BEFORE THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO

IN THE MATTER OF THE APPLICATION
OF AMERADA PETROLEUM CORPORATION
FOR THE ESTABLISHMENT OF PRORATION
UNITS AND UNIFORM SPACING OF WELLS
IN THE KNOWLES POOL IN LEA COUNTY,
NEW MEXICO.

CASE NO. 204

4/3/52

E. H. F.

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STATEMENT OF FACTS

September 9, 1948, Amerada commenced drilling the Hamilton #1 Well located in the NE/4 SW/4 Section 35-16S-38E. (Exhibit #1 is a map of the Knowles pool.) When the well reached the depth of about 6800 feet a show of oil was encountered, and a drillstem test was made indicating oil production from the Paddock zone at that depth. Amerada then continued with the drilling.

While still drilling the Hamilton well before it was subsequently completed in the Devonian formation, Amerada commenced the Stella Rose #1 Well to the North. (SE/4 NW/4 Sec. 35-16S-38E). This well was projected to the Paddock formation which had been discovered on the drillstem test of the Hamilton well. It was then the intention to develop the Paddock Zone on 40-acre spacing. However, when the Paddock Zone was reached it was found dry or absent, and the Stella Rose well was temporarily abandoned.

Then the Hamilton well was completed on May 4, 1949 in the Devonian formation at a plugged-back depth of 12,600 feet. It was a good well, flowing 935 barrels in 24 hours through a 1/2-inch choke. Amerada then determined that the Devonian formation should be developed on 80-acre spacing.

We were then faced with a dilemma. If we deepened the Stella Rose well to the Devonian, it would mean that either that well or the Hamilton well would have to be an exception on an 80-acre pattern. If we did not deepen the Stella

Rose well, but commenced a new well on the 80-acre pattern, then we would have to throw away 6800 feet of hole worth about $70,000.00. We elected to deepen the Stella Rose well and make the Hamilton well the exception. Then we commenced the Eaves #1 well to the south (SE/4 SW/4 Sec. 35-16S-38E) on the regular 80-acre pattern location. All three of these wells were completed in the Devonian.

Then on November 4, 1949, we started drilling the fourth well, the Eaves A (NW/4 NE/4 Sec. 2-17S-38E).

Shortly after the commencement of the fourth well in November, 1949, Amerada filed its application for 80-acre proration units and uniform spacing of wells. The spacing pattern called for a well in the southwest and northeast quarters of each Governmental Quarter Section, with the Hamilton well as an exception.

The 80-acre units proposed were the south half and north half of each Governmental Quarter Section, with a few exceptions to avoid pooling of separately owned tracts, but did not change the proposed location of any wells.

1. FIRST HEARING

The case was first tried on November 22, 1949. No one opposed the application. Magnolia Petroleum Company stated that it concurred.

Amerada presented the testimony of its geologist, Mr. John A. Veeder, and its engineer, Mr. R. S. Christie. There was also introduced into evidence the Schlumberger logs of

all wells drilled in the pool and a map showing the location of the proration units and spacing pattern requested.

Mr. Veeder testified that this pool had good vugular and vein porosity comparable to the Jones Ranch Field approximately 12 miles away which is being satisfactorily developed on 80 acres.

Mr. Christie testified that in his opinion this pool has an effective water drive, and that the productivity index indicates good permeability and good productivity.

Both the geologist and the engineer testified that in their opinion one well in this pool would effectively drain an area of at least 80 acres.

It was further shown that the discovery well cost $351,000 and future wells were estimated to cost approximately $260,000 to $270,000.

On January 11, 1950, the Commission entered its order R-3 finding Amerada's evidence insufficient, and denied the application. Exhibit 2 is a copy of Order R-3.

2. REHEARING

Amerada thereupon filed its application for rehearing and was joined in amicus curiae by Magnolia, Gulf, Sinclair and F. J. Danglade, being all of the lessees in the field.

The rehearing was granted and the case was set for trial again on February 21, 1950, but was continued to March 21, 1950.

A number of royalty owners in the area represented by their attorney, Mr. Rose of Hobbs, filed a protest stating:

"Whereas, the undersigned owners of mineral rights affected did not appear to resist said application for the reason that they had been under the belief that wells drilled in said area would be allotted a double allowable, which now appears to them not to be true."

