BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
August 15, 1957

TRANSCRIPT OF HEARING

Case 1294

DEARNLEY - MEIER & ASSOCIATES
INCORPORATED
GENERAL LAW REPORTERS
ALBUQUERQUE, NEW MEXICO
3-6691 5-9546

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
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IN THE MATTER OF: Application of Ambassador Oil Corporation, Graridge Corporation and Gulf Oil Corporation for an order authorizing a pilot water flood project in the Caprock-Queen Pool in Lea and Chaves Counties, New Mexico, and further, authorizing the applicants to produce at capacity their wells located within and offsetting the pilot water flood program. Applicants, in the above-styled cause, seek an order authorizing the injection of water into the Queen formation of the Caprock-Queen Pool through six wells located in Sections 1 and 12, Township 13 South, Range 31 East, Chaves County, New Mexico, and further, authorizing capacity production from ten wells located within and offsetting the pilot water flood area located in Sections 1, 11, and 12, Township 13 South, Range 31 East, and Section 6, Township 13 South, Range 32 East, in Chaves and Lea Counties, New Mexico.	Case 1294

BEFORE:

Mr. A. L. Porter
Mr. Murray Morgan
Honorable Edwin L. Mechem

TRANSCRIPT OF HEARING

MR. PORTER: The Commission will consider next Case 1294.

MR. COOLEY: Case 1294: Application of Ambassador Oil Corporation, Graridge Corporation and Gulf Oil Corporation for an order authorizing a pilot water flood project in the Caprock-Queen Pool in Lea and Chaves Counties, New Mexico, and further, authorizing the applicants to produce at capacity their wells located

and offsetting the pilot water flood program.

MR. NEWMAN: I am Kirk Newman of Roswell, representing Ambassador Oil Corporation, on behalf of the applicants in this case. Before we swear the witnesses, I would like to state that after further consideration of this matter, and the fact that we do not yet have the need for a capacity type allowable, we have decided that the application is premature and would like to amend our application in this case to omit the portion thereof dealing with the capacity type allowable, with the exception of the ten wells under Rule 5-2.

MR. PORTER: Is there any objection to counsel's amendment to the application? It is so amended.

MR. NEWMAN: We have one witness.

(Witness sworn.)

MR. NEWMAN: I would like to state at this time that although we consider this untimely, we will be back as the need arises.

H. L. McCRACKEN

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

DIRECT EXAMINATION

By MR. NEWMAN:

Q Would you state your name, please?

A H. L. McCracken.

Q By whom and in what capacity are you employed?

A Engineer for Ambassador Oil.

Q Would you state briefly your educational and professional experience?

A I graduated from Southern Methodist University in 1949 with a Bachelor of Science degree in geology. I am a registered professional geological engineer in the State of Texas. I worked three years for the Railroad Commission as, Texas Railroad Commission as field engineer, and three years as an examiner, and since that time I have been a water flood engineer for Ambassador.

MR. NEWMAN: Are the witness's qualifications accepted?

MR. PORTER: They are.

Q In what part of the Caprock-Queen Pool is this proposed water flood project located?

A If you'll turn to the first map in the brochure, this map covers the northern approximately one-quarter of the Caprock-Queen field. The location of the pilot program will be in the approximate center of the map. We have indicated the six injection wells by a half circle colored in red. There is one other pilot program in effect in the field, and we have indicated that by a blue circle. There are six well pilot operations by Graridge, Gulf and Great Western.

(Marked Ambassador's Exhibit No. 1, for identification.)

MR. NEWMAN: We will offer this map as Exhibit 1 in this case.

MR. PORTER: Do you have other exhibits to offer?

MR. NEWMAN: Yes, we will have several other exhibits.

Q Will you give a brief history of the Caprock-Queen Pool?

A The name of the sand to be flooded is the Queen sand of the Permean system. This data is covered on the tabulation of Engineering Data immediately behind the map. The name of the sand to be flooded is the Queen sand of the Permean system. There are no other producing reservoirs in the area. The average top of the Queen sand is 3,030 feet. With respect to the structural features of the reservoir, the structure is that of stratographic trap trending north, northwest with a dip to the east, southeast. There is no gas cap present. Water-oil contact has not been definitely established. There are some wells making a small amount of water in the field insofar as the over-all picture is concerned.

