BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO

IN THE MATTER OF:

CASE NO. 1324

TRANSCRIPT OF PROCEEDINGS

DEARNLEY - MEIER & ASSOCIATES
INCORPORATED
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ALBUQUERQUE, NEW MEXICO
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MARCH 6, 1958

NEW MEXICO OIL CONSERVATION COMMISSION

Mabry Hall

Santa Fe, NEW MEXICO

REGISTER

HEARING DATE Examiner March 6, 1958 TIME: 9:00 a.m.

NAME:	REPRESENTING:	LOCATION:
Robert H. Vick	Garrity & Corp.	Breckenridge, Tex.
[illegible]	"	"
R R Spurrier	Nancy Royal	Santa Fe

BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO

IN THE MATTER OF: Application of Graridge Corporation for an order amending Order R-1073-A. Applicant, in the above-styled cause, seeks an order amending Order No. R-1073-A dated November 13, 1957, to substitue the Malco State "A" Well No. 9, located 2310 feet from the North line and 1650 feet from the East line of Section 31, Township 12 South, Range 32 East, Lea County, New Mexico, as a capacity allowable producing well in the water flood project in the Caprock-Queen Pool in lieu of the Malco State "A" Well No. 2, located 1650 feet from the North line and 1650 feet from the East line of said Section 31.	CASE NO. 1324

BEFORE:

Daniel S. Nutter, Examiner.

TRANSCRIPT OF PROCEEDINGS

MR. NUTTER: The hearing will come to order, please. The first case on the docket this morning will be Case No. 1324. Application of Graridge Corporation for an order amending Order R-1073-A.

MR. ELLIOTT: Mr. Examiner, I am R. L. Elliott, attorney for Graridge Corporation, Breckenridge, Texas. I would like to introduce certain testimony to verify the necessity for substituting the allowable which was set by your Order No. R-1073-A for the Graridge Malco State "A" Well No. 2 located in the Southwest Quarter of the Northeast Quarter, Section 31, Township 12 South,

Range 32 East, Lea County, New Mexico, to the Malco State "A" Well No. 9, which has subsequently been drilled in lieu of that well in the same 40-acres because of the loss of the No. 2 Well in an attempt to complete same.

MR. NUTTER: Do you have any witnesses to make appearances this morning, Mr. Elliott?

MR. ELLIOTT: Yes, I would like to have Mr. Robert H. Vick take the stand.

(Witness sworn.)

ROBERT H. VICK

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

DIRECT EXAMINATION

BY: MR. ELLIOTT:

MR. ELLIOTT: Mr. Examiner, this is Robert H. Vick, water flood engineer for Graridge Corporation, who has appeared before your Commission several times, and I assume that you will recognize him as being qualified as an expert witness without further examination.

MR. NUTTER: Would you state your name, please.

A Robert H. Vick.

MR. NUTTER: And you have testified before this Commission on previous occasions?

A Yes, sir.

MR. NUTTER: Mr. Vick's qualifications are accepted and

you may proceed.

Q (By Mr. Elliott) Mr. Vick, in a hearing held before this Commission on October the 28th, which is Case No. 1324, Graridge Corporation, which I believe you testified for, requested a capacity allowable for several wells in the Caprock area, one of which was the Malco State "A" Well No. 2 located in the Southwest Quarter of the Northeast Quarter of Section 31, Township 12 South, Range 32 East in Lea County, New Mexico. Since that hearing, and since the order was issued granting this particular well capacity reduction allowable, has anything happened to changed the need for the allowable on that particular well?

A Well, I might start by giving a portion of the history of the No. 2 Well, would that be sufficient?

Q Yes.

A The No. 2 Well, located in the subject quarter section, was initially a producing well, and then in 1951 converted to an air input well by the Co-op Producing Company, through which air was periodically injected for a period of two or three years. I don't know exactly the length of time, and since the termination of that air injection program, the well has been temporarily abandoned. It was Graridge's intentions, when they started the pilot water flood, the six injection wells on the Caprock pilot flood, to re-enter No. 2 and recomplete it as a producing well, which would be affected by the pilot water flood, and approximately two weeks after the hearing on the capacity allowable that you mentioned a while ago, they

moved in cable tools over in No. 2 and started pulling the tubing, which pulled in two, and subsequent fishing operations failed to recover approximately four hundred feet of it out of the bottom of the hole, and moved off the cable tools and moved in a rotary with drill pipe, and started milling operations, and this proved ineffective as far as getting the fish out of the hole, and after approximately three and a half weeks, the management decided to permanently abandon No. 2 and drill No. 9 as a replacement well.

