BEFORE THE

Oil Conservation Commission

SANTA FE, NEW MEXICO

IN THE MATTER OF:

CASE NO. 819

TRANSCRIPT OF PROCEEDINGS

ADA DEARNLEY AND ASSOCIATES

COURT REPORTERS

605 SIMMS BUILDING

TELEPHONE 3-6691

ALBUQUERQUE, NEW MEXICO

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
February 16, 1955

IN THE MATTER OF:

Application of Jake L. Hamon and Warren Petroleum Corporation for approval of an 80-acre spacing pattern and distribution of allowable in the South Knowles-Devonian Oil Pool, Lea County, New Mexico.

Applicants, in the above-styled cause, seek an order permitting the establishment of an 80-acre spacing pattern and the assignment of allowable to the following-described acreage in and adjacent to the South Knowles-Devonian Oil Pool:

Twp. 17 South, Rgs. 38 East
Section 12: S/2 SW/4;
Sections 13 and 24: all

Twp. 17 South, Rgs. 39 East
Section 7: W/2;
Section 18: W/2;
Section 19: W/2

Case 819:

TRANSCRIPT OF HEARING

MR. HINKLE: If the Commission please, this is Case 819 on the Docket. The application of Jake L. Hamon and Warren Petroleum Corporation for 80 acre spacing in an area known as the South Knowles-Devonian Area. This area is situated about two and a half miles south of what is known as the Knowles Area which has heretofore been developed on an 80 acre spacing basis by an Order of the Commission. The applicants Jake L. Hamon and Warren, own approximately 82 per cent of the acreage in what we believe to be the

producing area of this field. The Gulf has approximately 14 per cent, and the Amerada approximately 2.9 per cent.

Jake L. Hamon and Warren Petroleum Corporation are each the owners of an undivided one-half interest in the leases, and Mr. Hamon is the operator as between the two companies. There have been six wells drilled and completed up to date, and I believe one well is in the process of being completed at the present time. We have two witnesses. Mr. J. S. Ewing, who is the General Superintendent for Jake L. Hamon, and U. S. Branson, Jr., who is a Petroleum Engineer for Hamon and Warren. I would like to have them sworn.

J. S. E W I N G

having been first duly sworn, testified as follows:

DIRECT EXAMINATION

By MR. HINKLE:

Q Mr. Ewing, will you take the stand, please. State your name, please. A J. S. Ewing.

Q Where do you live, Mr. Ewing? A Dallas.

Q How long have you been employed by Mr. Hamon?

A Thirty-three years.

Q In what capacity are you employed?

A General Superintendent.

Q As General Superintendent, do you have charge of all of Mr. Hamon's operations in New Mexico?

A I do.

Q Are you familiar with these lease holdings in New Mexico?

A Yes, sir.

Q Are you familiar with the area known as the South Knowles-

Devonian area in Lea County? A Yes, sir.

Q Are you familiar with the lease ownership in that area?

A Yes, sir.

(Marked Exhibits 1 through 9 for identification.)

Q State to the Commission -- you might refer first to this Exhibit No. 1. State whether or not that reflects the ownership accurately of the leases in that area.

A It does, the map reflects it.

Q What acreage is owned by Hamon and Warren?

A About 82 per cent of the acreage within this area. Do you want to describe the Sections or not?

Q Yes, I think you had better give accurately the Sections and subdivisions owned by Hamon and Warren.

A In 17 South, 38 East, northeast quarter and the southwest quarter of Section 12; the east half and the northwest quarter of Section 13; and the west half, south half of the northeast quarter and the southeast quarter of Section 24. Those are all in Township 17, South, Range 38 East.

Now, in Township 17 South, Range 39 East, the northwest quarter, the west half of the southwest quarter of Section 7; the west half of Section 18; the west half of Section 19.

That is an aggregate of about 2,240 acres or approximately 82.4 per cent of the lands in the probable productive area.

Q What is the acreage owned by the Gulf Oil Corporation?

A The Gulf is in Township 17 South, Range 38 East, the southeast quarter of Section 12, and the southwest quarter of Section 13.

In Township 17 South, Range 39 East, the east half of the

southwest quarter of Section 7, containing approximately 400 acres, being about 14.7 per cent of the lands in the probable producing area.

Q What other company owns working interest in the probable producing area? A Amerada.

Q What acreage do they own?

A In Township 17 South, Range 38 East, the north half of the northeast quarter of Section 24, being 80 acres and about 2.9 per cent of the probable producing area.

Q When you refer to the probable producing area, you mean the lands that are set up in the application that has been filed here by Hamon and Warren? A Yes, sir.

Q That consists of about 2,720 acres altogether?

A That is correct.

Q Do you know whether or not the royalty ownership is uniform under the respective leases?

A I think, so far as we have been able to ascertain.

Q So far as you know, the only working interest owners in this probable productive area are Hamon and Warren, the Gulf and the Amerada, is that right? A That is correct.

Q Do you know whether or not the Gulf and Amerada, what their attitude is toward developing this area on an 80 acre spacing basis?

A They have indicated they were in favor of that type of spacing.

Q Letters from the Gulf and Amerada have been attached to the application? A That is true.

Q Indicating they are in favor of the 30 acre spacing?

A That is correct.

MR. HINKLE: I believe that is all.

MR. MACEY: Any questions of the witness? Mr. Campbell.

MR. CAMPBELL: I am Jack M. Campbell, Roswell, New Mexico. I would like to enter an appearance in this case for myself and Mr. John F. Russell, Attorneys at Roswell, New Mexico, on behalf of a number of property owners in the area involved, and in the areas adjacent thereto, which could in the future be affected by the application. The list of the persons by whom I am authorized to enter an appearance in this case, all of whom are mineral owners, is as follows: Powhatan Carter, Anderson Carter, Powhatan Carter, Jr., Vallye M. Hardin, Robert H. Reeves, Carl L. Reeves, Luther Cooper, Virgil Linam, T. E. Mears, Jr., Lee Carter, F. E. Chartier, Roy G. Barton, T. O. Porter, C. A. Porter, Jenny A. Clinton, Edna Ray Reinhardt, Artie E. Cone, Melba Jean Aldridge, H. V. Black, Fanny Holloway, and Beatrice Howell. Mr. Mears is attorney and may perhaps wish to make some statement or ask some questions with regard to his own interest in this area.

CROSS EXAMINATION

By MR. CAMPBELL:

Q Am I correct that what you are seeking here is an order without any present time limitation for 30 acre spacing in the area covered by your application?

A That is right.

Q In other words, you are seeking a permanent order subject to future rules of the Commission? A Correct.

Q Are you seeking to have this order cover any future extensions of the area of the pool that may be involved of which you are not now aware?

A No, not anything that I know of outside the area that we have submitted in the application.

Q Are you acquainted with the type of spacing pattern that you intend to use in this pool?

A No, I am not, because that would have to be determined in the drilling.

Q You are not presenting to this Commission any proposed future spacing plan for the assignment of proration units in this area?

A No, other than assigning 30 acres to a well, because subsequent drilling will develop the shooting and prove what information we now have, and you couldn't say for sure just whether they want to drill in the north corner or south corner or what, or east and west would be my opinion.

MR. HINKLE: I might state that the spacing pattern will be gone into by Mr. Branson, the engineer. He is probably the proper one to cross examine in regard to that.

Q Do you have any information personally, or records with you to reflect the mineral ownership in this area?

A No, sir.

Q I believe you testified that so far as you knew, the mineral ownership was uniform under each of the leases involved?

A That is as far as I know, yes, sir.

Q Do you have any information with you with regard to the

expiration dates of the various leases?

A No, I do not, other than what the map shows. Don't we have a map there?

MR. CAMPBELL: Perhaps that information will be brought out also.

MR. HINKLE: No, the expiration dates are not shown.

Q Mr. Ewing, Mr. Ewing, I believe it was stated by Mr. Hinkle that there are four wells presently completed, or six wells presently completed? A That is correct.

Q Six wells?

A Yes, sir. That is, you are referring--

Q (Interrupting) How many wells are now drilling?

A Two, one by the Gulf and one by Mr. Hamon.

Q I believe you offered Exhibit 1 there, this plat showing the location of the leases?

A No, there are seven. I will correct that, there are seven completed.

Q Beg pardon. A Seven completed.

Q Including the Federal Davis well?

A Yes, sir.

Q The two wells that are drilling, one in the southeast of Section 12 and one in the southwest of Section 12?

A That is right.

Q Mr. Ewing, with the exception of the Federal Davis well, is it not true that all of those wells are normal 40 acre locations?

A Well, looking at it on the map you would say they were, wouldn't you?

Q That is what I want you to look at.

A See, the original well was drilled and then both offsets were started on each side before we had any reservoir information. So we got into this pattern and now we are in a jam with it. I think the engineer can clarify a lot of that for you here.

Q Do you have any knowledge about what other acreage is to be assigned to those wells yourself, or will Mr. Branson have to bring that out?

A I think Mr. Branson can give you that.

MR. CAMPBELL: I believe that is all from this witness.

MR. MACEY: Any further questions of the witness? If not, the witness may be excused and we will take a short recess.

(Recess.)

U. S. BRANSON

having been first duly sworn, testified as follows:

DIRECT EXAMINATION

By MR. HINKLE:

Q State your name, please. A U. S. Branson, Jr.

Q Where do you live? A Dallas, Texas.

Q Are you a petroleum engineer?

A Yes, sir, I am a registered professional engineer, petroleum engineer consultant.

Q Of what schools?

A Graduate of Hendricks College, Arkansas, University of Arkansas and further graduate work at University of Chicago.

Q How long have you practiced your profession as petroleum engineer? A About eleven years.

Q What areas have you practiced it in?

A You mean what fields have I worked?

Q Yes.

A Well, in the United States, from the Indiana Basin to California.

Q Have you been employed by any companies, oil companies, as a petroleum engineer?

A No, I have worked for petroleum engineering outfits from the beginning. Core Laboratories, James Lewis Engineering Corporation, and myself.

Q Where are the Core Laboratories?

A Dallas.

Q Where is the Lewis Corporation? A Dallas.

Q You have been a consulting engineer for how long?

A On my own for nearly four years now.

Q Have you ever been employed by Jake Hamon and the Warren Petroleum Company in connection with any of their work?

A Yes, in connection with the South Knowles in particular. I have been working with the reservoir performance of that area since approximately three weeks after the well was put on production.

Q When was the first well placed on production?

A In May, 1954.

Q Have you made a study of that particular area in the light of the wells that have been drilled and also of the Knowles Area?

A Yes, sir, I have.

Q Where is the Knowles Area with reference to the southeast or South Knowles-Devonian Area?

A The Knowles pool is approximately two miles north and one mile west, or two and a half miles northwest of the South Knowles Area.

Q If you will refer to Exhibit 1, I would like for you to explain to the Commission just what this Exhibit shows.

A Exhibit 1 is a map showing the area known as the South Knowles Area and showing the development at the present time. It shows the seven wells that have been completed in the Devonian and the two wells that are currently drilling.

Q Are you prepared to give to the Commission the data with respect to the wells that have been drilled in this area?

A I am. Exhibit 2 shows the completion date, the total depth by Schlumberger measurements, and the completion depth in feet subsea for each of the seven wells that are currently producing from the reservoir. The first well was completed in May of 1954, at a total depth of 12,174 feet. The oil producing interval is 8,445 to 70 feet subsea. That same data is given on each successive well that has been completed up to February 1st, 1955.

Q That is all shown on Exhibit 2 which you have prepared?

A That is all shown on Exhibit 2.

Q Are there any wells being drilled at the present time which are not shown on the Exhibit 2?

A There are two wells currently drilling that are not shown on Exhibit 2: the L. Cooper No. 1 in the southwest quarter of Section 12, Township 17 South, Range 38 East, being drilled by Hamon and Warren. The Gulf R. K. Cone No. 2 in the southeast quarter of the same section. The completion data is not given on those two

wells because they have not yet been completed.

Q Can you tell the Commission the approximate status of those wells at the present time?

A I do not know the status of Gulf Core No. 2. Gulf Cooper No. 1 cored the top of the Devonian yesterday.

Q In your study of this area, are you prepared to give to the Commission the information in regard to the reservoir data?

A From practically the beginning of the completion of Federal Davis 1 as a producing well, we set out to obtain or accumulate sufficient reservoir data to enable us to predict with reasonable reliability what the future performance of this reservoir would be. In a reservoir of this type at depths below 12,000 feet, it is essential that that data be obtained as early as possible to avoid making mistakes in the development that are extremely expensive to the operator.

With regard to that, we set up a program for coring and analyzing the cores on successive wells that would be drilled until we could obtain sufficient data. Then we feel a further core analysis would not improve it. Likewise, we measured initial pressure on the Federal Davis 1 prior to the completion of any further wells in the field; took a subsurface sample of the reservoir fluid and had it analyzed for pressure, volume, temperature relations, and viscosities. The factors that are used are incorporated in calculating reservoir performance.

Exhibit 3 is a summary of the data that had been obtained up to January, 1955. At that time we had cored or partially cored, since we did not penetrate the entire section in most of the wells,

we did not core in most of the wells, we had cored four wells and had the cores analyzed. We had recovered 107 feet of permeable productive formation. Defining there as permeable productive, anything showing a permeability as high as one millidarcy on core analysis. The range of permeability of all the cores was from zero to 445 millidarcies with an average permeability of 19.9 millidarcies for the 107 feet of permeable section encountered. The porosities varied from seven-tenths of one per cent in some of the impermeable sections up to 11.3 per cent of the bulk volume, with an average in the permeable section of 4.1 per cent. The residual oil saturation and water saturation given in the next two lines, 3.1 and 50.9 per cent, are additional data acquired during the core analysis. Of those two, the residual oil saturation is the only one that is used in engineering calculations. The productive thickness is given as 25 per cent of the gross section. This figure was taken from the core analysis from coring and analyzing some 380 feet of section in the Wilhoit No. 1 well, the only one that has penetrated anything like that, the main bulk of the section.

Of the 380 feet that we cored, we found approximately 25 per cent of it to have an effective permeability. That further agrees with one well. We had a microlog on one well in the Knowles Area northwest of this. The percentage shown before the microlog of the two sections, somewhat off 300 feet, was approximately the same. We deduced that, or called it simply 25 per cent of the gross section would be permeable productive section.

The original pressure measured in the Federal Davis No. 1 in

July after production of less than 15,000 barrels of oil, was 4,902 pounds on 36 hour shutin. The pressure built up rapidly. We ran a pressure buildup on it. It built up rapidly for the first 12, reaching 4,902 before 24 hours, and remaining constant for the remaining 12-hour period. It was considered a stabilized reservoir pressure. We took the sample from the Federal Davis 1 after the build up test and had it analyzed. It showed a saturation pressure of 1,155 psig, a solution gas-oil ratio of 570 cubic feet per barrel; reservoir oil viscosity at 182° F., 4,900 psig of 0.43; formation volume factor 1,357; estimated connate water saturation, per cent of pore space at 21 per cent. That figure, it should be emphasized, applies only to the permeable productive section. The massive section with permeability of less than one millidarcy is not included as 21 per cent connate water.

Q Mr. Branson, refer to Exhibit No. 4 and explain to the Commission what that shows.

A Prior to drilling the first well, a structure map was constructed from the shot picture and the first well located. The Exhibit 4 shows the current structure map that we are carrying on this particular reservoir. It has varied only in minor details from the initial shot picture, although this is primarily a subsurface control map, grafted on to the original shot picture.

Exhibits 5 and 6 are simply cross sections of the same well shown on Exhibit 4, illustrating the slope of the top of the Devonian from Exhibit 5. It shows that in the east-west cross section from J. G. Cox No. 1, showing the crest of the structure at the Federal Davis 1 and the dip to each side. Exhibit 6 is a north-south cross section from the Federal Davis 2 up through the Gulf

R. K. Cone No. 1, showing the same slope in all directions from the top.

Exhibit 4, 5 and 6 actually serve to illustrate our reasons for believing that this productive area that we have laid out here is essentially completely defined.

Q Is it your opinion that the acreage described in the application which consists of approximately 2,720 acres, would be the outside limits of all possibility of production in this area?

A Essentially it is my opinion there will be no production beyond that area. Practically speaking, there will be, or it is not expected that there will be any material, or very great change in this structure map, although some small changes are to be expected on drilling.

Q There could be slight variations that you would make after drilling additional wells? A Yes.

Q Which is always the case?

A Yes, there are always some variations in structure map shown by the drilling pattern.

Q You believe this does portray the productive limits of the area?

A Essentially I think it portrays the productive limits.

Q Based on the information you now have?

A Yes.

Q Are you prepared to give to the Commission the productive history of the wells in this area?

A In Exhibit 7 I have presented the production history of the South Knowles Field beginning with the production of the first

well, the Federal Davis No. 1 in May, 1954. It is presented here as the number of producing wells, the average daily oil production for each month and the cumulative production at the end of each month through December 1954. At the end of December, there were five producing wells in the field, oil production averaged 777 barrels per day in December, and the cumulative production to January 1st was 123,102 barrels.

Q That Exhibit 7 then, shows the history of the production up to and including December, 1955?

A Up to and including complete December returns.

Q Now, Mr. Branson, if you will refer to Exhibit 8, and explain to the Commission what that plat shows.

A Exhibit 8 is a plat showing the reservoir pressures measured in January on the six wells that were producing at that time that had been completed to that time. All the wells were shut in on January 8, the pressure allowed to stabilize over 48-hour period and then pressures were measured on each well, using the same bomb and the same operator.

The total range in pressures vary from 4,853 pounds, incidently, the reference depth is minus 8,450, about the center of the section. The pressures vary from 4,853 to 4,390, a total variation of not over 20 pounds from the average, which is within one-half of one per cent variation, or in other words, all pressures are, practically speaking, the same within limitations of bomb error. That particular graph, or that particular map, simply shows the pressure continuity existing from one corner of the developed reservoir to the other.

The production varied from a few hundred barrels up to over

60,000 barrels from individual wells with no corresponding variation in reservoir pressure, indicating that all of the wells within the developed area are in substantial pressure equilibrium regardless of their past productive history.

Q Mr. Branson, what does that show or tend to show, that they are in substantial pressure equilibrium?

A It would tend to show that they are producing from a common reservoir that is in connection with itself. That is their continuity and communication between the parts of the reservoir from one side to the other.

Q If you will refer to Exhibit 9 and explain to the Commission what that shows.

A Mr. Hinkle, I believe we are getting a little ahead of that.

Q Go ahead, if you care to make further remarks.

A In connection with Exhibit 8 and Exhibit 9, they both come in following the resume.

In connection with the study of the reservoir, the first problem for the reservoir engineer to figure out is what sort of a drilling pattern should be followed and what are the commercial prospects of the production. The reservoir data in Exhibit 3 was collected to permit as nearly as possible calculation of recoveries from the reservoir and estimation of the general over-all economics of the production. From that data, we had calculated an average recovery of one hundred barrels per acre foot of net productive section, which reduced by the fraction of net section to gross, becomes 25 barrels per gross acre foot from the top of the Devonian to the water level.

In connection with that, the water level was determined in the Federal Davis No. 2 by drill stem tests. The well was tested from 8557 to 8590 and salt water having the same composition as the salt water produced from the Devonian in the Knowles Pool was found in the drill pipe. So the water level is at approximately the base of that test, or minus 8590 feet subsea. That is the basis, incidently, for the water level shown on the structure map, Exhibit 4 and on the two cross sections, Exhibits 5 and 6. With a total section then not exceeding the 215 feet found in Federal Davis No. 1, the maximum recovery per acre comes down pretty low, about 5,000 barrels to the acre in that particular area, which is the crest of the structure, and will grade down from there on.

So the problem of what kind of well spacing pattern to follow here reduces itself then as far as the operators are concerned, to a question of economics. The cost of these wells averages approximately $300,000 per well. As a rule of thumb, the minimum recovery for which an operator can afford to drill consistently is approximately one barrel per dollar spent drilling. If the recovery falls much below that, the project becomes worse than marginal and will probably result in a net loss to the operator.

We had to figure on recovering approximately 300,000 barrels from each well. If the wells are spaced on 40 acre spacing, that requires a total of 7,500 barrels per acre. No section in that reservoir is thick enough to expect a recovery of that type. Reducing or expanding the spacing to an 80 acre spacing, on the assumption that one well would drain 80 acres, would reduce the required thickness to approximately 150 feet. That is not intended

to imply that no single well might or might not do better than that.

On the average, from the data we have collected, that is what you will expect. Essentially from an economic point of view, the operators then could not afford to drill on closer than 80 acre spacing. That economic aspect has inferences not only for the operators, but for royalty owners, but all others interested in royalty production. For, if an operator has to drill so closely that he cannot make any money out of an operation, there is very little inclination for him to go out on the market and acquire leases and drill additional wells. Forcing drilling closer than the operator can reasonably expect to profit on will tend to discourage further development. That, in the long run, hurts not only the operator, but also the royalty owners who might have wells on their property under a different system. Just as a practical proposition, then, it appeared that it would be necessary to drill this production on 80 acre or wider spacing in order to come out on the project.

Then, the next thing to be considered was could we drill it on 80 acres and reasonably expect to be able to produce it. In connection with that, the map Exhibit 8 is one piece of evidence that tends to prove that it is possible to drill this project. There is one thing I have forgotten in connection with the 80 acre spacing, and the calculated recovery. That is calculated on the assumption of a complete water drive. We feel there will be a water drive in this reservoir, first because we found water in the base of it in two places, and even more conclusive, is the fact that the Knowles Pool two and a half miles to the northwest and producing from the same reservoir, has been producing under a very

effective water drive with the pressure drop during the first four years of production of only about 50 pounds on 24-hour shutin. Most of that 50-pound drop it is believed is probably lack of complete stabilization of the well. We have found it requires somewhat more than twenty-four hours for the wells to build up and complete. We have reason to believe that the field will produce under a water drive, and that the water drive will probably be largely a bottom water drive, rising vertically, if production is handled properly.

The evidence that the reservoir is in continuous contact, or in continuous communication is presented there, or one piece of evidence is presented in Exhibit 8 showing that the reservoir is in continuous pressure equilibrium from one side to another, certainly within all reasonable limits of accuracy and measurement. A very strong piece of evidence that one well would be capable of producing and draining adequately at least 80 acres, is the performance of a Knowles area two and a half miles to the northwest. Through July of last year, the last time at which that data was available, the Knowles area had produced about 24 percent of all the oil in place under the pool. The area, or the productive area determined, incidently, from our own structure map, is approximately five hundred acres and there are currently seven wells producing from the area, a spacing of approximately 72 acres to the well.

With the production of last July of 24 percent of the oil in place, an indication that the probable recovery will run in the vicinity of 50 percent of the oil in place, which is extremely thorough and complete drainage even under water drive in this type

of reservoir, that in itself indicated that this formation could be produced and produced efficiently through one well to every 80 acres. Then the communication here over a total distance of more than 1320 feet spacing, in other words, considerably greater than any spacing you would encounter on any 80, reservoir pressure was the same.

In addition to that, after 24 hour additional shutin on the Federal Davis 1 which had produced more than any other well in the reservoir and actually through January produced about half of the oil produced, the well returned to its initial pressure, the 72 shutin pressure was 4900 pounds, or only two pounds below discovery pressure. The pressure is being maintained. The reservoir is in continuous pressure equilibrium throughout, indicating that over a spacing longer than 80 acres there is communication through the reservoir.

The last piece of evidence we are submitting on that is Exhibit 9. Among other tests we ran productivity index and build-up tests on these wells and compared the measured buildup curve on the Federal Davis 1 with the calculated buildup curve. For reference, that calculated curve was taken from Miller, Dies and Hutchison paper in Petroleum Technology. The calculated curve is for a well shutin at the sand face, or in other words, at the bottom. You have also a lag in pressure buildup due to the fact the flow continues into the well bore after the well is shut in at the top. So the section of that curve from a dimensional standpoint 001 up to some place .01 and .1 also falls below the calculated curve, reaching the calculated curve someplace in that range and then it should, if our spacing arrangement is right,

follow it fairly closely. In this particular case the buildup curve for the Federal Davis 1 well corresponds almost exactly with the calculated curve for 160 acre spacing, indicating that the well is draining from outside of an 80 acre pattern and that we will be able to drain the reservoir thoroughly and completely on a spacing of 80 acres.

The last thing that we considered there in connection with that possible 80 acre spacing, is whether the spacing would be reasonable and equitable to all concerned or whether putting it on 80 acre spacing would perhaps give one operator an undue advantage or one royalty owner an undue advantage. All the leases in the area that we consider probably productive are 80 acres or more. To the wells that are already drilled, each of the wells already drilled can be assigned 80 acres, 80 productive acres on leases which they involve the remaining acreage can be divided in any of several ways into regular 80 acre patterns. That no pattern has been submitted here because several different ones could be developed. It is also possible, although we feel like our structure map is pretty good, it is also possible at any time too to find a variation of ten to fifteen feet in a top of a zone which might justify the drilling of a location not contemplated, or might cause us to move or abandon a location we had originally contemplated. The pattern has not been drawn and rigidly set pending obtaining more structure data in drilling of additional wells. Spacing this on 40 acre pattern, incidentally, will require that all wells be drilled, I say required, will force the operators to try their wells at the top of the structure only leaving the wide area around the fringes either undeveloped or developed at a loss to

the operator, which operation can't continue very long.

In all, the wells are clumped at the crest of the structure and has to be drained from the flanks of the field by force as the actual drainage radius is going to be larger than the 80 acre spacing between wells. Whereas permitting drilling on the wider pattern would encourage the operators to develop out closer to the flanks because they can do so commercially and should result because of that in wells being drilled closer to the edges and actually in having a better aerial coverage than you would develop under the 40 acre spacing pattern. We feel that the evidence that we have shows the field can be drilled up and produced on 80 acre spacing and completely depleted, that all of the leases will break down readily into 80 acre patterns without doing any damage or disturbing any equities of any royalty owner or operator, that the resultant aerial coverage and ultimate recovery will be at least as good and probably better under the 80 acre than it would be under a forced 40 acre pattern, and that the result of this type of development or permitting this type of development, will be to encourage development of similar reservoirs rather than to discourage them by forcing the operators to lose money on his operation.

Q Mr. Branson, were all of these exhibits and plats prepared by you or under your direction?

A They were all prepared by myself and under my direction.

Q From information which you obtained personally in analyzing cores, logs and so forth in connection with the wells?

A I did not analyze the cores. I did check the logs, of course. They are from information obtained by myself and by service companies working for the people I represent.

Q More or less by way of summary of your testimony, state to the Commission the factors upon which you base the aerial extent of the area.

A The aerial extent is based on two things. The structure map shown in Exhibit 4 and the oil-water contact found by drill stem test in Federal Davis 2. The structure map is a composite of several shooting pictures. There were three shot pictures before the original structure map was drawn. On that we place each well as it was drilled with its proper subsurface Devonian top. The number shown on Exhibit 4 are the subsea top of the Devonian in each case. There have been some changes in the structure map but none of them of any material size. So apparently our initial, or the initial shot picture map was fairly close to what the structure is going to develop, and as confirming evidence on the structure as presented in this particular map, the Cooper 1 cut the top of the Devonian yesterday within less than ten feet of where it is shown on the structure map.

So all the data that we have to date indicates that map is accurate and that the productive area will be approximately as shown here, which is not meant to imply that it may not be moved out to some extent in any one direction.

