BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO
JUNE 28, 1961

EXAMINER HEARING

IN THE MATTER OF:

CASE 2317 Application of Pan American Petroleum Corporation for a pressure maintenance project in the Horseshoe-Gallup Oil Pool, San Juan County, New Mexico, and for special rules governing said project.

TRANSCRIPT OF HEARING

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CASE 2317: Application of Pan American Petroleum Corporation for a pressure maintenance project in the Horseshoe-Gallup Oil Pool, San Juan County, New Mexico, and for special rules governing said project. Applicant, in the above-styled cause, seeks permission to institute a pressure maintenance project in the Horseshoe-Gallup Oil Pool by the injection of water into certain Northeast Hogback Unit wells in Sections 10, 11, 13, 14, 15 and 24, all in Township 30 North, Range 16 West, San Juan County, New Mexico. Applicant further seeks special rules governing the operation of said project.

BEFORE:

Mr. Elvis A. Utz, Examiner.

T R A N S C R I P T O F P R O C E E D I N G S

MR. UTZ: The hearing will come to order, please. The next case will be 2317.

MR. MORRIS: Case 2317. Application of Pan American Petroleum Corporation for a pressure maintenance project in the Horseshoe-Gallup Oil Pool, San Juan County, New Mexico, and for

special rules governing said project.

MR. BUELL: For Pan American Petroleum Corporation, Guy Buell.

MR. UTZ: Are there other appearances in this case? You may proceed.

(Witness sworn)

GEORGE W. EATON, JR.,

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

DIRECT EXAMINATION

BY MR. BUELL:

Q Mr. Eaton, would you state your full name, by whom you are employed, in what capacity and at what location, please?

A George W. Eaton, Jr. Senior petroleum engineer for Pan American Petroleum Corporation in Farmington, New Mexico.

Q Mr. Eaton, you have testified at prior commission hearings, have you not?

A Yes, sir, I have.

Q Your qualifications, then, as a petroleum engineer are a matter of public record?

A Yes, sir, they are.

MR. BUELL: Any questions, Mr. Examiner?

MR. UTZ: No, sir. He's qualified.

(Whereupon, Pan American's Exhibits Nos.1 through 10,were marked for identification).

Q (By Mr. Buell) Would you look, now, at what has been marked as Pan American's Exhibit No. 1, and state,for the record, what that Exhibit reflects?

A Exhibit No. 1 is a map of the horseshoe-Gallup Oil Pool in San Juan County, New Mexico. On that map is shown the wells which are completed from the Horseshoe-Gallup Pool. A copy of the Exhibit 1 is hanging on the wall.

Q What is the significance, Mr. Eaton, of the areas on that Exhibit, which are delineated with the red line?

A This Exhibit No. 1, 1 also shows the location of three pressure maintenance projects which have been granted under previous Commission orders, and the location of the proposed Pan American pressure maintenance project, all of them in the Horseshoe-Gallup Pool.

Q State, for the record, the three projects that have already received authority from the Commission.

A These three projects are shown on Exhibit No. 1, in the narrow red line. Two of them are in the extreme northwest portion of the pool. Those are the Honolulu project and the Humble project. Near the center of the Horseshoe-Gallup Pool, that project is the Atlantic pressure maintenance project. The Pan American proposed project is in the extreme southeastern portion of the Horseshoe-Gallup Pool, and is shown by the heavier red line.

Q Go, now, to what has been makred as our Exhibit No. 2, Mr. Eaton, and state briefly what that Exhibit reflects.

A Exhibit 2 is a map of a portion of the Horseshoe-Gallup Pool, showing more precisely the location of the Pan American's Northeast Hogback Unit, together with the red outlined area, which is the pressure maintenance project area, which also is the Northeast Hogback Unit Gallup participating area.

The heavy dashed line in blue is the outline of the Northeast Hogback Unit. All of the Northeast Hogback Unit and, therefore, all of the Gallup participating area or the pressure maintenance project area, which I may use interchangeably in this hearing, is located in Township 30 North, Range 16 West.

This Exhibit 2 also shows all of the wells which are completed within a two-mile radius of our proposed project area.

Q How have you designated the proposed injection wells on Exhibit 2, Mr. Eaton?

A The proposed water injection wells, which will be used in the Pan American pressure maintenance project, are colored in green.

