BEFORE THE
NEW MEXICO OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
February 5, 1964

EXAMINER HEARING

IN THE MATTER OF:

In the matter of Case No. 2480, being reopened pursuant to the provisions of Order No. R-2182-A, which continued for a period of one year the temporary 80 acre proration units established by Order No. R-2182, Henshaw-Wolfcamp Pool, Eddy County, New Mexico

Case No. 2480

BEFORE: DANIEL S. NUTTER, EXAMINER

TRANSCRIPT OF HEARING

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IN THE MATTER OF:

Case No. 2480 being reopened pursuant to the provisions of Order No. R-2182-A, Eddy County, New Mexico.

CASE NO. 2480

BEFORE: DANIEL S. NUTTER, EXAMINER

TRANSCRIPT OF HEARING

MR. NUTTER: Call Case 2480.

MR. DURRETT: In the matter of Case No. 2480 being reopened pursuant to the provisions of Order No. R-2128-A, Eddy County, New Mexico.

MR. MORRIS: If the Examiner please, I am Richard Morris of Seth, Montgomery, Federici and Andrews, of Santa Fe, appearing on behalf of the applicant, Shell Oil Company.

MR. DURRETT: Let the record show that Mr. Stokes has been sworn.

DANA D. STOKES,

called as a witness herein, having been first duly sworn on oath,

was examined and testified as follows:

DIRECT EXAMINATION

BY MR. MORRIS:

Q Mr. Stokes, are you the same Mr. Stokes that testified in Case 2986?

A I am.

Q Shell is an operator in the Henshaw-Wolfcamp Pool; is that correct, Mr. Stokes?

A That's correct.

Q And as an interested party, Shell is appearing in response to the reopening of Case 2480?

A Yes, sir.

Q Are you familiar with the exploration and development of the Henshaw-Wolfcamp Pool?

A Yes,sir, I am.

Q What is Shell's position at this time with respect to the reopening of Case Number 2480?

A Shell is here as an operator of the Henshaw-Deep Unit, and to request that the temporary rules established by Order No. R-2182 be made permanent.

Q To bring the Commission and the Examiner up to date a little bit on this pool, Mr. Stokes, do you have a plat showing the Henshaw-Wolfcamp Pool?

A Yes, sir. Exhibit One is a plat of the Henshaw-Wolfcamp Pool area, showing the Henshaw Deep Unit outlined in green. It

shows the location of the three wells that have been drilled in the pool since our last hearing in February of 1963. These three wells resulted in the completion of one producing well, No. Eight, which is located in the Southwest Quarter of Section 23, and two dry holes, No. Seven in the Northeast Quarter of 24 and No. Nine in the Northwest Quarter of 23.

Q Do you have an exhibit showing the completion data on the two wells completed in this pool since the last hearing?

A Yes, Exhibit Two shows the completion data on Wells No. Six and No. Eight, which have been completed since our February hearing. Well No. Six was in the process of completion at that time, but it was testing another zone. We did make a satisfactory completion in that well in a zone which is just below the porous interval producing in Well No. One, but which tested water in that well. We obtained a very satisfactory potential of 261 barrels of oil per day on a 13/64ths choke, out of Well No. Six, with only a thousand gallon acid treatment. We also completed Well No. Eight, which is directly west of Well No. Six. We had a potential there of 380 barrels a day on a 14/64ths choke, after treatment of 300 gallons of acid. This well is possibly structurally, or I should say it is completed in an interval almost equivalent to that that produces in Well No. Six. However, the zones do not correlate between the two wells.

Q That is the story of just about all the wells in this pool, isn't it, Mr. Stokes?

A That's correct.

Q If you would refer now to Exhibit Number Three, concerning the pressure performance of the wells in this pool, would you explain that, please?

A Exhibit Three is a plot of bottom pressure versus accumulative production of the wells in the Henshaw-Wolfcamp Pool. This graph shows the pressure performance between the wells in the pool, and also has a dashed line which is our calculated pressure performance for a well draining only 80 acres. This line being based on the average thickness of pay encountered in the field to date, average porosity and so on. The graph shows that only one well, Well No. Three-A, is draining less than 80 acres. We feel this well is draining 40 to 50 acres. It is a non-commercial well. The ultimate recovery would be on the order of 40 to 50 thousand barrels. I believe the well recovered about 35 barrels of oil to date, and is currently producing only 700 barrels of oil per month. The rest of the wells in the pool are performing very satisfactorily. All of them are indicated to be draining more than 80 acres. Some of them quite a bit more than that. Well No. Two is the next poorest performer, however, it is a commercial well, and certainly capable of draining far more than 80 acres. Well Six and Eight appear to be very good wells. Well No. Five is performing very well, and Well No. One has made 150,000 barrels of oil without any decline of pressure from a zone that is only ten feet thick. You will note that Wells Six and Eight were completed with pressures

considerably below the initial pressure of the rest of the wells in the field. This could indicate that these two wells are in the same poreous interval, however, we have quite a bit of other data that tends to discount this. We actually have only the single pressure point on Well No. Eight. We won't have any data to confirm this until we do take another pressure measurement probably in the middle of this year.

Q Do you have an exhibit showing the reservoir data on each of these six wells?

A Yes, Exhibit Four shows our reservoir data from all of the completions in the pool, both core data and data calculated from performance. We have core data on a producing interval of two wells, Well No. 3-A and Five. Here our porosity from cores and logs are in close agreement and our permeability from core data and permeability calculated from pressure build-up curves are also in very good agreement, being two and 2.8 millidarcies with respect to Well No. 3-A, and 68 and 41 millidarcies in Well No. 5. We have calculated from - - permeability from performance of wells in the pool, from 2.8 millidarcies in Well 3-A to 350 millidarcies in Well No. 8. All of the wells exhibit satisfactory permeability except Well No. 3-A. Also, I would like to point out the difference in the gravities of the oil and H_2S content of gas. This, in addition to difference in correlating from well to well, leads us to believe, with the exception of Wells Two and 3-A, all of the rest of the wells are completed in separate zones

of porosity.

Well No. 5 has properties quite similar to Wells Two and 3-A, however, it produces from a well that correlates to be 75 feet low to the zone producing in Well No. One, while Wells Two and 3-A correlate with a zone 100 feet high to the one producing in Well No. One.

MR. NUTTER: In other words, Mr. Stokes, I don't want to interrupt, but you feel here in the Wolfcamp you have just got a whole bunch of individual stringers and these various wells may be completed in different stringers with the exception of two wells?

A Yes, sir. Yes, sir. Yes, sir.

MR. NUTTER: You think are producing from the same one?

A Yes, sir.

Q (By Mr. Morris) Actually, Mr. Stokes, you have pretty good structural control in this area, just a question of where you are going to pick up your porosity, isn't that right?

A That's correct. We have our structure outlined fairly well, but the porous development has absolutely nothing to do with the present day Wolfcamp structure.

Q Have you made a calculation concerning the difference in abandonment pressures that would be caused by development on 80 rather than 40 acre density?

A Yes. Exhibit Five shows a calculation of the difference in abandonment pressure we would expect on 40 and 80 acre spacing

with the type of permeability that we have in this pool. We averaged the data from the four intermediate wells, dropping out the lowest well and the highest well as not representative of the field. We obtained an average permeability of 23 millidarcies, and average pay thickness of 12 feet, which gives us about 250 millidarcy-feet of permeable capacity. The flow equation is basic Darcies law modified to radial flow. Our terms of TP minus PF would be difference in the pressure of a drainage radius of a given well to the well core. The equation shows that function of oil producing rate, oil viscosity, the permeability and the formation thickness and the logs of ratio of drainage radius to the well bore, and this equation shows that for any well having satisfactory or adequate permeability at all, the difference in abandonment pressure on 40 and 80 acre spacing is bound to be small because the difference in the log of the drainage radius ratio is only- - well, 3.35 for 40 acres, and 3.497 for 80 acres. Unless your permeability is quite small, any well should be capable of draining more than 40 acres without a significant loss of reserves. Our material balance calculation indicates that the difference in the oil to be recovered through lowering the abandonment pressure from 520 pounds to 500 pounds is less than one-tenth of one percent.

