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*Mt. Hope
and Walker
See File # 2 (Cause # 9)*

BEFORE THE OIL AND GAS CONSERVATION COMMISSION
OF THE STATE OF COLORADO

IN THE MATTER OF THE INVESTIGATION)
TO TAKE MEASURES TO PREVENT WASTE)
OF OIL AND GAS IN THE MT. HOPE)
NORTH FIELD, IN LOGAN COUNTY,)
COLORADO!)

CAUSE NO. 41

PURSUANT TO NOTICE the above-entitled matter came
duly on for hearing at 704 State Capitol Annex Building,
Denver, Colorado, at the hour of 11:45 a.m., July 29, 1954.

BEFORE:

Mr. Warwick Downing, Chairman
Mr. H. C. Bretschneider, Commissioner
Mr. F. M. Van Tuyl, Commissioner
Mr. A. J. Jersin, Deputy Director
Mr. D. V. Rogers, Petroleum Engineer
Miss Annabel Hogsett, Assistant Secretary.

APPEARANCES:

R. T. Robberson, Esq., Denver, Colorado, for the
Shell Oil Company;

Wilbur Rocchio, Esq., Assistant Attorney General
for the Oil & Gas Conservation Commission.



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COMMISSIONER BRETSCHNEIDER: This is Cause No. 41.
We will take the appearances.

MR. ROBBERTSON: R. T. Robberson, attorney for Shell Oil Company, the petitioner in this casue. Shell Oil Company respectfully requests that the Commission order the establishment of 40-acre drilling and spacing units for the development and exploitation of the "D" sand and "J" sand in the Mt. Hope North Field underlying the east half of the southeast quarter of Section 7, the west half of the southwest of Section 8, the west half of Section 17, the northeast quarter and the east half of the southwest of Section 18, and the northeast quarter of Section 19, in Township 9 North, Range 53 West, in Logan County Colorado. And as set forth in its petition, Shell Oil Company further requests that the Commission order that wells to be drilled to and produced from the "D" sand and the "J" sand in this field be located in the center of each governmental quarter quarter section with exceptions to be made for existing well locations as set forth in its petition. The exceptions which petitioner requests in its petition will be more fully detailed in the testimony of its witness.

Shell Oil Company further requests that the Commission vacate its Order No. 9-1 in Cause 9 in the Walker Field in so far as it pertains to the "J" sand underlying the west half of Section 17, Township 9 North, Range 53 West. Shell Oil Company further requests that the Commission amend its Order 21-1 in

Cause 22 to apply to the Mt. Hope North Field, that is the land previously described. In support of our petition herein we ask leave of the Commission to call Mr. N. J. Matthews as Shell Oil Company's witness.

MR. ROCCHIO: Mr. Robberson, am I correct, is that west half of 17 that you talk about as to the "J" only or "J" and "D"?

MR. ROBBERSON: Should be "J" and "D".

(Whereupon, a document was marked as Shell's Exhibit A for identification.)

N. J. MATTHEWS:

called as a witness for the Shell Oil Company, being first duly sworn according to law, upon his oath testified as follows:

DIRECT EXAMINATION

BY MR. ROBBERSON:

Q. Mr. Matthews, will you state your full name and address please.

A. N. J. Matthews, 921 Ursula Street, Denver, Colorado.

Q. By whom are you employed?

A. Shell Oil Company.

Q. You testified, did you not, Mr. Matthews, in the preceding Cause 38?

A. I did.

MR. ROBBERSON: Will the Commission accept Mr. Matthews'

qualifications to be a witness in this cause?

COMMISSIONER BRETSCHNEIDER: Yes, sir, we will.

Q. Mr. Matthews, are you the engineer in charge of Shell's operations in the Mt. Hope North Field?

A. Yes.

Q. Have you made a study of the Mt. Hope North Field from an engineering and geological standpoint?

A. Yes.

Q. I hand you a plat marked Shell's Exhibit A and ask you if this plat was prepared under your direction and supervision?