Q What was the exact location of that No. 2 Well?

A The No. 2, Malco State "A" was located 1650 feet from the North line and 1650 feet from the East line of said Section 13, Township 12 South, Range 32 East, Lea County, New Mexico.

Q Now, what was the location of the No. 9 Well which you stated that you drilled after that one was abandoned?

A The No. 9 Malco State "A" replacement well was located 2310 feet from the North line and 1650 feet from the East line of the same Section 13, Township 12 South, Range 32 East.

Q Is this No. 9 Well in the same 40-acre unit that the No. 2 Well was located?

A Yes, sir, it is.

Q When was the No. 9 Well commenced, do you have that date in mind?

A The potential date on it was February the 6th, I believe, I am not sure of the exact date, the potential date on it.

Q Well, this No. 9 Well was -- Let me put it this way,

the operations on the No. 2 Well in trying to complete it, together with the drilling of the new No. 9 Well, was all done subsequent to this hearing in October?

A The re-work on the No. 2 Well?

Q Yes.

A Subsequent to the capacity water flood allowable hearing, yes, sir.

Q You say this No. 9 Well was completed and potentialled as a producer about February 6th?

A I believe so, yes, sir.

Q Will you state to the Examiner what, if any, affect the pilot flood has shown on this No. 9 Well?

A Well, the initial potential was 109 barrels of oil and no water, which indicated that the oil bank being pushed from the No. 5, Livermore Maxwell State "G" No. 5 injection well had progressed to that area, immediate area of No. 9, and it was actual water flood oil on the initial potential.

Q How is it doing now?

A Well, the last test on the last day of February, the well was producing forty-nine barrels of oil and fifty barrels of water. It's our opinion that when the water production first commenced there some three weeks after initial production, the No. 2 injection well that we spoke of -- I mean, the No. 2 Well that is now abandoned, while it was being used as an air injection well had received approximately five thousand barrels of injected water, which was

slugged periodically to try to increase the effectiveness of the air drive, and we originally thought that the produced water coming into No. 9 might possibly be a portion of that five thousand barrels that was floating around, but subsequent tests and chemical analysis have proved that it is definitely injected water from our pilot water flood enterning No. 9 on a fifty per cent ratio.

MR. ELLIOTT: At this time, Mr. Examiner, so that you can follow the discussion which will come, I would like to introduce into evidence this plat. This plat is shown as Exhibit A in the application.

MR. NUTTER: Is there objection to the introduction of Graridge Corporation's Exhibit No. A?

MR. ELLIOTT: It is the same one that is in the application.

Q (By Mr. Elliott) Mr. Vick, this plat that has just been introduced, was that prepared by you?

A Yes, sir.

Q As indicated on this plat, the six water injection wells are located as they are actually on the ground?

A Yes, sir.

Q And your No. 9 Well which we are talking about lies just to the north of your north injection well?

A That's correct, yes, sir.

Q What seems to be your pattern of drive from these injection wells as of now? Is there any particular direction in

which the drive seems to be going, your water drive?

A It is our interpretation that, looking at the reservoir as a whole, we have about fifty feet of closure from the west side back down to the east side, and the effective permeability seems to be increasing as we go down dip, that fifty feet toward the east side of the lease. All of our -- the big percentage of our effective drive from our water flood is progressing in a northeasterly direction toward the down-dip side, which would indicate the increased effective permeability going down dip possibly toward the water table.

Q In your opinion, how do you think it would affect your water drive if this Commission failed to allow a capacity allowable for this No. 9 Well?

A Well, it actually is a whole picture. I mean, taking the pilot flood as a whole, the sooner we are able to get in and work up another row of injection wells to the northeast, the more efficient our operations are going to be, the more efficient the recovery operations are going to be as far as oil in the ground. We definitely feel that if No. 9 isn't produced at capacity, if we should decrease our injection rate into the injection well No. 5 at this time, we stand the possible chance of losing oil in the tighter streaks of permeability within the sand body, and even though we are producing fifty per cent water on No. 9, we feel we have to go ahead and produce it at capacity in order to have our efficient flood on the reservoir on the whole sand phase,

Q You mean by that then that it is a relief to the north that would keep the more permeable zones in your wells to the east from having a water break-through before the column of oil might have reached there, is that what you mean?