Q Why have you presented this exhibit, Exhibit Five, Mr. Stokes?

A Well, we have presented this exhibit in lieu of interference test data since we can't possibly obtain them. The

only two wells that are completed in the same porous interval, and one of them is so tight and impermeable we couldn't possibly show interference with a well 80 acres away which indicates to be draining only 40 or 50 acres. We think the permeability average throughout the Henshaw field is sufficient to drain more than 80 acres. We have presented profitability data in previous - - in a previous hearing that shows the thin pays that we have encountered in all wells to date would not support development on 40 acres. In fact, the 80 acre profitability is marginal.

Q Your Number Eight well didn't change that picture appreciably, did it?

A We encountered 24 feet of pay in Well No. Eight, which is the best to date. However, that would not support 40 acre development. Out of the nine wells that we have drilled, we found that one with that much pay.

Q Would you summarize your testimony now, Mr. Stokes, pointing out the features of why we believe we can make a case for permanent rules at this time?

A Well, like to go into geology a little bit of what we have encountered here. We feel that the problems of development from a geological standpoint are very severe. It is our opinion that the porous intervals we have found to date are the result of low reef mound or reef build up that accumulated on a shallow sea floor during alternate periods of regression and transgression of the sea. Those mounds that had sufficient vertical relief to be

above the water level, during the regressive period, having porosity developed and the areas in between being filled with lime,mud and shale, and no porosity. So far we haven't been able to find any logical rythum to these developments. They are random in orientation and this is why we feel that our performance data suggests that some of them must extend for some distance, quite some distance. There are others we are sure are quite small. If you would refer to our figure one, you can see that our development to date has been one location out-step, resulting in the well, one well quarter section, or 160 acre spacing. At the present time, we intend to continue development on this pattern until we have defined the limits of the field. At that time we feel we will have enough production information on the wells that we have drilled that we will know where we can profitably drill on the alternate 80 acre locations to conform with our 80 acre spacing that we have under the temporary rules. We feel that any accumulation that we miss on this type of development pattern will be so small that it could not be justified economically. I feel that the temporary rules we have in effect should be made permanent now because our performance data to date show that the wells are capable of draining more than 80 acres. Our experience to date shows us that we are not going to be in a better position to prove interference a year from now than we are right now. We have drilled nine wells, we are not able to complete any of them in the same zone so far with the exception of Two and 3-A. Our

calculations show that average field permeability, that we have in the Henshaw, that 80 acre development is justified.

Q In other words, Mr. Stokes, even if you carry through on your plans for drilling additional wells in the next year, or so, you don't anticipate being able to run any interference tests, that the pressure information that we have presented, particularly on Exhibit Number Three, shows that except for one well, all of the wells in the pool are draining in excess of 80 acres and a year from now, we will, of course, have more production history, but we wouldn't be able to show any more conclusively than we do now the drainage that is taking place in this pool?

A That's correct. We could drill an infilling well, say, from between Wells Five and Six and obtain the same pay, that we are draining from, either one of the wells, and show a communication between that new well and, say, that Well No. Five, but still wouldn't establish communication with Wells Eight and Six, and One and so on. I believe we would just have a system of mound build up here that give us porosity development, but we are not going to find one zone that we are going to be able to produce in several wells, and establish communication between all of these wells.

Q Do you have anything further you would like to add?

A No.

Q Were Exhibits One through Five in this case prepared by you or under your direction?

A Yes, sir, they were.

MR. MORRIS: We offer those exhibits at this time, Mr. Examiner.

MR. NUTTER: Shell's Exhibits One through Five will be admitted in evidence.

CROSS EXAMINATION

BY MR. NUTTER:

Q Mr. Stokes, what is the basis for believing that the Number Two and 3-A are producing from the common reservoir?

A In testimony that we presented at the last hearing in February, we showed an exhibit that showed the pressure versus time and given interval in time, the pressure that we had measured in Two and 3-A were the same, and they also started out with the same reservoir pressure and they have the same characteristics of oil and H2S content of gas in the zones that they are producing from. We also gave that testimony in the first hearing on the cross section which we presented at that time.

Q Even from examination of logs, these evidently are the only two wells that have the same correlative pays?

A Yes, sir.

Q I see. And their original pressure was the same, 3390?

A Yes, sir.

Q There is evidently even a difference in the permeability of this stringer, though, from one well to the other?

A Yes, sir. We think that Well Number 3-A is out on the

very edge of this fairly small accumulation. The pay was only seven feet thick, which is only half that encountered in Number Two, and the permeability is only 1/5th as much. We just believe we are out to the edge of the thing. This well is not a commercial well.

Q Now, these gravities that you have here- -

A Yes, sir.

Q - -do you have a variation in gravity, one being 36 and the Number Six being 66?

A Number Six was completed with a gas-oil ratio of twenty two hundred something to one, because of the GOR- -

Q Because of GOR. Is there considerable difference in the GOR from one well?

A Most of them have been 1500 to 1700 feet, cubic feet per barrel. Well No. Six is the only one we have encountered- -

Q What are the producing capabilities?

A Well No. Three-A is capable of 20 or 25 barrels a day. Well No. One at the present will make about 155 barrels a day, which is just about our allowable. This well,from pressure build up data, indicates considerable formation damage. If it were to drop below top allowable, we would work it over, bring it back up. The rest of the wells are capable of making far in excess of allowable.

Q In excess of the allowable?

A Well No. One is the one that has exhibited no pressure

drop over the productive history. As I said, it does have a considerable formation damage or skin.

MR. NUTTER: Are there any other questions of Mr. Stokes? He may be excused.

MR. MORRIS: Mr. Examiner, we, of course, would ask that you take notice of all the other matters that have been presented in previous versions of this case, including the economic data.

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

MR. MORRIS: No, sir.

MR. NUTTER: Does anyone have anything to offer in this case?

MR. DURRETT: If the Examiner please, I would like to state for the record that the Commission has received telegrams from the following operators, who state that they support the application to make the rules permanent. Those operators are Delhi-Taylor, Texaco, Humble and Carper Drilling Company. These telegrams will be in the Commission file.

MR. NUTTER: If there is nothing further in the case, we will take the case under advisement.

The hearing is adjourned.

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STATE OF NEW MEXICO)

COUNTY OF BERNALILLO)

I, ROY D. WILKINS, 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 of Office, this 24th day of February, 1964.

NOTARY PUBLIC

My Commission Expires:

September 6, 1967.

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 2480 heard by me on Feb 2, 1964

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

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
February 6, 1963

EXAMINER HEARING

IN THE MATTER OF: Case 2480 being reopened pursuant to the provisions of Order No. R-2182, which order established temporary 80-acre proration units for the Henshaw-Wolfcamp Pool, Eddy County, New Mexico, for a period of one year. All interested parties may appear and show cause why said pool should not be developed on 40-acre proration units.	Case No. 2480 (Reopened)

BEFORE:
Daniel S. Nutter, Examiner

TRANSCRIPT OF HEARING

MR. NUTTER: We will go next to Case 2480.