Q Go, now, to what has been marked as Pan American's Exhibit No. 3.

A Pan American's Exhibit No. 3 is a cross-section drawn through the proposed project area. The trace of that cross-section is shown by the letter A., AA prime on Exhibit No. 2. The purpose of the cross-section is simply to illustrate that the Gallup is a continuous formation throughout the project area, and, therefore, might be susceptible to pressure maintenance.

Q Certainly from the standpoint of uniformity and continuity, you would consider the Gallup in this portion of the pool as a good pressure maintenance prospect?

A Yes.

Q Go, now, to Pan American's Exhibit 4. What does that Exhibit reflect?

A Exhibit No. 4 is another map of the proposed project area. This map is on a larger scale than the map shown in Exhibits 1 and 2. It also shows the proposed project area outlined by the heavy red line, the location of the proposed water injection wells which are colored in green, the location of a water supply well in the southwest quarter -- southeast quarter, excuse me, southwest quarter, northeast quarter, Section 10, and the proposed location of the water injection plant which will serve the project area.

Q Mr. Eaton, talking for a moment about the proposed injection wells, is your recommendation in that regard a firm recommendation for each of these injection wells you show in green, on Exhibit 4, as well as Exhibit 2?

A Our recommendation with regard to the use of these specific injection wells is firm with the exception of the three wells in the extreme northwest portion of the project area. As you can see, Well No. 30, Well No. 23, and Well No. 25 are immediately adjacent to the project boundary, and those wells are simply tentative,because some arrangement will have to be worked out with the

adjacent operator before we can make a firm recommendation with regard to those three wells.

Q To your knowledge, Mr. Eaton, is there any activity northwest of our project area with respect to initiating a pressure maintenance project in the interim area between our area and the existing Atlantic area?

A Yes, sir, there is. Under the expediting of the Atlantic Refining, there's an effort on the part of the operators in that area to unitize and commence operation at an early date so that there will be in the very near future, I believe, a continuous project area joining the present Atlantic project with the proposed Pan American project.

Q Is it your understanding that the Atlantic would be the operator of this new area?

A Yes, sir, that is my understanding.

Q In that connection, then, have you discussed these proposed wells, these three that you mentioned,for the record, have you discussed the location of those wells with Atlantic reservoir engineering personnel?

A Yes, sir. As far as the engineering thinking and the engineering design of the project is concerned, both the Atlantic reservoir engineers are in accord with,both the Atlantic and Pan American reservoir engineers are in accord that this is a satisfactory pattern. Of course, the details of actually preparing and executing lease line and boundary line agreements will have to

come in the future, after the Atlantic unit is formed, and they're in a position to commence operations.

Q Now, later on, in your testimony, Mr. Eaton, you are going to recommend rules to govern this project. Let me anticipate that a little and ask you now, will your proposed rules cover administrative approval of future injection wells?

A Yes, sir, they will.

Q Such that if you have to make any change along your cooperative line there, it can be handled administratively under the rules you are recommending?

A Yes, sir. It would be my recommendation that these be set up, these three wells be set up along with all others as initial injection wells, because I'm fully confident that an agreement will be reached, and that they will ultimately be used for injection. In other words, it's less likelihood, that there will be a change if they are set up than if they are not set up initially.

Q Looking at your Exhibit 4, and your injection wells' dispersion flow, what type of pattern -- how would you describe this proposed flood?

A I believe I would term this flood a modified five-spot program. The reason that I believe that I would term it modified five-spot is because we actually thought initially of conducting a five-spot program, and because of the configuration of the pool limits in this extreme southeast portion an unduly large amount of injection wells were required to complete five-spot program through-

out the entire project area.

Q A moment ago when you referred to the water supply well, did you locate it, for the record? I don't recall.

A Yes, sir, I believe I did.

Q Let's talk about it a moment, and in that connection, drawing your attention to what has been marked as our Exhibit 5, --

A All right.

Q -- what does that Exhibit reflect?

A Exhibit No. 5 is the drilling and completion program which we intend to use when drilling the water supply well to the Morrison formation. Among the pertinent points that Exhibit No. 5 shows is that the Morrison is expected to be found at a depth of about 2900 feet, that the well will be completed with casing set through to T.D. and will be cemented at that point, and selectively perforated for completion in the Morrison formation.

Q Mr. Eaton, is the Morrison formation noted in this area of the basin as being a prolific water formation?