A I don't quite understand your exact question.

Q In other words, if this No. 9 Well were not produced at capacity allowable, and the water drive in that direction were more or less limited because of that, would it affect the wells to the east there more, or not?

A Well, it would certainly go ahead and unbalance our overall situation more, Mr. Elliott, as far as affecting these wells that would be the next row of injection wells, banking up the oil around them and possibly shoving some of it beyond them.

Q Well, do you feel like there would be a strong possibility of waste if this allowable, capacity allowable in No. 9 were not granted?

A Yes, sir, I do, because if we -- In order to maintain this balance I am speaking of here, it would be necessary to cut down our injection on these wells here until such time as we got our injection started into the next row, and if we are to do that, if we were cut down here, we would run the risk of leaving some oil in the tighter streaks of sand that otherwise we would be flooding out with higher rates.

Q What I would like you to do is to verify this statement

in the application:

"That there is and has developed an unbalance condition to the water drive down dip toward the east, and it is imperative that the Graridge Malco State "A" Well No. 9 be allowed to produce to its capacity in order to relieve the pressure of the water in a northerly direction. Failure to afford such relief might well result in a premature water break-through in the Livermore State "G" Well No. 6 and other wells to the east. This, of course, would result in waste to the opeators in the water flood unit as well as to the State of New Mexico because of the reduction in the amount of recoverable oil in the reservoir."

Is that statement true?

A Yes, sir.

Q Then it would be your opinion that if the capacity allowable for the No. 9 Well were not granted, that it would result in waste to the operators as well as the State of New Mexico?

A Yes, sir.

MR. ELLIOTT: I believe that's all I have.

MR. COOLEY: Off the record.

(Discussion off the record.)

Q (By Mr. Elliott) Mr. Vick, are you familiar with the testimony that was introduced in Case No. 1324 which resulted in the capacity allowable under this Commission's Order R-1073-A?

A Yes, sir.

Q Is it your opinion that the testimony upon which this Order was based in that case is still true and correct and hasn't changed any since that time?

A Yes, sir, that's right, in my opinion.

MR. ELLIOTT: Mr. Examiner, since this particular hearing is for the amendment of Order R-1073-A, it is respectively requested that you take into consideration all of the testimony in that hearing with reference to this case.

MR. NUTTER: Is there any objection to the incorporation of the record in Case 1324 as heard on October 17th and October 28th into the hearing of Case No. 1324 on March 6th? If not, it shall be incorporated.

Does anyone have any questions of the witness?

MR. COOLEY: Yes, sir.

MR. NUTTER: Mr. Cooley.

CROSS EXAMINATION

BY: MR. COOLEY:

Q Mr. Vick, how long have you been injecting water into the Livermore State No. 5 Well in the Northeast Quarter of the Southeast Quarter of Section 31?

A Since April the 15th of 1957. The approximate cumulative volume to February the 28th was one hundred sixty-eight thousand barrels of water.

Q You stated in answer to a question on direct that you were familiar with the testimony in the original case. There was

considerable testimony in that hearing with regard to what was high and what was low injection rates, and it was, I believe a figure of one barrel of water per acre foot was the figure that was argued to be the most satisfactory as a general rule.

A Yes, sir, the most ideal.

Q And that was considered a rather high injection rate?

A Well, I wouldn't consider it a high injection rate. I think it was borne out in the testimony that you speak of, that the averages ranged from five-tenths of a barrel up to one and a half to two tenths -- I mean, one and a half to two barrels per foot per day.

Q Could you tell me whether there were any operations on this Livermore Well No. 5 in which your company has attempted to maintain a constant pressure or a constant amount of injected water? Has it been pressure that you are after, or a given volume of injected water?