MR. DURRETT: In the matter of Case 2480 being reopened pursuant to the provisions of Order No. R-2182, which order established temporary 80-acre proration units for the Henshaw-Wolfcamp Pool, Eddy County, New Mexico.

MR. MORRIS: I am Richard Morris, of the Santa Fe law firm of Seth, Montgomery, Federici and Andrews, appearing for Shell Oil Company in this case. Shell Oil Company was the proponent of the 80-acre rules established by Order Number R-2182 for the Henshaw-Wolfcamp Pool approximately one year ago. As such Shell Oil Company would be the proper one to take the lead in this

case having been reopened to reconsider the special rules and regulations. Shell Oil Company has recently completed a well in the Henshaw-Wolfcamp Pool and at present is evaluating the results of the tests that have been taken and are being taken on that well.

Shell believes that it will be able to present a much better case and give the Commission much more information if the case would be continued until the last Examiner Hearing in February, which I understand is to be on the 21st, and at this time I move that the case be continued until that time.

MR. NUTTER: Case 2480 will be continued to February 21st.

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 2480, heard by me on 2/6, 1963.

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

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

IN WITNESS WHEREOF I have affixed my hand and notarial seal this 20th day of February, 1963.

Ada Dearnley
Notary Public - Court Reporter

My Commission Expires:
June 19, 1963

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
January 24, 1962
EXAMINER HEARING

IN THE MATTER OF:

Application of Shell Oil Company for temporary 80-acre proration units, Henshaw-Wolfcamp Pool, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks a temporary order establishing 80-acre oil proration units for the Henshaw-Wolfcamp Pool, Eddy County, New Mexico. Applicant further seeks the establishment of special rules for said pool including a provision assigning the 80-acre proportional factor of 4.00 for allowable purposes.

BEFORE:

Elvis Utz, Examiner

TRANSCRIPT OF HEARING

MR. UTZ: Case 2480.

MR. WALKER: Application of Shell Oil Company for temporary 80-acre pro-ration unit, Henshaw-Wolfcamp Pool, Eddy County, New Mexico.

MR. SETH: Oliver Seth for the applicant, and we have one witness.

MR. MORRIS: Let the record show that the witness was sworn in the previous case.

MR. UTZ: Are there any other appearances? You may proceed.

D. D. STOKES,

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

DIRECT EXAMINATION

BY MR. SETH:

Q Would you state your name, please, Mr. Stokes, and your position?

A I am D. D. Stokes, employed by Shell Oil Company in Roswell, New Mexico as a Division Reservoir Engineer.

Q And in that capacity are you familiar with the application of Shell Oil Company in this case?

A Yes, sir.

Q Are you generally familiar with the reservoir conditions in the area in question?

A Yes, sir.

Q Have you testified previously before this Commission?

A Yes, sir.

MR. SETH: May he be qualified as a Reservoir Engineer?

MR. UTZ: Yes, sir.

Q (By Mr. Seth) Would you tell us what is the purpose of the application in this case?

A We are applying for a temporary 80-acre proration unit, and the establishment of special rule including a provision of assigning the 80-acre proportional factor four for allowable purposes.

Q In what area?

A This is the Henshaw-Wolfcamp Pool, I believe will be the designation of it. We have not received notice as yet of the Commission's action on the pool nomenclature.

Q Do you have a plat showing the location of the area?

A Yes, sir, that is Exhibit No. 1.

Q Now, referring to Exhibit 1, would you tell us, please, what that shows?

A Exhibit 1 is the location plat of the Henshaw Deep Unit area outlined in green. It also gives our pre-structural interpretation of the Wolfcamp in the Henshaw lower Wolfcamp Pool and the location of wells completed in our drilling of this lower formation.

Q Will you point out the wells that will be considered in the testimony?

A Well No. 1 is located in the northwest quarter of Section 24, Well No. 2 is located in the southeast quarter of 24, Well No. 3A is in the southwest quarter of 24.

Q Are there three wells that are presently completed in the unit?

A Yes, sir, these are the three.

Q Is there an additional one drilling at this time?

A Well No. 4, in the southwest corner of Section 13 is now drilling.

Q Now, give us a little background on Well No. 1, if you

would?

A Well No. 1 was originally completed as a Devonian gas well but after six months production it was completed and then the well was then recompleted in the Wolfcamp where it now is producing.

Q That was the well first drilled?

A Yes, sir.

Q What about No. 2?

A It was originally drilled and completed in Pennsylvanian. This well seeks production after about three months and was then recompleted in the Wolfcamp Pool. Zone 3A was drilled too, and recompleted Wolfcamp.

Q As a Wolfcamp well?

A Yes, sir.

Q Now, do you have an exhibit which is a cross section of these three wells?

(Marked Applicant's Exhibit No. 2 for identification.)

A Yes, Exhibit 2 is a northwest, southeast, cross section through the Henshaw lower Wolfcamp Pool.

Q Now, these wells appear No. 1, No. 3A and No. 2 from left to right, is that correct? A Yes, sir.

Q Did you testify that generally they run in what direction?

A From the northwest to the southeast.

Q Tell us what this Exhibit shows in a general way first?

A Well, this Exhibit shows a section of the Wolfcamp

formation and the part of Pennsylvanian in the Henshaw field. We feel that this Exhibit shows that Wells No. 2 and 3A are completed in the same stratigraphic section and Well No. 1 is completed in a different layer just below this section that 2 and 3A were completed in. We feel that this evidence is confirmed by our pressure behavior in the well and by the difference in the crude oil in the wells. The crude in Wells 2 and 3A is 41 gravity crude and will sweep and the crude in Well No. 1 is 36 and slightly sour.

Q Do you have any opinion as to the areal extent of the development which was indicated in Wells 1 and 2, I mean, excuse me, Wells 2 and 3A?

A In my opinion the zone that Wells 2 and 3A are completed in is quite small, it probably covers 140 acres.

Q What about No. 1?

A Well No. 1 appears to completed in a fairly large zone from pressure behavior.

Q Do you have any data or exhibits that show this reservoir data?

(Whereupon Exhibits 3,4,5 and 6 marked for identification.)

A That data is shown on Exhibits 4, 5 and 6.

Q What is No. 3?

A Exhibit 3 gives the completion.

Q Do you want to refer to Exhibit 3 or do you want to go to 4?

A I believe I prefer to take them in order.

Q Let's refer to Exhibit No. 3, this is a tabulation of well completion and reservoir data?

A Yes, sir, it shows the Wolfcamp completion data for each of the three wells in the field. It shows the completion date, completion interval, the treatment necessary and the initial potential data is pointed out on here. The fact is that gravity in Well No. 1 was 36 degrees API the gravity in Wells 2 and 3A was 41.

Q Do you have any core data shown on this Exhibit?

A Yes, sir, we have core from Well No. 3A. There is core indicated, Porosity of $12\frac{1}{2}$ per cent, Permeability 2 millidarcies and Water Saturation of 25%.

Q Is this the only well that was cored through this productive interval?

A This is the only core. We do feel, however, that this permeability on Well No. 3A is not representative since calculations from the bottom well hole pressure show that Well 1 and 2 have 1720.

Q I think the 3A gravity is unusually low.

A Yes, sir, I believe it is located in the edge of the core's development in the zone it is completed in and it is not representative of the zone.

Q You reached that conclusion from the pressure built up in the other wells?

A Yes, sir, that is correct.

Q Do you have any other comment on Exhibit No. 3? Is this

original pressure data of any significance?

A Yes, sir, the pressure data shows that the original pressure in Well No. 1 is 3410 pounds. Well No. 2 and 3A is 3390 pounds. These pressures have been obtained from extrapolated build up periods and are believed to be quite accurate.

