BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
February 21, 1963

EXAMINER HEARING

IN THE MATTER OF: Application of Pan American Petroleum Corporation for a dual completion, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks approval of the dual completion of its USG Section 19 Well No. 17, located in Unit I of Section 19, Township 29 North, Range 16 West, San Juan County, New Mexico, to produce oil from the Hogback-Pennsylvanian Pool through tubing and to dispose of produced salt water into the Chinle formation through the intermediate casing annulus.	Case 2762

BEFORE: Elvis A. Utz, Examiner.

TRANSCRIPT OF HEARING

MR. UTZ: Case 2762.

MR. DURRETT: Application of Pan American Petroleum Corporation for a dual completion, San Juan County, New Mexico.

MR. MALONE: Charlie Malone of Atwood and Malone for the applicant. We have one witness and six exhibits.

(Witness sworn.)

GEORGE W. EATON, JR.

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

follows:

DIRECT EXAMINATION

BY MR. MALONE:

Q For the record, would you please state your name and position with the applicant?

A George W. Eaton, Junior, Senior Petroleum Engineer for Pan American Petroleum Corporation, Farmington, New Mexico.

Q Mr. Eaton, have you previously testified before this Commission and were your qualifications accepted?

A Yes, they were.

MR. MALONE: Would the qualifications of this witness be acceptable?

MR. UTZ: Yes, they are.

Q Would you briefly describe the nature of your application, please?

A This application is for permission to use the Entrada-Chinle interval in USG Section 19, Well No. 17, Hogback-Pennsylvanian Pool. In that connection I would like to refer the Examiner to Order R-2341, dated October 22, 1962 in Case 2644. In this order the interval 6514 to 6524 feet in USG Section 19, Well No. 13 was authorized as a disposal interval for the produced water from the Hogback-Pennsylvanian Pool. Actually this application in Case 2762 involves the same water production as

was involved in Case 2644, Order R-2341.

I would also like to call attention to the application of Pan American dated January 30, 1963, to which is attached the completed unnumbered form entitled "Application to Dispose of Salt Water by Injection into a Porous Formation not Productive of Oil or Gas."

Q Will you state the reason for this application?

A Yes, sir. While we were able to use the interval 6514 to 6524 in the Pennsylvanian formation of USG 19, Well No. 13, as a disposal interval, extremely high injection pressures were required to dispose of the produced salt water into that interval. As an alternate zone it is the purpose of the present application to seek another zone for approval in the Hogback-Pennsylvanian Pool area which can be used for disposition of at least a portion of the produced water.

Q In effect, then, the present application is supplemental to the prior authority which was granted rather than as a substitute for the prior order?

A Yes, sir, that is correct. We intend, or would prefer to leave Order R-2341 still in effect but add the Entrada-Chinle interval in the Well No. 17 as an alternative injection zone.

(Whereupon, Applicant's Exhibits Nos. 1 through 6 were marked for identification.)

Q Going now to your exhibits, would you state what Exhibit No. 1 shows, please?

A Yes, sir, Exhibit No. 1 is a map of the Hogback-Pennsylvanian Pool area showing thereon the location of the two wells in the pool which are colored in red and the fact that Pan American Petroleum Corporation is the sole owner of working interest in the general area of the pool and that the Navajo Tribe of Indians is the lessor in this entire general area.

Q There are no offset operators to Section 19 other than Pan American?

A That is correct.

Q What does Exhibit No. 2 show, please?

A Exhibit No. 2 is a copy of the electric log on USG 19, Well No. 17. It also shows the present completion interval of the well in the Pennsylvanian zone between the intervals of 6643 to 6659 feet. It also shows that the well is completed with tubing set on a packer and is actually producing from below this packer set in the casing string.

Moving up the hole from the present completion interval you will note that there are a number of perforated intervals which have been squeezed off in this well. These are former gas-producing intervals which produced helium-bearing gas at the time the Hogback-Pennsylvanian Pool was a gas pool.

Further, the log shows the various casing seats of the USG 19, 17 Well; again commencing at the bottom there is a 5" liner, the bottom of which is at 7035 feet. Moving up the hole there is a 7" casing string set at 5613 feet, the top of the cement behind the 7" casing string is shown to be at approximately 3100 feet. The next string of casing is a 9-5/8" string set at 2157 feet, approximately a hundred feet below the top of the Entrada formation. The surface casing in this well is a 13-3/8" string set at 251 feet.

Q Please go now to Exhibit No. 3 and discuss briefly what it shows.

A Exhibit No. 3 is a diagrammatic sketch of the USG 19 No. 17 Well completion showing the various casing strings again, together with the important cement tops and the relevant formation tops that were encountered during the drilling of this well. Particular attention is called to that interval on the sketch between the 9-5/8" casing set at 2157 feet and the top of cement behind the 7" casing which is estimated at 3100 feet. This interval includes the lower portion of the Entrada formation and the upper portion of the Chinle formation.

Q Is this the injection interval?

A Yes, sir, it is this interval which we're seeking approval for use as a disposal zone.

Q The dark lines on Exhibit 3 represent what?

A With the exception of one of these dark lines, the dark lines depict the portion of the casing which has cement behind it.

Q And the light lines are the casing strings and the tubing?

A That is correct, yes.

Q Going now to Exhibit No. 4, would you describe what it is, please?

A Yes. Exhibit No. 4 is a water analysis on the water recovered from a drill stem test in Pan American's Navajo Tribal No. 1 located 790 from the North line and 1,090 from the West line of Section 12, 29, 17. That location can be seen on Exhibit No. 1 and it's approximately two and a half miles northwest of the two producing wells in the Hogback-Pennsylvanian Pool. This analysis shows that the solids content of this water is in excess of 10,000 parts per million. There's a notation on the bottom part of the analysis that says that this analysis indicates contamination, probably from drilling fluids, and is not considered representative of formation water.