A. Yes, it was.

Q. Are the entries thereon correct to the best of your knowledge?

A. They are.

Q. Will you please explain that plat in detail.

A. This is a plat which is contoured on the top of the "D" sand reservoir, the structural contours are based upon our seismic and subsurface interpretation. The wells on this plat are indicated by circles. Those producing from the Muddy sandstone being a solid black circle and those producing from the Dakota sandstone by a plain circle. The drilling wells are indicated by the presence of a vertical line in the circle, while a dry hole is indicated by a circle with vertical and horizontal lines. A well which was previously producing from

one zone and subsequently re-completed in another zone is indicated by half solid, half plain circle with a line drawn through the portion of the circle that was plugged off as is the case of the well located in the southeast northwest northeast of Section 19, 9 North, 53 West. The elevation of the well is on the left of the well spot, while the number of the well is on the right.

The data relating to the sub-sea top of the principal reservoirs, the total depth of the well, its casing point, plug back depth and perforated interval is shown directly underneath the well spot and in some instance is above it. The bracket immediately beneath the above data shows the month and year during which the well was completed and the daily oil producing rate for which it was completed. The presence of two brackets under the well data indicates that the well was worked over with the lowest bracket showing the work-over date and the daily producing rate that was obtained by the work-over. The area to be spaced is crosshatched and the drilling and spacing units within the crosshatched area are set forth by dotted lines. Crosses in these drilling and spacing units indicate the location of the proposed well for each drilling and spacing unit.

Q. Are you familiar with Shell's well designated as C. F. Green B. No. 17?

A. Yes.

Q. What's the location of that well?

A. The southeast quarter of the northwest quarter of the northeast quarter Section 19, 9 North, 53 West.

Q. Mr. Matthews, will you please give any pertinent data that you have pertaining to this well.

A. The well was drilled to a total depth of 5122 feet and encountered the top of the "D" sand at 4906 feet and the top of the "J" sand at 5007 feet. Both horizons were found to be oil saturated and contained 7 and 4 feet of oil respectively. The well was completed during January, 1953, as a "J" sand producer through casing perforations from 5012 to 5019 feet. On its initial 24 hour test it pumped 82 barrels of oil with a trace of water. After producing from the "J" sand reservoir for approximately one year, production rates declined to 10 barrels per day, and during this time the well accumulated only 5400 barrels of oil. The well was plugged back to the "D" sand and re-completed through casing perforations from 4910 to 4914, and on its initial production test pumped 78 barrels of oil and no water in 24 hours.

Q. Are there any other wells in this area?

A. There are.

Q. Would you please give any pertinent data that you have pertaining to those.

A. McDermott and Barnhart E. E. Britton No. 1 located in the southeast southeast northeast of Section 18, 9 North,

53 West, was drilled to a total depth of 5077 feet. The "D" sand was encountered at 4851 feet and found to contain 6 feet of oil pay. The "J" sand was encountered at 4953 feet and found to contain 6 feet of oil pay. The "J" sand in this well was drillstem tested and recovered approximately 330 feet of oil. The well was completed during April, 1954, through casing perforations from 4851 to 4859 opposite the "D" sand and on its initial production test produced 132 barrels of clean oil with a gas-oil ratio of 546 cubic feet per barrel in 24 hours.

McDermott and Barnhart E. E. Britton No. 2 located in the southeast northeast northeast of Section 18, 9 North, 53 West, was drilled to a total depth of 5070 feet. The "D" sand was topped at 4836 feet and penetrated 6 feet of net oil sand, while the top of the "J" was encountered at 4944 feet. The "J" sand was drillstem tested and recovered 990 feet of gas, no oil, and 330 feet of muddy water. The well was completed during July, 1954, through casing perforations opposite the "D" sand reservoir from 4837 to 4842 feet. On its initial production test the well pumped at a daily rate of 144 barrels of clean oil.

Q. Have the gas-oil and oil-water contacts been established in this field?

A. No.

Q. Mr. Matthews, make reference to the plat that you

have before you and state whether in your opinion the area sought to be spaced encompasses the entire reservoir of oil and gas?

A. As can be seen on the plat the spaced area has 5 dry holes on its east, west, and south edges. The seismic information indicates a presence of a low area, therefore I believe the area to be spaced encompasses the entire reservoir of oil and gas.

Q. In your opinion are the "D" and "J" sand reservoirs underlying the area to be spaced contiguous to those reservoirs underlying the Mt. Hope Field which is located immediately to the south?