Q Do you have any performance history on these wells?

A Yes, sir, Exhibit No. 4 shows the performance history, across the top we have pressure behavior per each well versus time and at the bottom we have cumulative production and the number of wells below against time. The significant thing is I believe, the pressure behavior of Wells 2 and 3A. You will note that initial pressure on Well 3A was about the same as the pressure after four months of production on Well No. 2.

Q Now, this shows Well No. 2, that was completed about what date?

A In early June of '61.

Q Well No. 1?

A In the previous year, in December of 1960.

Q How about Well 3A?

A Completed early in November of '61.

Q Give us a little more complete description as to your conclusions from this exhibit.

A Well, the exhibit shows that the pressure in Well No. 1 has not declined although the well has produced for a little over a year, while the pressure in Well 2 and 3A shows a definite de-

cline of around 300 pounds after only a few months of production. This indicates that wells 2 and 3A have a limited reservoir, Well No. 1 must be in a larger reservoir.

Q Now, roughly, is the cumulative production as of the end of 1961?

A The total for the field is 66,000 barrels.

Q And there are just these three wells in the field?

A Yes, sir, they produced about 9,000 barrels in the month of December.

Q Do you have any other conclusions from this Exhibit No. 4?

A Not from No. 4, no, sir.

Q Now, referring to Exhibit No. 5, what pressure data does this exhibit show?

A This is the extrapolated build up pressure for each well. The top curve is Well No. 1. It shows pressure, now, after recovery of 26,000 barrels of oil is about equal to the original reservoir pressure. It also shows that Wells 2 and 3A have declined signifocantly since completion.

Q Do you have any data on the gas production?

A No, sir, we did not plot gas production. Our latest GOR test showed an average producing GOR in the field of 1795 cubic feet per barrel. We are not at this time selling gas from Wells 2 and 3A but we are negotiating for such.

Q Now, referring to Exhibit No. 5, what were the times in-

volved, the shut-in times?

A For Well No. 1, the shut-in times on the successive pressure was 24 hours, 68 hours, 69, and 71 hours and 91 hours. For Well No. 2 it was 66 hours and 70 hours and Well No. 3, 71 hours. The pressure in Wells 1 and 2 after this period, were pretty well built up. The last ten hours build up only amounted to about six pounds.

Q Does this exhibit again show the contrast in the pressure behavior of No. 1 as against 2 and 3A?

A Yes, sir, it shows that No. 1 has not declined although it has produced 36,000 barrels while Well 2 and 3A have declined, are significantly poor. Well No. 2 about 15,000 barrels, Well 3A only 3,000 barrels.

Q And what conclusions do you draw?

A This again points to the fact that Wells 2 and 3A are in a very small reservoir and Well No. 1 is apparently in a large one.

Q Is there anything further on No. 5?

A I don't believe so.

MR. UTZ: How much decline does No. 1 show?

A Mr. Utz, on extrapolated build up pressure it doesn't show any decline, the pressure now, after a little over a year, is still the same as it was initially, purely on a static without the extrapolating through 17 pound indication pressure drop indicated over that period.

MR. UTZ: What did you say these pressures, the time of set-in pressures, was?

A Well, No. 1, the first test 24 hours, the second 68, the third 69 the fourth 71 and the fifth 91.

MR. UTZ: Did you say that last one was stabilized?

A Well, the pressure was not at it's maximum, however, in the last 24 hours it only built up, I believe 15 pounds, so it is fairly well stabilized.

MR. UTZ: Thank you.

Q (By Mr. Seth) Do you have an exhibit showing the pressure performance of the three wells?

A Well, Exhibit No. 6 shows the actual performance of Well No. 1, pressure versus cumalative compared to a calculated pressure performance for a well that is draining 48 and 80 and 160 acres.

Q How is this computed?

A We used volumetric analysis in determining the reserve for each of the spacing patterns assuming many pattern pressures were 500 pounds per square inch.

Q Now, would you state those factors again that you used?

A In determining the reserves for each spaced we used a Porosity of 12 1/2 per cent, Permeability of 2 millidarcies, Water Saturation of 25% and a Formation Volume Factor of 1.67 and 30% Recovery Efficiency.

MR. UTZ: What was the percentage?

A Recovery Efficiency 30%.

Q ~~(By Mr. Seth) Now, you used an estimated Permeability,~~ is that a factor?

A No, sir, that is not a factor.

Q Now, were any other factors used in this calculation in addition to those that you mentioned?

A No, sir, that is all.

Q What does this Exhibit show or what conclusions do you draw from it?

A Well, from this exhibit I draw the conclusion that the Henshaw, No. 1, must be draining well over 160 acres and if so we would have had drop in pressure of 500 pounds with a recovery of some 36 barrels of oil. Since we have not a significant pressure drop then obviously the well has been draining more than 160 acres.

Q What causes, in your opinion, the pressure behavior in No. 1?

A Well, I feel that the pressure behavior is caused by fluid entry into the vicinity of the well. I believe that this fluid is oil and in order for pressure to behave in that manner the well must be in contact with an extremely large reservoir.

Q Why do you believe it is oil rather than water?

A Geologically, there is none in the Wolfcamp to provide a well camp, it is just water. It seems more reasonable in view of the lack of evidence of any water in the Wolfcamp.

Q Do you have any other comments on No. 6?

A No, sir, I don't believe so.

Q Have you prepared or had prepared an economic analysis

of various spacing patterns in this pool?

(Marked Shell's Exhibit 7 for Identification)

A Yes, sir, I have Exhibit 7. It presents our economic analysis and various well spacings. The reserves here for each different spacings are based on the same perimeters that were used in determining the pressure drop, that is Porosity 12 1/2 per cent, Permeability 2 md, and 25 per cent Water Saturation, 1.67 formation of volume factor and 30 per cent Recovery Effeciency.

Q And you used a well cost as indicated here as of how much?

A One hundred Fifty Seven Thousand per well in each case and we used operating net income of $2.00 a barrel in each case.

Q Now, if you will take us through this exhibit a little bit more in detail, if you would, from the beginning?

A We show a price of oil at 36 degrees, $2,830. We estimated a Gas-Oil Ratio over life as 3.0 MCF of barrels for Gas Income Average over life of .30 as barrels which gives a total gross income of $3.130 a barrel. Our Royalty and Overriding amounts are estimated as 0.548 per barrel, Production and Property Taxes 0.193 and Operating Costs of .205 which gives a total cost of $1.130 and leaves an operating net income of $2.000 a barrel.

Q Now, do you use this net operating figure of $2.000 for all spacing in all departments?

A Yes, sir, we use the same figure for all departments.

Q That is based on your belief that on either 40 or 80 acre

spacing the biggest part of the life of each well would be on a decline so that allowable would not be a factor, therefore the life on 80 acre spacing would be about double the life on 40 acre? There would be no given operating cost?

A On 160 acres you would expect a smaller operating cost per barrel. We feel there is a longer life offset through having more maintenance and repairs to lift equipment.

Q And you feel that is a realistic way of handling this?

A Yes, I do.

Q Referring to your paragraph 2 there, 40-Acre Spacing, give us that again.

A On 40-acre spacing we have estimated reserve volumetrics of 52,000 barrels which would give us a working net income of 104,000 and Loss per well of $53,000. On 80-acre spacing our Reserves would be 104,000 barrels. We have a working Net Income of $208,000 and a Profit of $51,000.00 or 32 per cent profit on the investment. On 160-Acre Spacing we have Reserves of 208,000 barrels, a Working Net Income of $416,000.00, a Profit of $259,000.00 and 165 per cent profit.