Q Mr. Branson, by way of summary of your testimony in regard to the water level, state the factors on which you base your statement that this is a water drive and it is coming from the bottom.

A The major evidence that we have for the fact that it will be an effective water drive is, of course, the fact that another Pool in the same Devonian section and in this immediate area has

produced for a period of several years under a completely effective water drive. The reason that we think it will probably be a bottom water drive in this area, is the performance of the wells themselves. When producing their allowable several of these wells started producing a little bit of water from the bottom. On reducing the production rate, that water fell out.

Q Was that one of the wells on top of the structure?

A The first well to show any water was the Holloway 1. At approximately the same time that showed water, the Federal Davis 1 on the extreme top of the structure began showing a little bit, which is usually a direct indication that in a couple of days you are going to keep going on at that rate you are going to have water at the bottom. We reduced that slightly and haven't had any trouble. But wells inside or wells at a lower level which have not been produced quite so long were making water while wells produced deeper in the structure were not making water, indicating that the water did not come in from the flanks but up from below.

Q Is the bottom water drive indicative of anything as far as maintaining the position of the respective lease and royalty holders?

A As far as maintaining the position of the respective lease and royalty owners, yes, it will.

Q I believe you have stated that in your opinion one well will effectively and economically drain as much or more than 80 acres? A Yes, sir.

Q State to the Commission what you base that statement on.

A That statement is based on the pressure continuity found in the reservoir without regard for, or rather in spite of differences

in production. It is based on the fact that a very similar reservoir in the immediate area is effectively draining 80 acres.

Q You have given some testimony with regard to the probable recovery per acre. I would like you to state again to the Commission upon what you base that statement.

A That statement is based on the calculated recovery by a completely effective water drive calculated by the standard permeability procedure which has been found to be applicable in similar reservoirs and the data obtained from the bottomhole sample analysis and core analysis. It is a standard engineering calculation.

Q I believe you made a statement to the effect of the average cost of the wells at $300,000. That all wells, or practically all wells drilled on 40 acre basis might prove to be marginal wells. What basis do you make that statement on?

A The total productive section from the highest well in the field to the water level is 215 feet, allowing 25 percent factor, that allows to about 50 net effective feet at 100 barrels per acre foot, 40 an acre spacing, a little over 200 barrels to the well. It means that each well is going to cost you a dollar and a half drilling cost to drill and complete the well for each barrel of oil you ever make. By the time you finish paying production costs, taxes and so on on the well, there will be no profit and in all probability will have lost money for the operator. The best well in the field at the very best will be marginal with the probability of it being a losing venture.

Q I believe you have also stated in your testimony that it would be well to have some flexibility in assigning 80 acres to

each well, and also that the spacing of the wells, the wells now located lend themselves to 80 acre spacing?

A Yes, from the map, Exhibit 4, it can be seen that 80 acres, 80 productive acres essentially can be assigned to every well. The reason for not laying out additional wells or a proposed set drilling pattern, the first of course is that it had not been agreed upon by the different operators in the concern. The second is the possibility that we might encounter the top of the Devonian in the next stepout well at 15 or 20 feet difference from where we expected it, which is certainly within the limits of probable variation. That might justify shifting the pattern from the north-south to east-west 80 and drilling additional wells on the royalty owners property. Whereas if it were fixed to begin with, we would not have the flexibility and might prevent us from developing to the extent it should be developed some of the flanked leases.

Q Allowing some flexibility would be to the benefit of the royalty owners as well as the working interest?

A The interest are identical in that they are to obtain the maximum amount of oil to be obtained. The additional interest of the operator is that he not lose money in doing so.

Q In asking for an 80 acre spacing here, what allowable is being requested?

A We are requesting the normal 40 acre allowable with the depth factor. No additional allowable is requested for the assigning of the 80 acres. We feel this is necessary because of the character of the reservoir with the bottom water drive. Under bottom water drive and producing at excessive rates, the water from the bottom will go on into the wells, forcing early pumping and

correspondingly earlier rise in water cut and premature abandonment and also blocking of oil back in the reservoir which could migrate into the well bore.

We have asked for the normal 40 acre allowable for wells of this depth rather than the increased allowable, to minimize the likelihood of that occurring, and therefore increase the prospect of obtaining the most probable oil from the reservoir.

Q It has been established by reason of the too rapid production of the wells on top lead to the encroachment of water?

A It has been established that coning does occur in this reservoir.

Q In your opinion would this plan of development on the 80 acre spacing basis and the allocation of one 40 acre allowable plus the deep well factor to each 80 acres be fair both to the working interest owners and the royalty?

A It is my opinion it would be fair to both working interest and royalty.

Q In your opinion would it be in the interest of conservation and prevention of waste?

A It would be in the interest of conservation and prevention of waste.

Q State whether or not in your opinion the greatest amount of oil will be produced by developing on 80 acre basis or 40 acre basis.

A The amount of oil produced under either pattern, assuming the same geographical coverage would be approximately the same. Under the discouragement for drilling that results from a closer spacing, it is doubtful that an equivalent geographical coverage

would be obtained on 40 acre spacing that would be obtained on 80. It is probable that the 80 acre spacing will actually result in more ultimate recovery.

Q In your opinion will the 80 acre spacing and this allocation of production allow each lease to recover its fair share of the recoverable oil in the reservoir?

A Yes, the reservoir pressure will be maintained by the bottom water drive and each well will produce its own oil essential.

Q Is there any other information you would care to give to the Commission?

A No, I believe that covers it.

MR. HINKLE: That is all.

MR. MACEY: Any questions of the witness?

MR. CAMPBELL: Yes, sir.

MR. MACEY: Mr. Campbell.

CROSS EXAMINATION

By MR. CAMPBELL:

Q I might state to eliminate any question about our position on this, the people that have entered appearances as mineral owners have no objection to the reduced allowable on 40 acre basis if the 80 acre spacing is granted, or the present control of the production from each of the individual wells. Our question is whether or not the reservoir will be drained with 80 acre spacing and whether or not the rights of the royalty owners individually will be affected. I believe you stated that you were working with this reservoir performance since immediately after the completion of the Federal Davis No. 1 well?

A Yes, I don't recall the exact first day, but it was within

a very short time.

Q You have been observing the production from each of these wells since that time? A Yes.

Q When did you feel that you had established the water-oil contact in the Federal Davis No. 1?

A Approximately, well, it was in January, early in January. The water-oil contact, now wait just a minute.

Q Wasn't it Federal No. 2 or No. 1?

A It was the Federal Davis No. 2 not No. 1.

Q Until you got the water in the Federal Davis No. 2, you didn't know where the water-oil contact was?

A We did not know for sure where it was, no.

Q Have you recommended the location of the wells that have heretofore been drilled in this pool?

A No.

Q Have you in connection with your study of the reservoir performance, been consulted about it? A Yes.

Q Well --

A (Interrupting) Just a minute, do you mean have they consulted me as to where to establish the exact location, or what kind of a general spacing pattern to follow?

Q The general spacing pattern to follow.

A Yes.

Q When did you first decide that the pattern to follow was a wider spacing than 40 acres? A About October.

Q October of 1954?

A Approximately in October was the first time that general communication was put out.

Q By that time you had drilled the Wilhoit No. 1 and the Holloway No. 1 in addition to the discovery well?

A Those two wells had been completed, yes. Two additional ones had been started.

Q Since that time, Hamon has drilled Cox No. 1, Cone No. 1, and Gulf has drilled the R. K. Cone No. 1 and their Cooper No. 1, on 40 acre stepouts, haven't they?

A Each of those wells have 80 acres assigned them. They are on an apparent 40 acre pattern. Each of them fits into an assignment of 80 acre tracts.

Q But the wells are now clustered at the top of the structure on 40 acre spacing?

A They are clustered across the structure in the northern third of it, yes. However, that statement implies that after the general discussion at the early part of October these wells were started. The wells were actually already drilling. They had already been spudded.

Q Was it from May of 1954 until October of 1954 from the production history of the discovery well before you decided this wasn't a very good reservoir?

A No, it was not that long before I discovered it myself. However, we had no evidence at that time as to what the base of the reservoir might be and had we had a thousand feet of section above water, or five hundred feet of section above water, the economic picture would be different from what it is with two hundred feet. So the conclusive evidence was actually, as to the economics, was actually not available until the early part of January, although from a generalized engineering basis it was apparent that

the per acre foot recovery was going to be low from almost the beginning.

Q Have you had any previous experience with the fields in New Mexico other than the Knowles field to the northwest of this one which have been developed on 80 acre spacing?

A Not that have been developed on 80 acre spacing in New Mexico, Devonian Field directly, no.

Q You have experience in other Devonian Fields in Texas perhaps? A Devonian-Ellenburger.

Q Have most of those been on a uniform 80 acre spacing pattern?

A Some of them are, some are not. It depends on the stage of development at which time the facts become known, and also on the size of the reservoir.

Q As a reservoir engineer, do you feel that it is better from the point of view of ultimate recovery and proper protection of the correlative rights of the owners that the 80 acre spaced field or any field on any spacing pattern be reasonably uniform?

A As long as the aerial coverage is approximately the same, that is the geographic coverage over the reservoir itself is approximately the same, and as long as under any pattern, as long as the individual royalty owners and operators wells are so located that they can drain adequately the lease under consideration, I feel that the correlative rights of both operators and royalty owners would be served by any pattern whether regular or irregular.

Q From the point of view of reservoir engineers, whether you use a 40 acre allowable or half of a 40 acre allowable as you are now using, or whatever production you have in a water drive field,

where you have wells that are situated closer together in one particular area, particularly at the top of the structure, do you think that that is a proper way to fully drain the reservoir?

A To the extent that we can keep that water level flat, that is never perfect of course, but to the extent that we can keep that water level flat, each of those wells will drain the reservoir underlying the top of the Devonian which is in effect what part of the reservoir is in existence there, and to the time that the water reaches the top, say for example, in the lowest well, the Federal Davis 2, the wells will have to drain effectively on the same allowable from the reservoir lying below it. The Federal Davis as an example, will have recovered its fair proportion of the well because it will have recovered its portion of the oils that was in existence, or in place at the time of its discovery.

Q One or two other questions about the development up to date as related to your application. You have stated that the information you have obtained from the wells that have been developed has indicated that your original structure picture was reasonably accurate? A Yes, sir.

Q Not deviated from to any extent?

A No, to a large extent. There have been some variations, of course.

Q Could you tell me from the history of the field as developed, why you didn't diagonally step out from some of these locations and drill the wells on 80 acres to start with?

A On the last step out that was made, the Federal Davis 2, that was done. It was stepped rather long stepout. The other wells

with the exception of the Cooper 1, were also established prior to the general discussion in the early part of October, not only established, but drilling prior to the general discussion in October and it was too late to move those wells at that time.

Q With the exceptions of the wells, of course, that have been started since that time?

A I don't know. I don't remember the exact starting date on the other wells. However, there cannot have been by Hamon and Warren over two wells that have been started since then, one of which is a large stepout. The R. K. Cone of Hamon was drilling at that time.

Q The R. K. Cone of Gulf was apparently drilling at that time also? A Yes.

Q The R. K. Cone of Gulf's and the Cooper No. 1 of Hamon were not drilling at that time?

A I can't say for sure.

Q They haven't been completed yet?

A No, they are not completed at the present time, but the Cooper 1 is approaching completion. I do not know the exact date they were started.

Q Your application states that the operators had agreed upon a plan of spacing for this pool, I assume that plan now is to assign 80 acres to every well and work it out as you go along?

A Yes.

Q Not a uniform plan of spacing? A That is a plan.

Q When was that plan agreed upon?

A That plan has been discussed off and on since October. I believe it would be January before it was actually agreed to.

MR. HINKLE: If the Commission please, I would like to make a statement in that connection. I don't believe the application says specifically we have agreed upon a plan of development. We state there that the Gulf and the Amerada have indicated that they are agreeable to go along developing this on 80 acre basis, and attach letters from Gulf and Amerada which speak for themselves, of course. We can't go outside of those letters.

MR. CAMPBELL: I wouldn't want to make an issue of it, but your application, Mr. Hinkle, does state in paragraph 7 that the applicants or the owners of 82.4 percent of the working interest cover the probable productive area and have agreed upon a plan for spacing of wells in the development of said area. Also, upon a plan and method for the distribution of the allowable findings by the Commission. I realize that covers the applicants only.

MR. HINKLE: That is right. That is the substance of the agreement, but there is nothing in writing about it, the extent of our agreement is shown by the letters that are attached.

MR. CAMPBELL: I don't have a copy. There were none attached to the copy that I received.

Q Do you know anything about the mineral ownership in the Hamon area in the north part of Section 13 and the south part of Section 12?

A I don't know exactly what you mean by do I know anything about it.

Q Do you know whether the Warren Foundation owns any sizeable amount of minerals in the area covered by the presently producing wells?

A No, I do not.

Q Mr. Branson, in connection with your Exhibit No. 3, I

believe you stated that most of the wells, in most of the wells you did not penetrate the entire Devonian section?

A Yes.

Q Did you penetrate the entire Devonian section in any of the wells until the Federal Davis No. 2?

A Actually we have never penetrated the entire Devonian section. We haven't the faintest idea how much there is below the bottom where we found it. The Wilhoit penetrated the largest part of that section and that is the most penetration that we have had.

Q How much is that roughly?

A Actually the amount of core that we had analyzed is about 380 feet. I don't have the exact number. It is that plus minus ten feet.

Q You had not reached any water-oil contact in that?

A We had reached the water-oil contact. We drill-stem tested water at that level.

Q Are you satisfied that was a water-oil contact?

A No, we do not believe it was a water-oil because the Devonian oil contact in the Federal Davis 2 was non-porous and impermeable. We feel that we did not get water at the higher level in the Wilhoit 1 is due to that fact.

Q Are you satisfied in your own mind that you have definitely determined the water-oil contact in this reservoir?

A Yes, sir. We sampled the water from the Federal Davis 2, had it analyzed, compared it with the analysis of the produced water from the Holloway No. 1 and with the analysis of the produced water in the Knowles area from the same reservoir just northwest of us, and essentially the three agree exactly in total salt contact

and iron distribution.

Q Do you customarily determine the water-oil contact by the comparison of some other separate oil pool? Is that the way you made the determination?

A No, we made it when we got water on drillstem test in Federal Davis 2.

Q You are satisfied that was water-oil contact and not water of some other kind?

A I am satisfied that is Devonian. The amount of it produced would not compare to the amount produced by pressure drawdown in connate water. That it is Devonian water or that the water lies at or below minus 4590.

Q You stated, I think in your Exhibit No. 3, you set up the average permeability and average porosity. Which wells did you take to make the core analysis on?

A Federal Davis 1, Wilhoit 1, Fanny Holloway 1 and a few feet from the top of the Federal Davis 2 were analyzed. There was so little change in the average values after the first two wells, we did not consider an appreciable improvement on our average values would be valuable in analyzing more core.

Q Your Federal Davis 1 and Wilhoit No. 1 are the basic cores for your conclusions?

A Actually there are more feet from the Wilhoit 1 than from the other because more feet analyzed. Averages from the Federal Davis 1 and Holloway 1 and Federal Davis 2 and combining them made only very slight variation from 3.95 to 4.115 average porosity, for example.

Q How many feet of cores did you analyze in the Wilhoit No. 1?

A About 380.

Q Do you have your core analysis with you?

A No, I do not.

Q All you have are your conclusions, is that right?

A All I have is the range and the average.

Q Do you consider that range of permeability from zero to 445 milidarcies considerable range of permeability?

A Well, for fractured vugular Devonian section I don't think it is considerable range.

Q Do you have any sufficient core analysis from your Federal Davis No. 1 or either of the other two wells which you have cored to some extent to indicate any comparison between the permeability and the core in the Wilhoit with the core in the other well?

A Actually I have better data than that in the specific productivity index of the wells. The specific productivity index is the producing capacity of the foot of section open. With the exception of the one well that is not completed in the same fashion as the others, all of the indeces are essentially the same, varying from 006-008 on all wells. So that the formation itself is very consistent.

Q You consider that the permeabilities and porosity in the field is uniform?

A No, the fact it is not uniform is given in the range as shown here.

Q Where you have a reservoir, Mr. Branson, that has considerable variation in permeability and porosity, isn't it possible that if you do not develop it on a reasonably close spacing, that you may not be able to recover the ultimate amount of oil that you

do on wider spacing?

A If you have continuous connection or continuous communication between all parts of the reservoir, which we apparently do have in this particular field, and which apparently does exist in the same formation in the immediate area, provided that you do not create excessive drawdowns by producing at too high rates for the reservoir to maintain, and provided that you maintain reservoir pressure or that reservoir pressure is maintained by an outside force, which apparently is here, it is at least theoretically possible to drain the entire reservoir with one well at the crest of the structure. So with regard to that, as long as the wells are produced properly and the well is handled properly, yes, the recovery should be as high as can be obtained.

Q I believe --

A (Interrupting) There is one other item in that though. I don't know exactly what you are driving at. It would be possible theoretically by stripping all the surface beds of this and producing it all from --

Q (Interrupting) -- mining it?

A Yes, from zero spacing to recover more oil than you can under any other pattern. Up to a spacing of 250 actually a little above that up to ten or fifteen acre spacing, closer spacing will recover somewhat more oil. After you get out past say twenty acre spacing, however, the shape of the pressure curve from the producing well is so flat there is no practical difference between the different spacings.

Q It then becomes a matter of economics?

A Yes, it is essentially a matter of economics from there on,

and rate of production. You could produce them somewhat faster on a closer spacing than on the wider spacing.

Q Mr. Branson, in December I believe that the production from all of the Hamon and Warren wells at least, was cut back considerably.

A On a number of them it was cut back, yes.

Q Was that upon your recommendation?

A Yes, sir.

Q And what was your reason for that?

A The appearance of water in the wells.

Q Was the water appearing in all of the wells, or did you just decide to cut them all back proportionally?

A The water did not appear in all the wells. We started cutting as soon as the water appeared in the first well. The reduced rates were determined from the conventional bottom water coning calculation.

Q Have you since that time maintained production at approximately the same level as December?

A Well, we varied the production to some extent when we were testing the wells. We made productivity index tests, measured pressure buildup tests and shut in the entire field for a pressure survey. In general, we have been producing as close to those indicated correct rates as we could.

Q Your water production has disappeared?

A Almost completely. Yes, there is one well still in the field from which we get a little water occasionally. Not consistent.

Q A few questions on the economic proposition. At the time that you decided to cut back the production from the Federal Davis

No. 1, that well had produced approximately 52,000 barrels of oil in seven months? A Yes, sir.

Q Under a normal 40 acre allowable with a deep well factor?

A Yes.

Q Now, it is cut back from, that well wasn't cut back according to my information. I assume that information is wrong. Did you cut back the Federal Davis 1?

A Very slightly because the information was that the well was capable of producing at that rate.

Q It didn't have any water, is that right?

A At the allowable rate it started making a little bit. We cut it a little below and got rid of it. That is usually the first indication of the appearance of water.

Q My records indicate that the well produced in November, 8100 and in December 8370 barrels, that is the latest figure I have. It may have gone down in January, I don't know.

A I don't know. I don't know what the exact production is at this time, but it has reduced below that figure.

Q What do you consider producing a barrel of oil at that depth costs?

A That varies from one operator to another. I have not run that particular figure on this reserve. As long as the wells flow and don't require any work over the cost of producing from that depth, is the same as producing from any other depth.

Q Is $2.00 net reasonable?

A I expect that is a reasonable figure for what we are recovering, yes.

Q From that well in a period of eight months, a hundred and

twenty thousand dollars has been recovered?

A Yes, assuming those figures.

Q Which assuming the 300,000, I am sure the original cost 300 and more. A Quite a bit in excess.

Q Assuming a $300,000 cost of well which you did, that would, at that rate of production would pay out in a period of some two years, wouldn't it?

A That would be true. However, the appearance of BS in that well indicated that either the rate had to cut down or water would break into the well. With the appearance of water in the well you get off the proposition of flowing a well. Pumping a deep well and flowing them, the production costs are very sharply different. Where there is very little difference in the cost of actually flowing a well whether 12,000, 18,000 or 2,000 feet deep, when you start lifting the fluid, when it no longer lifts itself naturally, the difference becomes marked and increases rapidly with depth.

Q What do you consider a reasonable period of payout for an oil well?

A If the payout period is extended much beyond three years, there is very little inclination to, or there is very little encouragement for an operator to drill it. There are exceptions to that drilling in the center of the east Texas pool where there is a long background of history and where it is about as safe as putting it in Government bonds, you can stand a longer period. On reservoirs of this type and these deep Devonian reservoirs, small pools or deep limestone reservoirs in small pools don't have that kind of long-term assured production, so you are involved in a pretty risky venture in the first place and the payout period accordingly

must be shorter to justify investing the money in drilling.

Q I believe you did make the statement in that regard that where this condition existed there wasn't much encouragement to buy additional leases and do additional drilling?

A Well, now, no.

Q With what you considered to be a small recovery per acre?

A I believe what I said is that if operators, if the custom or requirements are that they drill the wells on such a close spacing that they cannot pay out on the average, it will certainly tend to discourage any financial organization from going into that kind of a venture. If they know to begin with that the probabilities are, even getting good wells which these are good wells, that they will be forced to drill them on such close spacing, they can't make any reasonable profit there will be certainly little encouragement for getting leases and drillingwells.

Q You are aware, Mr. Branson, that it is generally the custom in New Mexico to drill wells on 40 acre spacing?

A It is generally the custom in reservoirs, I am not as familiar with New Mexico as others. It is generally the custom to drill them on 40 acre spacing where you make your money out of them, yes.

Q You don't consider 40 acre spacing to be close spacing, do you?

A For a pool of this type, yes.

Q Do you know whether since this field has been developed, these wells have been drilled and this information that you have has been furnished to Mr. Hamon, that he is continuing to buy leases in this area?

A No, sir, I do not. I am a consultant and not connected with his land department.

Q Do you feel that he openly seeks the perforations that you have in these, wells which I calculate averages about 34 feet, is all that you can economically, and from a conservation point of view, properly utilize?

A You mean do I consider that that method of completing the wells perforating or completing them high in the section, is advisable?

Q Yes, and whether there may be other perforations that you can make now or some time later, that will recover or increase the amount of recovery per acre that you are referring to?

A No, I do not believe so. The recovery from a single well in a bottom water drive reservoir is a function of the percentage penetration. The smaller the PP the larger the recovery factor.

Q Do you really believe that you have on the basis of your information from your Federal Davis No. 2 well which is the only one which you feel you have made water-oil contact, that you can definitely say that this is a water drive field with a vertical water drive? Do you have enough information for that?

A Now the existence of the water level in the Federal Davis No. 2 does not imply water drive. The presence of an active water drive is predicated on other information. The other information is the fact that the same Devonian section in the Knowles Pool just two and a half miles northwest of it producing from the same general area wide formation does have a very active water drive as evidenced, by several years of production history. Further evidence within

the pool itself is, after the production of 60,000 barrels, that the reservoir pressure in this Federal Davis was exactly the same as on discovery, there was no decline. The pressure was being maintained by something. The third piece of evidence, or the reason I consider it will be a bottom water drive, is the fact that the wells on the crest of the structure did show some coning at the same time as well as lower down or earlier than wells lower down that had not been produced at those rates sufficiently, indicating that the water cannot only move from the flanks but directly up from the bottom. The water is apparently capable of moving up from below each of the wells, even the ones on the crest of the structure, and it seems to me to be fairly conclusive evidence from that fact that we will not only have an active water drive, but an active bottom water drive.

Q I believe you stated that in order to take advantage of that at the flanks of the reservoir, you thought starting now, stepping out with 80 acres, that you would reach the limits of the field sooner and be able to get the oil at that stage?

A No, I did not say exactly that.

Q What did you say?

A What I said was that you would wind up economically with a better aerial coverage by drilling on 80 acres because that will permit the drilling of thinner sections closer to the water sections than could be drilled on 40. That is purely a commercial aspect.

Q I thought you had referred to the fact that people on the edges of the pool might get their acreage developed if they developed it on 80 by stepping out faster?

A Not faster, that I know of. Of course, if you jump a

location and don't have to drill the intermediate location first, you should get there sooner of course.

Q As you approach the edge of the field you are a little less inclined to jump those locations?

A That is the time when the theory and the practical inclination of the operator might run into disagreement, yes.

Q Do you know anything about the expiration dates of the leases on the edge of this structure?

A I have heard them. I do not know what they are, no.

Q If I told you that the lease in the northwest quarter of Section 7, you could tell by the contour map, is maybe outside this field, I don't know, the one year lease acquired not too long ago expired in April 1955, and leases in the west half of Section 19 and the west half of Section 24 expire in November 1955, it wouldn't make much difference to the operator if he wanted to hold the leases if it was on 40 or 80 acres?

A There are always some considerations other than purely scientific in drilling a well. In the first well that was drilled you just shut your eyes and dig a hole where you hope to find some oil. They had considerable acreage they wish to prove or disprove. I could not go to an operator and say dig this hole, you are going to make an oil well. The possibility of making one, combined with the fact that they did have considerable acreage around it which to their mind justified the gamble of the money, that might occur on any other lease; I wouldn't, although from an engineering or geological point of view there might be little likelihood of encountering a payout well in some of the leases around here. It might be that the management of the companies would choose

to drill them and take the beating of the lost drilling money just to prove that the present picture is correct. On that, that is a question for the decision of the people holding the purse strings and it is --

Q (Interrupting) That is when economics rears its ugly head again?

A Yes, that is when our scientific advice may or may not be observed, depending on how they feel economically at the moment.

MR. CAMPBELL: I believe that is all.

MR. MACEY: We will recess for lunch.

(Recess.)

MR. MACEY: Mr. Campbell, do you have any further questions?

MR. CAMPBELL: I have no further questions of Mr. Branson. I want to ask Mr. Ewing three questions before he leaves. I am through with Mr. Branson.

MR. HINKLE: We have no further examination of Mr. Branson. I would like to offer in evidence at this time, Exhibits 1 to 9, inclusive.

MR. MACEY: Is there objection to the introduction of Exhibits 1 through 9 in Case 819? If not they will be received in evidence. Is there anyone else who has any further questions of Mr. Branson?

MR. RHODES: Yes, I have some.

CROSS EXAMINATION

By MR. RHODES:

Q Mr. Branson, could you give us some idea as to what these wells are capable of making, that is, are they top allowable wells?

A All of the wells at the present time according to my

understanding and from past tests we have made on them, are capable of producing the allowable that we have requested. They have all been tested for potential at producing rates above, I believe, the 270 barrels per day rate, or equal to it.

Q Have you ever calculated the optimum rate, or what we laughingly call the MER?

A I have calculated for each well completed in the field on the Hamon and Warren leases, the maximum safe producing rate at which the wells should not cone, yes. If you call it a MER, it has been calculated.

Q Could you tell me how that calculated optimum compares with the allowable which you are requesting here today?

A In all except one case it is below the standard 40 acre allowable, 40 acre with the depth factor allowable.

Q Even though the optimum rate is lower, you still wish the allowable to be assigned on the basis of 40 acres times depth factor?

A That being the standard allowable schedule in the state, and most of the wells being capable of making that, we thought it would be a good place to start as a maximum allowable for any well in the field.

Q You definitely do not want the 40 acres times depth factor plus 40 acres? A No.

Q Which the Statute says you are entitled to?

A We don't want any allowable higher than the one we have requested.

Q Or lower?

A I can't speak for everyone else in the group on the lower.

Each well, of course, is a case in itself.