A Yes, sir, it is a well-known water aquifer throughout the western portion of the San Juan Basin.

Q Do you happen to know what Atlantic and Humble, where their water source is for their flood?

A Yes, sir. Both the Atlantic flood and the Humble flood are using Morrison water.

Q Are you satisfied that this supply well will furnish us sufficient water for our proposed program?

A Yes, sir. I'm confident that there's adequate water supply in the Morrison,as well as adequate capacity of a supply well,to completely flood this project area,without any question.

Q Mr. Eaton, before we leave our injection wells, I'm going to refer to several Exhibits which are the logs of each of the proposed injection wells, and when I give the number of the Exhibit and the name of the well, it would probably be well if you would locate that injection well, for the record.

A All right.

MR. BUELL: Our Exhibit 6-A, Mr. Examiner, refers to a log on El Paso Natural Gas Products Company's William No. 2 well.

A That well is located in the southeast, southeast of Section 11. I might repeat here that this entire project area is in Township 30 North, Range 16 West, so I'll just mention the Section number and the Township and Range.

Q Exhibit 6-B is a copy of a log on El Paso Natural Gas Products Company's William No. 3.

A That well is located in the northwest quarter, southeast quarter of Section 11.

Q Exhibit No. 6-C is a Braumham's Federal No. 3.

A That well is located in the northwest quarter, northeast quarter of Section 14.

Q Exhibit 6-D is Pan American's Northeast Hogback Unit No. 4.

A That well is located in the northwest quarter, southeast quarter of Section 14.

Q Exhibit 6-E is a copy of the log on Pan American's Northeast Hogback Unit Well No. 6.

A That well is located in the northwest quarter, northeast quarter, Section 15.

Q Exhibit 6-F is a copy of the log on Pan American's Northeast Hogback Unit No. 2.

A That well is located in the southwest quarter, northwest quarter, Section 14.

Q Exhibit 6-G is a copy of the log on Pan American's Northeast Hogback Unit No. 11.

A That well is located in the southeast quarter, northwest quarter of Section 14.

Q Exhibit 6-H is a log on Pan American's Northeast Hogback Unit No. 13. Can you find that one?

A Not yet.

Q Section 13?

A Yes. That well is located in the southwest, northwest quarter, Section 13.

Q Exhibit 6-I is Pan American's Northeast Hogback Unit No. 14.

A That well is located in the northeast quarter, southeast quarter, Section 14.

Q Exhibit 6-J is a log on Pan American's Northeast Hogback

Unit No. 16.

A That well is located in the southeast quarter, southwest quarter, Section 13.

Q Exhibit 6-K, the log on Pan American's Northeast Hogback Unit No. 17.

A That well is located in the southwest quarter, southwest quarter, Section 13.

Q Exhibit 6-L is a copy of the log on Pan American's Northeast Hogback Unit No. 20.

A That well is located in the northwest quarter, northeast quarter, Section 24.

Q Exhibit 6-M, the log of Pan American's Northeast Hogback Unit No. 21, Section 15, Mr. Eaton.

A Yes, sir. That well is located in the northwest quarter, northwest quarter of Section 15.

Q Exhibit 6-N, log of Pan American's Northeast Hogback Unit No. 22.

A That well is located in the southwest quarter, northeast quarter, Section 15.

Q Exhibit 6-O, a log of Pan American's Northeast Hogback Unit No. 23.

A That well is located in the northwest quarter, northeast quarter, Section 10.

Q Exhibit 6-P, log of Pan American's Northeast Hogback Unit No. 25.

A That well is located in the northwest quarter, northwest quarter, Section 11.

Q Exhibit 6-Q, a log of Pan American's Northeast Hogback No. 29.

A That well is located in the southeast quarter, northwest quarter of Section 11.

Q Exhibit 6-R, the log of Pan American's Northeast Hogback Unit No. 30.

A That well is located in the northwest quarter, southwest quarter of Section 10.

Q Exhibit 6-S, Pan American's Northeast Hogback Unit No. 32.

A That well is located in the northwest quarter, southwest quarter, Section 11.

Q And finally, concluding with Exhibit 6-T, which is a log of Pan American's Northeast Hogback Unit No. 37.

A That well is located in the southeast quarter, southeast quarter, Section 10.