Q Now, in your opinion, based on this data and the studies that you have made, I believe you have testified that one well will drain more than 80 acres, is that correct?

A Yes, sir, it is my opinion that a well in the Henshaw-Wolfcamp Pool efficiently drain more than 80 acres.

Q And will development made on 40 acres be economically sound?

A No, sir, we cannot justify definitely on a 40 acre

spacing.

Q And what is your recommendation to the Commission?

A My recommendation is that the Commission formulate the temporary rules to provide for 80 acre spacing during the development of the Henshaw lower Wolfcamp Pool.

Q Do you believe that such a spacing would be in the interest of conservation and prevent waste?

A Yes, sir.

Q And will correlative rights be protected?

A Yes, sir.

Q Now, in connection with the application, have you prepared some proposed field rules?

A Yes, sir, we have prepared five rules for the Henshaw lower Wolfcamp Pools.

Q Are these set out on your Exhibit 8? A Yes, sir.

(Marked Shell Oil Company's Exhibit 8 for identification.)

Q Would you mind reading these rules?

A "Rule 1, each well completed or recompleted in the Henshaw-Wolfcamp Pool," that should read "lower Wolfcamp, or in the Wolfcamp formation within one mile of said pool, and not nearer to nor within the limits of another designated Wolfcamp Pool, shall be spaced, drilled, operated, and prorated in accordance with the Special Rules and Regulations hereinafter set forth."

Q Now, that is just a standard preliminary paragraph?

A Yes. "Rule 2. Each well completed or recompleted in the

Henshaw-Wolfcamp Pool shall be located in the unit containing 80 acres, more or less, which consists of the S/2, N/2, E/2 or W/2 of a single governmental quarter section; provided, however, that nothing contained herein shall be construed as prohibiting the drilling of a well on each of the quarter-quarter sections in the unit.

Q Is that what you call a flexible 80 acre?

A Yes, sir, that provides that the unit can run either north, south, or east, west.

Q Now, Shell is the operator of this unit, is that correct?

A That is correct.

Q Have some of the other working interest owners disagreed with this particular ruling?

A Yes, sir, there are five working interest owners, four of them have agreed to the flexible spacing and one opposes it.

Q They would rather have a fixed location?

A They would rather have a fixed location.

Q Yes, sir, and No. 3?

A Rule 3. Each well completed or recompleted in the Henshaw-Wolfcamp Pool shall not be drilled closer than 330 feet to any quarter-quarter section line.

Q Now, all the operators agree with this ruling?

A All except the same one.

Q No. 4, is there anything unusual about that?

A No, sir, Rule 4 just makes provisions for granting the

exception to the spacing rules.

Q And is that an administrative procedure?

A Yes, sir, the only thing about it is that the provision for the allowable assigned to any such non-standard unit shall bear the same ratio to a standard allowable in the subject pool at the acreage in such non-standard unit bears to 80 acres.

Q Do you have any comment on that?

A Well, that would just mean that a well drilled on 40 acres would have half an 80 acre allowable.

Q No. 5?

A Rule 5. An 80-acre proration unit (79 through 81 acres) in the subject pool shall be assigned an 80-acre prorational factor of 4.00 for allowable purposes and in the event there is more than one well on an 80-acre proration unit, the operator may produce the allowable assigned to the unit in any proportion.

Q To any proportion between or among the several wells?

A Yes, sir, if there are two wells, the allowable can produce 50-50 on them.

Q Do you have any particular comments on Rule 5?

A No, sir.

Q How about the rules as a whole, do you believe that they are covering the reasonable way of the operation of the pool?

A I believe they will provide for orderly development in the pool and have sufficient flexibility and that well location may be changed for needed reasons.

Q And you recommend the adoption of the rules if the application is approved? A Yes, sir, I do.

Q Do you have anything further on the matter as a whole?

A No.

MR. SETH: We would like to, Mr. Utz, to offer our Exhibits 1 through 8.

MR. UTZ: Exhibits 1 through 8 will be entered into the record.

(Whereupon Shell Oil Company's Exhibits 1 through 8 entered in evidence.)

MR. SETH: That is all the direct testimony we have.

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

MR. PORTER: I have a few questions.

CROSS EXAMINATION

BY MR. PORTER:

Q Mr. Stokes, what is included in the well cost here, does that include the cost of the tank batteries?

A It includes each well's share of the lease facilities.

Q Is it about an average cost of Shell's wells of this department, would you say, for this particular area, for the southeast New Mexico area?

A Well, it varies a bit within southeast New Mexico, this is pretty cheap I think.

Q You'd say this is lower than the average?

A Yes, sir, I think so.

Q Did you state how you calculated your reserves?

A Yes, they are based on volumetric analysis using 12 1/2 porosity, 2 millidarcies of permeability and 25 per cent water saturation, 1.67 formation of volume factor and 30 per cent recovery effeciency.

Q Now, did Shell in the matter of nomenclature, Mr. Stokes, I believe this was to be considered at the regular January hearing?

A Yes, sir.

Q And for your information the Commission dismissed that particular paragraph pending the gathering of further information. And maybe you could help us on that score. Did Shell request a designation of lower Wolfcamp when they applied for this pool designation or did they just ask for the Wolfcamp?

A I believe that lower Wolfcamp was requested.

Q Now, you already have two stringers open in the lower Wolfcamp according to your testimony?

A Yes.

Q Is there any indication that there may be other productive stringers in the Wolfcamp here above these stringers?

A Yes, sir, we think there is a near the top of the Wolfcamp which if developed sufficiently for exploration, would be classified as upper Wolfcamp.

Q And is Shell aware of the fact that if this were limited to the lower Wolfcamp and another pool was created there would be

offset obligations for each particular pool designation?

A Yes, sir.

Q Do you think it might be better, Mr. Stokes, to go ahead and designate this as the Wolfcamp and then deal with the other situation if it arises, that is if it obtains production above this?

A If we could still classify it as upper Wolfcamp as opposed to just Wolfcamp, I think it would be satisfactory. The lower Wolfcamp designation does --

Q I wouldn't have any idea what action the Commission might take on it but in the past the Commission has been cautious in splitting the formation, so to speak.

MR. PORTER: I believe that is all the questions I have.

MR. SETH: Mr. Porter, do you want the Company to provide additional information that will assist in this pool designation lineation?

MR. PORTER: Well, I don't know exactly what information they could give at the present time since it is not known whether the stringers are there.

CROSS EXAMINATION

BY MR. UTZ:

Q You haven't run into any of this?

A I think we made some drill stem tests and recovered some oil and quite a bit of mud.

Q You don't have any pressure information?

A Not adequate, no, sir.

MR. UTZ: Mr. Morris.

CROSS EXAMINATION

BY MR. MORRIS:

Q You stated that you had some opposition to your Rule 2 and 3 as you proposed them. What source did that opposition come from?

A From Texaco.

Q Texaco. Now, I noticed from your Exhibit No. 1 that the three wells that are drilled in this unit so far appear to be in the exact center of the 40 acre tract on which they are located.

A Yes, sir, they are all at present located in such a manner that we could have fixed spacing in the pool without disturbing any of the presently completed wells.

Q Do you feel that you would have a better drainage pattern if the well location requirements were fixed as being say within 150 feet of the center of the quarter-quarter section?

A Well, we feel that might be necessary in some cases to go to the alternate 40.

Q Necessary for geologic reasons?

A For geologic reasons.

Q For topographic reasons?

A Not for topographic, for geologic. As far as there being within 150 feet of the center or 330 feet from the quarter-quarter section we have no strong feeling on the same.

Q You don't believe that a fixed pattern would result in a better drainage of this reservoir?