At the hearing Mr. Rose, attorney for the royalty owners, stated:

"At the time the original hearing was held on the Knowles Field application, no royalty owner appeared to resist the same. Now it is the assertion of certain royalty owners who have signed the exhibit which I will hereafter seek to introduce into evidence to the effect that they did not appear for the reason they were under the impression that Amerada would be given double allowable on this proposed 80-acre spacing. The royalty owners did not know until the transcript came that Amerada was not seeking more than top unit allowable. Then the royalty owners came. That is why they were not here heretofore, at least not here to testify."

Also in this connection at the hearing Governor Mabry stated:

"This is under the protest of royalty holders who claim that they did not know that double allowable was not being sought at that first hearing. The protest will be considered for what it is worth--not too important."

All previous testimony and exhibits were again introduced

into evidence. At this time there were three producing wells and one drilling well in the field.

Mr. C. V. Millikan, Chief Engineer for Amerada, testified that in his opinion one well would drain an area of at least 80 acres. In justification of this conclusion he pointed to the evidence indicating an active water drive and open type porosity.

The geometry of spacing was explained with appropriate exhibits. It was pointed out that geometrically, 80-acre spacing is in the form of a square in the same manner as is 40-acre spacing, where the wells are located in the center of the 40-acre tract. It was further pointed out that since the statewide 40-acre spacing rules permit off-center locations that they permit and recognize that one well will drain an area of 80 acres. This situation exists in about 75% of the wells in the Hobbs pool and in about 30% at Monument.

The royalty owners offered the evidence of a petroleum engineer, Mr. Ralph Fitting. He did not deny that one well would drain 80 acres. On the contrary, he stated that it was reasonable to expect a water drive in the Knowles pool. His testimony was, in substance, that the bypassing of oil in a water-drive pool and also coning would be aggravated on 80-acre spacing. He admitted on cross-examination that this situation would exist under any spacing and also regardless of spacing it would be affected by the rate of production.

At the time of this hearing the Eaves A Well was being drilled. We then advised the Commission that we were coring

that well and would furnish the Commission with a copy of the core analysis as soon as it was available. This was done.

3. TEMPORARY ORDER (R-23)

On June 14, 1950, the Commission entered Order No. R-23 establishing temporary 80-acre units. In the Order the Commission found:

> "Due to the relatively short history of the wells in the Knowles Pool and the lack of adequate geological and engineering data, it is impossible for the Commission to determine at this time if a spacing pattern of one well to an 80-acre tract will economically drain the oil within the common reservoir. It is in the interests of conservation that a drilling pattern of one well to an 80-acre tract be adhered to temporarily and until other wells are completed which will furnish more complete data on the characteristics of the common reservoir."

The allowable for each 80-acre unit was left at the regular 40-acre allowable for wells of that depth.

It was then ordered that the case be continued until December 20, 1950, when it would again be heard and a permanent spacing pattern then determined. Exhibit 3 is a copy of Order R-23.

4. PERMANENT ORDER (R-40)

On December 20, 1950, the case again came on for hearing before the Commission.

On December 20, 1950, the Commission entered its Order R-40 making 80-acre spacing permanent. In the Order the Commission found:

> "That it is in the interests of conservation that a drilling pattern of one well to an 80-acre tract be established."

The Order also provided for double allowable. Exhibit 4 is a copy of Order R-40.

5. EXCEPTION ORDER (R-52)

After the completion of the Eaves "A" Well Amerada drilled another well known as Cooper #1. (NW/4 NW/4 Sec. 2-17S-38E). This, however, resulted in a dry hole and the well was plugged and abandoned on October 16, 1950.

Amerada also drilled another dry hole known as Eaves #2 (SE/4 SE/4 Sec. 35-16S-38E) which was plugged and abandoned on January 25, 1951.

In December, 1950 Amerada filed its application for an exception to drill another well (Cooper #2, NE/4 NW/4 Sec. 2-17S-38E) in the same 80-acre unit in which the dry hole was located. This well was asked to be drilled on the other 40-acre tract. Amerada asked that the Commission set the allowable for the exception well.

On January 29, 1951, the Commission entered Order R-52 authorizing the drilling of the exception well known as Cooper #2. The evidence at the hearing disclosed that about 60% of the 80-acre unit was productive. The Commission set the

allowable for the exception well to be the normal 40-acre unit allowable with deep well adaptation. Exhibit 5 is a copy of Order R-52.