Estimated average effective pay thickness is 12 feet. From a core analysis of two wells early in the life of the field, the average porosity was determined to be 20%. The average permeability to range from 175 to 250 millidarcys, and the average connate water content to be 19%. With respect to the characteristics of the reservoir fluids, the average API gravity is 34 degrees. It's under saturated paraffin base with relatively high salt content.

The field was discovered in November 1940 and during the primary producing life has operated under solution gas drive. The cumulative production from the ten wells immediately surrounding the proposed pilot flood, averages approximately 50,000 barrels per well. With respect to the stage of depletion, all of the wells in this general area are in the surface stage of depletion, averaging in the order of three to four barrels of oil per well per day. As shown on the map, the primary development was one well to each 40 acres.

Q How many oil and gas lease operators of Queen formation wells are there in the immediate area of this flood?

A There are four.

Q Who are they?

A Gulf Oil Corporation, the Graridge Corporation, Great Western Drilling Company, and the Ambassador Oil Corporation.

Q Has an agreement been worked out with the cooperation of all of the applicants in this case for the joint operation of the water flood pilot project?

A An agreement has been worked out and was signed and is in the brochure, and we would like to have it marked Exhibit 2, if we may.

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

MR. NEWMAN: We will introduce it as Exhibit 2.

Q What arrangements have been made for use of water to inject in the Queen formation?

A We secured a water lease from the State Land Office, and obtained permission from the State Engineer to drill three water wells. Now, the source of the water will be the shallow sands down to a depth of approximately 230 feet. We've drilled two of the three wells, and have a capacity from the two in the order of 10,000 barrels. The State Engineer gave us approval to use 495 acre feet, which would be approximately 10,500 barrels per day on an average.

Q Do you have evidence in your exhibits of the granted authority by the State Engineer to use this water?

A Yes, sir, the permits on the three wells are in the file together with a letter of transmittal from the State Engineer's Office. We would like to have those marked collectively as our Exhibit No. 5.

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

MR. NEWMAN: They will be offered.

Q Has any other work been done to determine, with success, that is to determine another source of water other than the fresh water?

A We made a search of the general area on all the data that we could collect on wells drilled to a depth of approximately

5000 feet and found no evidence of any source of sufficient quantity. In addition to that, while doing well work we were logging one of our wells and increased the sensitivity on the neutron side of the gama ray neutron log for the top thousand feet in an effort to see if there was any water in that general area there, in that general depth that we could use. We thought that we might be able to get some at 300 feet. We drilled down to it, but there was no water available there.

Q What is the estimated rate of injection and the pressure at which the water will be injected?

A Based on initial potentials in the field and experience had by the water flood, the pilot water flood that is in operation at the present time, and the logs that we've acquired on the wells, we anticipate an injection rate of in the order of from 500 to 800 barrels a day, and we think that most of the wells will take the water on gravity.

Q Do you have logs on the wells that you are proposing to inject?

A On the four Ambassador wells we've obtained gama ray neutron logs and we would like to have those logs marked collectively as our Exhibit No. 4.

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

MR. NEWMAN: We would offer those exhibits. Those exhibits

are in the folder there.

Q In your opinion will the injection of the water in the Queen sand formation permit the production of oil which would not otherwise be produced, thereby preventing underground waste?

A Yes.

Q Were these exhibits being offered here prepared by you and under your direction? A Yes.

Q There is one other question. What is the completion procedure for these injection wells and converting them to injection wells as far as your casing program is concerned?

A If you will turn to the last sheet in the brochure, there is a tabulation of the casing program on the six proposed injection wells. When this field was developed, in the primary development, the general practice was to drill with rotary down to approximately 3000 feet and then to tail in with cable tools. Well, as a result there is approximately 30 feet of salt and shale opened between the base of your five and a half inch oil string, and the top of the pay.

Now, in three of our wells we have gone back in and cemented a liner down to the top of the pay. In the fourth well the casing was so bad that we ran a new string of pipe to the top of the pay from the surface, a complete new string of pipe.