Q Now, Mr. Branson, have you ever made a calculation of reserves in place in this reservoir?

A Under the entire reservoir, no. Actually, of course, I have calculated the oil in place per acre foot and to reduce that to the entire field would be simply perimeter acre of feet.

Q What was the figure that you arrived at?

A You mean recoverable?

Q No, total reserves.

A Excuse me just a minute, I don't have it in my mind. I have it in here someplace.

Q Let's approach it from this angle. What was the recovery factor you were using in assuming your 1,000 barrels --

A (Interrupting) One hundred barrels per net acre foot?

Q Yes.

A I am not sure just which one of these files I will find that in. The 100 barrels per acre foot is correct, 101 to be more exact.

Q What was your recovery factor, do you remember?

A No, sir, I have not reduced that to percentage of oil in place. However, it should be in the neighborhood of 45 to 50 percent.

Q Forty-five to 50 percent?

A Something in that immediate area.

Q Mr. Branson, you stated that you had PI tests available on all these wells? A That is correct.

Q Did you bother to calculate back from your PI to obtain a check on your effective permeability?

A Yes, we did. The average permeability for the section

from the productivity index is 6.6, which multiplied by the four to one factor for a net gross on the average would give approximately 25 milidarcies. That is somewhat higher for formation permeability because all of the wells have been acidized somewhat. The more acid we got in them, the higher the --

Q (Interrupting) This porosity that you speak about in the Devonian lime, is that in your estimation vugular porosity?

A Most of it in the permeable productive section is vugular and fracture porosity.

Q Vugular and fracture. You also mentioned the fact that you recorded a considerable interval in your Wilhoit No. 1?

A Yes.

Q Do you happen to have a core graph available for inspection?

A I do not have one with me, no.

Q Could you supply one for the Commission's consideration?

A Sure.

Q Now, you further testified to the fact that you established the oil-water contact in this reservoir on the basis of a drillstem test. Do you happen to have the particulars on that drillstem test available?

A I don't remember how many minutes it was open or what the drill stem test was from 8557 to 8590 subsea.

Q 8590?

A There was a good blow during the initial part of the test. The water cushion was recovered, the well flowed five barrels in an hour after cleaning water cushion, we shut in and pulled the drill pipe. We recovered several thousand feet of oil in the drill pipe and 1500 feet of sulphur water.

Q That is a 33 feet drill stem test?

A Yes.

Q As a reservoir engineer, do you feel that a 33 foot drill stem test provides a basis for the definite establishment of the oil-water contact?

A The oil-water contact is either in that interval or in the immediate vicinity of the interval, or I should say probably in the immediate vicinity.

Q What would you say would be the maximum interval by which the water-oil contact could deviate from the depth limits of this drill stem test?

A That I should not expect it to be more than 10 or 15 feet from the bottom depth. In view of the other performance, I do not think we could lift water any further than that on a short-term drill stem test in this particular type of reservoir. It is unlikely to be much higher than the bottom or any higher than the bottom of that test, because if it had been we would have recovered considerably more water in proportion to the oil we did recover. We arbitrarily set it at the base. A shift of ten feet in the oil-water contact would actually make very little difference as far as the overall picture in the practicability of drilling wells is concerned.

Q You feel that ten feet would be the maximum, or let's say it could run as low as 8600, but that would be the maximum?

A I would think that would be about correct. I would hesitate to make an absolute flat statement on how many feet. That is merely a borderhouse guess.

Q I see. You feel that that is a pretty well qualified guess

on the basis of the drill stem test?

A Yes, I think it is pretty close.

Q Have you or your client ever considered unitizing this area?

A That has been considered, I know. It did not seem feasible, it has not seemed feasible up to the present time.

MR. HINKLE: That is feasible in the sense of getting everybody together on the unit.

Q Now, I would like to get one thing straight in my own mind, are Warren and Hamon applying for the permanent 80 acre spacing order or for temporary 80 acre spacing order?

A It is my understanding it is a permanent order.

Q Permanent order. Would you care to venture a guess as to how many additional wells would be required in that reservoir to adequately drain the area?

A With the understanding that this is just a guess, I should think about three would complete.

Q Three additional wells? A Three additional wells.

Q I would like to refer you to Exhibit 9 for purposes of illustration and particularly refer you to the northwest quarter of Section 19, better yet, I believe Exhibit 4, the structure map would serve the purpose better. A Yes.

Q I see by my ownership map here that there is a well drilling in the northwest, northwest of Section 19?

A Your ownership map is in error. There is no well drilling there.

Q Was a location ever established there?

A I don't believe a location has ever been surveyed and established. I have no personal knowledge of it. It is my under-

standing that no location was established. In discussions in the offices, we spotted locations here there and yonder on the maps and talked about whether we would drill this one or that one or not. So far as I know, that location was never surveyed and established, no. That is my own information on the subject as far as --

Q (Interrupting) You think mayhaps this could have been placed, this particular situation, due to a mistake on somebodys part?

A I think that is more likely the case.

Q And that the well which they were talking about when they made the mistake was probably your No. 2 Federal Davis?

A I expect so, yes. I don't mean to imply that there will not be a location there either.

Q That is what I was coming to on my question about the northwest quarter of Section 19. Would you say there was an occurrence of hydrocarbon under that northwest corner in commercial quantity?

A From our present working, it would appear that there is hydrocarbon under that tract, that a well drilled in that tract would probably be marginal.

Q Would be marginal? A Yes.

MR. RHODES: That is all I have.

A That, of course, as to the exact shift in that range of 10 or 15 feet could make a difference between the payout and not. I am not implying by anything I stated or trying to commit the operators either to drill or not drill that particular location.

MR. HINKLE: That is all I have.

By MR. REIDER:

Q In your determination of this salt water contact, did you use any logs? Did any of the logs taken show any?

A I believe there was some evidence -- no, I am afraid I will have to back that off. There was some evidence in the Wilhoit that we were in a salt-water at considerably greater depth than this. I don't believe our information reflects any water contact above that, and since 8590 was the bottom that we cut there, we simply assumed that bottom was the contact, or that the contact at most would be just slightly below that.

By MR. KITTS:

Q Mr. Branson, this morning you outlined the factors which lead you to believe that there was a water drive in this field, one of those was the maintenance of pressure between the two tests?

A Yes.

Q What was the interval of time between those?

A I should say the middle of July to the middle of January, six months.

Q Which well? A Federal Davis 1.

MR. MACEY: Anyone else have any questions of the witness?

MR. CAMPBELL: This questioning brought one thing up I would like to ask him about.

By MR. CAMPBELL:

Q You stated the operators didn't think it was practicable to unitize this field; why was that?

A I am afraid I am not really qualified to answer that question because I have not worked on any unitization program. I was simply informed at the time I was doing the reservoir work, that

unitization would be from very difficult to practically impossible. I am quoting what I was told, not what I know.

Q Were you told whether or not any of the royalty owners had been contacted either with reference to the unitization or the spacing plan?

A No, I was not told anything with regard to either of those items.

MR. CAMPBELL: That is all.

MR. MACEY: Anyone else have any questions of the witness?

By MR. MACEY:

Q Mr. Branson, I would like to know, Mr. Rhodes I believe asked you a question about how many more wells you thought would be drilled in the pool under an 80 acre program. What was your answer to that question?

A I believe the field, what I said, I believe the field can be adequately drained by three additional wells. I am not in a position to say how many of the operators will drill. It is probable that there will be some dry holes drilled to prove our structure map.

Q Do you think in drilling three additional wells that although you will adequately drain the reservoir, do you think that the correlative rights of all the royalty owners will be protected by those three wells?

A Yes, sir, I do because the wells will be placed so, or the wells can be placed so, I should say, that they will drain the reservoir underlying the wells up to the top of the Devonian where they cut it. At the time, for example, as I used before, the Federal Davis 2 goes out, the well is gone. On an allowable

schedule all of the wells in the field will have produced the same amount of oil from below the top of the Devonian there, therefore, recovered what was in place under it at that time. Similarly, if you drill one in the southeast quarter of 13 on the Wilhoit lease, that is at the time that well became too wet to produce, it would have recovered its proportionate share of all the oil overlying the top of the Devonian in that area, which essentially amounts to its share of the oil in the pool. That condition would be true under a bottom water drive properly maintained and produced.

Q Taking, for example, the Wilhoit lease which occupies the west half of Section 18, according to your structure map of Exhibit 4, virtually the entire west half of that section or 320 acres is productive? A Yes.

Q Wouldn't that 320 acres be entitled to a total of four wells under an 80 acre pattern?

A Under a normal, I suppose it would be that, depending on the direction of the pattern certainly. The east half of that 320 however, is a question of commercial productivity. It is very questionable drilling that close to the strand line if you drill along the east half of it there, 660 feet west of the center of the section, any wells that you drill there according to our present structure map would not be commercial wells, they would not pay out.

Q I agree with you there. What would prevent the operator from drilling down the west half of the west half of Section 18?

A So far as I know --

Q (Interrupting) He could have easily dedicated 80 acres to each well. A To each of the wells.

Q Drilling down the west half. In Section 13 of 17 South, 38 East, there is an 80 acre tract that is not developed in the east half of the section, isn't there?

A Yes.

Q The west half of the southeast quarter is not developed?

A Yes.

Q There would be a possibility of a well there, wouldn't there?

A Yes. I want to clarify something I said a minute ago. I did not say that was all the wells that would be drilled. I said I thought the aerial pattern and the resultant depletion of the reservoir could be served by that. I did not specifically intend to imply that would serve at the royalty and working interests, that that was the number of wells that would be drilled.

Q That is the reason I asked you the question if you thought that all the correlative rights of the royalty owners in the field would be protected with three wells.

A I see what you mean. As to that, to answer that statement completely, to give the kind of answer I would have to give, I would have to perimeter that and determine the reservoir volume under each lease and then calculate the recovery from each well to give you an accurate statement on that. I don't think I am prepared to answer that as exactly perhaps as it would require. In particular, on the Wilhoit lease, the acre foot reservoir volume may be sufficient there to sustain and require additional wells, and that I am not sure at the moment.

Q Concerning your No. 1 Wilhoit which is located in the northwest, northwest of 18, 17 South, 39 East, can you give us some details about the manner in which the well was drilled into

the Devonian and the coring that was done, and also where you first contacted water in that well?

A We started coring in the well for just above the Devonian, I believe we cut ten feet of shale above the line, diamond cored the next ten feet above it, to slightly below 8820. I don't know what the bottom of the core was, five or six feet below 8820 on drill stem test 8820 we got water. We had substantially dry drill-stem tests over a considerable interval above it, massive dolmite and no permeability as shown by the core analysis.

Q That is considerably deeper as you established, as the water-oil contact in the Davis No. 2?

A That is right.

Q The Wilhoit No. 1, did it have any abnormally low permeability or porosity in the cores?

A There were considerable sections of the core which had no measureable permeability, and the porosity of which ran as low as less than one percent. On drill stem test, those sections gave up, that is the rest of the story, we tested it at eight foot intervals all the way down. On drill stem it gave up very little fluid.

Q Was there any oil recovered below what you established as the oil-water contact at a minus 8590 and the point where you did recover water at minus 88 something, was there any oil recovered on any drill stem test?

A As far as I can recall the only recovery was mud until we got salt water on the last test. We got ten feet of our load water and ten feet of mud on drill stem test. As far as I recall there was no free oil recovered below this depth.

Q Do you know whether or not the core data on that particular

well below the oil-water contact reflected any large percentage of water in place, or was it --

A (Interrupting) As my memory serves me, there was very little difference in the core data.

Q Would you have any objection to submitting all the core data on all the wells you cored in the pool?

A No, as I understand it, there is no objection whatsoever to submitting that to the Commission.

MR. MACEY: Does anyone else have any questions?

MR. RHODES: I have one more.

By MR. RHODES:

Q Do you have the completion date of the Wilhoit at hand?

A September of 1954.

Q About what time of the month, the first of the month?

A I don't know that. It was sometime during the month.

MR. MACEY: The 15th?

MR. HINKLE: Was it the 15th?

Q I was going through the scout records and I was unable to find any reference to the Wilhoit. I find some reference to the Cox. I was wondering --

A (Interrupting) The Wilhoit and the Holloway were completed during the same month. The Cox and the Cone were completed later, but they were not completed until in December I believe. They were drilling in, I believe they were started in September, but they were not completed at that time. I think the month is given in that table. I am not sure whether I gave the specific date of their first production in Exhibit 2 or not.

MR. MACEY: For the information of Mr. Rhodes and the

record, the Wilhoit No. 1 was completed on September 8, 1954. At least that is when the allowable was assigned.

A I just had the month. I did not have the specific date.

MR. MACEY: Anyone else have any questions? I have got one more question.

By MR. MACEY:

Q That answer to Mr. Rhodes' question about the optimum producing rate of certain wells, did I understand you to say that the rate that you determined was less than the presently assigned allowable?

A On some of the wells it was less. On one well in particular it was higher than the present assigned well.

Q Do you believe that by assigning the field as a whole, the allowable based on a 41 barrel unit allowable which is presently in effect, times the depth factor 277 barrels, do you feel that the field is being produced wastefully or produced at a proper rate?

A To answer that purely as a technical question, I believe it will be found in the immediate future that somewhat lower rate will be desireable from the standpoint of conservation and operating economy both.

MR. MACEY: Anyone else have any questions of the witness? If not the witness may be excused.

(Witness excused.)

J. S. E W I N G

having previously been duly sworn, testified further as follows:

CROSS EXAMINATION

By MR. CAMPBELL:

Q Mr. Ewing, in your testimony you referred to the lease ownership in this area and either you or Mr. Branson or both,

indicated that 80 acre spacing would not affect the rights of the royalty owners and it could be accomplished because the leases in the area all contained at least 80 acres and that you thought the royalty ownership was uniform under these leases. You are seeking here, as I understand it, a 40 acre allowable. You have drilled 8 wells on a 40 acre pattern, what is to have prevented you from starting out on an 80 acre pattern, and what is to prevent you from continuing on an 80 acre pattern without an order from this Commission?

A The reason we started out on a 40 acre pattern is primarily because that is your statewide rule. On the No. 1 well on the Federal Davis, that was the reason for that location. Then you have different ownerships on different leases on each side which demanded an offset obligation. They proposed in that manner --

Q (Interrupting) What I am getting at is this. You haven't undertaken to unitize the field, aren't seeking to do it here, subject to your obligations under your lease contract, what is there to prevent you from just starting to attribute 80 acres and go ahead and drill on 80 acres?

A You are asking me something that I can't answer. I don't know why you couldn't or not, maybe the lawyers could tell you.

Q Maybe they can.

A I think we drilled them why we did because we had offset and the first was drilled to conform to the statewide obligation. The first well cost 470,000 bucks and when we went on to commence with these others, they took a look at their hole card.

MR. CAMPBELL: That is all.

RE-DIRECT EXAMINATION

By MR. HINKLE:

Q You testified that the Federal Davis No. 1 was drilled first and the next wells were the Holloway and the Wilhoit which are the offsets. A That is right.

Q They are offsets to the Federal Davis No. 1. Now the Wilhoit is all one lease, is it not, that covers the west half of Section 18? A Yes.

Q The Federal Davis covers the east half of the east half of Section 13? A That is correct.

Q The Holloway covers the west half of the east half of Section 13? A That is right.

Q That is another separate lease. It just happened those are separate leases offsetting the original well?

A That is right.

Q Do you know whether or not your decision to drill those two wells would have been otherwise if it had been all one lease?

A They would not have drilled them that close, they would have stepped them out.

Q You were trying to meet the offset obligations under those particular leases at the time? A That is correct.

Q Does that prevent you, in your opinion, in going ahead with 80 acre spacing at this time?

A No, you can split them in two.

Q Because you have met your offset obligations on these leases? A That is right.

Q Except for two instances, there is only one well on each lease, is that right?

A That is right. Two on the Federal Davis.

Q The exception would be the Federal Davis, the two leases, and they are on an 80 acre pattern and the Gulf lease which is the southeast quarter of 12, two wells there, one which is still being drilled that can still be on an 80 acre pattern, yet they are meeting offset obligations which were required by the Federal Davis No. 1 and by the Holloway No. 1, is that right?

A That is right.

MR. HINKLE: That is all.

MR. MACEY: Anyone have any further questions of this witness? If not the witness may be excused.

(Witness excused.)

MR. HINKLE: That is our entire case. I think Mr. Campbell wanted to submit a statement as to the royalty ownership which is agreeable to us provided he submits it within a reasonable time so there will be no delay in the decision in this case.

MR. CAMPBELL: Yes, I requested Mr. Hinkle to allow me to make available to him for examination and then to the Commission, simply a statement showing the interest of the people who have appeared here and where that interest is situated and the intent of it. I would also like to make, and I would go ahead if you have finished, I am not going to put on any testimony if the Commission please, I do want to make a statement of the position of the people that I represent here, and if it is agreeable with Mr. Hinkle and the Commission, I will make it now and he can go ahead and close the matter.

MR. HINKLE: Very well.

MR. CAMPBELL: As I stated at the outset to Mr. Branson, the people that I represent are not urging that this field be produced on a 40 acre wide open wells, or even with the top allowable if they feel that is not a proper way to produce the reservoir,

They do feel, however, that due to the early development in the field, that these wells situated on 40 acre locations straddled at least the top of the structure. That any stepping out now on an 80 acre pattern will create a condition of non-uniformity that will be not only bad for the reservoir but affect the rights of the respective royalty owners. They think secondly, that the admitted variations in permeability and porosity in this field and in most Devonian fields, make question of full recovery or best recovery on 80 acre spacing extremely questionable, and that it should not be undertaken unless it is started originally. It should not be undertaken until we are certain it will recover the greatest amount of oil in the reservoir.

The third thing I want to call to the Commission's attention is this. This application seeks a 40 acre unit allowable exactly the same that is being attributed to these 40 acre locations, these 40 acre wells now. They say that it, in their opinion, would be wasteful to drill wells every 40 acres in the point of view of economics, and coning might result in a waste problem. That 80 acre spacing will properly drain this reservoir. It is also apparent that most of these leases in this area are fairly large leases. As they go they are larger than the 80 acres in most instances. All of that being true, I cannot see why they need a Commission order establishing 80 acre spacing in this field. There is nothing to prevent, short of failure to comply with the lease contract, and there was nothing to prevent them at the outset from diagonally offsetting the original well, or from starting to drill on 80 acre spacing now. If they are correct in their belief that this is a poor reservoir, probably they wouldn't be subject to any

great danger insofar as the royalty owners are concerned. It occurs to me that the purpose of some of these applications for 80 acre spacing is simply to make it possible for the operator to say to the royalty owner at a later date, we were justified in doing this because we had a hearing before the Commission and they issued an 80 acre spacing order. I think that is particularly true where they do not seek and the royalty owners do not demand that they get any more than the 40 acre unit allowable with a deep well factor even though they want to space the wells on an 80 acre pattern of some sort.

For that reason, the people for whom I have entered an appearance, feel that the application should be denied and that this Commission should issue no order for 80 acre spacing in this field.

MR. MACEY: Mr. Hinkle.

MR. HINKLE: I wonder if there are any further statements before I make mine.

MR. MALONE: May it please the Commission, Ross Malone for Gulf. Gulf is the leasehold owner of a relatively small percentage of the area that is included in the apparent producing limits of the South Knowles-Devonian pool. It has, as has been stated, given to the applicants in Case 819, a letter indicating its general approval of their problem. Gulf would like to express the view that regardless of any question of the development to date, the establishment of uneconomic proration units would not be in the interest of the State, the operator, or the royalty owners. On the basis of the evidence presented in case by applicant, Gulf recommends the establishment of an 80 acre proration unit in the field and that a normal 40 acre unit allowable with appropriate

depth factor be assigned to such units.

MR. MACEY: Anyone else? Mr. Christy.

MR. CHRISTY: R. S. Christy, Amerada Petroleum. Amerada owns an undeveloped lease within the prospective limits of the South Knowles-Devonian pool. We recommend to the Commission that this field be developed on an 80 acre unit basis for the following reasons. First, the testimony indicates one well would adequately and efficiently drain 80 acres. Therefore, more than one well to 80 acres would be unnecessary wells. Secondly, a point which I don't believe has been brought out, 80 acre units with the allowable here recommended, tends to keep the State's allowable near the market demand, which is considerably lower than the present State allowable. As we all know, these deep wells have a high allowable and every time you get a deep well with its allowable you increase the State allowable that much more by doubling that on 40 acre units, just makes the situation a little more acute and since one well will drain 80, I think that is all that is necessary and we recommend that the Commission adopt an 80 acre unit basis.

MR. MACEY: Anyone else? Mr. Hinkle.

MR. HINKLE: If the Commission please, I think that the evidence which has been introduced in this case overwhelmingly supports the application of Hamon and Warren for 80 acre spacing, and for allocation of 40 acre allowable in this case. I think it is clearly shown by the experience which we have had in the Knowles Field, to which this area is quite similar, that if there ever was a case for 80 acre spacing, that this is a proper one. I think it has been conclusively shown as Mr. Christy has pointed out, that one well will effectively and efficiently and economically drain

80 acres or more. If that is the case, there is no reason why the operators should be required to drill more than one well to 80 acres.

It has also been conclusively shown, and there has been no evidence introduced to the contrary, that the royalty owners will be protected. The correlative rights of all parties are protected by this form of development. As I say, I don't know of any reason why the Commission shouldn't approve the 80 acre spacing in this particular case, and I want to point out that there hasn't been one iota of evidence introduced to show that it would be unfair to the royalty owners.

MR. MACEY: Anyone have anything further in this case? For the purpose of the record, as I understand it, you, Mr. Campbell, are going to submit a statement?

MR. CAMPBELL: Just as to the ownership of the royalty owners.

MR. HINKLE: Just a tabulation.

MR. MACEY: Of mineral interests?

MR. CAMPBELL: Of the people who I represent.

MR. MACEY: The applicants are going to submit core data. We would appreciate electric logs.

MR. HINKLE: We will be glad to submit them.

MR. MACEY: If nothing further, we will take the case under advisement.

C E R T I F I C A T E

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 28th day of February, 1955.

Ada Dearnley
Notary Public, Court Reporter

My Commission Expires:
June 19, 1955

BEFORE THE

Oil Conservation Commission

SANTA FE, NEW MEXICO

July 14, 1955

IN THE MATTER OF:

CASE NO. 819

TRANSCRIPT OF PROCEEDINGS

ADA DEARNLEY AND ASSOCIATES
COURT REPORTERS
605 SIMMS BUILDING
TELEPHONE 3-6691
ALBUQUERQUE, NEW MEXICO

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
July 14, 1955

IN THE MATTER OF: By provisions of Order R-638-A, the Commission granted rehearing in Case 819 upon application of Jake L. Hamon and the Warren Petroleum Corporation. This case involves an application for 80-acre well spacing and allocation factors in the South Knowles-Devonian Pool, Lea County, New Mexico.	Case 819

BEFORE:

Honorable John F. Simms
Mr. E. S. (Johnny) Walker
Mr. William B. Macey

TRANSCRIPT OF PROCEEDINGS

MR. MACEY: The next case on the docket is Case 819.

MR. HINKLE: If the Commission please, Clarence Hinkle, Roswell, New Mexico, appearing on behalf of Jake L. Hamon and Warren Petroleum Corporation. This case is before the Commission on the application of Hamon and Warren for rehearing for an 80-acre spacing order in the Penrose-Devonian Pool of Lea County, New Mexico.

The testimony we propose to introduce here will be largely supplemental to that that was introduced at the original hearing, to show there has been a changed condition which we believe makes it absolutely necessary from an economic standpoint that this area be developed on an 80-acre spacing pattern on 80-acre proration units. We have also submitted with the application for rehearing a plat which shows an agreed spacing pattern between the Hamon and

Warren, the Gulf Oil Corporation and the Amerada Petroleum Corporation. At the original hearing, we indicated that they had, these operators who, by the way, are all the operators in the probable producing area, had agreed on an 80-acre spacing, but we did not present at that time a map showing the agreed pattern.

As I say, the pattern now has been definitely agreed upon by these operators and submitted with the application.

In addition to being just an application for rehearing, it is actually submission of the case under the provision of the Statute which provides in effect, which is 13-E of the Conservation Act, which provides this: "Whenever it appears that the owners of any pool have agreed upon a plan for the spacing of wells, or upon a plan or method of distribution of any allowable fixed by the Commission for the pool, or upon any other plan for the development or operation of such pool, which plan, in the judgment of the Commission, has the effect of preventing waste as prohibited by this act and is fair to the royalty owners in such pool, then such plan shall be adopted by the Commission with respect to such pool; however, the Commission, upon hearing and after notice, may subsequently modify any such plan to the extent necessary to prevent waste as prohibited by this act."

We have two witnesses, Mr. U. S. Branson, Jr., and Mr. J. S. Ewing, that I would like to have sworn.

U. S. B R A N S O N,

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

DIRECT EXAMINATION

By MR. HINKLE:

MR. HINKLE: I am going to hand to the Commission the exhibits

that will be introduced in evidence and attached to the application.

(Hamon-Warren Exhibits Nos. 1, 2 and 3 marked for identification.)

Q State your name, please.

A U. S. Branson, Jr.

Q You testified in the original hearing of this case, I believe, in February?

A I did.

Q I hand you Hamon and Warren's Exhibit No. 1 and would suggest that you tell the Commission what that exhibit shows.

A Exhibit 1 shows a spacing pattern showing how the wells as presently drilled and the remainder of the producing area can be divided up into 80-acre proration units and conform to the lease-lines as they exist.

Q Was there any particular reason that you know of that these wells were drilled on the pattern which was shown here?

A The discovery well, Federal Davis 1, has three direct offsets drilled around it. The Wilhoit No. 1, the Fanny Holloway No. 1, and the Gulf's Cone No. 1 -- these wells were drilled there to comply with offset obligations immediately following the completion of the Federal Davis 1.

Q Is each well located on a separate lease?

A Each of those wells is located on a separate and distinct lease.

Q Are there any instances where there is more than one well on one lease?

A There are. One, that being the Federal Davis in the east half of 13 and the Gulf's Cone lease in the southeast of 12; in both

cases those two wells fit into the 80 acre proration pattern as shown here and have 80 acres assigned to them.

MR. MACEY: Does this show all the wells that have been drilled in this particular area?

A All the wells that have been completed in this particular area are on this particular map.

Q Are there any other wells being drilled at the present time?

A There is one well being drilled on the south end of the Fanny Holloway lease offsetting the Federal Davis 2.

Q What is the location of that well?

A It is 660 feet from the west line and 660 feet from the south line of the southeast quarter of Section 13.

Q That would be approximately the center, then, of the southwest quarter of the southeast quarter of Section 13?

A That is correct.

Q That is the offset to the Federal Davis No. 2?

A Yes.

Q Do you know how deep that well is?

A 6565 this morning at 7 o'clock.

Q Does, in your opinion, this spacing pattern which is shown by Exhibit No. 1 be fair and equitable to all the operators, and would it protect correlative rights and the interest of the property owner?

A In my opinion, the spacing pattern is fair to the operators and does protect the correlative rights of the royalty owners.

Q Is there any reason that you know of why this pattern cannot be put into effect at this stage of the development of the field?

A No, that is, no engineering reason.

Q State whether or not in your opinion the development on 80-acre basis would be in the interest of conservation and prevention of waste.