6. ISSUES INVOLVED IN PRESENT HEARING

The Commission has now, on its own motion, requested that Amerada show cause why the 80-acre spacing order now in effect for the Knowles Pool should be continued. Exhibit 6 is a copy of the notice of the present hearing.

In all of the previous hearings of this case, the conclusion that one well will adequately drain 80 acres remains undenied. The most that can be said against this conclusion is the testimony of Mr. Fitting to the effect that the by-passing of oil by water and coning around the well bores is aggravated by 80-acre spacing. But Mr. Fitting admitted that the same situation existed on 40-acre spacing and that, regardless of spacing, it was affected by the rate of production.

It has been established by competent, uncontradicted evidence in the many hearings of this case that one well will efficiently and economically drain 80 acres. It has also been established by competent uncontradicted evidence that the uniform spacing pattern proposed by Amerada protects the correlative rights of all interested parties.

The Commission can make exceptions and adjust the allowable to protect the equities in any situation where a disturbance of correlative rights is threatened. This was done in connection with the two Cooper wells.

The protest by the royalty owners was that not enough allowable had been authorized. The question of allowable for the Knowles Pool has at all times been left to the discretion of the Commission.

69-213, New Mexico Statutes 1941 provides:

"No owner of a property in a pool shall be required by the Commission, directly or indirectly, to drill more wells than are reasonably necessary to secure his proportionate part of the production. To avoid the drilling of unnecessary wells a proration unit for each well may be fixed, such being the area which may be efficiently and economically drained and developed by one well. The drilling of unnecessary wells creates fire and other hazards conducive to waste, and unnecessarily increases the production costs of oil or gas, or both, to the operator, and thus also unnecessarily increases the cost of the products to the ultimate consumer." (As amended by Section 13(b), Chap. 168, 1949 Session Laws.)

Where one well will drain 80 acres, the drilling of extra wells is unnecessary and under the Statute constitutes waste. On the testimony heretofore presented, the Commission properly followed the law in entering the 80-acre spacing order. The Commission having entered such order "in the interests of conservation" and the order having become final, the question now presented is upon what basis can such order be revoked and what evidence should be required to set it aside.

In Oklahoma the Supreme Court held that the Corporation

Commission has no authority to modify a spacing order which has become final unless there is presented some competent evidence showing a change in conditions or that waste is being committed. Application of Continental 178 Pac. (2d) 880, Carter Oil Company vs. State 238 P (2d) 300; Wood Oil Company vs. Corporation Commission 239 P. (2d) 1021.

In Mississippi the Supreme Court held that the Oil and Gas Board correctly dismissed an application to modify a spacing order where no new developments or change of condition was shown. State vs. Superior Oil Company 30 So. (2d) 589, The Court said:

> "Most assuredly, the statute does not contemplate that two hearings shall be had upon the same issue between the same parties and on the same evidence."

Therefore the question now before the Commission is whether any waste is now being committed and whether there has been any change in condition since the entry of the last order which authorizes or justifies the revocation of 80-acre spacing for the Knowles Pool.

There is the further question of whether the order should be amended to provide for a different allowable for the Knowles Pool.

Also, there is before the Commission the question of whether a pressure maintenance program is feasible at this time.

7. TESTIMONY OF JOHN A. VEEDER, GEOLOGIST

Mr. John A. Veeder is a Geologist for Amerada Petroleum Corporation and is qualified to testify as an expert witness. The substance of his testimony is as follows:

(1) At the time of the rehearing three producing wells had been drilled and one well was then being drilled.

(2) Exhibits 7, 8, 9 and 10, respectively, are Schlumberger logs of Eaves "A", Eaves #2, Cooper #1 and Cooper #2, being all of the wells drilled in the pool at the Devonian formation since the rehearing as follows:

7 - Eaves "A" #1
8 - Eaves #2
9 - Cooper #1
10 - Cooper #2

(3) Exhibit 11 is a tabulation of the pertinent drilling data for all wells in the Knowles Pool.

(4) Exhibit 12 is a structure map of the Knowles-Devonian Pool.

(5) The Eaves "A" well was cored, but at the time of the last hearing the core analyses had not yet been prepared. A copy was subsequently filed with the Commission. Exhibit 13 is the core analyses.