Q Mr. Eaton, would you look, now, at what has been marked as our Exhibit No. 7, and state, for the record, what that Exhibit reflects?

A Yes, sir. Exhibit No. 7 is a list of the casing and cementing programs which were used in each of the proposed injection wells.

Q The data on Exhibit 7 are more or less self-explanatory,

are they not, Mr. Eaton?

A Yes, sir.

Q Let me just ask you this question in that regard, more or less by way of summary. Are you completely satisfied that the drilling and completion program outlined on Exhibit 7 will assure you that the injected water will go in the interval you want it to go in?

A Yes, sir, I am.

Q Look, now, at what has been marked as Pan American's Exhibit No. 8, and state, for the record, what that Exhibit reflects.

A Exhibit No. 8 is a tabulation showing pertinent reservoir data for the Horseshoe-Gallup Pool, in general, and the Northeast Hogback Unit Gallup participating area, in particular.

Q Mr. Eaton, these data are -- appear to be self-explanatory, but would you like to comment on some of the items that you feel are very pertinent?

A Yes, sir. I believe the first portion of the data sheet is self-explanatory, being principally factual data. I would like to comment briefly on that portion immediately following the heading "Pressure Maintenance Performance." The particular portion of that that is pertinent at this time is that the ultimate primary recovery extracted from the project area is 1,862,000 barrels. That amounts to 11.4 percent of the oil in place. Under pressure maintenance time operations, the ultimate recovery is expected to be increased to 4,235,000 barrels, which amounts to 25.8 percent

of the oil in place.

Q Certainly, Mr. Eaton, increasing ultimate recovery in that magnitude is a very good conservation effort, is it not?

A Yes, sir, it certainly is. The recovery from that project area, by institution of pressure maintenance, is expected to increase by an amount roughly a hundred fifty percent of that, which would have been obtained, had pressure maintenance not been instituted.

Q While we're speaking of the pressure maintenance program, I wish you would look, now, at what has been marked as our Exhibit No. 9, and briefly comment on that Exhibit, Mr. Eaton.

A Yes, sir. Exhibit No. 9 is simply a graphical illustration of the performance that we expect that this project area will have. The Exhibit is actually in two parts, consisting of two lines, which we would anticipate for performance. The lower line on Exhibit No. 9 represents what we think primary performance will be from this point forward. You will note that a peak production from the project area was reached about mid 1960. Since that time, production rate has actually declined, and we expect that it will continue to decline unless this pressure maintenance project is started.

That extrapolation of that predicted decline along the primary declining trend results in that ultimate primary from the project area, amounting to the 1,862,000 barrels, or 11 plus percent of the oil in place. Under pressure maintenance operation,

which is for the purpose of the preparation of this gravity, we assumed would be commenced by September, 1961, is shown by the upper curve on Exhibit No. 9. That shows that with pressure maintenance operations, injection of water, commencing in September an increase in production or buss should be obtained by January 1st, 1962.

Following early 1962, production will continue to increase until the latter part of 1962, when it, too, will commence a declining rate. However, it is always well above the predicted primary rate. Projection of that curve results in an ultimate recovery of 4,235,000 barrels, or 25.8 percent of the oil in place, which is expected to occur in about eleven years of project life.

On the primary operation, I might point out that we expect only about four more years of primary life. We expect primary to end in 1965. We expect our pressure maintenance project to extend the life of this project area until nearly 1972.

Q Mr. Eaton, would you look, now, at what has been marked as Pan American's Exhibit No. 10, and state, for the record, what is contained on that Exhibit?

A Pan American's Exhibit No. 10 is simply a copy of New Mexico Oil Conservation Commission's Order R-1699, which sets forth the applicable rules and regulations under which the Atlantic Refining Company pressure maintenance project is operating.

Q Are you recommending to the Commission that they adopt for our pressure maintenance project an Order identical to that

issued in the case of Atlantic?

A Yes, sir, that is my recommendation.

Q Why do you make that recommendation?

A First of all, I make that recommendation because I think it is a very pertinent order, and one under which maximum recovery from a project area might be obtained. Secondly, as I have mentioned before, there is in progress an effort to build a secondary recovery or pressure maintenance type unit, which would fill up that intervening area in the Horseshoe-Gallup Pool between the existing Atlantic project and the proposed Pan American project. It would be my anticipation that rules applicable to that enlarged project would be like the existing Atlantic project. Therefore, it seems only reasonable and logical, to me, that at that time when you would have two projects with a common boundary, that each one should be operating under the same rules.