A We plan to continue development on a fixed pattern for as long as we can but we have a provision in our field rules for non-standard location, if we feel it is necessary later.

MR. UTZ: You mean for each well?

A Yes, sir.

Q (By Mr. Morris) Mr. Stokes, you stated that you in estimating the reserves, you used a 30 per cent efficiency recovery, does that mean that you estimate a recovery of 30 per cent of the oil in place?

A Yes, sir.

Q From what you know of the reservoir so far, does it appear that secondary recovery might be feasible in this area?

A It is a little early to tell but if our primary recovery ranges between 30 and 40 per cent as I predict it does in the Wolfcamp there wouldn't be very much left for secondary.

Q At the present time do you believe it to be a solution gas drive reservoir?

A Yes, sir, I do.

Q Do you feel that a 30 per cent recovery factor in a solution gas drive reservoir is an appropriate factor to use in determining reservoirs?

A In Permian-Penn, I believe it is, there are quite a few in southern New Mexico that are far enough along that we can make a

good reservoir estimate and it appears that within 30 and 40 per cent is a reasonable one.

MR. PORTER: By the Permian-Penn you mean usually what is referred to as Wolfcamp and Pennsylvanian?

A Yes, sir, in the lower part of the Wolfcamp there is quite a bit of difference of opinion between geologists as to where it becomes Pennsylvanian and where it ceases to be Permian.

MR. MORRIS: I believe that is all the questions I have.

CROSS EXAMINATION

BY MR. UTZ:

Q Mr. Stokes, as an engineer, eliminating the possible outside the wells, or edge structure wells, in your opinion the fixed pattern appears to recover more oil or less?

A I think it provides for more effective drainage, yes, sir.

Q To the more uniform pattern?

A It would be more uniform pressure structure in the reservoir and I believe it should promote efficiency.

Q Now, would you recommend that the flexible pattern would enhance the possibility of dedicated dry acres drainage on this well?

A That could happen but a fixed pattern could also prevent somebody who had productive acreage from getting full credit from that productive acreage. We feel that flexible pattern has a better chance of protecting correlative rights as you approach the limit to the field.

Q Do you feel that possibility of dedication of dry acres

is full of productive correlative rights in the pool?

A No, I could hardly say that but it is just a matter of which is worse dedicating some possible non-productive acreage or possibility of not getting credit for some productive acreage. I feel that as you approach the lines of a field it is awfully hard to determine what is productive and non-productive.

Q It is pretty hard to determine without drilling the well outside the limit.

A Well, where the edge might fall between your standard and non-standard locations, if the standard location were dry within the unit, we wouldn't be concerned.

Q If it is all inside the unit then it wouldn't make any difference?

A Yes, sir.

Q You feel this unit boundary does include all productive acreage?

A Well, it would be awfully hard to say at the present time all the evidence from the Well No. 1 indicates that the reservoir should be fairly large and that it probably does extend outside the unit boundary.

Q You are not requesting the pool delineation?

A We requested that previously and I believe the hearing was held on January 17th and continued according to what Mr. Porter just said.

Q I understand it was dismissed.

MR. PORTER: It was dismissed, however, I feel that as a result a pool could be delineated.

MR. MORRIS: In fact it would be also to create a delineated pool in order to establish pool rules.

MR. SETH: We would be glad to furnish any additional data to the Commission that will assist in this area.

MR. UTZ: Well, I believe Mr. Stokes has testified to the fact that he believes No. 1 is in a different pool than 2 and 3A.

A Well, it is in a different zone of Porous development, however, the vertical distance is less than 100 feet between the zones and I don't believe we could very well classify it as a different pool. It would be similar to the Saunders Field where you have four different productive zones, fairly thin zones, that are all classified as Saunders.

Q Do you have any vertical communication between these pools?

A Not here, no, sir, apparently the zones don't overlap; the porour development on 2 and 3A is not present in Well No. 1 and of course development in Well 1 is not present in 2 and 3A.

Q Then, as I recall from your Exhibit, the pressure between the two zones is very slight?

A I know, it was initially. Now, there is about 400 pounds difference between the two.

Q First let me ask you, do you believe that in some of these wells, both of these zones will be present for the same allowable?

A No, sir, I believe that the zones in which Well [illegible] 2 and

and 3A are completed covers about 140 acres. It can't profitably support the two wells that are in it though I think our development plans will be towards finding the same zone that is productive in Well No. 1, since we know that it doesn't exist in Wells 2 and 3A, So we are now drilling to the north of Well No. 1 in an effort to locate that same zone.

MR. SETH: Are these the same wells?

A Yes, sir, Well 1 is ten feet, Well 3A was seven feet, Well No. 2, I believe, was about fourteen feet, fourteen feet.

Q (By Mr. Utz) By delineating the vertical limit of the pool to both the zones do you feel there will be any waste involved?

A I don't believe I understand that.

Q I say, by delineating this pool, the vertical limit of this pool to include both of these zones, do you feel that there would be any waste involved?

A No, sir, I don't believe there would be.

Q Now, on your Exhibit No. 5, you may have given me the shut in times for your 2 and 3A, I wish you would give it to me again, please.

A All right, sir. For Well No. 2 the first test was 66 hours, the second test 70 hours, Well No. 3A tested with 71 hours.

Q The first was 66?

A Well No. 3A has only had one test, No, 2 was 66 hours for the first test and 70 hours for the second.

Q Do you know whether or not the Pennsylvanian is likely to

be productive in this area?

A We had a porous zone about 35 feet thick in Well No. 2. The well was initially completed in that zone and after three months it was recompleted so apparently it doesn't extend very far and will not be anticipated Pennsylvanian. As a primary objective, we will probably drill other wells to the Penn hoping for development.

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. BLACK: I am C. R. Black, Texaco, Inc. out of Midland, Texas, Texaco owns an excess of 32 per cent of Henshaw Deep Unit and therefore we are a major interest holder and second only to Shell in the amount of interest held in the unit. Texaco does wish to concur with Shell in the application for temporary 80-acre proration units and we feel that certainly, completed in this recess is capable draining an excessive of 80 acres, however, Texaco does not concur with Shell's recommendation and rules governing the spacing of wells to be drilled and recompleted in this reservoir. Texaco believes that on 80-acre proration unit well should be drilled on what you would call staggered 40 acre. This would provide for orderly development of reservoir and will normally provide for the maximum efficient drainage of the reservoir. We also believe that in most instances the protection of correlative rights is normally insured if wells are drilled on this orderly development and staggered spacing, therefore, Texaco would like to reco-

mmend to the Commission that the field rules governing spacing of wells in this pool include the following things: 1, a well must be drilled in either the northeast or southwest quarter of any single governmental quarter section. This would conform to the present spacing pattern. No well presently drilled would be in violation of this well. 2, that no well may be drilled nearer than 660 feet to any lease or quarter-quarter section line. This would provide for an orderly development of the reservoir. Texaco also realizes that the rules do provide or contained provision that would permit an operator to obtain an exception to this rule if it was deemed necessary by the Commission.

MR. MORRIS: Mr. Black, may I ask you if Texaco has any opinion on what the vertical limits of the proposed pool should be?

MR. BLACK: No, sir, at this time I am not qualified to answer that. I have no information on that.

MR. MORRIS: Thank you.

MR. UTZ: Are there any other statements?

MR. MORRIS: If the Examiner please, I have a telegram from Carter Drilling Company, Marshall Rawley, Vice President, addressed to New Mexico Oil Conservation Commission: Carter Drilling is in concurrence with the proposed special rules and regulations for Henshaw-Wolfcamp in Eddy County as expressed on Exhibit No. 8, Commission's Hearing No. 2480, dated January 24, 1962.