(Marked Ambassador's Exhibits Nos. 5 and 6, for identification.)

MR. NEWMAN: We would like to offer in evidence our Exhibits 1 through 6 as designated in the testimony, with the casing schedule being Exhibit No. 6 and the tabulation of the Engineer Data being No. 3.

MR. PORTER: Without objection the Exhibits 1 through 6 will be admitted.

MR. NEWMAN: That is all we have.

MR. PORTER: Anyone have a question of Mr. McCracken? Mr. Utz.

CROSS EXAMINATION

By MR. UTZ:

Q Mr. McCracken, did you state where these water wells were located?

A Where the water wells are located?

Q Yes.

A One of the wells is located in the northeast quarter of the southwest quarter of Section 1, Township 12, excuse me, Township 13 South, Range 31 East. The other water well is located in the southwest quarter of the southeast quarter of Section 1, Township 13 South, Range 31 East.

Q Those are the only two wells you have at the present time?

A Yes, sir. We're contemplating drilling a third well, but we also want to get a change of location on it before we drill it so we haven't gone ahead with it yet.

Q Did I understand you to say that you -- three wells is all you wanted to drill? A Yes, sir.

MR. UTZ: That's all I have.

MR. PORTER: Anyone else have a question of the witness? Mr. Irby.

MR. IRBY: I am Frank Irby from the State Engineer's Office, Santa Fe.

By MR. IRBY:

Q Did you enter your letter, March 20th, in evidence? It was your letter addressed to our District Engineer at Roswell.

A With respect --

Q (Interrupting) These applications for shallow water.

A No, sir. I'm sure I didn't.

Q Did you enter your letter of May 3rd--

A No, sir.

Q To our District Engineer? A No, sir.

Q My question refers to the third item of your letter of May 3rd which states "initially it was thought that produced salt water from the nearby field in Lea County would possibly be available for injection in the Caprock-Queen Pool. However, we have been informed by Amerada Petroleum Corporation that this water will be returned to the formation from which it is produced."

A Yes, sir.

Q To what use is this water being put that is returned to the

formation from which it is produced?

A I would assume it would be pressure maintenance.

Q Pressure maintenance? A Yes, sir.

Q And that is an assumption? A Yes, sir.

Q Have you had any further dealings with Amerada concerning the possible use of this water? A No, sir.

Q Have you made any further investigations since your letter of May 3rd with respect to finding some water other than potable water which might be used for this purpose in the future?

A As I pointed out a minute ago when we were talking about the water wells we logged one of the, all of our injection wells, but had the sensitivity on the neutron side increased so that we could better evaluate the first thousand feet, and it looked like we might be able to get some water at 300 feet in drilling one of the water wells where you generally found the top of the red beds in the order of 230 feet, we drilled on down to 300 feet to see if the water was there, see if we could find another source other than the fresh water, but we were unable to develop any water in the well.

Q Were you still in the red beds at that depth?

A Yes, sir.

MR. IRBY: That's all. Thank you.

MR. PORTER: Any other questions?

MR. COOLEY: Yes, just a minute.

MR. PORTER: Do you have a question, Mr. Cooley?

MR. COOLEY: Yes.

By MR. COOLEY:

Q I believe you testified that the injection rate would be somewhere between five and eight hundred barrels per day per well?

A Yes, sir. Of course, now, Mr. Cooley, that is an estimate because we actually don't have any tests in our data with respect to the reservoir is very limited, but based on the initial potential test for the wells in the area, plus the rates that they're obtaining on the other pilot flood in the area, we think our rates would probably be in that order.

Q Would you please evaluate for me how five to eight hundred barrels per day injection rate stands, is that high-low?

A It's high. I would call it relatively high, yes, sir.

Q Mr. McCracken, is it true that if you commence a water flood at a high injection rate, that you would run a risk of losing some oil and not getting a great recovery than if you went to a low production rate?

A No, sir. Would you ask that question again?

Q If you got a high injection rate, would you have to have a high production rate?

A If you have a high injection rate do you have to have a high production rate? If you put it in you have to take it out.