A In the interest of conservation, development on 80 acre spacing pattern is capable of draining the area as thoroughly as development on any closer spacing pattern. Development on a closer spacing pattern with the correspondingly higher rates of withdrawal will result in aggravation of edgewater movement and the combination of edgewater movement and bottom water coning will result in trapping off of oil beyond the producing wells.

For that reason, it is my opinion that drilling on a closer spacing will result actually in loss of production and ultimate recovery.

Q In that respect, would this protect correlative rights and the interest of royalty owners?

A The drilling on the 40 acre spacing would not protect correlative rights any better than drilling on the 80 acre spacing.

Q What wells have been drilled and completed since the original hearing in this case?

A The Cooper No. 1 has been completed; the Gulf Cone No. 2 has been completed since the original hearing of the case.

Q Have the completion of those wells furnished any additional information which has any bearing upon the further development of this area?

A Yes, sir. Water was encountered in the L. Cooper No. 1 Well at minus 8530 feet, some 60 feet above where we thought the water level was at the last hearing. That simply shrinks the reservoir and makes recovery from the top of the reservoir consider-

ably below what was calculated originally. It shrinks the reservoir.

Q Was Exhibit No. 1, the plat showing the pattern, prepared by you and under your direction?

A It was.

Q I hand you Hamon and Warren's Exhibit No. 2; state to the Commission what that exhibit shows.

A This map is a plat showing the status of the wells in the field as of May the first of this year. There are three numbers given under each well, the top number is the cumulative oil production to the first of May, by wells. The second number is the subsea section open, simply showing where the wells are completed. The bottom number was the water cut at that time. Beginning with the Cooper No. 1, by the time the well had produced 4,618 barrels completed at depths of 8496 to 531, it was producing at 50 per cent water cut. Gulf Cone 2, completed from 8438 to 549, was producing at 12 per cent water cut with, practically speaking, no past production attributed to it. In each of the successive wells, simply give the cumulative production, the amount of water being produced and the section open.

Q Why are the figures on this plat shown as of May 1st, 1955?

A That is the last time at which complete data from the entire field was available.

Q Do you have any additional information as to the status of the water that is being made at the present time?

A Yes, sir; since the time that this map was made, and as of the first of July, the Cooper No. 1 is no longer making 50 percent water. It is making about 62 and a half percent. The Cone No. 1 is producing approximately 8 percent water at the present time.

The Cox No. 1 has increased to 17 percent. The Holloway and the Wilhoit, by reduction in production, we have been able to reduce the water cut in those wells. This map also shows, among other things, that all wells completed below the minus-8530 or at the minus 8530 contour are producing some water.

Q The production figures which are shown in this plat were obtained from what source?

A The New Mexico Conservation Commission records and the records of the operators themselves, of course.

Q At what rate have these wells been producing or are they being produced at the present time?

A The rate varies from well to well, depending on how much they will produce without increasing rapidly in water cut. On the L Cooper No. 1 well, that one is being produced at capacity and makes 61 barrels per day of oil at 62 percent water cut. The Cone No. 1, that is Hamon and Warren's Cone No. 1, is producing around 130 barrels per day; both of those two wells are pumped. The remaining wells are flowing, with the Cox 1 producing at 113 barrels and we have been able to hold, by maintaining a restricted rate on that, we have been able to keep the water cut from increasing rapidly. The Holloway No. 1, as I mentioned before, has been restricted as of July 1st to 92 barrels per day, at which rate we almost succeeded in drying the well up. The water cut is below 1 percent at present.

Q Your experience has been that few tried to flow these wells successfully at the full allowable?

A If we attempt to pull a full allowable, the water cut increases.

Q You are trying to produce them at the rate to cut down the water production?

A We are trying to produce them at a rate that will not permit coning water.

Q Are any of the wells capable of producing the 40 acre allowable?

A Yes, quite a number of wells are capable of producing the 40-acre allowable for a limited time. Specifically, whether they would produce them flowing or not is something else.

Q What, in your opinion, would be the result of trying to produce these wells at the full 40 acre allowable rate?

A Most of the wells would promptly increase in water cut and a few among the ones flowing, with the increase in water cut, would go to pumping, with a resultant drop in production, so it would be possible to maintain the allowable rate for a limited time on most of the wells.

Q Was this plat No. 2 prepared by you and under your direction?

A It was.

Q I hand you Hamon-Warren's Exhibit 3 and ask you to state to the Commission what that shows?

A It is a revised structure map prepared since the completion of the Cooper No. 1 well, showing the contour on top of the Devonian section.

Q Mr. Branson, in connection with the original hearing, there was an exhibit No. 4, I believe, introduced, which was similar to this structural plat on the Devonian. Can you state to the Commission the changes in this exhibit over that exhibit No. 4 that was originally introduced?

A After encountering water in the Cooper 1 sixty feet above where we expected, we went back and checked our structure map carefully. This particular structure map represents two deviations from the map presented as Exhibit 4. One, the oil-water contact has been moved to 8530 subsea depth, found in Cooper No. 1 well. The second change is a stemming of the gradient on the righthand side of that on the southeast corner of the field from a re-evaluation of shot pictures.

Q The major change then, in the structural map, is the oil-water contact?

A That is the major change in the structure, yes.

Q Have you made any additional bottom hole pressure surveys since the original hearing?

A A pressure survey was conducted on June 30th in which all wells in the field with the exception of the two pumping wells, were shut in 48 hours and bottom hole pressured at minus 8450. Those pressures ranged on this second survey, as of June 30th, from 4760 on the Cox No. 1 to 4900 on the Federal-Davis 2. The total variation represents a range of about 1½ percent of the pressure, of the average pressure there, being about 69 pounds above and 70 pounds below, the mean pressure. The pressure variation actually reflects more the lack of sufficient time for building up than it does the actual ultimate pressure on buildup.

Q Does this survey have any significance as far as the 80 acre spacing is concerned?

A The continuity of the pressure, the close relationship between the pressures on the different wells across the field, and the fact that the highest pressure measured is still apprcximately

the original reservoir pressure, indicates first that the wells are draining, are capable of draining the wide spacing or relatively wider spacing and, second, of course, that the water drive is fairly effectively maintaining pressure in the reservoir. The increase in buildup time is normal with continued production in a tight reservoir and actually indicates that the well is pulling from further back in the reservoir than during the early stages of development or production.

Q Due to the change in the conditions since the original hearing and the additional information which you obtained from the experience in the field and the drilling of additional wells, do you have any different view than was expressed by you at the original hearing, with respect to the economic aspects of the development of this area?

A The economic aspects of this development are, of course, considerably less favorable to the operators than we believed them to be when we had a deeper water level. That is approximately 60 feet off of the net effective section which amounts to a reduction of approximately 1500 barrels per acre in expected recovery, or, in other words, converts a marginal well from -- to a losing proposition and converts one that was going to make a little money to a marginal proposition.

Q Have you made a study as to the probable production of each of the wells that have been drilled?

A To a limited extent.

Q What would you say would be the result of your opinion after making the study?

A Economically?

Q Yes.

A There are several wells here that undoubtedly will not pay out the drilling cost now. Specifically, the Cooper No. 1, which had a production of about, under 8000 of barrels, is already making some 62 and a half percent water cut, with an increase in water cut of 12 and a half percent, along with a production of only 3500 barrels of oil.

Q Is that one of the wells that is on the pump?

A That is one of the wells that is pumping, yes. The indicated recovery is far below sufficient actually to pay for the pipe in the well. Other wells there that are questionable as far as payout is concerned are the Cox and the Cone and some of the others there will be a pretty close fit to pay for the drill also.

Q What other well is on the pump?

A Cooper No. 1 and Cone No. 1 are pumping at present.

Q From an economic point of view, if the probable productive area is developed on 40 acre spacing pattern, will the pool or field return a profit to the operators, based on the present price of production?

A Developed on 40 acre spacing pattern, it is very unlikely that it would pay for the drilling.

Q How many additional wells would have to be drilled to completely develop the present prospectively productive area on 40 acre?

A Six additional wells.

Q By the drilling of these six additional wells, would any additional oil be recovered?

A No.

Q What would be the additional cost of drilling these six additional wells?

A About $1,800,000. They cost approximately $300,000 apiece.

Q This would mean, would it not, that it would result in an economic loss, additional economic loss of approximately $1,800,000?

A That is correct. The additional expenditure investment of the operators would simply reflect that much loss.

Q In addition to the $1,800,000 cost of drilling those wells, you would also have an economic loss in the cost of operating the wells and in lifting cost, would you not?

A That is correct. Each additional well increases the operating cost in the field. The more wells you have the more it costs you to produce. If you produce the same amount of oil, you simply have spent additional production money in obtaining it.

Q Then your conclusion is that if this area is required to be developed on 40 acre spacing pattern and all the necessary wells drilled that it would probably result in a loss to the operator?

A It would probably result in a financial loss to the operators.

Q As far as protecting correlative rights and the interests of royalty owners, would it serve any purpose in that connection?

A It would not serve to protect correlative rights as well as the 80 acre spacing, if as well.

MR. MACEY: Any questions of the witness?

MR. HINKLE: I would like to offer in evidence Exhibits 1, 2, and 3.

MR. MACEY: Without objection, they will be received.

Mr. Campbell.

CROSS EXAMINATION

By MR. CAMPBELL:

Q I gather from your testimony, Mr. Branson, concerning the

water situation and the fact that you cannot produce the full allowable from these wells, that whether the field is on 40 or 80 acre spacing program, you consider it to be a pretty sorry oil pool, is that correct?

A That is correct.

Q Do you know of anything, Mr. Branson, in the rules or regulations or the Statutes that require you to drill any wells?

A I can't answer that question because I am not an expert on New Mexico law.

Q Do you know of anything in the rules and regulations or the Statutes that require you to produce the full allowable?

A Not that I know of, no.

Q Do you feel that any time you want to stop recommending that they drill any additional wells, they can stop drilling, irrespective of the pattern?

MR. HINKLE: I think that is the question of law. We have an implied obligation to these owners for reasonable development That is a question of law.

MR. CAMPBELL: I will be glad to ask Mr. Hinkle if he wants to answer it.

Q Mr. Branson, since the last hearing, the only well that has been commenced is a well in the southwest quarter of the southeast quarter of Section 13, is that correct?

A Yes.

Q Quite obviously, that well wasn't commenced on your recommendation, if your contour is correct, is that right?

A That is right.

Q But that well is a direct 40-acre offset to the Federal-

Davis No. 2 to the east, is it not?

A 1320 feet west of the No. 2.

Q So that the only additional development that nas taken place since the last hearing is another 40 acre location insofar as offset is concerned?

A With reference to Exhibit 1, it is in an 80 acre proration pattern. It is in the south end of the 80 acre proration pattern section on the Holloway lease, just as the No. 2 Federal-Davis is on the south end.

Q But it is 1320 feet from the nearest well?

A Tnat is right.

Q With reference to the spacing pattern as indicated in your Exhibit 1, what is the reason for changing the pattern from north-south unit to east-west unit in Section 24 and 19 in the south part of the area?

A Primarily the east-west 80 of the Ameradas there in the northeast of 24, simply to fit the lease ownership.

Q Do you know, Mr. Branson, whether or not the original leases are two separate leases covering the east-half of 24 and the west half of 19?

A Of my own knowledge, no.

Q Would you, so far as the development of the field is concerned, if the field were to be continued on 80 acre spacing, object to the changing of your pattern here in Sections 19 and 24, to a north-south unit instead of an east-west unit?

A So far as engineering is concerned, there would be no distinction.

MR. CAMPBELL: I believe that is all.

MR. MACEY: Anyone else? Mr. Rieder.

By MR. RIEDER:

Q You mentioned before that there might be six additional wells drilled?

A Yes.

Q Could you give me an idea where?

A The question as asked was to give complete development on 40 acre spacing. For those six there would be, besides the one being drilled on the south end of the Holloway lease at the present time, there would be two additional Holloway, two additional Federal-Davis, and two, either one or both of them might be questionable, one on the Wilhoit and one on Cox.

Q On this 80 acre spacing pattern there would be no further development?

A As to that, I can't say for sure. Within the 8530 contour as we understand it at present, there would be no additional wells.

Q On the Holloway No. 2 from the contour, if the contour is correct, the well hasn't got a chance of being a producer?

A That is correct.

Q It would have had a better chance if it had been the northwest to the southeast?

A That is correct.

Q It would seem that the northwest to southeast would have been a more practical location and still proved the southern end of your contour.

A I expect that location was staked for other than engineering reasons.

MR. HINKLE: May I ask a question to clear that up?

MR. MACEY: Yes.

MR. HINKLE: Do you know whether or not any demand was made by royalty owners?

A I do understand it was an offset to Federal-Davis No. 2 that was responsible for the staking of that location.

MR. RIEDER: No further questions.

MR. MACEY: Anyone else?

MR. CAMPBELL: Does your company just automatically meet those demands?

A In a good share of cases -- I don't believe I could state the company policy.

MR. MACEY: Anyone else have a question of the witness?

By MR. MACEY:

Q I would like to know, Mr. Branson, whether you consider the present top allowable for this pool, and taking the pool in its entirety, you consider that that figure, which is 264 barrels a day, do you consider it excessive from the standpoint of economic, efficient recovery?

A I think it is excessive.

Q There may be circumstances where you could produce it without?

A There is, isolated on the structure, where the wells are capable of producing that without coning the water into them, there are isolated cases; in most of the field that is not true.

Q Can you explain why the Federal-Davis No. 2 which is completed only 12 feet from the oil-water contact, isn't producing any water, yet it is producing at high rate?

A It has been restricted to 125 barrels since its completion. We had water in some wells completed higher than that before we

completed the Federal-Davis No. 2, and as of the first of July, it is producing 125 barrels per day.

Q How much is the Federal Davis No. 1 producing?

A 230 .

Q What about the Wilhoit 1?

A 206. These tests are as of July 1st.

Q Do you have any information on the Cone wells of Gulf?

A I do not know of my own knowledge what they are producing now. It is my understanding, however, that with the appearance of water in Gulf Cone No. 2 its production has been restricted to someplace in the range of 125 to 150 barrels per day, and No. 1 is producing approximately the allowable rate, just as the Federal No. 1 Davis is. That is purely hearsay.

Q Did you use any geophysical data in order to make the interpretation of your possible oil-water contact on your Exhibit No. 3, I believe.

A The structure map itself is based, with the exception of where we have sub-surface control, it is based on geophysical data, yes. As far as the water level itself, that is based on where we found the water in the Cooper No. 1.

Q Is there a possibility of a tilted water table?

A Yes, I would say there is a possibility.

Q Do you have the top of the Devonian on the No. 1 Cone? It is not very important if you don't have it on your exhibit.

A 8463, it is on this exhibit. I thought it was on all of them. Minus 8463.

MR. MACEY: Does anyone else have a question of the witness? If no further questions the witness may be excused.

(Witness excused.)

J. S. EWING,

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

DIRECT EXAMINATION

By MR. HINKLE:

Q State your name, please.

A J. S. Ewing.

Q You have testified at the previous or the original hearing in this case, did you not?

A Yes, sir.

Q I believe your testimony shows that you were general superintendent for Jack Hamon?

A That is correct.

Q Do you know whether or not any agreement has been reached between Mr. Hamon, Warren Petroleum Corporation, Gulf Oil Corporation and the Amerada Petroleum Corporation, with respect to spacing units or proration units in this South Knowles area?

A Yes, sir, that was agreed upon at a meeting on June 7th, with the representatives of engineers and counsel of Gulf, Amerada, and Warren and Hamon.

Q What does this agreement consist of, essentially?

A Well, the proration pattern as shown on Figure 3 --

Q That is the Exhibit No. 1, I believe? A Yes.

Q . That is the pattern referred to and the same plat which is attached to the application for rehearing in this case?

A That is correct.

Q Does your agreement require the drilling of wells in either component part of 80?

A No, sir, either 40 acres.

Q Are you familiar with the well which is being drilled at the present time in the southwest quarter of the southeast quarter of Section 13?

A Yes, sir.

Q Do you know when you expect to complete that well, or about when?

A About the first of September.

Q If you don't have any trouble?

A If we don't have any trouble.

Q Do you have any short-term leases that might be affected by that particular well, the completion of it?

A Yes, sir.

Q What --

A (Interrupting) The west half, I believe, of 19, and the east half of 24. I understand the Amerada lease, also.

Q That also includes the Amerada 80?

A Yes, sir.

Q Do you know when those leases expire?

A November 7, 1955.

Q In other words, if the Holloway No. 2 should prove to be a dry hole or a well that is so low that it wouldn't pay out, what would be the natural result, with respect to these leases to the south?

A I would imagine they would release them.

Q Or they would expire?

A They would expire, yes.

MR. HINKLE: I believe that is all.

MR. MACEY: Any questions of the witness?

CROSS EXAMINATION

By MR. CAMPBELL:

Q Supposing the Federal Holloway well is a good well, what would be the result?

A I hope it is.

Q What would be the result?

A I imagine they would start a couple right quick.

Q On the basis of the spacing pattern that you suggest here, by the changing of your pattern to east-west in Sections 19 and 24, it would appear that instead of drilling two offsets to meet your unit requirements there, you would drill one.

A Well, the Amerada have that 80, it wouldn't be our well. We probably would have to go over here, I would say, in the west half of 24, wouldn't we -- 19, I mean.

Q If you drill one in the west half of 24 and drilled it, which you undoubtedly would, in the north tract there, --

A (Interrupting) I mean the west half of 19. I beg your pardon. I meant we would have to go into 19 would be my guess.

Q I am not asking you to commit yourself on what you would do. I am trying to get the result of changing the direction of your units when you reach this point. I believe the fact is that there is one lease covering all the east half of 24 and one lease covering all the west half of 19?

A That is right.

Q If you followed the same arrangement, you did up in the north part of this pool, by making your offsets direct offsets to meet lease obligations in that fashion, it seems to me that by re-

arranging the pattern here, even though it was not the purpose for which you did it, that the result would be that you could hold the east half of 24 and all of the west half of 19 with one well each.

A Well, I wouldn't know about that.

Q Would you have any objection if the 80 acre spacing is granted, to changing the direction of the proration units in Sections 24 and 19?

A Well, personally, I wouldn't, but I wouldn't know what the management would do about it, but my guess would be they would be glad to do it.

Q So far as your management is concerned, it would be a benefit to them?

A It looks like it would.

Q Do you know of anything, Mr. Ewing, in the rules or the Statutes of New Mexico that prevent you from stopping your drilling program whenever you see fit?

A I am not an authority on New Mexico regulations. I wouldn't know.

MR. CAMPBELL: That is all.

MR. MACEY: Anyone else have a question of the witness? If nothing further, the witness may be excused.

(Witness excused.)

MR. HINKLE: If the Commission please, that is all we have. I would like to make a short statement in connection with this matter.

As I have already pointed out, we have come in here now with an agreed plan of all of the operators who are involved in the area, agreeing on the spacing and proration pattern. We have come under

that Section of the Statute that provides in that case where the operators so agree that the pattern, and agreement must be respected by the Commission unless the Commission finds that it would not be fair to royalty owners. There has been no evidence introduced here by Mr. Campbell or anybody else which would show that this plan is not fair to the royalty owners or that it would not adequately and fairly protect correlative rights. In fact, the only evidence that has been introduced in this case by Hamon and Warren shows clearly that all rights will be protected.

There is another aspect to this thing which I think ought to be brought to the attention of the Commission, and that is the economic aspect. It has been clearly shown here that this is a case where, if the Commission requires that this field be developed and the royalty owners insist upon it on 40 acre spacing, that there would be an economic loss to the operators. There would not be any additional oil actually recovered in the operation. If the Commission is going to take that position in connection particularly with these deep pools, it is certainly going to discourage development in New Mexico. I think it has always been the policy of the State by the laws which have been enacted by the Commission and encouraging development in the State, particularly with respect to State lands and Federal lands, and the State ultimately gets the benefit of that by reason of the operation, the money that is expended in them, and in connection with the Federal and State lands, by the royalties which accrue and also the citizens of the State by the royalties that accrue to them in connection with fee land.

I don't think the Commission should adopt any arbitrary rule that there should be no fields developed on 80 acre spacing pattern.

I think when we come in with a case of this kind, when we clearly show it is economically not sound to develop it on 40 acres, that the Commission should have that in mind, that an overall general policy should be adopted that would encourage development in New Mexico and encourage the drilling of these deep wells which cost some 300,000 to 350,000 to drill, being 13,000 feet deep. If the operators get the idea that the Commission is arbitrarily going to shut them off from 40 acre development, they are going to be reluctant to come into New Mexico and develop the areas, particularly when we know from the experience of Lea County that the deep Devonian areas are small in size. They are pinpoints that do not cover large areas. That has been the experience generally in New Mexico.

I think that the evidence clearly shows that this is a case where we are entitled to have 80 acre spacing. It shows that the operators of the field are in agreement on the spacing and the proration units. It clearly shows that the royalty owners are not going to be hurt.

Another thing I want to point out is that up to date I don't think there is any evidence or statement on the part of counsel for the royalty owners showing that they actually have any royalty interest that would be affected in the probable producing area of the field.

MR. CAMPBELL: I would like to make a brief statement on behalf of the protestants. The Commission has on file a list of the royalty owners who have entered an appearance in this case, and a tabulation of the mineral interests insofar as we were able to obtain them at the time of the original hearing. I think that the only question involved here really is whether or not it is

necessary for the Commission in a situation where you have a field as poor as this one apparently is to enter an order establishing a wide spacing pattern. The wide spacing patterns that we have come upon in New Mexico have always been in either real good fields or real bad fields. When you get to a situation where you have a bad field, it is hard for me to understand,other than the proposition that it might avoid somebody suing them, which is a chance that I think they take when they get a lease contract, why the Commission needs to intercede. If he feels that a prudent operator would not drill any more wells or would drill his wells on 80 acre spacing or 160 acre spacing, then there is nothing to compel him to drill on any other pattern. What it amounts to is that the Commission, by entering an order for 80 acre spacing, is simply, in my judgment as I view it, coming between the lessor and the lessee in this contract.

Mr. Hinkle has said that they have an implied obligation to drill wells. That is quite true, as long as you are on 40-acre spacing; I think that implied obligation probably means each 40 acres, but if conditions are such that a reasonably prudent operator would not drill those wells, then that obligation doesn't exist and couldn't be enforced if the conditions in this field are what these people say they are. I am sure they are. I for one wouldn't try to get them to drill 40-acre locations. I don't think it is a matter to be decided in this form. I don't think it is a matter that the Oil Conservation Commission from the point of conservation and protection of correlative rights should decide in a situation of this kind. If the Commission should see fit to approve 80-acre spacing in this area because of the fact that the operators can't pay their wells out on 40-acre spacing, then there are two things

that we would like to request that the Commission consider.

In the first place, to my knowledge there has never been in New Mexico at the outset a permanent 80-acre spacing order. They have been on a temporary basis and the operators have been required to come in at some stated time, usually one year, and tell the Commission what conditions have developed since the field went on this spacing. I suppose it is conceivable,though improbable, that Mr. Branson could be wrong and that this well they are drilling there against his better judgment,apparently, might turn out to be an oil well. I suppose that is possible. If it did, and if the field started to develop back to the south, I think that it is incumbent on the Commission to protect the correlative rights of the royalty owners, that at least they had the opportunity by future information to request a change in the pattern. It keeps the operators and the Commission and royalty owners advised of the development.

We suggest first that it be a temporary period of one year if on 80-acre spacing.

Second, we would like to request that the Commission, if it sees fit to put it on temporary 80-acre spacing, to change the pattern insofar as 19 and 24 are concerned so that the proration units will run north and south, just as they do in the rest of the field. I can understand why, with this Amerada situation here, Amerada having received in some manner either the original lease and farmed the rest out, or having a farmout, I don't know how it worked out, but it is all under the basic lease where they have an east-west 80 there that the simplest way, from the operator's point of view, to avoid pooling of interest, was to make the units east and west, but the way we view it, the result could be unfair to the

royalty owners, because if the well now drilling proved to be a well,instead of having to drill an offset to the Federal Holloway or the Holloway No. 2 and to the Federal Davis, or two wells to hold the entire west half or east half of Section 24, they would only have to drill one well in the unit lying to the north. We feel that if it is fair to divide these units north-south elsewhere, they should be divided the same way by the Commission in any order they may see fit to enter for temporary 80-acre spacing in this particular field.

MR. MACEY: Anyone else have anything else? Mr. Hinkle.

MR. HINKLE: Mr. Campbell has mentioned about the implied obligations of the lease owners for full development, which I had mentioned a while ago, which might require us to develop or drill these additional wells, which would result in an economic loss. One of the reasons the Oil Conservation Commission was established was to determine in matters of this kind what proper spacing units and proration units should be in connection with proration. That is set out specifically in the Statute and I think we have a perfect right to come in here and ask the Commission to determine a spacing and a location pattern for this area, and that we not be left to the Courts as far as our lease obligations are concerned in that respect. As far as the temporary order of one year is concerned, we have no objection to that. If the Commission should see fit in entering an order in this case to make it a temporary order for one year, I think that would be all right. I think certainly at the end of the year by the drilling of this additional well which would be completed before that time, that it will determine whether there is any additional area there that needs to be developed and if

conditions warrant at that time that further development of it, I am sure that Hamon and Warren would be willing to go ahead and develop it. They are as anxious as anybody else to develop anything that will show a profit. They are certainly not anxious to be forced to drill six or seven additional wells here which would be a total loss to them. I believe the record in this case will show that both the Gulf and the Amerada agreed to this form of spacing. I was informed that the Amerada had sent the Commission a telegram --

MR. MACEY: That is right.

MR. HINKLE: -- which shows they were in agreement. Mr. John Woodward, attorney for the Amerada, was present at the meeting where this spacing was agreed upon. He couldn't be here and I understand he sent a telegram. I understand that the Gulf has written the Commission a letter also, stating that they concur in the application and want the 80-acre spacing as it has been agreed upon. I would like for those, the telegram and the letter, to be made a part of the record in this case.

MR. MACEY: Very well. Mr. Malone, did you have a statement?

MR. MALONE: May it please the Commission, Ross Malone for Gulf Oil Corporation. Gulf, as has been pointed out, is an operator in the South-Knowles-Devonian Pool and is in accord with the application which has been made by Hamon and Warren for an 80-acre spacing order, with 40-acre allowables to be assigned, with the customary depth factor. In supporting that, I would like to point out, as I have mentioned on previous occasions, to the Commission that we view with a number of reservations any argument that this Commission should act or should not act because of obligations that exist between an operator and the royalty owner. Those are contractual

rights and not correlative rights. In this case, as we view the testimony which has been presented, the most important single part of the testimony is the testimony that if a 40-acre pattern is adopted, tne number of wells that can be drilled will be doubled, and the rate of withdrawal from this reservoir likewise would be doubled. The testimony shows that in that situation both coning and boundary water encroachment are going to result with the result that there will be a waste and a reduction in the amount of oil that can be ultimately recovered from this reservoir. Under the Statute which created the Commission, that waste which would result from a spacing pattern of that kind is certainly the primary consideration which must be kept in mind, rather than the question as suggested in the argument as to the Commission acting because a well would or would not pay out for a particular operator. As we view it, the question of waste is the predominant question and the evidence shows that waste will result from a 40-acre spacing pattern, by reason of an increase in the rate of withdrawal from the reservoir, which will result in coning.

MR. MACEY: Anyone else have a statement or anything further in this case? Nothing further? We will take the case under advisement.

* * * * * * * * *

STATE OF NEW MEXICO)
: ss.
COUNTY OF BERNALILLO)

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 21st day of July, 1955.