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

I N D E X

STATE OF NEW MEXICO)
) ss
COUNTY OF BERNALILLO)

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

Katherine Peterson
COURT REPORTER

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 2480, heard by me on Jan. 24, 1962.

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

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
February 21, 1963

IN THE MATTER OF:

Case 2480 being reopened pursuant to the provisions of Order No. R-2182, which order established temporary 80-acre proration units for the Henshaw-Wolfcamp Pool, Eddy County, New Mexico, for a period of one year. All interested parties may appear and show cause why said pool should not be developed on 40-acre proration units.

Case No. 2480

BEFORE:

Elvis A. Utz, Examiner
A. L. (Pete) Porter, Secretary and Director

TRANSCRIPT OF HEARING

MR. UTZ: We will now take Case No. 2480.

MR. DURRETT: Application of Shell Oil Company for temporary special rules and regulations for the Henshaw-Wolfcamp Pool, Eddy County, New Mexico.

MR. UTZ: Who is appearing in the Henshaw Case No. 2480?

MR. DURRETT: Shell Oil Company is, Mr. Examiner.

MR. MORRIS: If the Examiner please, I am Richard Morris of the Santa Fe law firm of Seth, Montgomery, Federici and Andres, appearing for Shell Oil Company. I wonder if I

might inquire at this time if we are going to have any help or opposition in this matter?

MR. UTZ: I will ask for appearances. I don't hear any pro or con.

MR. MORRIS: Then we are prepared to carry the burden with one witness, Mr. Stokes, who I believe the record will show has been sworn in the previous case.

MR. DURRETT: Mr. Stokes was sworn in the previous case and is still under oath in this case.

D. D. STOKES

called as a witness, having been previously sworn, testified as follows:

DIRECT EXAMINATION

BY MR. MORRIS:

Q Mr. Stokes, state your name and position for the record, please.

A My name is D. D. Stokes. I am Senior Reservoir Engineer for Shell Oil Company in Roswell, New Mexico.

Q Mr. Stokes, are you familiar with Case No. 2480 and the previous hearing that was held in this matter?

A Yes, sir, I am.

Q And are you familiar with the characteristics of the wells that are now completed in the Henshaw-Wolfcamp Pool and are you prepared to testify with respect to them at this time?

A Yes, sir.

Q Mr. Stokes, what is the purpose of your appearance here in this case today?

A This case was reopened by the Commission to permit Shell to appear and show cause why the Henshaw-Wolfcamp Pool should not be developed on 40 acres. I am here to request that the temporary rules in effect be continued for one more year.

Q Then at the outset, we are not going to ask at this time that the rules be made permanent at this time, just asking that they be continued in effect for one more year?

A That is correct.

Q Do you have any exhibits prepared to substantiate your request?

A Yes, I have six exhibits to present.

Q Referring to Exhibit No. 1, would you explain that to the Examiner?

A Exhibit 1 is the location of the Henshaw-Wolfcamp Pool and has the Henshaw Deep Unit outlined in green and it shows our current interpretation of the Wolfcamp structure in the area. You can see from the plat that we have drilled three wells since our original hearing last January. These wells are 4, 5, and 6. Well No. 4 was completed temporarily and abandoned. We tested several thin zones in the Wolfcamp, but none of them were commercial. Well No. 5 was completed as a top allowable Wolfcamp Well with ten feet of net pay. Well No. 6 is now in the process of completion.

Q It has not been completed and tested at this time?

A That is correct. We tested a zone about 60 feet thick in that well which we thought would be productive and we would have data when we came to this hearing; however, this zone produced about 80 percent water so we have now abandoned that zone and are coming up the hole to test a higher zone.

Q Wells 1, 2, and 3-A were completed at the time of the hearing a year ago?

A Yes, that is correct.

Q Would you now refer to Exhibit No. 2 and explain that to the Examiner?

A Exhibit 2 is a cross section, showing the correlation of porous zones in the Henshaw Deep Unit No. 1, No. 5, and No. 6. We showed the correlation of No. 1 with 2 and 3-A at the previous hearing. You can see that Well No. 5 is completed in a porous zone that is about 75 feet lower than the zone producing in Well No. 1. This zone produces oil with a gravity of over 40 degrees, as well as gas having a H2S content of only 18 grams per hundred cubic feet. Whereas, Oil Well No. 1 produced, having a H2S content of 750 grams per hundred cubic feet, had a gravity of 36 degrees. Wells 2 and 3-A are produced in a zone about a hundred feet higher than the zone producing in Well No. 1. These two wells also produce gas, having a low H2S content and having gravities greater than 40 degrees. The zone that we tested in Well No. 6 is around 50

feet lower than the producing zone in Well No. 5. This well also produced very sour gas, having H2S content of more than 1100 grams per hundred cubic feet. This data indicates that except for Wells 2 and 3-A, none of the other wells in the Henshaw Deep Unit have as yet been completed in the same zone or reservoir. The characteristics of the oil are different in each case and the pressure performance is different in each case.

Q Your testimony in this regard, Mr. Stokes, is about the same as it was a year ago, where you felt that your Wells 1, 2, and 3-A were completed in different stringers at that time?

A We felt that 2 and 3-A were probably in the same stringer, but that Well No. 1 was in a different one and our data now confirms this, and we have two more wells that haven't managed to find the same zone.

Q I refer now to what has been marked as Exhibit No. 3 and explain that please.

A Exhibit 3 shows completion of reservoir data for the Henshaw Deep Unit No. 5. We gave the data for Wells 1, 2, and 3 at the previous hearing and the data for Well No. 6 is not available yet. We had a core through a pay zone in Well No. 5 which indicated 10 feet of pay, also 9 per cent porosity and 68 millidarcies permeability. The performance of this well to date compares favorably with Wells 1 and 2 and gives indication that the well does have a good permeability, as indicated by core analysis.

Q Have you anything else to show from Exhibit 3 that is not self-explanatory, Mr. Stokes?

A No, I don't think so.

MR. UTZ: Excuse me, Mr. Morris, we will recess until 1:15. I can see we are going to run 20 or 30 minutes past twelve.

(Whereupon, the hearing was recessed.)

AFTERNOON SESSION

MR. UTZ: The hearing will come to order to continue with Case No. 2480.

DIRECT EXAMINATION
(Continued)

BY MR. MORRIS:

Q Mr. Stokes, will you refer now to what has been marked Exhibit No. 4 and state what that shows?

A Exhibit 4 presents a graphical picture of the performance history of the Henshaw Wolfcamp Pool. The exhibit shows reservoir pressure, monthly oil production, cumulative oil production, and number of wells related to time, pressure data against the individual wells identified on the graph. Cumulative oil production January 1st, 1963, 205,789, production increase amounted to 134,823 barrels. Looking at the pressure chart at the top of this page, you can see that Wells 2 and 3-A show very similar pressure measured at any given time. The pressure in these two wells has declined to about 2400 pounds

in this over a year that the two wells have been producing. Well No. 5 has only been producing a short time, does show a definite pressure drop. Well No. 1 has been producing for more than two years and has exhibited no pressure decline at all.

Q That is why you are still looking for the formation that Well No. 1 is completed in?

A That is correct. It is fairly apparent from this exhibit that Wells 2 and 3-A are probably draining the same reservoir. However, we haven't been able to conduct interference tests in these wells. Because of the poor performance characteristics of Well No. 3-A, we cored the zone that is producing in this well. It had an average permeability of only 2 millidarcies. The performance has borne out the tightness indicated by the core analysis. We expect to recover only 40 or 50 thousand barrels from this well.