(6) I previously testified that the Knowles pool has vugular and good vein porosity. Additional geological information obtained from the drilling of Cooper #2 and the study of the core analyses confirms that opinion.

(7) It is now my opinion from a study of all presently existing geological information and by comparison with other

similar Devonian limestone reservoirs that this pool has good vugular and vein porosity.

(8) It is now my opinion that the porosity is continuous and connected throughout the reservoir.

(9) There has been no change of condition since the entry of the permanent 80-acre spacing order from a geological viewpoint that would justify a revocation of the order. On the contrary, the additional information confirms my previous opinions.

8. TESTIMONY OF R. S. CHRISTIE, PETROLEUM ENGINEER

Mr. R. S. Christie is a Petroleum Engineer for Amerada Petroleum Corporation and is qualified to testify as an expert witness. The substance of his testimony is as follows:

(1) The average gas-oil ratio of all wells in the Knowles Pool is 150 cu. ft.

(2) The gravity of the oil is 48° API.

(3) The P.I. test on Eaves "A" well was 3.0.

(4) The P.I. test on Cooper #2 was 2.3.

(5) Exhibit 14 is a graph showing the oil and water production by months, cumulative production and bottom hole pressure at Knowles to March 1, 1952.

(6) Exhibit 15 is a graph showing the monthly oil and water production by wells to March 1, 1952.

(7) The small decline in pressure for the amount of oil produced with a low gas-oil ratio confirms my previous opinion that this pool is under an effective water drive and that one well will effectively drain an area of eighty acres.

(8) The core analyses, the production history and all additional information obtained since the last hearing confirms my previous opinion that the Knowles pool has good permeability conducive to wide drainage.

(9) It is now my opinion that one well will efficiently and economically drain and develop an area of 80 acres.

(10) The average cost of Devonian producing wells at Knowles has been approximately $310,000 per well.

(11) The increase in water production is due to the fact that the initial completions were near the water table and because of the high permeability the water encroached rapidly with oil withdrawals.

(12) The decrease in oil production is due to the decrease in relative permeability caused by plugging of the pores by some foreign material. There is a black residue in the formation that appears to plug up the pores as fluids move toward the well bore.

(13) The increase in water production and the decrease in oil production is not caused by its wide spacing of wells and will not be corrected by revoking the 80-acre spacing order and changing the spacing to 40 acres. It is my opinion that the same result would have occurred for the same amount of production had the wells been located on 40-acre spacing.

(14) The allowable for each 80-acre proration unit in the Knowles Pool should be one top unit allowable for regular 40-acre unit with deep well adaptation.

(15) It is my opinion that no waste is now being com-

mitted. Therefore, no waste will be prevented by reducing the spacing from 80 acres to 40 acres.

(16) There has been no change of condition since the entry of the 80-acre spacing order, from the standpoint of reservoir performance, that would justify a revocation of the order. On the contrary, the additional information obtained by subsequent drilling and tests made establishes that this pool can be properly developed without waste on 80-acre spacing.

(17) It is my opinion that the correlative rights of all parties are being protected under the existing order and there is no unequal net drainage between tracts.

(18) In view of the natural effective water drive which is maintaining the reservoir pressure at a constant high level, it is my opinion that artificial pressure maintenance by water flooding would serve no useful purpose at this time, but would entail unnecessary expense without increasing the ultimate production.

9. CONCLUSION

The permanent 80-acre spacing order heretofore entered was fully justified by the evidence and the law. There has been no change in condition since the entry of that order which requires the revocation of that order. On the contrary, all of the new information obtained by additional drilling and additional testing confirms the correctness of the existing 80-acre spacing order.

The evidence at this time is sufficient to justify the entry of an 80-acre spacing order even if one had not been

heretofore entered.

There is no waste now being committed that could in any manner be corrected by the revocation of 80-acre spacing.

The allowable provisions of the existing order should be amended to provide for a regular 40-acre unit allowable with deep well adaptation for each 80-acre proration unit.

The natural effective water drive which is maintaining the reservoir pressure at a constant high level renders unnecessary any artificial pressure maintenance program at this time.

Respectfully Submitted

SETH & MONTGOMERY

By_____

Harry D. Page

Booth Kellough

ATTORNEYS FOR AMERADA
PETROLEUM CORPORATION