Ada Dearnley
Notary Public, Court Reporter

My Commission expires:

June 19, 1959.

BEFORE THE

Oil Conservation Commission

SANTA FE, NEW MEXICO

July 14, 1955

IN THE MATTER OF:

CASE NO. 819

TRANSCRIPT OF PROCEEDINGS

ADA DEARNLEY AND ASSOCIATES
COURT REPORTERS
605 SIMMS BUILDING
TELEPHONE 3-6691
ALBUQUERQUE, NEW MEXICO

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
July 14, 1955

IN THE MATTER OF: By provisions of Order R-638-A, the Commission granted rehearing in Case 819 upon application of Jake L. Hamon and the Warren Petroleum Corporation. This case involves an application for 80-acre well spacing and allocation factors in the South Knowles-Devonian Pool, Lea County, New Mexico.	Case 819

BEFORE:

Honorable John F. Simms
Mr. E. S. (Johnny) Walker
Mr. William B. Macey

TRANSCRIPT OF PROCEEDINGS

MR. MACEY: The next case on the docket is Case 819.

MR. HINKLE: If the Commission please, Clarence Hinkle, Roswell, New Mexico, appearing on behalf of Jake L. Hamon and Warren Petroleum Corporation. This case is before the Commission on the application of Hamon and Warren for rehearing for an 80-acre spacing order in the Penrose-Devonian Pool of Lea County, New Mexico.

The testimony we propose to introduce here will be largely supplemental to that that was introduced at the original hearing, to show there has been a changed condition which we believe makes it absolutely necessary from an economic standpoint that this area be developed on an 80-acre spacing pattern on 80-acre proration units. We have also submitted with the application for rehearing a plat which shows an agreed spacing pattern between the Hamon and

Warren, the Gulf Oil Corporation and the Amerada Petroleum Corporation. At the original hearing, we indicated that they had, these operators who, by the way, are all the operators in the probable producing area, had agreed on an 80-acre spacing, but we did not present at that time a map showing the agreed pattern.

As I say, the pattern now has been definitely agreed upon by these operators and submitted with the application.

In addition to being just an application for rehearing, it is actually submission of the case under the provision of the Statute which provides in effect, which is 13-E of the Conservation Act, which provides this: "Whenever it appears that the owners of any pool have agreed upon a plan for the spacing of wells, or upon a plan or method of distribution of any allowable fixed by the Commission for the pool, or upon any other plan for the development or operation of such pool, which plan, in the judgment of the Commission, has the effect of preventing waste as prohibited by this act and is fair to the royalty owners in such pool, then such plan shall be adopted by the Commission with respect to such pool; however, the Commission, upon hearing and after notice, may subsequently modify any such plan to the extent necessary to prevent waste as prohibited by this act."

We have two witnesses, Mr. U. S. Branson, Jr., and Mr. J. S. Ewing, that I would like to have sworn.

U. S. B R A N S O N,

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

DIRECT EXAMINATION

By MR. HINKLE:

MR. HINKLE: I am going to hand to the Commission the exhibits

that will be introduced in evidence and attached to the application.

(Hamon-Warren Exhibits Nos. 1, 2 and 3 marked for identification.)

Q State your name, please.

A J. S. Branson, Jr.

Q You testified in the original hearing of this case, I believe, in February?

A I did.

Q I hand you Hamon and Warren's Exhibit No. 1 and would suggest that you tell the Commission what that exhibit shows.

A Exhibit 1 shows a spacing pattern showing how the wells as presently drilled and the remainder of the producing area can be divided up into 80-acre proration units and conform to the lease-lines as they exist.

Q Was there any particular reason that you know of that these wells were drilled on the pattern which was shown here?

A The discovery well, Federal Davis 1, has three direct offsets drilled around it. The Wilhoit No. 1, the Fanny Holloway No. 1, and the Gulf's Cone No. 1 -- these wells were drilled there to comply with offset obligations immediately following the completion of the Federal Davis 1.

Q Is each well located on a separate lease?

A Each of those wells is located on a separate and distinct lease.

Q Are there any instances where there is more than one well on one lease?

A There are. One, that being the Federal Davis in the east half of 13 and the Gulf's Cone lease in the southeast of 12; in both

cases those two wells fit into the 80 acre proration pattern as shown here and have 80 acres assigned to them.

MR. MACEY: Does this show all the wells that have been drilled in this particular area?

A All the wells that have been completed in this particular area are on this particular map.

Q Are there any other wells being drilled at the present time?

A There is one well being drilled on the south end of the Fanny Holloway lease offsetting the Federal Davis 2.

Q What is the location of that well?

A It is 660 feet from the west line and 660 feet from the south line of the southeast quarter of Section 13.

Q That would be approximately the center, then, of the southwest quarter of the southeast quarter of Section 13?

A That is correct.

Q That is the offset to the Federal Davis No. 2?

A Yes.

Q Do you know how deep that well is?

A 6565 this morning at 7 o'clock.

Q Does, in your opinion, this spacing pattern which is shown by Exhibit No. 1 be fair and equitable to all the operators, and would it protect correlative rights and the interest of the property owner?

A In my opinion, the spacing pattern is fair to the operators and does protect the correlative rights of the royalty owners.

Q Is there any reason that you know of why this pattern cannot be put into effect at this stage of the development of the field?

A No, that is, no engineering reason.

Q State whether or not in your opinion the development on 80-acre basis would be in the interest of conservation and prevention of waste.

A In the interest of conservation, development on 80 acre spacing pattern is capable of draining the area as thoroughly as development on any closer spacing pattern. Development on a closer spacing pattern with the correspondingly higher rates of withdrawal will result in aggravation of edgewater movement and the combination of edgewater movement and bottom water coning will result in trapping off of oil beyond the producing wells.

For that reason, it is my opinion that drilling on a closer spacing will result actually in loss of production and ultimate recovery.

Q In that respect, would this protect correlative rights and the interest of royalty owners?

A The drilling on the 40 acre spacing would not protect correlative rights any better than drilling on the 80 acre spacing.

Q What wells have been drilled and completed since the original hearing in this case?

A The Cooper No. 1 has been completed; the Gulf Cone No. 2 has been completed since the original hearing of the case.

Q Have the completion of those wells furnished any additional information which has any bearing upon the further development of this area?

A Yes, sir. Water was encountered in the L. Cooper No. 1 Well at minus 8530 feet, some 60 feet above where we thought the water level was at the last hearing. That simply shrinks the reservoir and makes recovery from the top of the reservoir consider-

ably below what was calculated originally. It shrinks the reservoir.

Q Was Exhibit No. 1, the plat showing the pattern, prepared by you and under your direction?

A It was.

Q I hand you Hamon and Warren's Exhibit No. 2; state to the Commission what that exhibit shows.

A This map is a plat showing the status of the wells in the field as of May the first of this year. There are three numbers given under each well, the top number is the cumulative oil production to the first of May, by wells. The second number is the subsea section open, simply showing where the wells are completed. The bottom number was the water cut at that time. Beginning with the Cooper No. 1, by the time the well had produced 4,618 barrels completed at depths of 8496 to 531, it was producing at 50 per cent water cut. Gulf Cone 2, completed from 8438 to 549, was producing at 12 per cent water cut with, practically speaking, no past production attributed to it. In each of the successive wells, simply give the cumulative production, the amount of water being produced and the section open.

Q Why are the figures on this plat shown as of May 1st, 1955?

A That is the last time at which complete data from the entire field was available.

Q Do you have any additional information as to the status of the water that is being made at the present time?

A Yes, sir; since the time that this map was made, and as of the first of July, the Cooper No. 1 is no longer making 50 percent water. It is making about 62 and a half percent. The Cone No. 1 is producing approximately 8 percent water at the present time.

The Cox No. 1 has increased to 17 percent. The Holloway and the Wilhoit, by reduction in production, we have been able to reduce the water cut in those wells. This map also shows, among other things, that all wells completed below the minus-8530 or at the minus 8530 contour are producing some water.

Q The production figures which are shown in this plat were obtained from what source?

A The New Mexico Conservation Commission records and the records of the operators themselves, of course.

Q At what rate have these wells been producing or are they being produced at the present time?

A The rate varies from well to well, depending on how much they will produce without increasing rapidly in water cut. On the L Cooper No. 1 well, that one is being produced at capacity and makes 61 barrels per day of oil at 62 percent water cut. The Cone No. 1, that is Hamon and Warren's Cone No. 1, is producing around 130 barrels per day; both of those two wells are pumped. The remaining wells are flowing, with the Cox 1 producing at 113 barrels and we have been able to hold, by maintaining a restricted rate on that, we have been able to keep the water cut from increasing rapidly. The Holloway No. 1, as I mentioned before, has been restricted as of July 1st to 92 barrels per day, at which rate we almost succeeded in drying the well up. The water cut is below 1 percent at present.

Q Your experience has been that few tried to flow these wells successfully at the full allowable?

A If we attempt to pull a full allowable, the water cut increases.

Q You are trying to produce them at the rate to cut down the water production?

A We are trying to produce them at a rate that will not permit coning water.

Q Are any of the wells capable of producing the 40 acre allowable?

A Yes, quite a number of wells are capable of producing the 40-acre allowable for a limited time. Specifically, whether they would produce them flowing or not is something else.

Q What, in your opinion, would be the result of trying to produce these wells at the full 40 acre allowable rate?

A Most of the wells would promptly increase in water cut and a few among the ones flowing, with the increase in water cut, would go to pumping, with a resultant drop in production, so it would be possible to maintain the allowable rate for a limited time on most of the wells.

Q Was this plat No. 2 prepared by you and under your direction?

A It was.

Q I hand you Hamon-Warren's Exhibit 3 and ask you to state to the Commission what that shows?

A It is a revised structure map prepared since the completion of the Cooper No. 1 well, showing the contour on top of the Devonian section.

Q Mr. Branson, in connection with the original hearing, there was an exhibit No. 4, I believe, introduced, which was similar to this structural plat on the Devonian. Can you state to the Commission the changes in this exhibit over that exhibit No. 4 that was originally introduced?

A After encountering water in the Cooper 1 sixty feet above where we expected, we went back and checked our structure map carefully. This particular structure map represents two deviations from the map presented as Exhibit 4. One, the oil-water contact has been moved to 8530 subsea depth, found in Cooper No. 1 well. The second change is a stemming of the gradient on the righthand side of that on the southeast corner of the field from a re-evaluation of shot pictures.

Q The major change then, in the structural map, is the oil-water contact?

A That is the major change in the structure, yes.

Q Have you made any additional bottom hole pressure surveys since the original hearing?

A A pressure survey was conducted on June 30th in which all wells in the field with the exception of the two pumping wells, were shut in 48 hours and bottom hole pressured at minus 8450. Those pressures ranged on this second survey, as of June 30th, from 4760 on the Cox No. 1 to 4900 on the Federal-Davis 2. The total variation represents a range of about 1½ percent of the pressure, of the average pressure there, being about 69 pounds above and 70 pounds below, the mean pressure. The pressure variation actually reflects more the lack of sufficient time for building up than it does the actual ultimate pressure on buildup.

Q Does this survey have any significance as far as the 80 acre spacing is concerned?

A The continuity of the pressure, the close relationship between the pressures on the different wells across the field, and the fact that the highest pressure measured is still approximately

the original reservoir pressure, indicates first that the wells are draining, are capable of draining the wide spacing or relatively wider spacing and, second, of course, that the water drive is fairly effectively maintaining pressure in the reservoir. The increase in buildup time is normal with continued production in a tight reservoir and actually indicates that the well is pulling from further back in the reservoir than during the early stages of development or production.

Q Due to the change in the conditions since the original hearing and the additional information which you obtained from the experience in the field and the drilling of additional wells, do you have any different view than was expressed by you at the original hearing, with respect to the economic aspects of the development of this area?

A The economic aspects of this development are, of course, considerably less favorable to the operators than we believed them to be when we had a deeper water level. That is approximately 60 feet off of the net effective section which amounts to a reduction of approximately 1500 barrels per acre in expected recovery, or, in other words, converts a marginal well from -- to a losing proposition and converts one that was going to make a little money to a marginal proposition.

Q Have you made a study as to the probable production of each of the wells that have been drilled?

A To a limited extent.

Q What would you say would be the result of your opinion after making the study?

A Economically?

Q Yes.

A There are several wells here that undoubtedly will not pay out the drilling cost now. Specifically, the Cooper No. 1, which had a production of about, under 8000 of barrels, is already making some 62 and a half percent water cut, with an increase in water cut of 12 and a half percent, along with a production of only 3500 barrels of oil.

Q Is that one of the wells that is on the pump?

A That is one of the wells that is pumping, yes. The indicated recovery is far below sufficient actually to pay for the pipe in the well. Other wells there that are questionable as far as payout is concerned are the Cox and the Cone and some of the others there will be a pretty close fit to pay for the drill also.

Q What other well is on the pump?

A Cooper No. 1 and Cone No. 1 are pumping at present.

Q From an economic point of view, if the probable productive area is developed on 40 acre spacing pattern, will the pool or field return a profit to the operators, based on the present price of production?

A Developed on 40 acre spacing pattern, it is very unlikely that it would pay for the drilling.

Q How many additional wells would have to be drilled to completely develop the present prospectively productive area on 40 acre?

A Six additional wells.

Q By the drilling of these six additional wells, would any additional oil be recovered?

A No.

Q What would be the additional cost of drilling these six additional wells?

A About $1,800,000. They cost approximately $300,000 apiece.

Q This would mean, would it not, that it would result in an economic loss, additional economic loss of approximately $1,800,000?

A That is correct. The additional expenditure investment of the operators would simply reflect that much loss.

Q In addition to the $1,800,000 cost of drilling those wells, you would also have an economic loss in the cost of operating the wells and in lifting cost, would you not?

A That is correct. Each additional well increases the operating cost in the field. The more wells you have the more it costs you to produce. If you produce the same amount of oil, you simply have spent additional production money in obtaining it.

Q Then your conclusion is that if this area is required to be developed on 40 acre spacing pattern and all the necessary wells drilled that it would probably result in a loss to the operator?

A It would probably result in a financial loss to the operators.

Q As far as protecting correlative rights and the interests of royalty owners, would it serve any purpose in that connection?

A It would not serve to protect correlative rights as well as the 80 acre spacing, if as well.

MR. MACEY: Any questions of the witness?

MR. HINKLE: I would like to offer in evidence Exhibits 1, 2, and 3.

MR. MACEY: Without objection, they will be received.

Mr. Campbell.

CROSS EXAMINATION

By MR. CAMPBELL:

Q I gather from your testimony, Mr. Branson, concerning the

water situation and the fact that you cannot produce the full allowable from these wells, that whether the field is on 40 or 80 acre spacing program, you consider it to be a pretty sorry oil pool, is that correct?

A That is correct.

Q Do you know of anything, Mr. Branson, in the rules or regulations or the Statutes that require you to drill any wells?

A I can't answer that question because I am not an expert on New Mexico law.

Q Do you know of anything in the rules and regulations or the Statutes that require you to produce the full allowable?

A Not that I know of, no.

Q Do you feel that any time you want to stop recommending that they drill any additional wells, they can stop drilling, irrespective of the pattern?

MR. HINKLE: I think that is the question of law. We have an implied obligation to these owners for reasonable development That is a question of law.

MR. CAMPBELL: I will be glad to ask Mr. Hinkle if he wants to answer it.

Q Mr. Branson, since the last hearing, the only well that has been commenced is a well in the southwest quarter of the southeast quarter of Section 13, is that correct?

A Yes.

Q Quite obviously, that well wasn't commenced on your recommendation, if your contour is correct, is that right?

A That is right.

Q But that well is a direct 40-acre offset to the Federal-

Davis No. 2 to the east, is it not?

A 1320 feet west of the No. 2.

Q So that the only additional development that has taken place since the last hearing is another 40 acre location insofar as offset is concerned?

A With reference to Exhibit 1, it is in an 80 acre proration pattern. It is in the south end of the 80 acre proration pattern section on the Holloway lease, just as the No. 2 Federal-Davis is on the south end.

Q But it is 1320 feet from the nearest well?

A That is right.

Q With reference to the spacing pattern as indicated in your Exhibit 1, what is the reason for changing the pattern from north-south unit to east-west unit in Section 24 and 19 in the south part of the area?

A Primarily the east-west 80 of the Ameradas there in the northeast of 24, simply to fit the lease ownership.

Q Do you know, Mr. Branson, whether or not the original leases are two separate leases covering the east-half of 24 and the west half of 19?

A Of my own knowledge, no.

Q Would you, so far as the development of the field is concerned, if the field were to be continued on 80 acre spacing, object to the changing of your pattern here in Sections 19 and 24, to a north-south unit instead of an east-west unit?

A So far as engineering is concerned, there would be no distinction.

MR. CAMPBELL: I believe that is all.

MR. MACEY: Anyone else? Mr. Rieder.

By MR. RIEDER:

Q You mentioned before that there might be six additional wells drilled?

A Yes.

Q Could you give me an idea where?

A The question as asked was to give complete development on 40 acre spacing. For those six there would be, besides the one being drilled on the south end of the Holloway lease at the present time, there would be two additional Holloway, two additional Federal-Davis, and two, either one or both of them might be questionable, one on the Wilhoit and one on Cox.

Q On this 80 acre spacing pattern there would be no further development?

A As to that, I can't say for sure. Within the 8530 contour as we understand it at present, there would be no additional wells.

Q On the Holloway No. 2 from the contour, if the contour is correct, the well hasn't got a chance of being a producer?

A That is correct.

Q It would have had a better chance if it had been the northwest to the southeast?

A That is correct.

Q It would seem that the northwest to southeast would have been a more practical location and still proved the southern end of your contour.

A I expect that location was staked for other than engineering reasons.

MR. HINKLE: May I ask a question to clear that up?

MR. MACEY: Yes.

MR. HINKLE: Do you know whether or not any demand was made by royalty owners?

A I do understand it was an offset to Federal-Davis No. 2 that was responsible for the staking of that location.

MR. RIEDER: No further questions.

MR. MACEY: Anyone else?

MR. CAMPBELL: Does your company just automatically meet those demands?

A In a good share of cases -- I don't believe I could state the company policy.

MR. MACEY: Anyone else have a question of the witness?

By MR. MACEY:

Q I would like to know, Mr. Branson, whether you consider the present top allowable for this pool, and taking the pool in its entirety, you consider that that figure, which is 264 barrels a day, do you consider it excessive from the standpoint of economic, efficient recovery?

A I think it is excessive.

Q There may be circumstances where you could produce it without?

A There is, isolated on the structure, where the wells are capable of producing that without coning the water into them, there are isolated cases; in most of the field that is not true.

Q Can you explain why the Federal-Davis No. 2 which is completed only 12 feet from the oil-water contact, isn't producing any water, yet it is producing at high rate?

A It has been restricted to 125 barrels since its completion. We had water in some wells completed higher than that before we

completed the Federal-Davis No. 2, and as of the first of July, it is producing 125 barrels per day.

Q How much is the Federal Davis No. 1 producing?

A 230 .

Q What about the Wilhoit 1?

A 206. These tests are as of July 1st.

Q Do you have any information on the Cone wells of Gulf?

A I do not know of my own knowledge what they are producing now. It is my understanding, however, that with the appearance of water in Gulf Cone No. 2 its production has been restricted to someplace in the range of 125 to 150 barrels per day, and No. 1 is producing approximately the allowable rate, just as the Federal No. 1 Davis is. That is purely hearsay.

Q Did you use any geophysical data in order to make the interpretation of your possible oil-water contact on your Exhibit No. 3, I believe.

A The structure map itself is based, with the exception of where we have sub-surface control, it is based on geophysical data, yes. As far as the water level itself, that is based on where we found the water in the Cooper No. 1.

Q Is there a possibility of a tilted water table?

A Yes, I would say there is a possibility.

Q Do you have the top of the Devonian on the No. 1 Cone? It is not very important if you don't have it on your exhibit.

A 8463, it is on this exhibit. I thought it was on all of them. Minus 8463.

MR. MACEY: Does anyone else have a question of the witness? If no further questions the witness may be excused.

(Witness excused.)

J. S. EWING,

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

DIRECT EXAMINATION

By MR. HINKLE:

Q State your name, please.

A J. S. Ewing.

Q You have testified at the previous or the original hearing in this case, did you not?

A Yes, sir.

Q I believe your testimony shows that you were general superintendent for Jack Hamon?

A That is correct.

Q Do you know whether or not any agreement has been reached between Mr. Hamon, Warren Petroleum Corporation, Gulf Oil Corporation and the Amerada Petroleum Corporation, with respect to spacing units or proration units in this South Knowles area?

A Yes, sir, that was agreed upon at a meeting on June 7th, with the representatives of engineers and counsel of Gulf, Amerada, and Warren and Hamon.

Q What does this agreement consist of, essentially?

A Well, the proration pattern as shown on Figure 3 --

Q That is the Exhibit No. 1, I believe? A Yes.

Q That is the pattern referred to and the same plat which is attached to the application for rehearing in this case?

A That is correct.

Q Does your agreement require the drilling of wells in either component part of 80?

A No, sir, either 40 acres.

Q Are you familiar with the well which is being drilled at the present time in the southwest quarter of the southeast quarter of Section 13?

A Yes, sir.

Q Do you know when you expect to complete that well, or about when?

A About the first of September.

Q If you don't have any trouble?

A If we don't have any trouble.

Q Do you have any short-term leases that might be affected by that particular well, the completion of it?

A Yes, sir.

Q What --

A (Interrupting) The west half, I believe, of 19, and the east half of 24. I understand the Amerada lease, also.

Q That also includes the Amerada 80?

A Yes, sir.

Q Do you know when those leases expire?

A November 7, 1955.

Q In other words, if the Holloway No. 2 should prove to be a dry hole or a well that is so low that it wouldn't pay out, what would be the natural result, with respect to these leases to the south?

A I would imagine they would release them.

Q Or they would expire?

A They would expire, yes.

MR. HINKLE: I believe that is all.

MR. MACEY: Any questions of the witness?

CROSS EXAMINATION

By MR. CAMPBELL:

Q Supposing the Federal Holloway well is a good well, what would be the result?

A I hope it is.

Q What would be the result?

A I imagine they would start a couple right quick.

Q On the basis of the spacing pattern that you suggest here, by the changing of your pattern to east-west in Sections 19 and 24, it would appear that instead of drilling two offsets to meet your unit requirements there, you would drill one.

A Well, the Amerada have that 80, it wouldn't be our well. We probably would have to go over here, I would say, in the west half of 24, wouldn't we -- 19, I mean.

Q If you drill one in the west half of 24 and drilled it, which you undoubtedly would, in the north tract there, --

A (Interrupting) I mean the west half of 19. I beg your pardon. I meant we would have to go into 19 would be my guess.

Q I am not asking you to commit yourself on what you would do. I am trying to get the result of changing the direction of your units when you reach this point. I believe the fact is that there is one lease covering all the east half of 24 and one lease covering all the west half of 19?

A That is right.

Q If you followed the same arrangement you did up in the north part of this pool, by making your offsets direct offsets to meet lease obligations in that fashion, it seems to me that by re-

arranging the pattern here, even though it was not the purpose for which you did it, that the result would be that you could hold the east half of 24 and all of the west half of 19 with one well each.

A Well, I wouldn't know about that.

Q Would you have any objection if the 80 acre spacing is granted, to changing the direction of the proration units in Sections 24 and 19?

A Well, personally, I wouldn't, but I wouldn't know what the management would do about it, but my guess would be they would be glad to do it.

Q So far as your management is concerned, it would be a benefit to them?

A It looks like it would.

Q Do you know of anything, Mr. Ewing, in the rules or the Statutes of New Mexico that prevent you from stopping your drilling program whenever you see fit?

A I am not an authority on New Mexico regulations. I wouldn't know.

MR. CAMPBELL: That is all.

MR. MACEY: Anyone else have a question of the witness? If nothing further, the witness may be excused.

(Witness excused.)

MR. HINKLE: If the Commission please, that is all we have. I would like to make a short statement in connection with this matter.

As I have already pointed out, we have come in here now with an agreed plan of all of the operators who are involved in the area, agreeing on the spacing and proration pattern. We have come under

that Section of the Statute that provides in that case where the operators so agree that the pattern,and agreement must be respected by the Commission unless the Commission finds that it would not be fair to royalty owners. There has been no evidence introduced here by Mr. Campbell or anybody else which would show that this plan is not fair to the royalty owners or that it would not adequately and fairly protect correlative rights. In fact, the only evidence that has been introduced in this case by Hamon and Warren shows clearly that all rights will be protected.

There is another aspect to this thing which I think ought to be brought to the attention of the Commission, and that is the economic aspect. It has been clearly shown here that this is a case where, if the Commission requires that this field be developed and the royalty owners insist upon it on 40 acre spacing, that there would be an economic loss to the operators. There would not be any additional oil actually recovered in the operation. If the Commission is going to take that position in connection particularly with these deep pools, it is certainly going to discourage development in New Mexico. I think it has always been the policy of the State by the laws which have been enacted by the Commission and encouraging development in the State, particularly with respect to State lands and Federal lands, and the State ultimately gets the benefit of that by reason of the operation, the money that is expended in them, and in connection with the Federal and State lands, by the royalties which accrue and also the citizens of the State by the royalties that accrue to them in connection with fee land.

I don't think the Commission should adopt any arbitrary rule that there should be no fields developed on 80 acre spacing pattern,

I think when we come in with a case of this kind, when we clearly show it is economically not sound to develop it on 40 acres, that the Commission should have that in mind, that an overall general policy should be adopted that would encourage development in New Mexico and encourage the drilling of these deep wells which cost some 300,000 to 350,000 to drill, being 13,000 feet deep. If the operators get the idea that the Commission is arbitrarily going to shut them off from 40 acre development, they are going to be reluctant to come into New Mexico and develop the areas, particularly when we know from the experience of Lea County that the deep Devonian areas are small in size. They are pinpoints that do not cover large areas. That has been the experience generally in New Mexico.

I think that the evidence clearly shows that this is a case where we are entitled to have 80 acre spacing. It shows that the operators of the field are in agreement on the spacing and the proration units. It clearly shows that the royalty owners are not going to be hurt.

Another thing I want to point out is that up to date I don't think there is any evidence or statement on the part of counsel for the royalty owners showing that they actually have any royalty interest that would be affected in the probable producing area of the field.

MR. CAMPBELL: I would like to make a brief statement on behalf of the protestants. The Commission has on file a list of the royalty owners who have entered an appearance in this case, and a tabulation of the mineral interests insofar as we were able to obtain them at the time of the original hearing. I think that the only question involved here really is whether or not it is

necessary for the Commission in a situation where you have a field as poor as this one apparently is to enter an order establishing a wide spacing pattern. The wide spacing patterns that we have come upon in New Mexico have always been in either real good fields or real bad fields. When you get to a situation where you have a bad field, it is hard for me to understand,other than the proposition that it might avoid somebody suing them, which is a chance that I think they take when they get a lease contract, why the Commission needs to intercede. If he feels that a prudent operator would not drill any more wells or would drill his wells on 80 acre spacing or 160 acre spacing, then there is nothing to compel him to drill on any other pattern. What it amounts to is that the Commission, by entering an order for 80 acre spacing, is simply, in my judgment as I view it, coming between the lessor and the lessee in this contract.

