in this case?

MR. KELLAHIN: If the Examiner please, I believe there's a letter in the file from Socony-Mobil, is there not? We were informed that Socony-Mobil was sending a letter to the Commission concurring in the application of Standard Oil Company of Texas.

MR. UTZ: Well, they defaulted or the Commission defaulted, because there's not a letter.

MR. KELLAHIN: Skelly Oil Company authorized us to state that they concur in the application.

MR. DURRETT: Wholeheartedly?

MR. KELLAHIN: Well, wholeheartedly as Mr. Selinger usually does.

MR. UTZ: We'll take the case under advisement.

* * *

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 5th day of August, 1963.

Ada Dearnley
NOTARY PUBLIC

My Commission Expires:

June 19, 1967.

I do Hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 2557, heard by me on July 24, 1963.

Examiner
New Mexico Oil Conservation Commission