We were drilling the Navajo Tribal No. 1 with a fresh mud, so this simply means that the actual formation water content of the Entrada formation is likely to be considerably in excess of

10,000 parts per million. Unfortunately we do not have an analysis of the Entrada water from either of the two Hogback-Pennsylvanian Pool wells, but because of the proximity of the Navajo Tribal No. 1, I feel confident that the water in the Entrada zone in the Hogback-Pennsylvanian Pool is substantially identical to that encountered in the Navajo Tribal No. 1.

Q For the record, the water which was analyzed and the analysis shown on this report is the water from the same interval in which you request the right to inject and dispose of salt water?

A Yes, sir. With the exception that more than the Entrada is exposed in this particular annular space in the USG 19, 17. That interval also includes the upper portion of the Chinle formation.

The drill stem test recovery was from the upper portion of the Entrada, since it shows a high solid content, it's safe to presume that the formations lying underneath the Entrada also have high solids content in them too.

Q In your opinion, waters in the top of the Chinle would be as bad or worse than waters which were analyzed for Exhibit No. 4, is that correct?

A That is correct, if there, in truth, is any water in the top of the Chinle. The log on this well actually shows that

there's not much porosity in the Chinle. The fact is, in this entire interval that is proposed for use as injection there's not much porosity shown on the log.

Q Ten thousand parts per million means that the water is not potable and non-useable for irrigation, is that correct?

A That is correct.

Q What is Exhibit No. 5, please?

A Exhibit No. 5 is a copy of a letter from Mr. P. T. McGrath, District Engineer for the United States Geological Survey in Farmington, in which he states that the United States Geological Survey offers no objection to the use of the Entrada-Chinle zone in this well as a disposal zone.

Q And Exhibit No. 6, please?

A Exhibit No. 6 is a copy of a letter from the New Mexico State Engineer's office in which he states that that office has no objection to the use of the Entrada-Chinle zone as a disposal zone.

Q Which of those exhibits were prepared either by you or under your direct supervision and control?

A Exhibits 1 and 3 were prepared by me or under my direct supervision and control.

MR. MALONE: We offer in evidence Exhibits Nos. 1 through 6.

MR. UTZ: Without objection Exhibits 1 through 6 will be entered into the record of this case.

(Whereupon, Applicant's Exhibits Nos. 1 through 6 were offered and admitted in evidence.)

Q Mr. Eaton, are either correlative rights or waste involved in this application, in your opinion?

A There would be no question of violation of correlative rights involved since we have the approval of the two agencies who are most concerned with protection of those rights concurrence already. With regard to waste, approval of this zone could result in the prevention of waste through the operation of the remaining two wells in the Hogback-Pennsylvanian Pool for a longer period of time than would otherwise be possible.

Our concern is that the high injection pressures that are necessary for continued use of this volume of water to be disposed of into the Pennsylvanian interval might cause some damage to equipment both in the well and on the surface as regards the injection pump and thereby cause increased operating costs and eventually possible abandonment of the two wells sooner than might otherwise be necessary.

Q Approximately what pressure is necessary to inject in the Chinle and Entrada?

A Approximately 350 pounds, based on the test which we've

run on that zone.

Q Is the required injection pressure in the Pennsylvanian zone higher than that?

A Yes, sir, it's much higher. It required close to 2,000 psig. to inject into the Pennsylvanian zone.

Q Do you have anything further to add to your testimony in this case?

A I don't believe so, thank you.

MR. MALONE: We have no further questions, Mr. Examiner.

CROSS EXAMINATION

BY MR. UTZ:

Q Mr. Eaton, how old is the 7" casing in this well?

A It's approximately five years old.

Q It should be in pretty good shape then?

A Should be, yes, sir. One thing we haven't been bothered with in the Hogback-Pennsylvanian area is severe corrosion, and certainly the steel in these wells has been exposed to plenty of opportunities for it having produced large quantities of this rugged, saline water, both at the time the wells were gas wells, and here in the last year since they've started making water as oil wells. Apparently it isn't too corrosive.

Q Where would you say the top of the cement was behind

the 9-5/8ths?

A That top of the cement behind that 9-5/8" is somewhere between 345 feet and 772 feet. The reason I give you that range is that we attempted to run a temperature survey on that particular string but the top, as defined by that survey, was not very conclusive. So in order to determine if they had a suitable cement job, we ran a free point survey. That free point survey showed that the pipe was completely free at 345 feet but it wasn't completely stuck until down to 772 feet. I suspect that that's the reason the temperature survey was inconclusive.

What this means is that there is some cement behind the casing in that 345 to 772 feet interval, but it isn't solid cement.

Q So you would actually have around thirteen, fourteen hundred foot of cement there?

A Yes, sir, at least.

Q How about your temperature survey, or did you run one for the cement behind the 7"?

A Yes, sir.

Q The top on that?

A The 3100 feet, which is the estimated top of the cement behind the 7", was picked from a temperature survey. Again, as you know, the exact top is a little difficult to tell on most

temperature surveys, but that's the approximate top of it, which means that there's about 2500 feet of cement behind the 7" casing.

Q You feel that these two cement jobs are adequate to hold any pressure that would be exerted on them by the injection of salt water in the Chinle?

A Yes, sir, I certainly do.

MR. UTZ: Are there any further questions of the witness? He may be excused.

(Witness excused.)

MR. UTZ: Are there any statements in this case? The case will be taken 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 30th day of April, 1963.

Ada Dearnley
Notary Public-Court Reporter

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. 2762, heard by me on Feb. 21, 1963.

Examiner
New Mexico Oil Conservation Commission