A. No.

Q. What is the basis of that answer?

A. During December, 1953, a bottom hole pressure survey was run in C. F. Green B No. 17, which is in the area to be spaced, and in 16 key wells in the Mt. Hope Field. The average of the pressures measured in the Mt. Hope Field was 665 pounds per square inch gauge at a minus 650 datum, while the bottom hole pressure observed in C. F. Green B No. 17 at the same datum was 1154 pounds per square inch gauge. In addition to this datum Mr. Conaway with British-American has just informed me that they ran a bottom hole pressure in their C. F. Green No. 1 located in the northwest northwest northwest of Section 20,

9 North, 53 West. This pressure was ran on February 7, 1954, and indicated the bottom hole pressure to be 1158 pounds per square inch gauge, which is well in line with the bottom hole pressure that was observed in Shell's C. F. Green B No. 17. In addition to the bottom hole pressure data, C. F. Green B No. 15 located in the northwest northwest southeast of Section 19, 9 North, 53 West, found the "D" and "J" sand reservoirs both non-productive of oil or gas and was plugged and abandoned, and as can be seen on the plat this well lies between the Mt. Hope Field and the area to be spaced.

Q. Is it your opinion that the "D" and the "J" sand reservoirs underlying the area to be spaced are contiguous with those reservoirs underlying the Walker Field, which is adjacent to this area to the east?

A. No.

Q. And upon what is that answer based?

A. Shell's J. F. Kirk A No. 3 located in the northwest northwest southeast of Section 17, 9 North, 53 West, found the "D" and "J" sands non-productive of oil or gas and was completed as a dry hole. On the plat you can see that this well is located between the Walker Field and the area that we are requesting to be spaced.

Q. It is then, is it not, your opinion that the west half of Section 17, Township 9 North, Range 53 West, as it was spaced under Order 9-1 in Cause 9, the Walker Field, that

that order should be vacated?

A. It is.

Q. What is the porosity and permeability of the "D" sand in this area?

A. Based on a core analysis for McDermott and Barnhart Britton No. 1, the average porosity and permeability of the oil saturated portion of the reservoir is 19.6 per cent and 175 millidarcies respectively.

Q. And what is the porosity and permeability of the "J" sand in this area?

A. Based on core analysis taken in the same well of the "J" sand reservoir the average porosity of the oil saturated portion of the reservoir is 20.8% with a corresponding permeability of 76 millidarcies.

Q. What is the solution gas-oil ratio?

A. It is estimated at 400 cubic feet per barrel in both the "D" and "J" sand reservoirs.

Q. In your opinion what is the reservoir mechanism in this field?

A. Solution gas.

Q. How do the bottom hole pressures in the "D" and the "J" sand reservoirs compare in the area to be spaced?

A. Based on a drillstem test pressure recorded in McDermott and Barnhart E. E. Britton No. 1, which covered oil from both the "D" and "J" sands, the pressures were indicated

to be within 10 pounds per square inch of one another.

Q. In your opinion if these reservoirs were produced simultaneously in the same well bore, would damage then result to either reservoir?

A. No.

Q. And upon what is that answer based?

A. Bottom hole pressures in these reservoirs vary by only 10 pounds per square inch. It is therefore unlikely that either reservoir will thief the other.

Q. Based on the facts relating to porosity, permeability, bottom hole pressure, solution gas-oil ratio, and type of recovery mechanism, is it then your opinion that one well will adequately drain 40 acres?

A. Yes.

Q. Do you supervise the computation of well costs for Shell Oil Company?

A. Yes.

Q. What is the cost of drilling, completing, and equipping a well in this area?

A. Approximately \$62,000.

Q. In your opinion if one well is drilled per 40 acres, how much oil will it recover?

A. Based on core analysis a "D" sand well would recover 48,000 barrels, and based on production history from Shell Green B 17 and low drillstem test recoveries from McDermott

and Barnhart No. 1 a "J" sand well would recover 10,000 barrels; while a commingled producer, that is a well that produces from both the "D" and "J" sand, it would produce approximately 58,000 barrels.

Q. In your opinion if two wells were drilled on 40 acres how much oil would each produce?

A. One half the amount just stated or 24,000 barrels from the "D" sand, 5,000 from the "J", and 29,000 barrels from a commingled "D" and "J" producer.

Q. With reference to the economic factors and on the basis of your last answers relative to well costs and oil recovery, do you think then that drilling to a density of more than one well to both reservoirs per 40 acres is economically justifiable?