Mr. Hinkle has said that they have an implied obligation to drill wells. That is quite true, as long as you are on 40-acre spacing; I think that implied obligation probably means each 40 acres, but if conditions are such that a reasonably prudent operator would not drill those wells, then that obligation doesn't exist and couldn't be enforced if the conditions in this field are what these people say they are. I am sure they are. I for one wouldn't try to get them to drill 40-acre locations. I don't think it is a matter to be decided in this form. I don't think it is a matter that the Oil Conservation Commission from the point of conservation and protection of correlative rights should decide in a situation of this kind. If the Commission should see fit to approve 80-acre spacing in this area because of the fact that the operators can't pay their wells out on 40-acre spacing, then there are two things

that we would like to request that the Commission consider.

In the first place, to my knowledge there has never been in New Mexico at the outset a permanent 80-acre spacing order. They have been on a temporary basis and the operators have been required to come in at some stated time, usually one year, and tell the Commission what conditions have developed since the field went on this spacing. I suppose it is conceivable, though improbable, that Mr. Branson could be wrong and that this well they are drilling there against his better judgment, apparently, might turn out to be an oil well. I suppose that is possible. If it did, and if the field started to develop back to the south, I think that it is incumbent on the Commission to protect the correlative rights of the royalty owners, that at least they had the opportunity by future information to request a change in the pattern. It keeps the operators and the Commission and royalty owners advised of the development.

We suggest first that it be a temporary period of one year if on 80-acre spacing.

Second, we would like to request that the Commission, if it sees fit to put it on temporary 80-acre spacing, to change the pattern insofar as 19 and 24 are concerned so that the proration units will run north and south, just as they do in the rest of the field. I can understand why, with this Amerada situation here, Amerada having received in some manner either the original lease and farmed the rest out, or having a farmout, I don't know how it worked out, but it is all under the basic lease where they have an east-west 80 there that the simplest way, from the operator's point of view, to avoid pooling of interest, was to make the units east and west, but the way we view it, the result could be unfair to the

royalty owners, because if the well now drilling proved to be a well,instead of having to drill an offset to the Federal Holloway or the Holloway No. 2 and to the Federal Davis, or two wells to hold the entire west half or east half of Section 24, they would only have to drill one well in the unit lying to the north. We feel that if it is fair to divide these units north-south elsewhere, they should be divided the same way by the Commission in any order they may see fit to enter for temporary 80-acre spacing in this particular field.

MR. MACEY: Anyone else have anything else? Mr. Hinkle.

MR. HINKLE: Mr. Campbell has mentioned about the implied obligations of the lease owners for full development, which I had mentioned a while ago, which might require us to develop or drill these additional wells, which would result in an economic loss. One of the reasons the Oil Conservation Commission was established was to determine in matters of this kind what proper spacing units and proration units should be in connection with proration. That is set out specifically in the Statute and I think we have a perfect right to come in here and ask the Commission to determine a spacing and a location pattern for this area, and that we not be left to the Courts as far as our lease obligations are concerned in that respect. As far as the temporary order of one year is concerned, we have no objection to that. If the Commission should see fit in entering an order in this case to make it a temporary order for one year, I think that would be all right. I think certainly at the end of the year by the drilling of this additional well which would be completed before that time, that it will determine whether there is any additional area there that needs to be developed and if

conditions warrant at that time that further development of it, I am sure that Hamon and Warren would be willing to go ahead and develop it. They are as anxious as anybody else to develop anything that will show a profit. They are certainly not anxious to be forced to drill six or seven additional wells here which would be a total loss to them. I believe the record in this case will show that both the Gulf and the Amerada agreed to this form of spacing. I was informed that the Amerada had sent the Commission a telegram --

MR. MACEY: That is right.

MR. HINKLE: -- which shows they were in agreement. Mr. John Woodward, attorney for the Amerada, was present at the meeting where this spacing was agreed upon. He couldn't be here and I understand he sent a telegram. I understand that the Gulf has written the Commission a letter also, stating that they concur in the application and want the 80-acre spacing as it has been agreed upon. I would like for those, the telegram and the letter, to be made a part of the record in this case.

MR. MACEY: Very well. Mr. Malone, did you have a statement?

MR. MALONE: May it please the Commission, Ross Malone for Gulf Oil Corporation. Gulf, as has been pointed out, is an operator in the South-Knowles-Devonian Pool and is in accord with the application which has been made by Hamon and Warren for an 80-acre spacing order, with 40-acre allowables to be assigned, with the customary depth factor. In supporting that, I would like to point out, as I have mentioned on previous occasions, to the Commission that we view with a number of reservations any argument that this Commission should act or should not act because of obligations that exist between an operator and the royalty owner. Those are contractual

rights and not correlative rights. In this case, as we view the testimony which has been presented, the most important single part of the testimony is the testimony that if a 40-acre pattern is adopted, the number of wells that can be drilled will be doubled, and the rate of withdrawal from this reservoir likewise would be doubled. The testimony shows that in that situation both coning and boundary water encroachment are going to result with the result that there will be a waste and a reduction in the amount of oil that can be ultimately recovered from this reservoir. Under the Statute which created the Commission, that waste which would result from a spacing pattern of that kind is certainly the primary consideration which must be kept in mind, rather than the question as suggested in the argument as to the Commission acting because a well would or would not pay out for a particular operator. As we view it, the question of waste is the predominant question and the evidence shows that waste will result from a 40-acre spacing pattern, by reason of an increase in the rate of withdrawal from the reservoir, which will result in coning.

MR. MACEY: Anyone else have a statement or anything further in this case? Nothing further? We will take the case under advisement.

* * * * * * * * *

STATE OF NEW MEXICO)
: ss.
COUNTY OF BERNALILLO)

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 21st day of July, 1955.

Ada Dearnley
Notary Public, Court Reporter

My Commission expires:

June 19, 1959.

BEFORE THE

Oil Conservation Commission

SANTA FE, NEW MEXICO

July 18, 1956

IN THE MATTER OF:

CASE NO. 819

TRANSCRIPT OF PROCEEDINGS

DEARNLEY-MEIER AND ASSOCIATES
COURT REPORTERS
605 SIMMS BUILDING
TELEPHONE 3-6691
ALBUQUERQUE, NEW MEXICO

BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO
July 18, 1956

IN THE MATTER OF: Application of the Oil Conservation Commission upon its own motion for all operators in the South Knowles-Devonian Pool, Lea County, New Mexico, to appear before the Commission in compliance with paragraph 6 of Order R-638-B to show cause why 80 acre drilling and proration units in the South Knowles-Devonian Pool provided for in Order R-638-B should be continued; operators shall present evidence to support the continuation of 80 acre drilling and proration units and show necessity for continuing Order R-638-B beyond September 30, 1956, in said pool.	Case No. 819

BEFORE:

Honorable John F. Simms, Jr.
Mr. E. S. (Johnny) Walker
Mr. A. L. Porter

TRANSCRIPT OF HEARING

MR. PORTER: The next case on the docket is Case No. 819.

MR. GURLEY: Case No. 819, the application of the Oil Conservation Commission upon its own motion for all operators in the South Knowles-Devonian Pool, Lea County, New Mexico, to appear before the Commission in compliance with Paragraph 6 of Order R-638-B to show cause why 80 acre drilling and proration units in the South Knowles-Devonian Pool provided for in Order R-638-B should be continued; operators shall present evidence to support the continuation of 80 acre drilling and proration units and show necessity for continuing Order R-638-B beyond September 30, 1956, in said pool.

MR. HINKLE: Clarence Hinkle, Roswell. Appearing on behalf of

Jake Hamon and the Warren Petroleum Corporation. I would like to make a brief statement in connection with this matter before we proceed with the evidence.

As the Commission knows the original hearing in this Case 819 was held on July the 14th, 1955; the petition for rehearing was filed and the subsequent hearing was held on October the 20th, 1955. There was also some evidence having a bearing on this case which was introduced in connection with Case No. 965, which was the application of Mr. Williamson for an unorthodox location. I simply mention this because it is my understanding that the evidence introduced in connection with this Case 819 and in connection with the two previous hearings will constitute a part of the record in connection with this hearing, being simply a continuation of the case, and we will also probably refer to one or two of the exhibits that were introduced in connection with the Williamson hearing which was No. 965.

The evidence which we propose to introduce here this morning will be simply supplemental of that which has heretofore been introduced in connection with this case, and the Williamson case. In order to bring the Commission up to date on the statute of the development of the field and to show that there is no reason for the change in the spacing pattern, we have eight exhibits which we have marked from "A" to "H" inclusive. The previous exhibits in this case were numbered, so this will distinguish them from the previous exhibits. We also have two witnesses, Mr. Elliott and Mr. Branson,which we would like to have sworn.

(The witnesses were sworn.)

A. C. ELLIOTT

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

DIRECT EXAMINATION

BY MR. HINKLE:

Q State your name, please.

A A. C. Elliott, District Geologist, Hamon & Warren Petroleum Corporation for West Texas and Southeast New Mexico.

Q Where do you live?

A Midland, Texas.

Q Have you previously testified before the Commission?

A Yes, sir.

Q In connection with what matter?

A The hearing in behalf of J. C. Williamson.

Q In October?

A October, yes, sir.

Q At that time you qualified as an expert geologist?

A Yes, sir.

MR. HINKLE: Are the qualifications of the witness acceptable here?

MR. PORTER: They are.

Q Mr. Elliott, you are familiar with what has transpired in connection with this case at the original hearing and the subsequent hearing, and also in the Williamson case which you have referred to?

A Yes, sir.

Q During the original hearing of July the 14th in 1955 and October the 20th of '55, there was introduced in evidence a contour map showing the structure as portrayed at that time from the

information of the wells that had been drilled on top of the Devonian Formation, is that not right?

A Yes, sir.

Q And there was also an additional exhibit introduced in connection with the Williamson case which showed the contour on top of the Devonian Formation, due to the change and condition -- because of the well which had been drilled subsequent to the original hearing?

A Yes, sir.

Q How many wells have been drilled since these original exhibits were introduced, which were exhibits having borne exhibit numbers one and three, I believe?

A Since Mr. Williamson's hearing there has been one, two, three, four, five, five additional wells.

Q There was one well drilled subsequent to the original hearing in Case 819, is that not right?

A That's right.

Q What well was that?

A Holloway No. 2.

Q And where is that located?

A This well right here.

Q Would you give the location to the Commission, rather than referring to the exhibit at the present time?

A The Holloway No. 2 was drilled 1980 from the east line and 660 from the south line of Section 13. Seventeen South, Twenty-nine East.

Q And when was that well completed?

A That well was completed, let's see, the Holloway No. 2 in September of '55.

Q All right, now what is the next well that has been drilled since that time? Give the location and the name of the well.

A Subsequent to the drilling of this well, Mr. Williamson's well which was drilled 1980 from the east line and 660 from the north line of Section 24, and the next well was the Warren-Hamon C-1.

Q When was the second well completed?

A The second well --

Q Was that referred to as the Gulf Black No. 1?

A The Gulf Black No. 1 was February 19, 1956, which was drilled 1980 from the west, 1980 from the south of Section 17, 17 South, 38 East.

Q What is the next well chronologically?

A The Hamon and C-1.

MR. PORTER: Is that Lawrence C-1?

A Lawrence C-1, yes, sir. Subsequent to the drilling of this well --

Q In what location is that? Give the location.

A The location of the Lawrence C-1 is 1980 from the west and 660 from the south of Section 24, 17 South, 38 East.

Q All right, what was the next one?

A The Lawrence A-1, located 660 south of the northwest corner of Section 19, 17 South, 39 East.

Q And when was it completed?

A Lawrence A-1 in February, 1956.

Q What was the next well drilled?

A The Wilhoit No. 2 located 660 from the west, 660 from the south of Section 18, 17 South, 39 East.

Q When was it completed?

A May, 1956.

Q Is that all of the wells which have been drilled?

A Yes, sir.

Q Subsequent to the original hearing?

A Yes, sir.

Q Now, since the completion of these wells have you made an additional study of the South Knowles reservoir, Devonian reservoir?

A Yes, sir.

Q And have you prepared a contour map showing the top of the Devonian Formation as from the information obtained from these additional wells?

A This is an up to date interpretation --

Q Well, now just a minute, answer the question, answer the question have you prepared --

A (Interrupting) Yes, sir. Yes, sir.

Q Refer to Exhibit A, and tell the Commission what that is and what it shows.

A Exhibit A is a structural map contoured on Top Devonian Formation, based on Schlumberger core analysis.

Q What else does it show?

A It shows the position, the structural elevation of the top of the Devonian fifty foot contours that we have established in the original presentation, access running a little bit west of

south, our subsequent drilling has only shown that there is a slight access from the information from the Lawrence A-1 and the Wilhoit No. 2, a slight lobe existing on the southeast flat of the structure.

Q Were any of these additional six wells which you have testified as having been drilled, completed as dry holes?

A The Wilhoit No. 2 was completed as a dry hole.

Q Is it a high or low well?

A It is structurally a high well on top of the Devonian.

Q In your opinion is there any reason why it didn't produce although high?

A The development of the limestone and porosity in this well is, -- was cored and there was no porosity, and has no showing of any commercial value to the extent that would justify completing it as an oil well.

Q Now, Mr. Elliott, refer to Hamon-Warren Exhibit "B" and tell the Commission what it is and what it shows.

A Exhibit "B" is a Schlumberger cross section showing the structure on the South Knowles of the Devonian Pool and is shown on our plat as a section extending along the red line, which is shown on the structural interpretation plat.

Q That's Exhibit "A"?

A Exhibit "A".

GOVERNOR SIMMS: Do you want us to make one of these or are you going to introduce those?

MR. HINKLE: Those are going to be introduced.

Q Mr. Elliott, what does the blue line on Exhibit "B" represent?

A We have drawn the blue line, -- the black line is marked on the top of the Schlumberger, top of the Devonian Formation and the A-1, the Williamson-Hardin No. 1, the Holloway No. 2, the Hamon and Warren Davis No. 2, and the Lawrence A-1. The blue line represents the structural top of the Devonian based on Schlumberger correlations.

Q Do you know whether or not, in connection with previous testimony in this case, a similar cross section was introduced that covers the north portion of the field?

A We introduced a similar cross section extending across the north end of the field, across this line of wells, at the J. C. Williamson hearing in October.

Q And there would be no change in that condition because of the drilling of these wells to the south, is that right?

A We see no evidence for any change.

Q So there is no reason for offering another cross section, as far as the north portion of the field is concerned?

A Right.

Q Now, I believe you stated that you were familiar with the previous contour maps which had been introduced in connection with this case and the Williamson case. Explain to the Commission the difference between those and the one which you have referred to as Exhibit "A".

A On the access of these wells on the southeast flange, we had this Davis No. 2 well and the Holloway No. 2, which is absent in this data. We connected the high Devonian points here and showed the access in this direction.

Q Does Exhibit "A" still show that all of the wells which have been drilled are producing from the same reservoir?

A Yes, sir.

Q Your revision of the contour on top of the Devonian, has that changed in any way, the spacing or the reason for the spacing of the wells in the area?

A From the geological standpoint and additional information, we have no evidence that would require any change in the present spacing pattern.

MR. HINKLE: That is all.

MR. PORTER: Does anyone else have a question of Mr. Elliott? Mr. Mankin.

QUESTIONS BY MR. MANKIN:

Q Warren Mankin of the Oil Commission. Mr. Elliott, I notice you have drawn a cross section on your Exhibit "B" and then on your Exhibit "A" have you attempted to draw any connecting section on the Wilhoit No. 2, through the Wilhoit No. 2 as to try to interpret what happened there? The Wilhoit No. 2 has recently been completed as a dry hole?

A This cross section here was prepared at the time we completed this well here. This well was just recently completed and we have not prepared any section, the only reasons that we have, from a geological standpoint, was the fact that we have the development of porosity which was sufficiently high in A-1 to make a marginal well, whereas in the Wilhoit No. 2 we had a development of lime for a hundred and thirty feet, and at the time we reached the porosity, we had three drill stem tests and the third test showed water.

Q You indicated that the Lawrence A-1 was a marginal well, it is not a top allowable well?

A That, I think, would be covered in the testimony of the reservoir engineer, by Mr. Branson.

Q Will this Wilhoit No. 2, not having any porosity development, which was anticipated, will be used for a salt water well in the upper horizon. Was this structure map which you have drawn here, drawn after the Wilhoit No. 2 was completed?

A Yes, sir.

Q And it is still the same interpretation?

A We have taken the top of the Devonian into consideration.

Q There was no development of porosity in there?

A No, it was cored and examined very thoroughly.

Q The field has not yet been completely defined? The South Devonian Pool has not yet been completely defined, has it?

A Well, we feel that with the edge wells, the A-1 as showing water, the C-1 showing water, we feel that it is defined as far as economics is concerned.

Q You say it is showing water. During the test in March neither one, the Lawrence A or Lawrence C, produced any water but it did in May, is that correct?

A That will be covered by the reservoir engineer.

Q I don't believe I understood you, you feel that it is practicably developed, the field is practicably developed from the outer boundaries?

A Yes, sir.

MR. MANKIN: That is all.

MR. PORTER: Mr. Campbell.

MR. CAMPBELL: Jack Campbell, Roswell, New Mexico. I would like to show an appearance in this case for Ted Carter and other royalty owners for whom an original appearance was made at the time the original hearing was held in this case.

QUESTIONS BY MR. CAMPBELL:

Q At the time the hearing was held on Williamson on an unorthodox location, you also thought that this field was fully developed at that time, didn't you?

A Not to my knowledge.

Q Didn't you testify at that time that as far as economics were concerned you were satisfied that the field had been developed to the fullest extent?

A Not at that time.

Q Well, another question, is it possible that your findings with regard to your Wilhoit No. 2 being a dry hole, could tend to confirm the interpretation of the structure as made by Mr. Williamson at the time of the hearing on his application?

A Not at all.

Q You are unwilling to say that it is a possibility that you may have a dry hole there by reason other than the lack of permeability in the Devonian?

A Lack of permeability and porosity.

Q No other possibilities as far as you are concerned?

A Not to my knowledge.

MR. CAMPBELL: That's all.

MR. PORTER: Does anyone have a question of Mr. Elliott?

Witness may be excused.

MR. HINKLE: I would like to ask him one other question. Were both of these exhibits "A" and "B" prepared by you and under your direction?

A Yes, sir.

MR. HINKLE: I would like to offer Exhibits "A" and "B".

MR. PORTER: Without objection, they will be accepted.

(Witness excused.)

MR. PORTER: Next witness, please.

U. S. BRANSON, JR.

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

DIRECT EXAMINATION

BY MR. HINKLE:

Q State your name, please.

A U. S. Branson, Jr.

Q Where do you live, Mr. Branson?

A Dallas, Texas.

Q And what is your profession?

A Consulting engineer, petroleum engineer.

Q Have you previously testified in connection with this Case 819?

A Yes, sir.

Q At both hearings?

A Yes, sir. At three past hearings.

Q And also in connection with the Williamson case?

A Yes.

Q No. 965.

GOVERNOR SIMMS: His qualifications are accepted.

Q For the benefit of the Commission we have six different exhibits which I would like to have Mr. Branson refer to, and we have marked them from Exhibit "C" to "H" inclusive.

Now, Mr. Branson, please refer to Exhibit "C", Hamon and Warren Exhibit "C" and state to the Commission what that is and what it shows.

A Exhibit "C" is simply a summary of the production data from the entire field, giving both the number of wells producing during the particular month, the average daily oil production from all wells for each month, and cumulative production from the beginning of the field, from the completion of the first well. This production information was obtained from the individual operator and simply added up and presented for convenience in seeing what the field has produced and what time.

Q And what is, this is through May, 1956, is it not?

A Yes, sir.

Q What is the accumulative production?

A As of June the 1st, '56 the accumulative production was 801,526. There were fourteen wells in the field, the average daily production during the month of May was one thousand five hundred eighty-three barrels per day.

Q Now, refer to Hamon-Warren Exhibit "D" and state to the Commission what it is and what it shows.

A Exhibit "D" is a summary of the data on each of the wells that has been completed in the South Knowles Devonian Pool to the present

time. At an earlier hearing, I think, all but six of these wells were presented, those wells have been then included here simply to keep from having to refer to two different exhibits. It gives all fifteen wells that have been drilled in the field, the data at which they were completed, that is, the month they were completed, the total depth to which they were drilled by Schlumberger measure, and the section that is open to production at the present time.

Q All right. Now, refer to exhibit, Hamon-Warren Exhibit "E" and state to the Commission what that is and what it shows.

A Hamon and Warren Exhibit "E" is a summary of test data on all wells in the field except the Williamson well. Some of the tests were made in May and in particular the test on the group of wells were made between, in the period May 19th through May 28th, except the No. 1 Cone which was retested following acidation. The tests on the Hamon & Warren wells were run in the first ten days of July, the last one being completed on the 10th of July. Opposite each well is given the twenty-four hour oil production, or the oil producing rate,and the water cut at which these wells are produced.

At the completion of the well test program carried on in May, we closed the wells in forty-eight hours,in forty-eight hour shut-in pressure on each of the wells as shown here on each of the flowing wells. We did not pull the tubing and run the pressure on the Cooper or Cone Wells. This exhibit in connection with past exhibits, and with one of the subsequent ones, simply serves to illustrate the progressive increase in water cuts in most of the wells around the field. It also indicates or shows in particular that in the Lawrence C-1 there was some question about before, in

July it was producing, was capable of producing one hundred sixty-five barrels of oil with twenty-three per cent water cut. The Lawrence A-1 in July was producing one hundred twenty-three barrels of oil with only eight per cent water cut. The only other new well in that group is the Gulf's Black No. 1, which was flowing at a rate of one hundred seventy-six barrels of oil with four per cent water cut.

Q This shows, does it not, that there are only three wells in the entire pool, field that are not making water, is that right?

A No, sir, Mr. Williamson's well was not, again I state on that, and in the Gulf Cone No. 1 the water is a bare trace, it was not sufficient to record any percentage. There are three wells of the thirteen that we tested that were dry, making less than two tenths per cent of water, and one that was making a bare trace. The remaining wells in the field are producing water in percentages varying from 4.93.

Q What is the average pressure for the field?

A The average pressure, neglecting one well in taking these average pressures, the Cox No. 1 Well has, for the past year ran something over around one hundred pounds below the average pressure in the rest of the wells in the field, it is also a low capacity well and we consider that evident that the buildup of the well was very slow and will drop it from the average of the wells. Excluding that well, the average pressure is four thousand seven hundred ninety-two pounds as of June the 1st, '56.

Q Is there any great differential between any of the wells, what is the average percentage of variation?

A Approximately one per cent of deviation of the average is the maximum, both below and above the average pressure.

Q Were these pressure tests made under the same conditions, as to all wells which were tested?

A Yes, sir, the wells were shut in simultaneously and two days later a bomb was run in. The entire field was, with the exception of, or all of the Gulf and Hamon and Warren were shut in and --

Q What was the shut in?

A Forty-eight hours. The pressure reference was eight thousand fifty feet, at approximately the middle of the producing zone.

Q Now, refer to Hamon and Warren Exhibit "F" and explain to the Commission what that shows.

A Exhibit "F" is a plot of the pressure history of the field. On discovery or on completion of the Federal Davis No. 1 in July, '54 the well was shut in twenty-four hours, it built up considerable water in it, and the bomb shell and the pressure ceased rising before the end of twenty-four hours, pressure four thousand nine hundred two pounds. At intervals since then, to begin with, of approximately every month, over the past year at six months intervals, the field has been shut in and pressure measured. The solid black line on Exhibit "F" is simply a plot of the average pressures as measured in the Field, with the exception that since July of '55 the Cox No. 1 has been dropped from the average. Circles on the map are the pressures measured in what we refer as new wells. That is, they are the pressures measured after forty-eight hours

shut in period on a well that has been under production for a period less than a month. Some of the new wells, in particular this one measured in October of '54 did not build up appreciably above the field average. Other wells drilled since then, as shown by the points across the top, were fairly high in pressure, even on the forty-eight hour shut in period until the ones completed in February and measured in March of this year, and now that reservoir pressure measured in the new wells has declined below that measured in the new wells initially, indicating that the production from the field is having an affect even in the areas where there is no production. The principal purpose of that exhibit is simply to indicate that there is pressure continuity across the field.

Q All right. Now, refer to Hamon and Warren Exhibit "G" and explain to the Commission what that shows.

A Exhibit "G" is the pressure, present pressure that is shown on, is the same pressure as the ones included in the last column of Exhibit "E". Simply shown in the map for areal reasons.

Q To the different wells?

A Yes, sir, comparing them with the exhibit that was introduced last July, as figure 4, you find that all of the wells in the field have fallen somewhat, varying from approximately thirty pounds to as much as seventy pounds. This simply serves further to illustrate the same thing as the tabulated pressures that the present continuity across the field is quite low, within approximately one per cent deviation from the average.

Q Now, refer to Hamon and Warren Exhibit "H" and explain to

the Commission what that shows.

A Exhibit "H" is an areal plot of the same thing as the test data shown in Exhibit "E", also, for reference or for comparison with the same chart which was presented in May of 1955. At that time we placed under each well on the map accumulative production to that time and the present per cent water cut. To bring that status up to date we have here the status of May and July actually, 1956, showing the accumulated production from each well as afforded incidently from the test data, and the water cut at which each well is producing. Now it serves to show, perhaps, better than the tabulations of test data, that around the flanks of the field all of the wells are producing water. In particular, when compared with Exhibit "D" which gives the completion depths,it indicates that the new wells as a result, Hamon and Warren Lawrence 1 and Lawrence Black 1, both show water almost immediately after completion, after production of very small amounts of oil indicating that the water is actually moving into an area which had no production within nineteen hundred feet from it, as a result of the production from the remainder of the field. This simply confirms our original belief that the field would reduce under a water drive and that the field would be capable of drilling wells in excess of thirteen hundred foot rates.

Q Were all of these exhibits "C" to "H" inclusive prepared by you and under your direction?

A They were.

MR. HINKLE: We would like to offer in evidence, Exhibits "C" through "H".

MR. PORTER: Any objections to the admission of these exhibits? They will be admitted.

Q Mr. Branson, in that previous hearing I believe you testified as to the probable ultimate recovery of the field if developed on a forty acre spacing pattern as against an eighty acre spacing pattern. Have you any reason to change your opinion, of your previous testimony in connection with this?

A No, sir, I have no reason to believe that production on a forty acre spacing pattern, ultimate production, will exceed that on eighty. Actually, the apparent move, possible edge water movement along the sides indicates that closer spacing would, if anything, reduce the ultimate recovery from the reservoir.

Q The exhibits which you have referred to and testified to in regard to the wells, do they show that all of the wells which have been drilled are producing from the same reservoir?

A Yes, sir.

Q They tend to show that?

A They show that there is considerable pressure continuity, within actually practicably speaking the limits of the access of the bomb, the pressure measurements there are approximately the same pressure. It also shows, or the appearance of water early in relative high wells drilled after considerable production, indicates that the reservoir is being drained by existing wells.

Q Now, Mr. Branson, I believe also in your previous testimony in this case, you testified that a high producing rate, because of reservoir character in particular, might be injurious to the entire field?

