BEFORE THE

Oil Conservation Commission

SANTA FE, NEW MEXICO

June 28, 1955

IN THE MATTER OF:

CASE NO. 922

TRANSCRIPT OF PROCEEDINGS

ADA DEARNLEY AND ASSOCIATES

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ALBUQUERQUE, NEW MEXICO

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
June 28, 1955

IN THE MATTER OF:

Application of Lowry et al Operating Account for approval of an extension of its pressure maintenance program in the South Blanco-Tocito Pool, Rio Arriba County, New Mexico, to permit the drilling of an additional well to be located in the NW/4 SE/4 Section 4, Township 26 North, Range 6 West; said well to be used as an injection well in the event it is not a commercial producer in the Tocito formation. Case No. 922

BEFORE:

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

TRANSCRIPT OF HEARING

MR. MACEY: The next case on the docket is Case 922. Mr. Kellahin?

MR. KELLAHIN: Jason Kellahin, appearing for Lowry Oil Company in Case 922. Before we put on our testimony I would like to make a brief statement to the Commission, if I may? This is an application for an extension of the pressure maintenance program which has heretofore been approved by the Oil Conservation Commission. In connection with the case, we felt that the Commission was entitled to information in regard to the progress of this pressure maintenance program, it being a unique program in the State of New Mexico.

In the past we have offered considerable testimony, both

engineering and geological testimony in other cases, in an effort to make a full and complete disclosure to the Commission of all the information which is available to Lowry Oil Company, rather than attempt to review the testimony at this time, and a portion of it is essential to our case before the Commission today. We would ask that the Commission take notice of the testimony and exhibits offered by Lowry Oil Company in Cases Nos. 537, 555, 607 and 697.

While the testimony we are offering today we feel amply supports the order which we are seeking, and the case will stand on its own merits, of course, we do feel that a consideration of the full information is advantageous to the Commission. That is the reason we ask that the Commission take notice of this testimony. The information which we offer today will, we believe, both enlighten the Commission and give them some information on the progress of this pressure maintenance program, and also show the necessity for an extension of it at this time. We will have one witness, Mr. Art Holland.

MR. MACEY: Do you wish this witness sworn also for Case 923?

MR. KELLAHIN: We might as well, and just proceed right into it.

MR. MACEY: Let the record show that Mr. Holland has been sworn for testimony in both cases.

MR. KELLAHIN: We are not consolidating the cases.

MR. MACEY: That is right.

A. F. HOLLAND,

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

DIRECT EXAMINATION

By MR. KELLAHIN:

Q Would you state your name, please?

A My name is A. F. Holland.

Q By whom are you employed?

A I am employed by the Lowry Oil Company.

Q What is your position with Lowry Oil Company?

A I am employed as a Petroleum Engineer.

Q Have you testified as an expert, as a petroleum engineer before this Commission in the past, and had your qualifications accepted?

A I have.

MR. KELLAHIN: Are the witnesses qualifications acceptable to the Commission?

MR. MACEY: They are.

Q Mr. Holland, you are representing the applicant in Case 922. Would you state briefly what the application is?

A The purpose of the application is to add an injection well to the pressure maintenance project being operated by the Lowry et al Operating Account in the South Blanco-Tocito Pool.

Q Have you prepared a plat showing the location of that well?

A A plat has been prepared and is marked Exhibit No. 1, showing among others, the following items. The acreage colored in yellow is that operated by Lowry; No. 2, the dashed line represents the presently defined limit of the South Blanco-Tocito Pool, that is the New Mexico Oil Conservation Commission delineation. No. 3, it shows the present wells in the field that are being utilized for water injection.

Q How are those wells shown?

A They are designated by a red circle. Well T-85 is one, located in Section 4. Well T-134 is the other located in Section 10.

Q Where is the location of the proposed injection well?

A The proposed injection well is located in the northwest quarter of Section 4, Township 26 North, Range 6 West.

Q How is it shown on the plat?

A It is indicated by a green circle.

Q What is the status of that well at the present time?

A The well at the present time is nearing completion. The status yesterday was that the Tocito Formation was being cored.

Q Is that core information available to you as yet?

A It is not yet available.

Q Why did you select that location, Mr. Holland?

A The location was selected for several reasons; one being that it is low on structure to the Tocito Formation, another reason is that between the present wells being used for water injection there is a space there where no well had been drilled, and we considered further water injection without injection in that point would possibly trap oil. For that reason it was considered necessary to add an additional injection well.

Q How will that well be completed?

A The well will be drilled to total depth, and casing run to total depth, and perforated opposite the Tocito Formation.

Q Mr. Holland, have you prepared a contour map showing the contour of the Tocito Formation in the area involved?

(Marked Lowry's Exhibit No. 2, for identification.)

A A contour plat is hereby submitted as Exhibit No. 2, which shows the location of the Well T-87, and it shows that the well is low to structure and will probably be one of the lowest wells that has been drilled in the South Blanco Field.