A. No, and in any case we could not drill a well as a "J" sand producer unless we were allowed to commingle it in the same well bore with the "D" sand.

Q. A "J" sand producer alone would not be economically justified?

A. We could not justify a "J" sand producer.

Q. You would then, would you not, recommend to this Commission that in the interest of conservation and prevention of waste and drilling of unnecessary wells that 40-acre drilling and spacing units for the development of both the "D" and the "J" sand in this area be approved and ordered by

the Commission as requested in Shell's petition?

A. Yes.

Q. You would also recommend, would you not, to this Commission that in the interest of conservation and prevention of waste and in the drilling of unnecessary wells that Order 22-1 which pertains to the commingling of production from the "D" and "J" sand reservoirs be extended to cover all of the acreages in the area to be spaced?

A. Yes.

MR. ROBBERSON: Do the members of the Commission have any further questions?

COMMISSIONER BRETSCHNEIDER: I would like to ask one. Is there a particular reason why the area in the northwest quarter of Section 20 is not included in this boundary line?

THE WITNESS: It was requested to be spaced last week I understand, so for that reason we didn't include this.

MR. JERSIN: That is in the Mt. Hope East spacing order, Mr. Bretschneider.

THE WITNESS: And that order requests centers of 40's just like we request centers of 40's, so there is no need in us covering it twice.

COMMISSIONER BRETSCHNEIDER: I didn't remember that, but I did know in your testimony that you said the bottom hole pressure on both those wells, No. 1 and the one in 17, were about the same.

THE WITNESS: Well, I just did that to substantiate the fact that these wells over here are not producing from the same reservoir as these wells in the Mt. Hope Field.

MR. ROBBEYSON: I should like to offer then this plat in evidence.

MR. CONAWAY: Since you brought up the problem in that area, it has been discussed in which reservoir this northwest quarter of 20 belongs, and Mr. Matthews and I in comparing our pressures were both of the opinion that it probably falls in that same reservoir in which he is interested, and we have no objection taking the northwest of 20 out of our order and including it in this if the center of the 40-acre pattern and 40-acre spacing is established in this area that he is concerned with, as they do overlap, and it would be rather difficult to identify them.

COMMISSIONER BRETSCHNEIDER: As long as the spacing request is the same it doesn't make much difference which one its included, does it?

MR. ROCCHIO: I think, Mr. Bretschneider, it doesn't make any difference which one it goes into.

COMMISSIONER BRETSCHNEIDER: I think just leave it the way it is.

MR. ROCCHIO: I don't think our publication covers it so it will fall in the other one.

MR. ROGERS: We can't put it in Mt. Hope North

because publication didn't cover it, but it was covered under Mt. Hope East.

COMMISSIONER BRETSCHNEIDER: It belongs to the same spacing and wouldn't make any difference.

MR. ROBBERSON: I should like to cover just one more point. Mr. Matthews, would you recommend that a tolerance be allowed for surface obstructions?

THE WITNESS: Yes.

MR. ROBBERSON: And what amount of tolerance would you recommend?

THE WITNESS: One hundred feet.

MR. ROBBERSON: That concludes our evidence in this cause.

COMMISSIONER BRETSCHNEIDER: Is there anyone else here who would like to appear in connection with this cause? No objection from any other operator? Would anyone like to ask Mr. Matthews any questions?

MR. ROCCHIO: To get this clear, on your Exhibit A the area that you have outlined as the Mt. Hope North, according to your testimony as I get it here is not changed at all as shown in Exhibit A?

THE WITNESS: No, sir.

MR. ROBBERSON: That is right, Exhibit A is right.

THE WITNESS: We haven't changed our areas at all.

MR. ROCCHIO: Then I am clear.

COMMISSIONER BRETSCHNEIDER: If there is no question from anyone or objection, we will take the matter under advisement.

(Whereupon the hearing in Cause No. 41 adjourned at 12:15 p.m., July 29, 1954.)



C E R T I F I C A T E

I, Donald E. Weimer, Certified Shorthand Reporter, hereby certify that I personally recorded in shorthand the proceedings in the foregoing matter in the first instance and that I later transcribed the same and that the foregoing record is true and correct to the best of my knowledge and belief.

Done at Denver, Colorado, this 27th day of August, 1954.

Donald E. Weimer

Certified Shorthand Reporter
2027 Newport Street
Denver, Colorado

Phone
FR7-0358