A It has been a constant volume of water, Mr. Cooley. We normally, in a water flood operation, when you start your injection, you can start it at certain pressure and maintain that pressure throughout the life of the flood, or you can put in a, strive to maintain a constant volume, and when you attempt to maintain a constant volume, your pressure naturally start off at a low rate, and then as you approach fillup, when it reaches some intermittent point or maximum point, then it levels off at a

top pressure. What we did here was start out with our constant volume, and as our pressure has gradually built up from zero to our eight hundred and fifty pounds, from the fracture work and such that had been done in the field, we were under the impression that our breakdown pressure was around eleven hundred pounds, so we installed our equipment for a maximum of nine hundred pounds injection pressure and started our injection volume on the basis of five hundred barrels per well per day and attempted to maintain that throughout the life, up to date on the pilot flood, and our pressure has increased gradually from zero up to our nine hundred pounds.

Q And would you repeat the date that the No. 9 Well, the substitute well was completed?

A I believe the potential date on it was February the 6th.

Q From February the 6th to February the 28th, the well went from one hundred per cent oil to fifty per cent oil and fifty per cent water?

A That's correct, yes, sir.

Q Does this indicate to you that there is a possiblity that you have had a water break-through in this particular area, at least a premature water break-through?

A Yes, sir.

Q Wouldn't that be as a result of too high an injection rate and too high pressure on the Livermore No. 5 Well?

A No, sir, I don't believe so. It is one of the problems

you have to deal with. There are some other points that might be brought out. On the air injection program carried out on the No. 2 Well, they did receive some increased oil recovery from that air injection. It was in a more or less defined streak running more or less east and west from No. 2, and more to the east side. The Sunray well in the Phillips lease there in Section 32 definitely had some increases. The air injection therefore was partially effective in driving out some of the oil there, plus the fact that the way the air injection moved across the area. It indicated a highly permeable zone in this immediate area, which when it did receive water as a result of the decreased oil saturation, and also this increased -- I mean the high permeability section, it naturally would break through first on water. This water break-through probably wouldn't have occurred if we had backed up on the north side where our pressures could have been equalized and held more in balance.

Q Do you think the fact that there has been no production at all from the Southwest Quarter of the Northeast Quarter of Section 31 as a result of the failure to complete the No. 2 Well, could you assume some of the oil has by-passed that area already?

A It could be a possibility. We debated, when we staked the No. 9 location whether or not to move it past No. 2 or south of No. 2, and it was managements' position that it should be moved south, and we were definitely sure that we would probably drill

into the oil bank and start recovering our oil. We weren't sure whether or not this high permeability streak that I mentioned a minute ago extended to the west side of No. 2. We were sure it extended east of No. 2 due to the air injection, the results of the air injection program.

MR. COOLEY: No further questions.

QUESTIONS BY MR. PORTER:

Q Mr. Vick, was not the No. 2 Well drilled originally as an injection well?

A No, it was drilled as a producing well and produced a volume of oil. I am not sure whether I have the exact volume here with me.

Q Well, that's all right. Do you know what -- I believe you stated your potential on No. 9 was in the neighborhood of one hundred fifty-six barrels. Do you have information on what the potential on the No. 2 Well is?

A No, sir, I don't. Just a second, I believe I have the cumulative production from Malco State "A" 2. It had produced, up through November the 1st, 1956, forty-two thousand three hundred and ten barrels, which was an average production for the overall field per well.

MR. PORTER: That's all.

MR. NUTTER: Any further questions of the witness?

QUESTIONS BY MR. NUTTER:

Q Mr. Vick, are any of the other wells which you directly

or diagonally offset, the six injection wells in this pilot program, not completed at this present time, or was the No. 2 Well the only well that had not been completed and in a condition to produce?

A That's correct, yes, sir.

Q All the other wells that offset these injection wells are capable of producing? A Yes, sir.

Q Are they all producing? A Yes, sir.

Q What is the next step and the most logical row of wells to convert to injection, if you expand this water flood project to the northeast?

A Well, it would be -- As you know, the unitization proceedings are under way and just about completed on approximately twenty-eight hundred acres. The first well to go on injection after that program is effected, will be the No. 7 Well on the Malco State "A" Lease, which would be just east of No. 9 that we are speaking of.

Q How about in Section 32?

A Would be the Sunray No. 1, State 13 Lease, and the Phillips, I believe that's their No. 1 here on my map.

Q Is it Phillips' well in the Southeast Quarter of the Southwest Quarter of Section 32? A Yes, sir.

Q In the event that the No. 9 Well were drilled a little bit to close to the injection well No. 5 and the water oil bank had passed or nearly passed the location of the No. 9 Well, is it possible that the injection of water into the No. 7 would drive

some oil back towards the No. 9?