Q Does that contour map show any other information that would be of value to the Commission at this time?

A It shows the structural relation of all the presently producing wells in the pool. It shows the structural position of the wells being used now for water injection.

(Marked Lowry's Exhibit No. 3, for identification.)

Q Now, referring to what has been marked as Exhibit No. 3, Mr. Holland, would you state what that is?

A Exhibit No. 3 is a statement of the Lowry operations in the South Blanco-Tocito Pool, as regards oil production for the past three months. In addition, a graph is attached which describes or outlines those operations since inception of the pool.

Q Referring to that portion of the exhibit which shows oil production during the past three months, what does that reflect in connection with the gas-oil ratios?

A It shows that the gas-oil ratios for the Lowry properties have increased. By referring to the graph it can be seen that gas-oil ratios have been arrested since the institution of the pressure maintenance project and that even with some control there have been increases. At the present time the ratio is, roughly, 2,000 cubic feet per barrel.

Q You say it shows that the gas-oil ratios have increased? You mean by that that they have increased during recent months, or

during the operation of the pressure maintenance program as a whole? Would you clarify that, please?

A The gas-oil ratio, the producing gas-oil ratio for the pool was relatively high. By that, I mean, around 2,000 to 1 at the commencement of the project. After the project had been in operation for several months, gas-oil ratios declined to, oh, something in the neighborhood of 1,200 cubic feet per barrel. Since that time, as production has proceeded, the gas-oil ratio for the pool has gradually increased.

Q What does the Exhibit show, in relation to pressures, as compared to your daily average production?

A It shows that prior to the water injection program, that the average reservoir bottom hole pressure had a rather steep decline. Since commencement of the project the average bottom hole pressure has been retarded. It has not been completely arrested, but the decline has been retarded.

Q The Exhibit does reflect that the gas-oil ratios have been controlled also, does it not?

A They have been aided.

Q Have they been controlled or benefitted to the extent that you believe possible?

A Taking into consideration the present number of injection wells, yes.

Q Would an additional injection well for the injection of water be of benefit in that regard?

A We believe it will. It will disburse the water injection, and we will be able to inject additional water, and attempt to

maintain reservoir pressures, and thereby arrest any increase in gas-oil ratios.

(Marked Lowry's Exhibit No. 4, for identification.)

Q Referring to Exhibit No. 4, Mr. Holland, what does that exhibit show?

A Exhibit No. 4 is a statement of the amounts of water that have been injected during the past three months period, to the South Blanco Project. Also attached is a graph showing the water injection operations in total, since inception of the pressure maintenance program.

Q Is that Exhibit based on the same information which you file regularly with the Commission?

A Yes. All of that information is filed monthly.

Q What does it show in regard to the water injection per day and the accumulative total?

A During the past three months an average of 1,718 barrels per day have been injected. Since inception, to May 31, 1955, 951,960 barrels of water has been injected in the pool.

(Marked Lowry's Exhibit No. 5, for identification.)

Q Do you have an exhibit which shows the affect of that water injection upon the reservoir voidage?

A Exhibit No. 5 shows the degree to which injection of water has balanced production from the reservoir. In summary, the materials were moved from the reservoir, have voided a space of approximately 4,000 barrels per day. Roughly, half of that has been replaced by injected water, leaving a balance of 2,000 barrels per day of reservoir voidage. Approximately half of the reservoir

voidage has been balanced by water injection.

(Marked Lowry's Exhibit No. 6, for identification.)

Q Referring to Exhibit No. 6, Mr. Holland, what is that designed to show?

A Exhibit No. 6 is a statement of the producing gas-oil ratios for the well operated by Lowry in the South Blanco-Tocito Pool. It divides the project into two areas; one which is an area surrounding the initial water injection well, T-134 which has approximately 20 months of water injection history. For those wells it shows in all cases that prior to water injection operations, the gas-oil ratios were high. The last three months or the past three months of this year, it shows that the gas-oil ratios for the same wells have been materially reduced. For most of the wells they are producing at solution gas-oil ratios values. . . One well, the gas-oil ratios has been decreased from 2,463 to 1, to 1479 to 1.

Q What well is that?

A T-109.

Q What has been the effect of the water flood program on Well T-182?

A It had a gas-oil ratio in excess of 5,000 cubic feet per barrel prior to the water injection operation. The well now with a ratio of 800 cubic feet per barrel, approximately solution gas.

Q What has been the effect on the wells more remotely located in the pool from your injection wells?

A All of the wells, with the exception of T-129 have increased in gas-oil ratios. The exhibit is self-explanatory. For instance, Well T-127 had a gas-oil ratio before the project was started, of

1,076 to 1. It now has a producing gas-oil ratio of 3,459 to 1, indicating that the well has not been influenced by water injection. Well T-129, which offsets the second water injection well added to the program, is now being influenced by water injection. The ratio of that well has decreased from 1,230 cubic feet per barrel to 800 cubic feet per barrel.

Q Does that reflect the need for increasing the water injection?