Q Mr. Eaton, you have already testified as to the significant waste prevention measure this proposal is. Let me ask you this question. In your opinion, under the rules you are recommending, as well as the program you've recommended, do you feel that the correlative rights of all parties of interest will be protected?

A Yes, sir, I do. In that regard, I might reiterate that this injection line agreement along this northwest boundary will have to be worked out with the operator of that adjacent unit. With regard to the other injection wells, there are no questions,

since all of the wells fall in the Northeast Hogback Unit Gallup participating area.

Q Do you have anything else, Mr. Eaton, that you would like to add?

A No, sir. I don't believe so.

MR. BUELL: That concludes our direct examination, Mr. Examiner, and may I at this time formally offer our Exhibits 1 through 10, inclusive?

MR. UTZ: Without objection, Exhibits 1 through 10 will be accepted.

(Whereupon, Pan American's Exhibits 1 through 10 were received in evidence).

CROSS-EXAMINATION

BY MR. UTZ:

Q Mr. Eaton, have you run any factor analyses on the gas down at this end of the Pool?

A No, sir, I haven't.

Q Do you feel that the gas analysis would be the same as that run in the Atlantic area?

A Yes, sir, I do. It should be very closely similar. It's solution gas.

MR. UTZ: Are there other questions?

MR. MORRIS: Yes, sir.

BY MR. MORRIS:

Q Mr. Eaton, do you propose any effective date for an Order,

if the Commission sees fit to enter it in this case?

A I would recommend that that date be as early as possible for this reason. We are moving forward with our initial expenditures on this project area in anticipation of an Order, those expenditures amounting principally to the drilling and testing of the Morrison supply well. I expect that that well will be commenced within the next week or so. Once the testing of the well is concluded, certain further arrangements can be commenced at that time that just can't be done before then. We can commence designing our system, and we can collect samples of the water, and determine for our own knowledge whether or not treatment is desirable, and, if so, what treatment,and design our facilities to do that with.

I would recommend an early date, because we're quite anxious to make our plans actually coincide with our predictions on that graph, and hope to get water to be injected by September 1st.

Q I didn't know whether you would need, say, a date of July 1st or not, whether you would need it by the 1st of this coming month.

A No, sir, I don't think so.

Q Mr. Eaton, you are proposing the same rules as set forth in Order No. R-1699. Now, that would include Rule 7 of that Order, which makes provision for credit for daily average gas injected. Now, is any gas being proposed as to be injected in here?

A No, sir. We do not propose to inject gas, although cer-

tainly that might be a possibility. We don't plan to at this time.

Q Is Atlantic injecting gas up in their project under these rules?

A Not to my knowledge, no, sir.

Q But you think it would be a good idea to adopt these same rules just in the event your areas might merge?

A It could be possible that at some future time gas injection might be considered, although I think it's rather remote, but I do recommend adoption of the same rules for the reason that you mentioned. I fully expect that the Atlantic project will be enlarged to the extent that it completely fills up that intervening area, and will be immediately adjacent to the proposed Pan American project area.

Q And Rule 11 of these rules does make administrative provision for including injection wells, which is something you mentioned earlier?

A Yes, sir.

MR. MORRIS: Thank you, sir.

MR. UTZ: Any other questions? If not, the witness may be excused.

(Witness excused)

MR. UTZ: Any other statements to be made in this case? If not, the case will be taken under advisement.

STATE OF NEW MEXICO)
) ss
COUNTY OF BERNALILLO)

I, ADA DEARNLEY, Court Reporter, in and for the County of Bernalillo, State of New Mexico, do hereby certify that the foregoing and attached Transcript of Proceedings before the New Mexico Oil Conservation Commission was reported by me in machine shorthand and reduced to typewritten transcript under my personal supervision, and that the same is a true and correct record, to the best of my knowledge, skill and ability.

WITNESS my Hand and Seal this, the 3rd day of July, 1961, in the City of Albuquerque, County of Bernalillo, State of New Mexico.

Ada Dearnley
NOTARY PUBLIC

My Commission expires:

June 19, 1963

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 2317, heard by me on June 28, 1961.

....., Examiner
New Mexico Oil Conservation Commission