A Yes, sir, it will. It means, as far as operation, that we will merely have to carry a higher water production on No. 9 than normally we would if the whole thing had been put in together.

Q But the oil that has by-passed this No. 9 Well as a result of the late drilling in this program isn't necessarily lost and gone forever, is it?

A No, sir, not the oil that might have possibly been driven by No. 9, if it doesn't go too far. It's sometimes very hard to change the movement of an oil bank once it gets started, but since we are so near the outer limits of the field here, it might be possible here that -- what I am speaking of is, say if we put the No. 9 on injection in this oil bank moving from our No. 5 injection well, we are going in that direction and everything moving when we start injecting into No. 7 would naturally run up against this pressure, or this oil bank coming toward it, and most of the drive from No. 7 would therefore be directed on down northeast, just like the present trend is going, and wouldn't be in a, theoretically in a radial expansion from No. 7.

Q Has the No. 7 Well shown any effects of the water injection to date?

A No, sir. We have currently readied it for injection, pulled our tubing and cleaned the well out, and do have it ready for injection.

MR. PORTER: Has any well in that direction, other than

No. 9?

A Well, the Sunray Lease, Mr. Porter, has shown a slight increase, which would be on the second row, and it is up several barrels. I believe it is seven to ten barrels, something like that.

MR. NUTTER: Any other questions? Mr. Stamets.

QUESTIONS BY MR. STAMETS:

Q Can you direct your water flood by shutting off certain wells? As I understand it, because you can't produce this No. 9 Well, you are forcing more water to go to the east, northeast.

A Yes, sir.

Q Now, would it be possible once, say, you got this No. 9 well back in production, to straighten the front of your water flood by shutting off Sunray's No. 1 and Phillips' Well No. 1 in Section 32?

A If I understand your question right, I don't believe so, on a regular pattern flood. When we would start injection into our No. 7 Well there, immediately offsetting No. 9, with that front moving in that direction, I mean, the momentum of it, carrying right on, would take some type of back up on No. 7, I mean, to the northeast of No. 7, to equalize, to start the thing moving backwards on the thing.

Q In other words, once you got your flood out of shape, so to speak -- A Yes, sir.

Q --it is a very difficult job to get it back?

A To balance it back, yes.

Q Now, you say that the No. 9 Well is presently shutin?

A The No. 9 Well?

Q Malco State No. 9, or is it producing?

A It is producing. We were granted an emergency allowable.

Q I wasn't aware of that. The increased pressure on the north, as I understand it, will cause premature break-through in this Livermore State No. 6?

A Well, if we weren't allowed No. 9 at capacity, it would cause a premature break-through at No. 6. Now, we are currently -- within the last week, water production has broken through on the No. 6, and is approximately four per cent of volume on the hundred and thirty barrels, approximately. It is producing oil now.

Q Even though No. 6 is granted capacity allowable, you expect oil to be by-passed?

A Well, not necessarily oil to be by-passed, but if we were to close in No. 9 and let the head build up in it, it would back, the pressure would be backed up against the No. 5 well, injection well, and therefore, if we continue to inject in the No. 5, that pressure has to go some place, and a greater percentage of it would be directed toward the No. 6 Well. Therefore, breaking water into it, before, say the No. 7 injection well down here. If the water bank came into No. 6 from No. 7, it would just tend to unbalance the whole thing.

MR. STAMETS: That's all.

MR. NUTTER: Any further questions? If not, the witness

may be excused.

(Witness excused.)

MR. NUTTER: Does anyone else have anything further they wish to offer in Case 1324? If not, we will take the case under advisement, and the hearing is adjourned.

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STATE OF NEW MEXICO)
) ss
COUNTY OF BERNALILLO)

I, J. A. Trujillo, Court Reporter, do hereby certify that the foregoing and attached Transcript of Proceedings before the New Mexico Oil Conservation Commission was reported by me in Stenotype and reduced to typewritten transcript under my personal supervision, and the same is a true and correct record to the best of my knowledge, skill and ability.

WITNESS my Hand and Seal this 7th day of March, 1957, in the City of Albuquerque, County of Bernalillo, State of New Mexico.

J. A. Trujillo
COURT REPORTER

My Commission Expires:

October 5, 1960

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 1324, heard by me on 3-6, 1958.

Examiner
New Mexico Oil Conservation Commission