A It shows that wells that have not been influenced by water injection have increasing gas-oil ratios, resulting in low oil recovery efficiency. See, Exhibit No. 2, the contour map will reflect there is a gascap in existence for the pool, and it seemingly means that the gascap is expanding, is not being controlled as much as desirable, and is causing increasing gas-oil ratios.

(Marked Lowry's Exhibit No. 7, for identification.)

Q Have you prepared an exhibit to show bottomhole pressure tests?

A I would like to add to this, that wells in the area of the water injection wells, are showing decreased gas-oil ratios. The overall reservoir picture shows an increasing gas-oil ratio history. For that reason, we desire to influence more wells and maintain more gas-oil ratios on an overall reservoir basis.

Q How can that best be done?

A By additional water injection.

Q Would it be possible to increase the water injection in the present wells now used for injection purposes, and accomplish that result?

A We haven't so far. We have injected about all that they are

capable of taking.

Q Then, an additional well is needed?

A We will have to disperse the water injection in addition to that.

Q Have you prepared an Exhibit showing bottomhole pressure tests?

A Exhibit No. 7 is a record of bottomhole pressure tests, by individual wells, prior to the commencement of the pressure maintenance program and subsequent to the program. Page 1 of that Exhibit lists the wells in the area of the Pilot Program again, and it shows that in all cases that the oil production per change in bottomhole pressure has increased.

Q You mean per pound of change?

A Per pound of change.

Q Yes.

A Two wells have shown increases in pressure, therefore, their oil production per pound of change would be infinite, which is meaningless, but the other wells, for instance T-132 has increased from 374 barrels per pound drop to 1,141 barrels per pound drop. The other wells show like increases. Page 2 lists the wells that have not been influenced by water injection with the exception of Well T-129 again. This data reflects that the oil production per pound change in bottomhole pressure is relatively stable. Our conclusions from this are that water injection has benefitted a large number of wells of the pool, and is materially aiding in increasing ultimate oil recovery.

Q Are all these wells that you have referred to by number shown on Exhibit No. 1, Mr. Holland, so that the Commission could locate them?

A They are posted. Exhibit No. 1 is a plat showing all the producing wells of the South Blanco-Tocito Pool.

MR. KELLAHIN: At this time we offer Applicant's Exhibits 1 through 7, inclusive.

MR. MACEY: Without objection they will be received.

Q Mr. Holland, based on your study of the pressure maintenance program, do you consider it a successful program at this time?

A All of the information that we have been able to assemble to date indicates to us that it is a successful program, and that it will materially increase oil recoveries from the South Blanco-Tocito Pool. The exhibits reflect that without some artificial restoration of energy that recoveries from the field will be low. That is, gas-oil ratios, early in the depletion life of wells has increased to values in excess of five and ten thousand cubic feet per barrel, which indicate low gas recovery efficiency, and, therefore, it was necessary to do something to improve that situation. All of the information we have assembled to date indicates that the water injection operation is successful; for that reason we are asking to enlarge the program and inject more water.

Q In your opinion, is the approval of the enlargement of the program in the injection of more water necessary to the success of the program?

A We think so. We think it will enhance the oil recovery.

Q What is the royalty ownership under the land?

A It is common. That is, the working interest is unadvertised. There is a common working interest in all the leases delineated in the plat on Exhibit 1, that is, which have producing wells, all Federal acreage with producing wells.

Q Is it Federal acreage?

A All of the oil production to date is from Federal acreage.

Q Have you had approval of this proposal before the Commission today from the United States Geological Survey?

A The program was outlined to the United States Geological Survey and it has been approved by Mr. P. T. McGrath on June 15, 1955.

MR. KELLAHIN: That is all. Do you have anything further to add, Mr. Holland?

A I have nothing.

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

CROSS EXAMINATION

By MR. RHODES:

Q This proposed well will make your third injection well?

A That is correct. There are two wells now.

Q What is the relative success, let's say, of the other two? Are you able to inject sufficient water in either of the other two to conduct your program, or is one of the other two injection wells rather a poor one, for injection purposes that is?

A During the month of May some 600 barrels were injected in Well T-85, and some 1,500 barrels in Well T-184.

Q That would indicate then that the second of your two wells was the better of the two injection wells?

A Well, for the month of May the first injection well took more than twice the amount of water, see.

Q At the same pressure?

A At the same pressure.

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

(Witness excused.)

MR. MACEY: Mr. Kellahin, I would like to ask a question for my own personal information. In your application, I believe you requested the use of the well as an injection well in the event it was not a commercial producer.

MR. KELLAHIN: That is correct. The well hasn't been completed, Mr. Macey. They are just now ready to core the formation. If there is any oil that is recoverable they want to produce it until such time as it seems wise to turn it into an injection well.

MR. MACEY: Anyone have anything further in this case? 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 7th day of July, 1955.

Ada Dearnley
Notary Public, Court Reporter

My Commission Expires:

June 19, 1959