A High producing rate in this particular reservoir would have two harmful effects. First, it will result in coning as proven early in the life of the field by the appearance of water in the Hamon and Warren Holleway No. 1 well which yield climbed to approximately twenty per cent water cut in a period of four months after completion. The well producing rate was cut back, the water cut drop last July was about one and a half per cent after three months of reduced production. Continuing that reduced production, the water has in the past six months began to rise slowly, being now approximately nine per cent, as compared to a higher earlier value. We feel that excessive production, or that any increase in the production rate will increase the tendency to cone water into the bottom of the wells, resulting in the operator having produced abnormally large volumes of the water too early in the life of the field, and the result an earlier abandonment than will be if they produce at a reasonable rate. In addition to that the high rate of the withdrawal from the field as a whole will promote the encouraging of the edge water, in general the horizontal permeability runs a little higher than vertical, and the water will run a little better, side water, horizontal and vertically. What we are attempting to do here is bring the water up, slowly up from the bottom, keeping the water level as level as possible so that all of the reservoir will be swept out rather than bring water in from the side to meet with the coning under a rapidly producing well, possibly resulting in additional loss of oil through trapping off.

Q It is your opinion then that the field should be continued to be produced on lower than the regular allowable rate?

A Yes, sir.

Q Now, I believe you also previously testified in connection with this case as to the economic aspect, as far as the operators are concerned, of the field being developed on a forty as against an eighty acre basis. Do you have any reason to change your opinion with respect to that?

A Well, the picture at present is even gloomier than it was in the beginning. Complete development on a forty acre spacing now instead of having all the wells marginal, there would be a large share in commercial losses, and only a relative small percentage of the wells actually drilled or to be drilled that would make commercial producers, and they would be commercially in the, close to marginal class at best.

Q Approximately how many wells would it require, additional wells would be required if the field were developed on the forty acre basis at this time?

A Assuming that all operators would drill any place they could make any oil on forty, it would require approximately ten additional wells. That does not mean to imply that the operator would necessarily drill those wells. There are a number of them that would, the leases would probably be recessed in preference to drilling.

Q Has there been any change in the cost of drilling wells?

A Since getting into it more thoroughly we found that we have been able to reduce the cost somewhat below that experienced in the first six or eight wells, in the current cost so I understand, this is not of my knowledge. I haven't totaled the figures, it

runs approximately two hundred fifty thousand dollars per well, on the average.

Q Then if ten wells were drilled it would amount to an investment of some two and a half million dollars?

A Yes, sir, for the recovery, practicably speaking.

Q In your opinion would that result in the recovery of any more oil than would be produced under the present pattern spacing?

A It would develop in the recovery of no appreciable amount of additional oil. There might be a few additional buyers.

Q If the operators were forced to drill these wells on the forty acre spacing basis, how would they come out?

A They would be two hundred fifty million dollars further in the hole.

MR. HINKLE: I believe that is all.

MR. PORTER: Does anyone have a question of Mr. Branson? Mr. Campbell.

QUESTIONS BY MR. CAMPBELL:

Q Mr. Branson, you represent just Mr. Hamon, or Warren, also?

A Hamon and Warren.

Q You make the recommendations for the drilling of additional wells by those concerns?

A You mean do I stake the locations?

Q No, do you recommend --

A Not the specific locations, no. I recommend the areal spacing. I recommend the areal spacing in the reservoir but not for the specific location.

Q Would you recommend to either of, or both of them, that any

additional wells be drilled?

A You mean drill additional wells on their tract at this time?

Q Yes, sir.

A Judging from this structural map I don't see any very promising locations, no, sir.

Q Would you recommend to them that rather than drill any additional wells on the basis of your structure map, that they surrender the leases?

A You are referring to edge leases or to the entire area?

Q Any leases. Rather than drill any forty acre locations.

A There are some possible forty acre locations in the center of the field that it might be desirable to drill rather than release.

Q You would not recommend that as to any of the outer boundaries?

A No, sir, I would not recommend drilling a twelve thousand foot well, offsetting wells already producing water.

Q I assume that the J. C. Williamson well is not producing water, would you recommend the drilling of any additional wells to the south of that?

A I haven't made a direct study of this with regard to the staking of any particular location. However, just a quick glance, the structure is dipping in this direction from it, probably dipping also in this direction, your best location here would be with respect to encounter the top of the Devonian at about eight thousand five hundred feet below sea level, with his low completed as high as eight thousand five hundred one producing in excess of

twelve per cent water. That would not be commercial at all.

Q Mr. Branson, at the time the Holloway No. 2 was drilled you anticipated that to be the only well?

A That's correct.

Q So the structure is changed with the drilling of additional wells?

A In this particular case the Federal Well No. 2 offsetting had been a low well. At that time we only had one well in the structure at the south end of the field. At the present time there are seven. At that time, originally it was their opinion that the structure was north, south and drilling the low well on the Federal Davis No. 2 about halfway condemned the southern area. However, there was considerable acreage down here, and a possibility that the access might be tilted at a somewhat different angle, and besides I think there was an official demand that the well be drilled.

MR. CAMPBELL: That's all.

MR. PORTER: You are through questioning? Mr. Mankin.

QUESTIONS BY MR. MANKIN:

Q Warren Mankin of the Oil Conservation Commission. Mr. Branson, relating to your Exhibit "H" which shows the water cut of the wells, let's consider for a moment the Lawrence "A" Well in Section 19. I believe it shows that it now has eight per cent water cut?

A Yes.

Q Do you have knowledge that in March that Hamon and Warren took a survey and that showed zero water production, March of this

year?

A Just a second, sir. I do not have that March potential of gas in the well, no.

Q It was submitted?

A The first test that I have was on the 19th of May.

Q And in May it was approximately three and a half per cent water?

A Yes.

MR. PORTER: Just a minute, for classification, Mr. Mankin, are you referring to a test for C-1, 16?

MR. MANKIN: Yes, represented to the Commission.

Q In May approximately the same percentage for this same well, the Lawrence C-1?

A That is my recollection, yes.

Q At the present time, the 1st of July?

A Eight per cent, yes.

Q Referring now to the Lawrence C #1, you apparently have no knowledge that in March that was zero water production on the test?

A No, sir, the only thing I actually know is a verbal report that they were completed dry, I don't have any record.

Q In May, a little over sixteen per cent on the same well, sixteen per cent water?

A That's correct.

Q And at the present time twenty-three per cent?

A Yes, sir.

Q On the basis of that increase in water, and on the basis of a statement that you made awhile ago about producing rate, do you

feel a hundred fifty barrels -- Before I ask that question, those two wells are top allowable at the present time, are they not?

A I believe so, I do not know what the allowable is.

Q One hundred fifty barrels a day.

A I think so.

Q You think that is too great a rate for these wells on the edge to be producing?

A In this particular case, the wells were completed fairly low on the structure, with the water level having already moved up as a result of the production of eight hundred thousand barrels of oil, I feel that they would be making water even if the rate were cut back, or that the water would appear in the future in any event. And I don't actually consider that further reduction in their rate would have much prospect of improving them very much. We found that it did not in the cone for the Cooper 1 and Cox 1 which were completed low, also.

Q Then you do not have a recommendation to reduce top allowables from one hundred fifty barrels a day?

A No, sir, not at this time.

Q I thought I heard you make such a recommendation or statement previously, but apparently that was an error.

A No, I think the only figure I ever used was one hundred fifty, actually of course, I qualify, the reservoir should be produced differentially in theory. But it is necessary to have a reasonable pay out at that time on the well, and be able to pay the cost of production, and that interferes with the theoretical production make. If you call these wells much below one hundred fifty

barrels the pay out on them gets extensively long, and for that reason as well as the fact that I don't feel they are actually injuring the reservoir at this time, I don't think there is any particular reason for reducing the allowable.

Q All right, Mr. Branson, referring now to the Wilhoit No. 1, I noticed on your Exhibit "H", that shows that is twelve per cent water cut?

A Yes, sir.

Q However, on a test submitted by Hamon and Warren in May, showed a production of ninety-five barrels of oil and forty-three barrels of water, which would be approximately thirty-one per cent?

A That is correct, at the time of the May test the well was flowing and apparently loading up on water, in the tube, and when we ran the test we got a load of water. Since that time pumping equipment has been installed and the well is pumping, keeping the water pumped out of the tubing and the actual water cut we have found since then is twelve per cent.

Q It is pumping higher, therefore it is not producing much water?

A It pumps at a higher produce rate, which tends to keep the tubing in the lower part of the casing from loading up with water. Of getting a slug of water in any one test.

Q But the actual oil production rate has increased as a result of the pump being installed?

A Yes, it would flow only ninety-five barrels previously, at present from seven thousand feet it's producing one hundred sixty-six barrels of oil at twelve per cent water cut.

Q So it is now a top allowable well with pumping equipment?

A Yes.

Q Referring to Exhibit "A" which Mr. Elliott had prepared, and referring to your prior testimony as to the water table, has the water table changed?

A It is our feeling, or actually the result of completing the new wells, the Lawrence A-1. I will have to go back to Exhibit "D" I believe it is, that gives the completion dates of these wells. The Lawrence A-1 well was completed from 445 to 502, and shortly after completion showing some water in the flanks on the field. Gulf Black was completed higher than that, at 413 to 468, and shortly after production, after completion started showing some water. We feel that the water level has moved up considerably. At the time of the initial completion, the water production in the Cone 1 and the Cooper 1 was comparatively slight. Since that time, although their compression interval has not particularly changed, the Cone is not a fair case because that well was acidized The Cooper has not been changed in any way and the water cut is from, oh, about fifty per cent last May to eighty-seven per cent, I believe, on our last test; indicating an actual movement of the water in the reservoir.

Q Could you recall what the original oil-water contact was?

A At the completion of the Cooper we found water at the completed drill stem at the time at 8530.

Q Sub sea minus 8530?

A Yes.

Q What do you feel it is now?

A Probably the actual high water-oil contact is something in the neighborhood of 8512. Now there will be, of course, local variation there.

Q So there has been a movement of about eighteen feet?

A Something like that, yes.

Q Referring to your Exhibit "C" on the oil production in April, 1956 and May, 1956; what was the reason for the decrease in oil production in May of 1956 from April?

A In May of 1956 from April?

Q Yes, sir, showed 1583 daily average in May, and 1727 in April, was that because -- what was the reason for that decrease?

A Well, part of it, I expect, was the fact that we shut in the entire field for two days in order to make a pressure survey.

Q Had nothing to do with producing ability of the wells?

A No, the producing ability of the wells in May was substantially the same as it was in April,all the wells were shut in a minimum of two days and others were shut in longer than that.

Q Your exhibits do not indicate any reflection of data from the Williamson well, you have no data from the Williamson well?

A I have no data from the Williamson well with the exception of its monthly production figures.

Q Have no water production?

A No, sir, nor test data, nor pressure.

Q Mr. Campbell asked you a question with regard to the development of the south of Mr. Williamson's well, and you indicated that you didn't think that was a very favorable well. On the Wilhoit lease of Hamon, now with the drilling of the dry hole of the Wilhoit

No. 2 and still a commercial well in the Wilhoit No. 1, do you feel there will be some development between those two wells?

A The Wilhoit No. 1 well has increased in water cut over the past year, let's see, I have those figures here, a year ago the Wilhoit No. 1 well was producing at one and a half per cent water cut, at the present time it is producing at twelve per cent water cut. Most of this increase in water cut came about actually just before we had to put in the pump. I feel that the water cut in the Wilhoit No. 1 will increase quite rapidly. We are finding the informal effect of the upper part of the Wilhoit No. 2 leaves the picture about like this. If you drill a well there you will get one, or judging from the performance of Wilhoit No. 1 which is commercial since, that is it is producing at the present time a full allowable, but somewhat questionable in the sense that in ultimate production it is producing some water which is really half enough to really pay the well out. It is already showing a twelve per cent water cut. We would expect, possibly, to get a well equivalent to that, possibly get a well on the same line development on the top of the Devonian and get another dry hole, so it would be at best a very marginal venture, risky venture.

Q It would be another well on that Section 18, and would be a little higher structurally than the Wilhoit No. 1, would it not?

A Judging from the structure I found in Wilhoit No. 2, yes.

Q It would not make a commercial well?

A That would not mean you found enough porosity in the Devonian to make a commercial well. We found the top of the Devonian quite level in the Wilhoit No. 2, but the first producing

section was back in the water, so you will be fighting actually two things there, encroachment of the water that already exists as shown by the performance of Wilhoit No. 1 and the tightening up of the top of the lime as you go south there, indicated by the Wilhoit No. 2.

Q The original hearing on South Knowles, I believe, was in July of '55,at least the Order 638B was entered, at which certain eighty acre patterns were specified at that time based upon structure and other means. Would you at this time recommend any change to the eighty acre patterns that were developed and introduced at that time?

A Considering that the development is practically complete and the acreage assigned, I don't see any particular change to be made, no.

Q Of course, you are assuming that there will be no more wells drilled on that basis?

A That's correct.

Q If there was another well drilled would you be in favor of a change in pattern such as the Williamson well was granted, and was also considered at that original hearing in July of last year?

A At that time we showed, I believe, the Williamson drill on an east-west angle due to the lease ownership. From the apparent shape of the structure the south well might be better off on an east eighty,also. However, if I don't consider them a commercial venture any way, I won't recommend drilling them or changing the pattern, to requesting a change in pattern to make them more attractive.

Q To bring us up to date for the eighty acre units that have been assigned since the original hearing of July, 1955; do you have knowledge of what units had been assigned for the new wells that had been completed since that hearing?

A No, sir, I do not. I have no personal knowledge of that at all.

Q So far as you know, other than the Williamson well, they possibly were a standard east half or west half of the forty section?

A That's correct, that is my understanding.

MR. PORTER: Anyone else have a question?

MR. HINKLE: I have one more question.

MR. PORTER: Mr. Hinkle.

QUESTIONS BY MR. HINKLE:

Q Mr. Branson, Mr. Mankin referred to in his cross examination, to Lawrence A-1 and the Lawrence 1-C, you know when those wells were completed?

A February of 1956.

Q And the test you referred to where they were making water was in May?

A That is correct.

Q In other words, they were not making any water, but by May 1956 --

A That is my understanding, there was no measurable water shown on the original completion.

Q But they started making water very fast?

A That's right.

MR. HINKLE: That's all.

MR. PORTER: If there are no further questions the witness may be excused.

(Witness excused.)

MR. HINKLE: That's all we have. I am ready for a statement.

MR. PORTER: Are there any other witnesses in this case? Mr. Hinkle.

MR. HINKLE: If the Commission please, we believe that the evidence which has been submitted here clearly shows that there is no reason for a change in the spacing pattern for the development of these wells at this time, and that it would be clearly an economic loss if it should be changed and go back to forty acre pattern. It would be untenable as far as the operators are concerned.

There has been no evidence submitted here to show that anybody really is objecting to the continuation of the field on an eighty acre basis and at the allowable.

We recommend to the Commission that the order which has heretofore been entered in Case 819 be continued at least for a year. If the Commission wanted to make it permanent it would suit us, but if they just want to make it for a year it would be all right. And I think that has clearly been demonstrated in the end that it has been for the best interest of all concerned, and in the interest of conservation for the prevention of waste to develop and produce this field on an eighty acre basis.

MR. PORTER: Mr. Campbell:

MR. CAMPBELL: On behalf of the people for whom I have entered

an appearance, we have no objection to the continuation of this spacing pattern for an additional year. We don't feel that the field has been fully developed, I think that the number of changes that have been made since the matter first came to the attention of the Commission, as evidenced, it is difficult to tell when the field is fully developed until there is more than one dry hole.

We have no objection to the continuation of the spacing pattern for another year. We are not requesting at this time that there be any increase in allowable. However, we do not want to commit ourselves to top allowable of a hundred and fifty barrels for a full year. We want to reserve the right, upon proper application to the Commission, to request an increased allowable. This one hundred fifty barrels was established at the time when there was only one or possibly two operators in the field who were in accordance as to what the maximum or top allowable should be. And if they have marginal wells in the field, of course that is unfortunate if others have wells that can produce the regular allowable without damage to the reservoir or to the wells. We see no reason why they could not be permitted to do it, upon proper application and upon evidence that there would be no waste committed by virtue of a higher or normal allowable for that depth. But so far as the present extension is concerned we do not oppose it for one year, reserving the right if we see fit to request an increased allowable at a future date.

MR. PORTER: Mr. Walker.

MR. WALKER: Don Walker of Gulf Oil. We operate three wells in this pool and we are in accord with Hamon and Warren for a

continuation of the present spacing.

MR. PORTER: If there is nothing further we will take the case under advisement.

The hearing will be recessed until one-fifteen.

(Recess.)

C E R T I F I C A T E

STATE OF NEW MEXICO)
: ss
COUNTY OF BERNALILLO)

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

J. A. Trujillo
Court Reporter

Subscribed and sworn to before me.

Witness my Hand and Seal this, the ____day of August, 1956.

Notary Public

My Commission expires:

BEFORE THE

Oil Conservation Commission

SANTA FE, NEW MEXICO

July 18, 1956

IN THE MATTER OF:

CASE NO. 819

TRANSCRIPT OF PROCEEDINGS

DEARNLEY-MEIER AND ASSOCIATES
COURT REPORTERS
605 SIMMS BUILDING
TELEPHONE 3-6691
ALBUQUERQUE, NEW MEXICO

BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO
July 18, 1956

IN THE MATTER OF: Application of the Oil Conservation Commission upon its own motion for all operators in the South Knowles-Devonion Pool, Lea County, New Mexico, to appear before the Commission in compliance with paragraph 6 of Order R-638-B to show cause why 80 acre drilling and proration units in the South Knowles-Devonian Pool provided for in Order R-638-B should be continued; operators shall present evidence to support the continuation of 80 acre drilling and proration units and show necessity for continuing Order R-638-B beyond September 30, 1956, in said pool.	Case No. 819

BEFORE:

Honorable John F. Simms, Jr.
Mr. E. S. (Johnny) Walker
Mr. A. L. Porter

TRANSCRIPT OF HEARING

MR. PORTER: The next case on the docket is Case No. 819.

MR. GURLEY: Case No. 819, the application of the Oil Conservation Commission upon its own motion for all operators in the South Knowles-Devonian Pool, Lea County, New Mexico, to appear before the Commission in compliance with Paragraph 6 of Order R-638-B to show cause why 80 acre drilling and proration units in the South Knowles-Devonian Pool provided for in Order R-638-B should be continued; operators shall present evidence to support the continuation of 80 acre drilling and proration units and show necessity for continuing Order R-638-B beyond September 30, 1956, in said pool.

MR. HINKLE: Clarence Hinkle, Roswell. Appearing on behalf of

Jake Hamon and the Warren Petroleum Corporation. I would like to make a brief statement in connection with this matter before we proceed with the evidence.

As the Commission knows the original hearing in this Case 819 was held on July the 14th, 1955; the petition for rehearing was filed and the subsequent hearing was held on October the 20th, 1955. There was also some evidence having a bearing on this case which was introduced in connection with Case No. 965, which was the application of Mr. Williamson for an unorthodox location. I simply mention this because it is my understanding that the evidence introduced in connection with this Case 819 and in connection with the two previous hearings will constitute a part of the record in connection with this hearing, being simply a continuation of the case, and we will also probably refer to one or two of the exhibits that were introduced in connection with the Williamson hearing which was No. 965.

The evidence which we propose to introduce here this morning will be simply supplemental of that which has heretofore been introduced in connection with this case, and the Williamson case. In order to bring the Commission up to date on the statute of the development of the field and to show that there is no reason for the change in the spacing pattern, we have eight exhibits which we have marked from "A" to "H" inclusive. The previous exhibits in this case were numbered, so this will distinguish them from the previous exhibits. We also have two witnesses, Mr. Elliott and Mr. Branson,which we would like to have sworn.

(The witnesses were sworn.)

A. C. ELLIOTT

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

DIRECT EXAMINATION

BY MR. HINKLE:

Q State your name, please.

A A. C. Elliott, District Geologist, Hamon & Warren Petroleum Corporation for West Texas and Southeast New Mexico.

Q Where do you live?

A Midland, Texas.

Q Have you previously testified before the Commission?

A Yes, sir.

Q In connection with what matter?

A The hearing in behalf of J. C. Williamson.

Q In October?

A October, yes, sir.

Q At that time you qualified as an expert geologist?

A Yes, sir.

MR. HINKLE: Are the qualifications of the witness acceptable here?

MR. PORTER: They are.

Q Mr. Elliott, you are familiar with what has transpired in connection with this case at the original hearing and the subsequent hearing, and also in the Williamson case which you have referred to?

A Yes, sir.

Q During the original hearing of July the 14th in 1955 and October the 20th of '55, there was introduced in evidence a contour map showing the structure as portrayed at that time from the

information of the wells that had been drilled on top of the Devonian Formation, is that not right?

A Yes, sir.

Q And there was also an additional exhibit introduced in connection with the Williamson case which showed the contour on top of the Devonian Formation, due to the change and condition -- because of the well which had been drilled subsequent to the original hearing?

A Yes, sir.

Q How many wells have been drilled since these original exhibits were introduced, which were exhibits having borne exhibit numbers one and three, I believe?

A Since Mr. Williamson's hearing there has been one, two, three, four, five, five additional wells.

Q There was one well drilled subsequent to the original hearing in Case 819, is that not right?

A That's right.

Q What well was that?

A Holloway No. 2.

Q And where is that located?

A This well right here.

Q Would you give the location to the Commission, rather than referring to the exhibit at the present time?

A The Holloway No. 2 was drilled 1980 from the east line and 660 from the south line of Section 13. Seventeen South, Twenty-nine East.

Q And when was that well completed?

A That well was completed, let's see, the Holloway No. 2 in September of '55.

Q All right, now what is the next well that has been drilled since that time? Give the location and the name of the well.

A Subsequent to the drilling of this well, Mr. Williamson's well which was drilled 1980 from the east line and 660 from the north line of Section 24, and the next well was the Warren-Hamon C-1.

Q When was the second well completed?

A The second well --

Q Was that referred to as the Gulf Black No. 1?

A The Gulf Black No. 1 was February 19, 1956, which was drilled 1980 from the west, 1980 from the south of Section 17, 17 South, 38 East.

Q What is the next well chronologically?

A The Hamon and C-1.

MR. PORTER: Is that Lawrence C-1?

A Lawrence C-1, yes, sir. Subsequent to the drilling of this well --

Q In what location is that? Give the location.

A The location of the Lawrence C-1 is 1980 from the west and 660 from the south of Section 24, 17 South, 38 East.

Q All right, what was the next one?

A The Lawrence A-1, located 660 south of the northwest corner of Section 19, 17 South, 39 East.

Q And when was it completed?

A Lawrence A-1 in February, 1956.

Q What was the next well drilled?

A The Wilhoit No. 2 located 660 from the west, 660 from the south of Section 18, 17 South, 39 East.

Q When was it completed?

A May, 1956.

Q Is that all of the wells which have been drilled?

A Yes, sir.

Q Subsequent to the original hearing?

A Yes, sir.

Q Now, since the completion of these wells, have you made an additional study of the South Knowles reservoir, Devonian reservoir?

A Yes, sir.

Q And have you prepared a contour map showing the top of the Devonian Formation as from the information obtained from these additional wells?

A This is an up to date interpretation --

Q Well, now just a minute, answer the question, answer the question have you prepared --

A (Interrupting) Yes, sir. Yes, sir.

Q Refer to Exhibit A, and tell the Commission what that is and what it shows.

A Exhibit A is a structural map contoured on Top Devonian Formation, based on Schlumberger core analysis.

Q What else does it show?

A It shows the position, the structural elevation of the top of the Devonian fifty foot contours that we have established in the original presentation, access running a little bit west of

south, our subsequent drilling has only shown that there is a slight access from the information from the Lawrence A-1 and the Wilhoit No. 2, a slight lobe existing on the southeast flat of the structure.

Q Were any of these additional six wells which you have testified as having been drilled, completed as dry holes?

A The Wilhoit No. 2 was completed as a dry hole.

Q Is it a high or low well?

A It is structurally a high well on top of the Devonian.

Q In your opinion is there any reason why it didn't produce although high?

A The development of the limestone and porosity in this well is, -- was cored and there was no porosity, and has no showing of any commercial value to the extent that would justify completing it as an oil well.

Q Now, Mr. Elliott, refer to Hamon-Warren Exhibit "B" and tell the Commission what it is and what it shows.

A Exhibit "B" is a Schlumberger cross section showing the structure on the South Knowles of the Devonian Pool and is shown on our plat as a section extending along the red line, which is shown on the structural interpretation plat.

Q That's Exhibit "A"?

A Exhibit "A".

GOVERNOR SIMMS: Do you want us to make one of these or are you going to introduce those?

MR. HINKLE: Those are going to be introduced.

Q Mr. Elliott, what does the blue line on Exhibit "B" represent?

A We have drawn the blue line, -- the black line is marked on the top of the Schlumberger, top of the Devonian Formation and the A-1, the Williamson-Hardin No. 1, the Holloway No. 2, the Hamon and Warren Davis No. 2, and the Lawrence A-1. The blue line represents the structural top of the Devonian based on Schlumberger correlations.

Q Do you know whether or not, in connection with previous testimony in this case, a similar cross section was introduced that covers the north portion of the field?

A We introduced a similar cross section extending across the north end of the field, across this line of wells, at the J. C. Williamson hearing in October.

Q And there would be no change in that condition because of the drilling of these wells to the south, is that right?

A We see no evidence for any change.

Q So there is no reason for offering another cross section, as far as the north portion of the field is concerned?

A Right.

Q Now, I believe you stated that you were familiar with the previous contour maps which had been introduced in connection with this case and the Williamson case. Explain to the Commission the difference between those and the one which you have referred to as Exhibit "A".

A On the access of these wells on the southeast flange, we had this Davis No. 2 well and the Holloway No. 2, which is absent in this data. We connected the high Devonian points here and showed the access in this direction.

Q Does Exhibit "A" still show that all of the wells which have been drilled are producing from the same reservoir?

A Yes, sir.

Q Your revision of the contour on top of the Devonian, has that changed in any way, the spacing or the reason for the spacing of the wells in the area?

A From the geological standpoint and additional information, we have no evidence that would require any change in the present spacing pattern.

MR. HINKLE: That is all.

MR. PORTER: Does anyone else have a question of Mr. Elliott? Mr. Mankin.

QUESTIONS BY MR. MANKIN:

Q Warren Mankin of the Oil Commission. Mr. Elliott, I notice you have drawn a cross section on your Exhibit "B" and then on your Exhibit "A" have you attempted to draw any connecting section on the Wilhoit No. 2, through the Wilhoit No. 2 as to try to interpret what happened there? The Wilhoit No. 2 has recently been completed as a dry hole?

A This cross section here was prepared at the time we completed this well here. This well was just recently completed and we have not prepared any section, the only reasons that we have, from a geological standpoint, was the fact that we have the development of porosity which was sufficiently high in A-1 to make a marginal well, whereas in the Wilhoit No. 2 we had a development of lime for a hundred and thirty feet, and at the time we reached the porosity, we had three drill stem tests and the third test showed water.

Q You indicated that the Lawrence A-1 was a marginal well, it is not a top allowable well?

A That, I think, would be covered in the testimony of the reservoir engineer, by Mr. Branson.

Q Will this Wilhoit No. 2, not having any porosity development, which was anticipated, will be used for a salt water well in the upper horizon. Was this structure map which you have drawn here, drawn after the Wilhoit No. 2 was completed?

A Yes, sir.

Q And it is still the same interpretation?

A We have taken the top of the Devonian into consideration.

Q There was no development of porosity in there?

A No, it was cored and examined very thoroughly.

Q The field has not yet been completely defined? The South Devonian Pool has not yet been completely defined, has it?