Q In other words, you hope that Well No. 3 is not a typical well in this pool?

A It certainly hasn't performed as well as the rest of the wells and we will certainly lose money on it.

Q I refer now to what has been marked Exhibit 5 and state what that shows?

A Exhibit 5 is a plot of the extrapolated build up pressure of the cumulative oil recovery for each well. The exhibit shows that contrast in performance between the Wells 2, 3-A and 5 and Well No. 1. We also show on this graph cal-

culated pressure performance for well draining 80 acres, there is a dashed line identified as such on the graph. From this it would appear that Well No. 3-A is only draining 40 to 50 acres, probably more in the order of 40, where Wells 2 and 5 are draining in excess of 160 acres; it would be possibly what Well No. 1 might be draining but from the lack of pressure decline, it is either associated with a very large oil reservoir or connected to a large aquifer.

Q Have you had any showing of water production in your Well No. 1?

A It has produced a small quantity of water but never more than 3 or 4 barrels a day and that has dried up at the present time. The only two wells that encountered the zone that is producing in Well No. 1, other than Well No. 1, were Wells 5 and 6. We cored that zone in both of these wells and the zone was tight with permeability less than 1 millidarcy throughout.

Q I refer now to what has been marked Exhibit 6 and ask you state what that shows?

A Exhibit 6 shows the economics for 40-, 80- and 160-acre well spacing. We base the reserves on volumetric analysis ten feet of pay, 12½ per cent porosity, 25 per cent water saturation, 1.67 Formation Volume Factor, 30 per cent Recovery Efficiency; well cost, $157,000, which lease facility includes pumping equipment when required. On 40 acres we would

recover 52,000 barrels of oil and have a net loss of $53,000. If wells were drilled on 80 acres, we would recover 104,000 barrels and have a profit of $51,000 or 32 per cent on the investment. On 160-acre spacing, we would recover 208,000 barrels of oil and have a profit of $259,000 or 165 per cent.

Q So even on 80 acres, Mr. Stokes, your proposition is not extremely attractive economically?

A We wouldn't consider that satisfactory profit.

Q Is this information, as shown on Exhibit No. 6, approximately the same as presented to the Commission in the original hearing of this case a year ago?

A Yes, this information is identical.

Q Identical?

A Yes.

Q And the additional information that you have obtained from the past year, with respect to your recoverable reserves, has just borne out your original estimation?

A The only thing that would be different is the price of the oil. We used 36 degrees gravity price of $2.83. Actually the oil that we are selling right now is over 40 gravity and would have a $2.95 price. That would not significantly affect the economic showing here.

Q What conclusions then can you draw from these six exhibits to which you have just testified?

A It is my opinion that the data presented here shows

that Wells 1, 2 and 5 are capable of draining more than 80 acres and have not suffered damage from producing with an 80-acre allowable during the past year. Well No. 3-A is not capable of producing even 40-acre allowable and I feel should be classified as non-commercial. I further believe that development of 40 acres is not economically feasible.

Q Then what would your recommendations be to the Commission at this time?

A I would recommend that the Commission extend the temporary field rules now in effect for one more year, during which time, we hope to accumulate sufficient data to justify an establishment of a permanent ruling.

Q During that period of an additional year, Mr. Stokes, will additional wells be drilled in this pool?

A Yes, we are now completing one well and have plans to drill another one immediately, and I imagine we will drill at least one more besides that one during the year.

Q And if these additional wells that are to be drilled appear to be in the same reservoir or in the same stringer as some of the wells previously drilled, then would it be feasible to conduct interference tests?

A Yes, it would and we would have those tests available by the time we come back next year.

Q Now, the special rules and regulations that were adopted for this pool by Order No. R-2182, are you recommending

that those rules be continued in effect for the coming year?

A Yes, that is correct.

Q Were Exhibits 1 through 6 prepared by you or under your direction?

A Yes, sir.

MR. MORRIS: We offer Exhibits 1 through 6 in evidence and that concludes the direct examination of Mr. Stokes at this time.

MR. UTZ: Without objection, Exhibits 1 through 6 will be entered into the record of this case. Are there any questions of Mr. Stokes?

CROSS EXAMINATION

BY MR. UTZ:

Q Mr. Stokes, I believe that your information here shows that you might have two reservoirs here, is that true?

A I believe at least three to date.

Q Have you been able to correlate those zones through two or more of your wells?

A The only one that we can correlate through two wells that is productive is the zone that Wells 2 and 3-A are producing from. We can correlate the zone that is producing Well No. 1 through Wells 5 and 6, but it's too tight to be productive in those wells.

Q And you are now drilling Well No. 6, did I understand you to say that?

A Yes, we are in the process of completing Well No. 6, it has been drilled and cased.

Q On your Exhibit No. 6, I note that for your 40-, 80- and 160-acre examples of net income, your 40-acre reserves or rather your 80-acre reserves are exactly twice your 40-acre reserves and your 160 acres are exactly twice your 80-acre reserves?

A Yes, sir.

Q Is it your opinion that a well can drain as much oil from a 660-acre radius as it can from a 1320-acre radius in this type of formation?

A Yes, sir.

Q Even though it is as tight as this?

A The only well that is indicated to be tight is No. 3-A, only going to make 40 or 50 thousand barrels of oil. It is a non-commercial well. The permeability measured in core data 'r Well No. 5 was 86 millidarcies and in lime stone is very good and I don't believe it could be considered tight. The range in that well, by the way, was from 8 millidarcies to over 300.

Q What kind of net pay did you have in that well?

A Ten feet.

Q And that 10 feet didn't have any tight streaks?

A That is ten net feet. Gross interval was about 16 feet.

Q Did 16 feet have any tight streaks or any shale breaks?

A Dense streaks, yes, sir.

Q Do you have any proposed plans to drill after Well No. 6 is completed?

A We are now planning Well No. 7. We have to receive the approval of, I believe, five partners in this test before we can commence drilling.

Q Do you have a location for that well yet?

A It hasn't been established as yet, no, sir.

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

MR. MORRIS: Mr. Examiner, I would like to point out something with regard to a question that you asked of Mr. Stokes concerning the different reservoirs that might be encountered in this pool. At the original hearing of this case, a year ago, this point was discussed and I have been looking at the transcription of that case in front of me now and see that it was the testimony at that time that at least two stringers were open in the lower Wolfcamp. At that time, that was the testimony then. Now, the witness has stated that there may be two or three such stringers, but that it should all be considered within the classification of lower Wolfcamp. That is all I have to offer.

MR. UTZ: Any other statements?

MR. DURRETT: If the Examiner please, I would like to

state for the record that the Commission has received several communications concerning this case, all of these communications are in support of the application. I do not propose to read them in their entirety. I will state the names of the companies who communicated with us concerning this matter. One is Humble Oil and Refining Company, next one is Kara Drilling Company, Delhi-Taylor Oil Corporation, and Texaco, Inc. These letters will be in the Commission file in case anyone would desire to read them.

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

STATE OF NEW MEXICO)
) ss
COUNTY OF BERNALILLO)

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

IN WITNESS WHEREOF, I have affixed my hand and notarial seal this 4/11 day of April, 1963.

Elaine Buchanan
NOTARY PUBLIC

My Commission Expires:

October 14, 1966.

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 2480, heard by me on Feb. 21, 1963.

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

I N D E X

EXHIBITS

NUMBER	MARKED FOR IDENTIFICATION	OFFERED	ADMITTED
Exhibit 1	4	12	12
Exhibit 2	5	12	12
Exhibit 3	6	12	12
Exhibit 4	7	12	12
Exhibit 5	8	12	12
Exhibit 6	9	12	12