Q Yes, then if you start at a high injection rate, then cut

to a lower injection rate which would give you a lower production rate, would you incur any damage in the reservoir in loss of oil?

A I'd really prefer if it's all right with the Commission, to present data along those lines when we come back on our capacity type allowable. It's kind of getting into that question.

Q Isn't it true that if the answer to that question is in the affirmative, we would lose oil to reduce the production later? If the answer is in the affirmative and you commence at a high injection rate, would not the curtailment of production at a later date cause waste?

A In my opinion it definitely would.

Q Now, if you should proceed to inject at a lower rate, would there be any loss of oil through the low production? You have low injection, low production throughout the life of the water flood?

A I fail to see where the significance of a change, in my opinion, the higher injection rate will recover more oil. Now, if you started low and then went up to a higher rate well, you would still have the production, but you are still going to hurt when you reduce your injection rate.

Q If you start high and reduce, your testimony is that you are apt to lose some oil?

A In my opinion that is true.

Q If you start low and stay low, will you lose any oil?

A I don't think that the changing of injection rates after you get say an established rate, has anything to do with it. I mean I think the main difference in my opinion is the difference between high injection and low injection, and I think that the greatest ultimate recovery will be from high injection rates.

Now, like I say, we would like to put, come a little bit better prepared for that portion of the hearing which is kind of getting into the capacity part of it.

Q You testified that you have only one well on these 40 acres throughout this proposed unit? A Pardon.

Q You have only one well on each 40 acre unit throughout the project area?

A That was the primary development, yes, sir. One well to each 40 acre unit.

Q Is there only one well presently drilled in the six 40 acre units in which you have injection well,, is the injection well the only well drilled in that unit?

A That's right.

Q The effect would be to leave that unit without any production whatsoever? A Yes, sir.

Q Since oil is prorated per unit?

A Yes, sir.

MR. COOLEY: That is all.

MR. PORTER: Mr. Newman.

RE-DIRECT EXAMINATION

By MR. NEWMAN:

Q At the estimated rate of injection, how long do you predict that it will be before you will have a fill up of the reservoir and a kick in the oil production?

A I would estimate from six to nine months.

Q And if your injection rate were lower, it would increase?

A Longer time.

Q Increase it proportionately? A Yes.

MR. PORTER: Anyone else have a question? Mr. Montgomery.

RE-CROSS EXAMINATION

By MR. MONTGOMERY:

Q How much water will it take to fill up this space, fill up this area?

A I haven't made calculations on this area itself. It would be, of course, you have got to replace the cumulative production from the reservoir which has been approximately 56,000 barrels per well.

Q You have authority, as I understand it, for 495 acre feet and you anticipate that you will need more water than that?

A No, sir.

Q Do you anticipate that you will need more water than that?

A No, sir.

MR. COOLEY: Is there a time limit on your water permit?

A No, sir.

MR. PORTER: Anyone else have a question? The witness may be excused.

(Witness excused.)

Anyone have anything further in this case? Mr. Kastler.

MR. KASTLER: Mr. Kastler, representing Gulf Oil Corporation. As one of the co-applicants in this matter, it is our opinion that a pilot water flood project will improve the feasibility of continued water flooding in the Caprock-Queen Pool. Therefore, we concur in the application.

MR. PORTER: Anyone else have a statement?

MR. COOLEY: I have a telegram from Great Western Drilling Company addressed to the Oil Commission. "Re Case 1294 wherein Ambassador Oil Corporation seeks an order for capacity water flood in the Caprock Queen Pool, Great Western Drilling Company, as an offset operator, has no objection to the proposed plans. Great Western Drilling Company. M. B. Wilson."

MR. ADKINS: Grant Adkins, representing Union Oil Company, California, who has about thirty wells in this field. I would like to go on record as supporting Ambassador in their application. We believe that granting of this application will result in an increased recovery of oil in the Caprock-Queen field.

MR. PORTER: Anyone else have a statement? If nothing further in the case, we will take it under advisement.

(Recess.)

C E R T I F I C A T E

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 day of August, 1957.

Ada Dearnley
Notary Public-Court Reporter

My commission expires:

June 19, 1959.