A Well, we feel that with the edge wells, the A-1 as showing water, the C-1 showing water, we feel that it is defined as far as economics is concerned.

Q You say it is showing water. During the test in March neither one, the Lawrence A or Lawrence C, produced any water but it did in May, is that correct?

A That will be covered by the reservoir engineer.

Q I don't believe I understood you, you feel that it is practicably developed, the field is practicably developed from the outer boundaries?

A Yes, sir.

MR. MANKIN: That is all.

MR. PORTER: Mr. Campbell.

MR. CAMPBELL: Jack Campbell, Roswell, New Mexico. I would like to show an appearance in this case for Ted Carter and other royalty owners for whom an original appearance was made at the time the original hearing was held in this case.

QUESTIONS BY MR. CAMPBELL:

Q At the time the hearing was held on Williamson on an unorthodox location, you also thought that this field was fully developed at that time, didn't you?

A Not to my knowledge.

Q Didn't you testify at that time that as far as economics were concerned you were satisfied that the field had been developed to the fullest extent?

A Not at that time.

Q Well, another question, is it possible that your findings with regard to your Wilhoit No. 2 being a dry hole, could tend to confirm the interpretation of the structure as made by Mr. Williamson at the time of the hearing on his application?

A Not at all.

Q You are unwilling to say that it is a possibility that you may have a dry hole there by reason other than the lack of permeability in the Devonian?

A Lack of permeability and porosity.

Q No other possibilities as far as you are concerned?

A Not to my knowledge.

MR. CAMPBELL: That's all.

MR. PORTER: Does anyone have a question of Mr. Elliott?

Witness may be excused.

MR. HINKLE: I would like to ask him one other question. Were both of these exhibits "A" and "B" prepared by you and under your direction?

A Yes, sir.

MR. HINKLE: I would like to offer Exhibits "A" and "B".

MR. PORTER: Without objection, they will be accepted.

(Witness excused.)

MR. PORTER: Next witness, please.

U. S. BRANSON, JR.

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

DIRECT EXAMINATION

BY MR. HINKLE:

Q State your name, please.

A U. S. Branson, Jr.

Q Where do you live, Mr. Branson?

A Dallas, Texas.

Q And what is your profession?

A Consulting engineer, pretroleum engineer.

Q Have you previously testified in connection with this Case 819?

A Yes, sir.

Q At both hearings?

A Yes, sir. At three past hearings.

Q And also in connection with the Williamson case?

A Yes.

Q No. 965.

GOVERNOR SIMMS: His qualifications are accepted.

Q For the benefit of the Commission we have six different exhibits which I would like to have Mr. Branson refer to, and we have marked them from Exhibit "C" to "H" inclusive.

Now, Mr. Branson, please refer to Exhibit "C", Hamon and Warren Exhibit "C" and state to the Commission what that is and what it shows.

A Exhibit "C" is simply a summary of the production data from the entire field, giving both the number of wells producing during the particular month, the average daily oil production from all wells for each month, and cumulative production from the beginning of the field, from the completion of the first well. This production information was obtained from the individual operator and simply added up and presented for convenience in seeing what the field has produced and what time.

Q And what is, this is through May, 1956, is it not?

A Yes, sir.

Q What is the accumulative production?

A As of June the 1st, '56 the accumulative production was 801,526. There were fourteen wells in the field, the average daily production during the month of May was one thousand five hundred eighty-three barrels per day.

Q Now, refer to Hamon-Warren Exhibit "D" and state to the Commission what it is and what it shows.

A Exhibit "D" is a summary of the data on each of the wells that has been completed in the South Knowles Devonian Pool to the present

time. At an earlier hearing, I think, all but six of these wells were presented, those wells have been then included here simply to keep from having to refer to two different exhibits. It gives all fifteen wells that have been drilled in the field, the data at which they were completed, that is, the month they were completed, the total depth to which they were drilled by Schlumberger measure, and the section that is open to production at the present time.

Q All right. Now, refer to exhibit, Hamon-Warren Exhibit "E" and state to the Commission what that is and what it shows.

A Hamon and Warren Exhibit "E" is a summary of test data on all wells in the field except the Williamson well. Some of the tests were made in May and in particular the test on the group of wells were made between, in the period May 19th through May 28th, except the No. 1 Cone which was retested following acidation. The tests on the Hamon & Warren wells were run in the first ten days of July, the last one being completed on the 10th of July. Opposite each well is given the twenty-four hour oil production, or the oil producing rate, and the water cut at which these wells are produced.

At the completion of the well test program carried on in May, we closed the wells in forty-eight hours, in forty-eight hour shut-in pressure on each of the wells as shown here on each of the flowing wells. We did not pull the tubing and run the pressure on the Cooper or Cone Wells. This exhibit in connection with past exhibits, and with one of the subsequent ones, simply serves to illustrate the progressive increase in water cuts in most of the wells around the field. It also indicates or shows in particular that in the Lawrence C-1 there was some question about before, in

July it was producing, was capable of producing one hundred sixty-five barrels of oil with twenty-three per cent water cut. The Lawrence A-1 in July was producing one hundred twenty-three barrels of oil with only eight per cent water cut. The only other new well in that group is the Gulf's Black No. 1, which was flowing at a rate of one hundred seventy-six barrels of oil with four per cent water cut.

Q This shows, does it not, that there are only three wells in the entire pool, field that are not making water, is that right?

A No, sir, Mr. Williamson's well was not, again I state on that, and in the Gulf Cone No. 1 the water is a bare trace, it was not sufficient to record any percentage. There are three wells of the thirteen that we tested that were dry, making less than two tenths per cent of water, and one that was making a bare trace. The remaining wells in the field are producing water in percentages varying from 4.93.

Q What is the average pressure for the field?

A The average pressure, neglecting one well in taking these average pressures, the Cox No. 1 Well has, for the past year ran something over around one hundred pounds below the average pressure in the rest of the wells in the field, it is also a low capacity well and we consider that evident that the buildup of the well was very slow and will drop it from the average of the wells. Excluding that well, the average pressure is four thousand seven hundred ninety-two pounds as of June the 1st, '56.

Q Is there any great differential between any of the wells, what is the average percentage of variation?

A Approximately one per cent of deviation of the average is the maximum, both below and above the average pressure.

Q Were these pressure tests made under the same conditions, as to all wells which were tested?

A Yes, sir, the wells were shut in simultaneously and two days later a bomb was run in. The entire field was, with the exception of, or all of the Gulf and Hamon and Warren were shut in and --

Q What was the shut in?

A Forty-eight hours. The pressure reference was eight thousand fifty feet, at approximately the middle of the producing zone.

Q Now, refer to Hamon and Warren Exhibit "F" and explain to the Commission what that shows.

A Exhibit "F" is a plot of the pressure history of the field. On discovery or on completion of the Federal Davis No. 1 in July, '54 the well was shut in twenty-four hours, it built up considerable water in it, and the bomb shell and the pressure ceased rising before the end of twenty-four hours, pressure four thousand nine hundred two pounds. At intervals since then, to begin with, of approximately every month, over the past year at six months intervals, the field has been shut in and pressure measured. The solid black line on Exhibit "F" is simply a plot of the average pressures as measured in the Field, with the exception that since July of '55 the Cox No. 1 has been dropped from the average. Circles on the map are the pressures measured in what we refer as new wells. That is, they are the pressures measured after forty-eight hours

shut in period on a well that has been under production for a period less than a month. Some of the new wells, in particular this one measured in October of '54 did not build up appreciably above the field average. Other wells drilled since then, as shown by the points across the top, were fairly high in pressure, even on the forty-eight hour shut in period until the ones completed in February and measured in March of this year, and now that reservoir pressure measured in the new wells has declined below that measured in the new wells initially, indicating that the production from the field is having an affect even in the areas where there is no production. The principal purpose of that exhibit is simply to indicate that there is pressure continuity across the field.

Q All right. Now, refer to Hamon and Warren Exhibit "G" and explain to the Commission what that shows.

A Exhibit "G" is the pressure, present pressure that is shown on, is the same pressure as the ones included in the last column of Exhibit "E". Simply shown in the map for areal reasons.

Q To the different wells?

A Yes, sir, comparing them with the exhibit that was introduced last July, as figure 4, you find that all of the wells in the field have fallen somewhat, varying from approximately thirty pounds to as much as seventy pounds. This simply serves further to illustrate the same thing as the tabulated pressures that the present continuity across the field is quite low, within approximately one per cent deviation from the average.

Q Now, refer to Hamon and Warren Exhibit "H" and explain to

the Commission what that shows.

A Exhibit "H" is an areal plot of the same thing as the test data shown in Exhibit "E", also, for reference or for comparison with the same chart which was presented in May of 1955. At that time we placed under each well on the map accumulative production to that time and the present per cent water cut. To bring that status up to date we have here the status of May and July actually, 1956, showing the accumulated production from each well as afforded incidently from the test data, and the water cut at which each well is producing. Now it serves to show, perhaps, better than the tabulations of test data, that around the flanks of the field all of the wells are producing water. In particular, when compared with Exhibit "D" which gives the completion depths,it indicates that the new wells as a result, Hamon and Warren Lawrence 1 and Lawrence Black 1, both show water almost immediately after completion, after production of very small amounts of oil indicating that the water is actually moving into an area which had no production within nineteen hundred feet from it, as a result of the production from the remainder of the field. This simply confirms our original belief that the field would reduce under a water drive and that the field would be capable of drilling wells in excess of thirteen hundred foot rates.

Q Were all of these exhibits "C" to "H" inclusive prepared by you and under your direction?

A They were.

MR. HINKLE: We would like to offer in evidence, Exhibits "C" through "H".

MR. PORTER: Any objections to the admission of these exhibits? They will be admitted.

Q Mr. Branson, in that previous hearing I believe you testified as to the probable ultimate recovery of the field if developed on a forty acre spacing pattern as against an eighty acre spacing pattern. Have you any reason to change your opinion, of your previous testimony in connection with this?

A No, sir, I have no reason to believe that production on a forty acre spacing pattern, ultimate production, will exceed that on eighty. Actually, the apparent move, possible edge water movement along the sides indicates that closer spacing would, if anything, reduce the ultimate recovery from the reservoir.

Q The exhibits which you have referred to and testified to in regard to the wells, do they show that all of the wells which have been drilled are producing from the same reservoir?

A Yes, sir.

Q They tend to show that?

A They show that there is considerable pressure continuity, within actually practicably speaking the limits of the access of the bomb, the pressure measurements there are approximately the same pressure. It also shows, or the appearance of water early in relative high wells drilled after considerable production, indicates that the reservoir is being drained by existing wells.

Q Now, Mr. Branson, I believe also in your previous testimony in this case, you testified that a high producing rate, because of reservoir character in particular, might be injurious to the entire field?

A High producing rate in this particular reservoir would have two harmful effects. First, it will result in coning as proven early in the life of the field by the appearance of water in the Hamon and Warren Holloway No. 1 well which yield climbed to approximately twenty per cent water cut in a period of four months after completion. The well producing rate was cut back, the water cut drop last July was about one and a half per cent after three months of reduced production. Continuing that reduced production, the water has in the past six months began to rise slowly, being now approximately nine per cent, as compared to a higher earlier value. We feel that excessive production, or that any increase in the production rate will increase the tendency to cone water into the bottom of the wells, resulting in the operator having produced abnormally large volumes of the water too early in the life of the field, and the result an earlier abandonment than will be if they produce at a reasonable rate. In addition to that the high rate of the withdrawal from the field as a whole will promote the encouraging of the edge water, in general the horizontal permeability runs a little higher than vertical, and the water will run a little better, side water, horizontal and vertically. What we are attempting to do here is bring the water up, slowly up from the bottom, keeping the water level as level as possible so that all of the reservoir will be swept out rather than bring water in from the side to meet with the coning under a rapidly producing well, possibly resulting in additional loss of oil through trapping off.

Q It is your opinion then that the field should be continued to be produced on lower than the regular allowable rate?

A Yes, sir.

Q Now, I believe you also previously testified in connection with this case as to the economic aspect, as far as the operators are concerned, of the field being developed on a forty as against an eighty acre basis. Do you have any reason to change your opinion with respect to that?

A Well, the picture at present is even gloomier than it was in the beginning. Complete development on a forty acre spacing now instead of having all the wells marginal, there would be a large share in commercial losses, and only a relative small percentage of the wells actually drilled or to be drilled that would make commercial producers, and they would be commercially in the, close to marginal class at best.

Q Approximately how many wells would it require, additional wells would be required if the field were developed on the forty acre basis at this time?

A Assuming that all operators would drill any place they could make any oil on forty, it would require approximately ten additional wells. That does not mean to imply that the operator would necessarily drill those wells. There are a number of them that would, the leases would probably be recessed in preference to drilling.

Q Has there been any change in the cost of drilling wells?

A Since getting into it more thoroughly we found that we have been able to reduce the cost somewhat below that experienced in the first six or eight wells, in the current cost so I understand, this is not of my knowledge. I haven't totaled the figures, it

runs approximately two hundred fifty thousand dollars per well, on the average.

Q Then if ten wells were drilled it would amount to an investment of some two and a half million dollars?

A Yes, sir, for the recovery, practicably speaking.

Q In your opinion would that result in the recovery of any more oil than would be produced under the present pattern spacing?

A It would develop in the recovery of no appreciable amount of additional oil. There might be a few additional buyers.

Q If the operators were forced to drill these wells on the forty acre spacing basis, how would they come out?

A They would be two hundred fifty million dollars further in the hole.

MR. HINKLE: I believe that is all.

MR. PORTER: Does anyone have a question of Mr. Branson? Mr. Campbell.

QUESTIONS BY MR. CAMPBELL:

Q Mr. Branson, you represent just Mr. Hamon, or Warren, also?

A Hamon and Warren.

Q You make the recommendations for the drilling of additional wells by those concerns?

A You mean do I stake the locations?

Q No, do you recommend --

A Not the specific locations, no. I recommend the areal spacing. I recommend the areal spacing in the reservoir but not for the specific location.

Q Would you recommend to either of, or both of them, that any

additional wells be drilled?

A You mean drill additional wells on their tract at this time?

Q Yes, sir.

A Judging from this structural map I don't see any very promising locations, no, sir.

Q Would you recommend to them that rather than drill any additional wells on the basis of your structure map, that they surrender the leases?

A You are referring to edge leases or to the entire area?

Q Any leases. Rather than drill any forty acre locations.

A There are some possible forty acre locations in the center of the field that it might be desirable to drill rather than release.

Q You would not recommend that as to any of the outer boundaries?

A No, sir, I would not recommend drilling a twelve thousand foot well, offsetting wells already producing water.

Q I assume that the J. C. Williamson well is not producing water, would you recommend the drilling of any additional wells to the south of that?

A I haven't made a direct study of this with regard to the staking of any particular location. However, just a quick glance, the structure is dipping in this direction from it, probably dipping also in this direction, your best location here would be with respect to encounter the top of the Devonian at about eight thousand five hundred feet below sea level, with his low completed as high as eight thousand five hundred one producing in excess of

twelve per cent water. That would not be commercial at all.

Q Mr. Branson, at the time the Holloway No. 2 was drilled you anticipated that to be the only well?

A That's correct.

Q So the structure is changed with the drilling of additional wells?

A In this particular case the Federal Well No. 2 offsetting had been a low well. At that time we only had one well in the structure at the south end of the field. At the present time there are seven. At that time, originally it was their opinion that the structure was north, south and drilling the low well on the Federal Davis No. 2 about halfway condemned the southern area. However, there was considerable acreage down here, and a possibility that the access might be tilted at a somewhat different angle, and besides I think there was an official demand that the well be drilled.

MR. CAMPBELL: That's all.

MR. PORTER: You are through questioning? Mr. Mankin.

QUESTIONS BY MR. MANKIN:

Q Warren Mankin of the Oil Conservation Commission. Mr. Branson, relating to your Exhibit "H" which shows the water cut of the wells, let's consider for a moment the Lawrence "A" Well in Section 19. I believe it shows that it now has eight per cent water cut?

A Yes.

Q Do you have knowledge that in March that Hamon and Warren took a survey and that showed zero water production, March of this

year?

A Just a second, sir. I do not have that March potential of gas in the well, no.

Q It was submitted?

A The first test that I have was on the 19th of May.

Q And in May it was approximately three and a half per cent water?

A Yes.

MR. PORTER: Just a minute, for classification, Mr. Mankin, are you referring to a test for C-1, 16?

MR. MANKIN: Yes, represented to the Commission.

Q In May approximately the same percentage for this same well, the Lawrence C-1?

A That is my recollection, yes.

Q At the present time, the 1st of July?

A Eight per cent, yes.

Q Referring now to the Lawrence C #1, you apparently have no knowledge that in March that was zero water production on the test?

A No, sir, the only thing I actually know is a verbal report that they were completed dry, I don't have any record.

Q In May, a little over sixteen per cent on the same well, sixteen per cent water?

A That's correct.

Q And at the present time twenty-three per cent?

A Yes, sir.

Q On the basis of that increase in water, and on the basis of a statement that you made awhile ago about producing rate, do you

feel a hundred fifty barrels -- Before I ask that question, those two wells are top allowable at the present time, are they not?

A I believe so, I do not know what the allowable is.

Q One hundred fifty barrels a day.

A I think so.

Q You think that is too great a rate for these wells on the edge to be producing?

A In this particular case, the wells were completed fairly low on the structure, with the water level having already moved up as a result of the production of eight hundred thousand barrels of oil, I feel that they would be making water even if the rate were cut back, or that the water would appear in the future in any event. And I don't actually consider that further reduction in their rate would have much prospect of improving them very much. We found that it did not in the cone for the Cooper 1 and Cox 1 which were completed low, also.

Q Then you do not have a recommendation to reduce top allowables from one hundred fifty barrels a day?

A No, sir, not at this time.

Q I thought I heard you make such a recommendation or statement previously, but apparently that was an error.

A No, I think the only figure I ever used was one hundred fifty, actually of course, I qualify, the reservoir should be produced differentially in theory. But it is necessary to have a reasonable pay out at that time on the well, and be able to pay the cost of production, and that interferes with the theoretical production make. If you call these wells much below one hundred fifty

barrels the pay out on them gets extensively long, and for that reason as well as the fact that I don't feel they are actually injuring the reservoir at this time, I don't think there is any particular reason for reducing the allowable.

Q All right, Mr. Branson, referring now to the Wilhoit No. 1, I noticed on your Exhibit "H", that shows that is twelve per cent water cut?

A Yes, sir.

Q However, on a test submitted by Hamon and Warren in May, showed a production of ninety-five barrels of oil and forty-three barrels of water, which would be approximately thirty-one per cent?

A That is correct, at the time of the May test the well was flowing and apparently loading up on water, in the tube, and when we ran the test we got a load of water. Since that time pumping equipment has been installed and the well is pumping, keeping the water pumped out of the tubing and the actual water cut we have found since then is twelve per cent.

Q It is pumping higher, therefore it is not producing much water?

A It pumps at a higher produce rate, which tends to keep the tubing in the lower part of the casing from loading up with water. Of getting a slug of water in any one test.

Q But the actual oil production rate has increased as a result of the pump being installed?

A Yes, it would flow only ninety-five barrels previously, at present from seven thousand feet it's producing one hundred sixty-six barrels of oil at twelve per cent water cut.

Q So it is now a top allowable well with pumping equipment?

A Yes.

Q Referring to Exhibit "A" which Mr. Elliott had prepared, and referring to your prior testimony as to the water table, has the water table changed?

A It is our feeling, or actually the result of completing the new wells, the Lawrence A-1. I will have to go back to Exhibit "D" I believe it is, that gives the completion dates of those wells. The Lawrence A-1 well was completed from 445 to 502, and shortly after completion showing some water in the flanks on the field. Gulf Black was completed higher than that, at 413 to 468, and shortly after production, after completion started showing some water. We feel that the water level has moved up considerably. At the time of the initial completion, the water production in the Cone 1 and the Cooper 1 was comparatively slight. Since that time, although their compression interval has not particularly changed, the Cone is not a fair case because that well was acidized The Cooper has not been changed in any way and the water cut is from, oh, about fifty per cent last May to eighty-seven per cent, I believe, on our last test; indicating an actual movement of the water in the reservoir.

Q Could you recall what the original oil-water contact was?

A At the completion of the Cooper we found water at the completed drill stem at the time at 8530.

Q Sub sea minus 8530?

A Yes.

Q What do you feel it is now?

A Probably the actual high water-oil contact is something in the neighborhood of 8512. Now there will be, of course, local variation there.

Q So there has been a movement of about eighteen feet?

A Something like that, yes.

Q Referring to your Exhibit "C" on the oil production in April, 1956 and May, 1956; what was the reason for the decrease in oil production in May of 1956 from April?

A In May of 1956 from April?

Q Yes, sir, showed 1583 daily average in May, and 1727 in April, was that because -- what was the reason for that decrease?

A Well, part of it, I expect, was the fact that we shut in the entire field for two days in order to make a pressure survey.

Q Had nothing to do with producing ability of the wells?

A No, the producing ability of the wells in May was substantially the same as it was in April,all the wells were shut in a minimum of two days and others were shut in longer than that.

Q Your exhibits do not indicate any reflection of data from the Williamson well, you have no data from the Williamson well?

A I have no data from the Williamson well with the exception of its monthly production figures.

Q Have no water production?

A No, sir, nor test data, nor pressure.

Q Mr. Campbell asked you a question with regard to the development of the south of Mr. Williamson's well, and you indicated that you didn't think that was a very favorable well. On the Wilhoit lease of Hamon, now with the drilling of the dry hole of the Wilhoit

No. 2 and still a commercial well in the Wilhoit No. 1, do you feel there will be some development between those two wells?

A The Wilhoit No. 1 well has increased in water cut over the past year, let's see, I have those figures here, a year ago the Wilhoit No. 1 well was producing at one and a half per cent water cut, at the present time it is producing at twelve per cent water cut. Most of this increase in water cut came about actually just before we had to put in the pump. I feel that the water cut in the Wilhoit No. 1 will increase quite rapidly. We are finding the informal effect of the upper part of the Wilhoit No. 2 leaves the picture about like this. If you drill a well there you will get one, or judging from the performance of Wilhoit No. 1 which is commercial since, that is it is producing at the present time a full allowable, but somewhat questionable in the sense that in ultimate production it is producing some water which is really half enough to really pay the well out. It is already showing a twelve per cent water cut. We would expect, possibly, to get a well equivalent to that, possibly get a well on the same line development on the top of the Devonian and get another dry hole, so it would be at best a very marginal venture, risky venture.

Q It would be another well on that Section 18, and would be a little higher structurally than the Wilhoit No. 1, would it not?

A Judging from the structure I found in Wilhoit No. 2, yes.

Q It would not make a commercial well?

A That would not mean you found enough porosity in the Devonian to make a commercial well. We found the top of the Devonian quite level in the Wilhoit No. 2, but the first producing

section was back in the water, so you will be fighting actually two things there, encroachment of the water that already exists as shown by the performance of Wilhoit No. 1 and the tightening up of the top of the lime as you go south there, indicated by the Wilhoit No. 2.

Q The original hearing on South Knowles, I believe, was in July of '55,at least the Order 638B was entered, at which certain eighty acre patterns were specified at that time based upon structure and other means. Would you at this time recommend any change to the eighty acre patterns that were developed and introduced at that time?

A Considering that the development is practically complete and the acreage assigned, I don't see any particular change to be made, no.

Q Of course, you are assuming that there will be no more wells drilled on that basis?

A That's correct.

Q If there was another well drilled would you be in favor of a change in pattern such as the Williamson well was granted, and was also considered at that original hearing in July of last year?

A At that time we showed, I believe, the Williamson drill on an east-west angle due to the lease ownership. From the apparent shape of the structure the south well might be better off on an east eighty,also. However, if I don't consider them a commercial venture any way, I won't recommend drilling them or changing the pattern, to requesting a change in pattern to make them more attractive.

Q To bring us up to date for the eighty acre units that have been assigned since the original hearing of July, 1955; do you have knowledge of what units had been assigned for the new wells that had been completed since that hearing?

A No, sir, I do not. I have no personal knowledge of that at all.

Q So far as you know, other than the Williamson well, they possibly were a standard east half or west half of the forty section?

A That's correct, that is my understanding.

MR. PORTER: Anyone else have a question?

MR. HINKLE: I have one more question.

MR. PORTER: Mr. Hinkle.

QUESTIONS BY MR. HINKLE:

Q Mr. Branson, Mr. Mankin referred to in his cross examination, to Lawrence A-1 and the Lawrence 1-C, you know when those wells were completed?

A February of 1956.

Q And the test you referred to where they were making water was in May?

A That is correct.

Q In other words, they were not making any water, but by May 1956 --

A That is my understanding, there was no measurable water shown on the original completion.

Q But they started making water very fast?

A That's right.

MR. HINKLE: That's all.

MR. PORTER: If there are no further questions the witness may be excused.

(Witness excused.)

MR. HINKLE: That's all we have. I am ready for a statement.

MR. PORTER: Are there any other witnesses in this case? Mr. Hinkle.

MR. HINKLE: If the Commission please, we believe that the evidence which has been submitted here clearly shows that there is no reason for a change in the spacing pattern for the development of these wells at this time, and that it would be clearly an economic loss if it should be changed and go back to forty acre pattern. It would be untenable as far as the operators are concerned.

There has been no evidence submitted here to show that anybody really is objecting to the continuation of the field on an eighty acre basis and at the allowable.

We recommend to the Commission that the order which has heretofore been entered in Case 819 be continued at least for a year. If the Commission wanted to make it permanent it would suit us, but if they just want to make it for a year it would be all right. And I think that has clearly been demonstrated in the end that it has been for the best interest of all concerned, and in the interest of conservation for the prevention of waste to develop and produce this field on an eighty acre basis.

MR. PORTER: Mr. Campbell:

MR. CAMPBELL: On behalf of the people for whom I have entered

an appearance, we have no objection to the continuation of this spacing pattern for an additional year. We don't feel that the field has been fully developed, I think that the number of changes that have been made since the matter first came to the attention of the Commission, as evidenced, it is difficult to tell when the field is fully developed until there is more than one dry hole.

We have no objection to the continuation of the spacing pattern for another year. We are not requesting at this time that there be any increase in allowable. However, we do not want to commit ourselves to top allowable of a hundred and fifty barrels for a full year. We want to reserve the right, upon proper application to the Commission, to request an increased allowable. This one hundred fifty barrels was established at the time when there was only one or possibly two operators in the field who were in accordance as to what the maximum or top allowable should be. And if they have marginal wells in the field, of course that is unfortunate if others have wells that can produce the regular allowable without damage to the reservoir or to the wells. We see no reason why they sould not be permitted to do it, upon proper application and upon evidence that there would be no waste committed by virtue of a higher or normal allowable for that depth. But so far as the present extension is concerned we do not oppose it for one year, reserving the right if we see fit to request an increased allowable at a future date.

MR. PORTER: Mr. Walker.

MR. WALKER: Don Walker of Gulf Oil. We operate three wells in this pool and we are in accord with Hamon and Warren for a

continuation of the present spacing.

MR. PORTER: If there is nothing further we will take the case under advisement.

The hearing will be recessed until one-fifteen.

(Recess.)

C E R T I F I C A T E

STATE OF NEW MEXICO)
: ss
COUNTY OF BERNALILLO)

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

J. A. Trujillo
Court Reporter

Subscribed and sworn to before me.

Witness my Hand and Seal this, the ____day of August, 1956.

Notary Public

My Commission expires: