BEFORE THE
NEW MEXICO OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
October 13, 1964

EXAMINER HEARING

IN THE MATTER OF:
Application of Murphy Oil Corporation for a pressure maintenance project, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks authority to institute a pressure maintenance project in the Many Rocks-Gallup Pool by the injection of water into the Gallup formation through five wells in Sections 17, 18 and 20, Township 32 North, Range 17 West, San Juan County, New Mexico. Applicant further seeks the promulgation of special rules for the operation of said project.

Case No. 3126

BEFORE: ELVIS A. UTZ, EXAMINER.

TRANSCRIPT OF HEARING

MR. UTZ: Case 3126.

MR. DURRETT: Application of Murphy Oil Corporation for a pressure maintenance project, San Juan County, New Mexico.

MR. COOTER: Mr. Examiner, Paul Cooter of Atwood and Malone, Roswell, New Mexico, appearing for the petitioner. I have one witness.

(Witness sworn.)

MR. COOTER: Some of our exhibits are attached to the petition and unfortunately we are rather short on copies, but I'll give you my copy of all of them.

LUCIEN D. SIPES, JR.

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

DIRECT EXAMINATION

BY MR. COOTER:

Q Would you state your name for the record, please?

A Lucien D. Sipes, Junior.

Q By whom are you employed, Mr. Sipes?

A Core Laboratories, Incorporated.

Q In what capacity?

A I'm a project engineer in the Engineering and Consulting Department.

Q Have you previously testified before the Oil

Conservation Commission of the State of New Mexico or one of its Examiners?

A No, sir.

Q Are you a college graduate?

A Yes, sir.

Q From what college did you receive your degree?

A I received a B. S. in petroleum engineering from Texas Technological College in Lubbock.

Q When did you receive that degree?

A 1957.

Q What positions have you had in the oil industry since your graduation in 1957 to date?

A I have worked for Core Laboratories from before my graduation to date. The positions which I have held are Field Engineer, Research Engineer, Special Core Analysis Engineer, and then in the Engineering Consulting Department I have been a Reservoir Engineer and a Project Engineer.

Q Has that employment been continuous since 1957 to date?

A No, it has not. I have been in service part of that time.

MR. COOTER: Are Mr. Sipe's qualifications as an expert acceptable to the Commission?

MR. UTZ: Yes, sir.

Q (By Mr. Cooter) First, Mr. Sipes, I'll direct your attention to Exhibit A which was attached to the petition of Murphy Oil Corporation, and ask you to relate what that exhibit shows.

(Whereupon, Applicant's Exhibit A was marked for identification.)

A Exhibit A shows the location of the proposed unit area for the Murphy Oil Corporation pressure maintenance project; the project area itself is outlined in blue and all wells included in this unit are on leases held by Murphy Oil Corporation. In addition, this exhibit shows all the wells and the owners of leases within a two-mile radius of the project.

MR. COOTER: For clarification purposes, may I state to the Examiner at this time that the lease, the lands are included in one lease from the Navajo Tribe to Texas Pacific Coal and Oil Company and Murphy Corporation, which covers all of these lands and other lands. Murphy Oil Corporation being the operator under a farmout agreement.

Q The wells shown in red are the proposed injection wells?

A The wells shown in red on Exhibit A are the proposed injection wells as of this date. It should be pointed out at this point, however, that initially Murphy Oil Corporation

plans to inject water only into Wells 4, 13 and 18 as shown on Exhibit A.

Q Well No. 18 has not yet been drilled by Murphy, is that correct?

A That is correct.

Q Murphy proposes to do that if this project should be approved by the Commission?

A That is correct. The water supply well from which the water source, from which the water will be derived for this project is also shown on Exhibit A, and it's circled in red in Section 28. The well is the Guyer Oil Company Navajo AA1B.

(Whereupon, Applicant's Exhibit K was marked for identification.)

Q I'll next direct your attention to what has been marked as Exhibit K, which is not attached to the application, and ask you to explain that exhibit to the Examiner.

A Exhibit K is a table of completion data and well status and production data for all wells which are productive on the Murphy Oil Corporation Navajo AA lease. It will be pointed out that all these wells have a similar type completion. In each case casing has been set through the productive Gallup formation, cemented and then perforated or notched opposite the Gallup formation.

Q I next direct your attention to Exhibit L and ask you to relate what that exhibit shows.

(Whereupon, Applicant's Exhibit L was marked for identification.)

A Exhibit L is a structure map on the top of the Sanistee limestone underlying the proposed project area. The Sanistee limestone is the nearest correlative marker to the productive Gallup sandstone in this field. The Sanistee lies directly under the Gallup.

You will notice that the structure itself is steeply dipping to the northwest, the northwest end of the field or northwest end of the project area as shown on this map actually lies in a sincline. The southeast portion of the field approaches the crest of an anticline. The crest of this anticline is actually in Section 28.

I want to point out also the presence of a fault on the southeast end of this field running diagonally southwest, northeast in Sections 20 and 21.

(Whereupon, Applicant's Exhibit M was marked for identification.)

Q I'll next direct your attention to Exhibit M, entitled "The net oil sand isopach map." Is that the same fault that's shown on the bottom line?

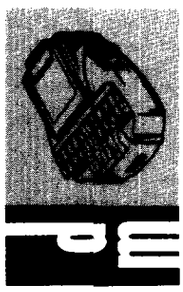
A It is.

Q Would you relate what Exhibit M shows?

A Exhibit M shows the development of the Gallup sand lens on top of the Sanistee limestone. The axis of the lens is in a northwest, southeast direction. Production on the Curtis Little lease, the Skelly lease and Humble leases to the southeast are also from this same lens. However, the portion of the reservoir shown on this isopach is believed to be effectively sealed from communication with the leases to the southeast by the fault as shown.

The sand in the lens is a clean sand with good permeability near the center and grades into shale or shaley sand on the flanks. This lithology change determines the limits of the productive area of the reservoir on the southwest and northeast flanks.

As noted in the title of this particular exhibit, the sand development as shown is the net oil-sand that is that portion of the reservoir rock which has greater than one millidarcy permeability and more than 9.2% porosity. You will also notice the presence of a gas-oil contact in Section 20 of this map. The position of this gas-oil contact is estimated to be at 4180 feet above sea level. The oil-productive limit of the sand on the northwest is the oil-water contact which is estimated at 3870 feet above sea level. This occurs before the bottom of the sincline as shown on



the structure map, Exhibit L. The oil-productive volume of the sand as shown is 3,009 acre feet. The gas-productive volume is 886 acre feet.

MR. COOTER: Before passing from this particular exhibit, Exhibit M, I would like to point out to the Examiner that the Navajo lease in question to Murphy includes all Sections 7, 8, 17, 19 and 19 and 20. I do this at this time because the particular proposed rules as they relate to offset operators will be mentioned at a later date.

(Whereupon, Applicant's Exhibit N was marked for identification.)

Q Next, Mr. Sipes, I'll direct your attention to Exhibit N and ask you to relate that exhibit to the Examiner.

A Exhibit N is a list of reservoir perimeters and reservoir data which were developed during the course of a study conducted for Murphy Oil Corporation. The estimated reservoir conditions are extrapolations of data from reservoirs in the near vicinity. The core analyses averages shown were established from core data available on Wells 2 through 11 on the Murphy Oil Corporation lease.

As I pointed out previously, the oil zone volume is 3,009 acre feet with an initial oil in place of 2,257,000 stock tank barrels. The approximate original gas cap gas in place in 886 acre feet of reservoir is approximately

96 million cubic feet. Cummulative production from this Gallup reservoir to October 1st, 1964 was approximately 115,490 barrels.

(Whereupon, Applicant's Exhibits O and P were marked for identification.)

Q I next direct your attention to Exhibits O and P and ask you to consider and explain both exhibits jointly.

A Exhibit O is a tabular data showing the oil production from the Murphy Oil Corporation Navajo AA lease from the time of discovery through September, 1964 by months. These data were used to prepare Exhibit P. As you will note on Exhibit P, the rate decline under primary depletion operations is very severe. The decline as shown here is not truly representative of the individual declines of the wells, because during the decline new wells were being drilled and put on production.

From these data the future primary production after January the 1st, 1965 is estimated to be only 52,000 stock tank barrels under primary depletion operations. On the basis of the above data, the feasibility of a pressure maintenance operation by water injection was investigated.

Conclusions of this study with pressure maintenance operations by water injection into this reservoir are both technically and economically feasible. That such a project

should be initiated as soon as possible to obtain maximum benefit and recovery. Third conclusion is that approximately 300,000 additional stock tank barrels of oil would be recovered by a pressure maintenance operation over and above that estimated by primary recovery.

It might be pointed out as of interest that the operators will spend approximately $300,000 to recover this oil over the seven-year life of the project.

Q Next, Mr. Sipes, I'll ask you to redirect your attention to Exhibit A, which is the area map, and relate the proposed method of operation for this project.

A As indicated in the application by Murphy Oil Corporation for a pressure maintenance project, water injection is proposed to begin into Wells 4, 13 and as yet undrilled Well No. 18 upon approval of this project. After a sufficient time has elapsed from the start of this project for evaluation to be possible on the success of this flood, a decision will be made at that time to inject water into Wells 5 and 6 if warranted.

Q To make that point clear, it has not yet been definitely determined whether Wells 5 and 6 will be converted into injection wells.

A This decision has not been made.

Q And will not be made until after the project has

been commenced?

A That is true. The maximum water injection rate is expected to be approximately 655 barrels per day.

(Whereupon, Applicant's Exhibits B through F were marked for identification.)

Q I next direct your attention to Exhibits B through F which were attached to the application of Murphy Oil Corporation and ask you to relate what those exhibits show.

A Exhibits B through F are schematic diagrams of all the wells considered at this time to be possible water injection wells. You will note that each well has the casing set through the Gallup sand, which is the productive interval, and cement has been put into the wells behind the casing to protect the productive formation.

You will note that there is a string of tubing schematically shown to be present in each of the proposed injection wells. Murphy Oil Corporation requests permission to inject water down the casing rather than to install this tubing string in the injection well. The State Engineer, Mr. Irby, has stated that he does not have objections to this plan due to the location of the formation which is to be flooded and the zones between this formation and the surface.

Q Would you expand just a little bit on the zones between the Many Rocks-Gallup sand and the surface? Why this is

proposed.

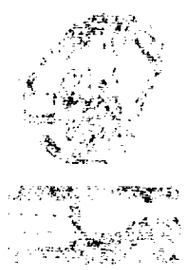
A The formation overlying the Gallup sand in the vicinity of the proposed water injection project is the Mancos shale. The shale extends from the top of the Gallup sand to the surface in every case where the injection wells are, with one exception. At the surface of Well No. 4 there is approximately 28 feet of sandstone overlying the Mancos. This sandstone is the Point Lookout sandstone. There have been no formations above the Gallup sand at this location which have produced fresh water.

(Whereupon, Applicant's Exhibits G through J were marked for identification.)

Q I next direct your attention to Exhibits G through J which were attached to the application of Murphy Oil Corporation and ask you to identify those, please.

A Exhibits G through J are formation density logs of the proposed injection wells which have been drilled to date. Each of these logs illustrates the fact that there are no productive intervals above the Gallup sand which have fresh water, and that the entire section above the Gallup sand is the Mancos shale.

Q Mr. Sipes, this investigation into the Murphy Oil Corporation Many Rock-Gallup Pool and the characteristics that were made by Core Laboratories, by you on behalf of Core



Laboratories, Incorporated at the request of Murphy Oil Corporation?

A That's true.

Q The recommendations which you have made, is the project a feasible one?

A Yes, it is.

Q In your opinion would the injection of water into this formation and the pressure maintenance promote conservation and prevent waste and increase the ultimate recovery from the pool?

A Yes.

MR. COOTER: That concludes our testimony.

MR. UTZ: Are there questions of the witness?

MR. IRBY: I would like to ask a couple of questions. Frank Irby, State Engineer's Office.

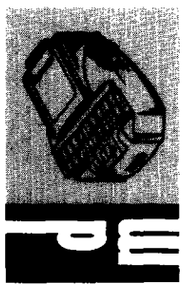
CROSS EXAMINATION

BY MR. IRBY:

Q Mr. Sipes, referring to your diagrammatic sketches of the various wells and recalling our previous conversation, is it true that the cement surrounding the production string goes well up into the Mancos shale?

A This is true, yes, sir.

Q One other question. You gave the volume to be injected into each well, but you didn't give the pressures.



Could you give us that?

A The maximum pressure which is anticipated at this time is approximately 700 pounds at the surface.

MR. IRBY: Thank you. That's all I have, Mr. Examiner.

MR. UTZ: Any other questions?

MR. DURRETT: I have a question, please.

BY MR. DURRETT:

Q Mr. Sipes, referring to the well that you are proposing to drill, somewhere in the description here is there a description of the proposed location, a footage description?

A No, sir, not to my knowledge.

Q Can you give it to me? Do you have it with you there some place or in your mind?

A No, sir, I couldn't give it to you exactly.

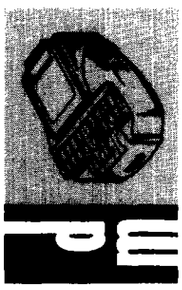
MR. UTZ: Can you write us a letter immediately, if not sooner, and give us the location, the exact footage location of all your injection wells?

A I didn't understand your question.

MR. UTZ: I say can you write us a letter as soon as possible giving us the footage location of all the injection wells?

A Yes, sir.

Q (By Mr. Durrett) Including this one, Mr. Sipes, so



we'll know exactly where it's to be located?

A Yes, sir.

Q One other question I had was, do you feel that you can get an efficient drive, water drive or produce an efficient water drive the way you have your injection wells located?

A The pattern as it's shown on this map is not the complete pattern which Murphy anticipates with full development of this flood. We believe that the wells proposed for injection will allow us to evaluate the performance of a water injection operation, and at some later date then we anticipate expanding the water injection.

Q Along that line I would assume that you'd anticipate putting possibly one of these wells, the 7, 10, 12 or 8, 9 on your Navajo AA lease on as an injector, is that correct, or drill in that area?

A Actually the plan as we foresee it at this time is to drill another injection well north of the dry hole No. 1. This will provide us an Indian sweep in the better portion of the reservoir.

Q The wells that you have indicated here in red are the only ones that you are seeking approval of at this time?

A Yes, sir.

Q And I suppose Mr. Cooter may go into this, but are you going to ask for an administrative procedure where you

can put on additional wells?

A Yes, sir, we anticipate to do this.

MR. DURRETT: Thank you. One other question.

Q (By Mr. Durrett) On your water well down here, what type of water is that, do you have an analysis on the water?

A I have an analysis of a contaminated sample.

Q What does it indicate?

A It indicates that the water is fresh to brackish.

Q Fresh to brackish?

A An uncontaminated sample is proposed to be taken a week from tomorrow. We're at the present time producing this well in an attempt to clean it up and get a good sample of the formation water itself.

Q Would you propose to furnish that to Mr. Irby and to this office?

A Yes, sir, I do.

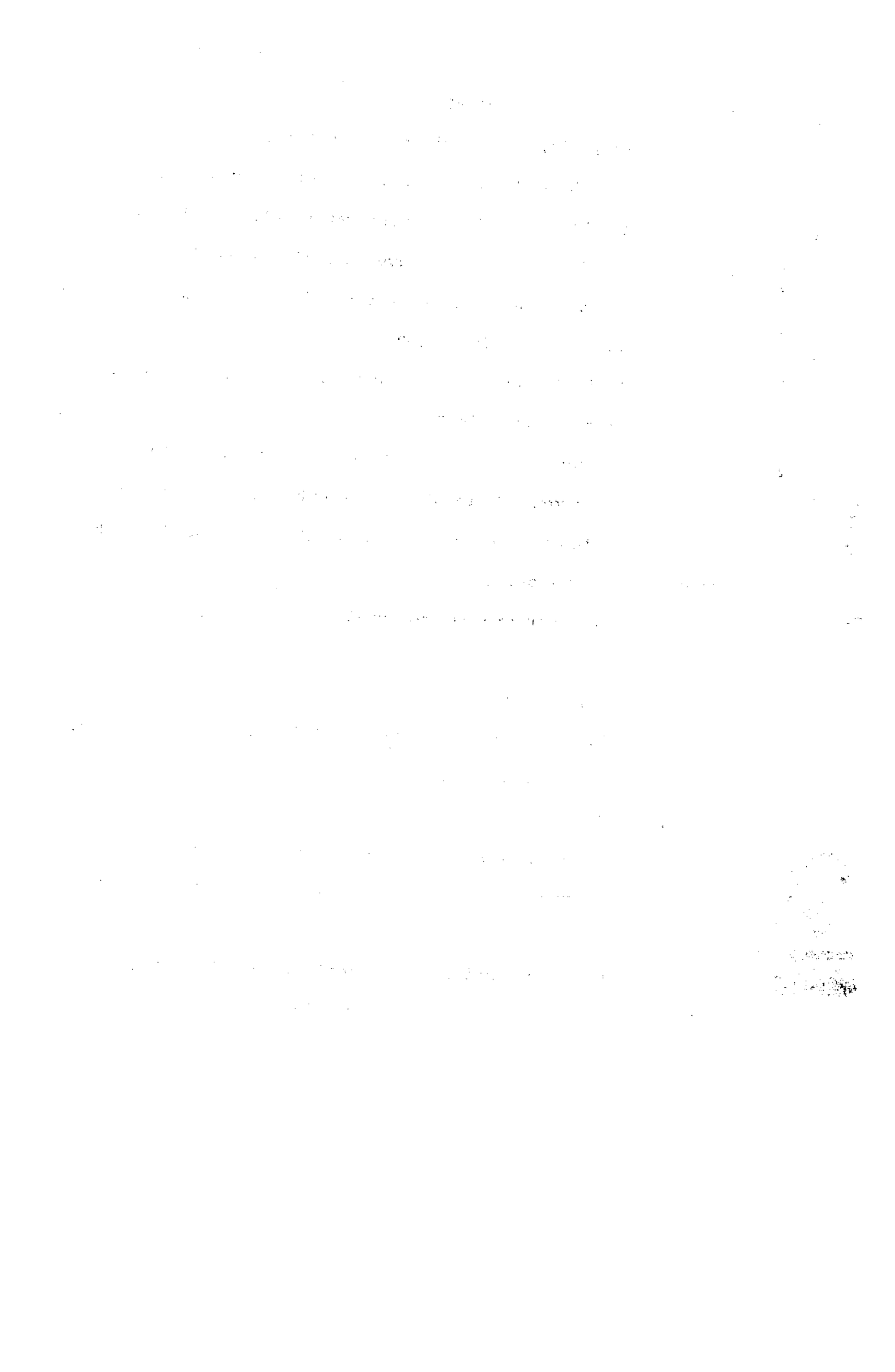
MR. DURRETT: Thank you. I think that's all I have.

MR. ARNOLD: Emery Arnold.

BY MR. ARNOLD:

Q Do you anticipate any corrosion problems from this water or have you had enough of an analysis made to determine that?

A We do not anticipate corrosion, no, sir. This Entrada water which we propose to use is being successfully



used in the same area and there have been no corrosion problems to date that I know of.

Q I believe that they have developed some corrosion problems in the Horseshoe-Gallup in their floods, haven't they?

A Yes, sir. I believe this is Morrison water.

Q Different water source?

A Yes, sir.

MR. IRBY: Mr. Examiner.

MR. UTZ: Yes.

BY MR. IRBY:

Q In our conversation we discussed the quality of this water and, as I recall, you stated that if it was found necessary the water would be treated, is this correct?

A Yes, sir. At the present time Murphy Oil Corporation anticipates that if the water is corrosive that treatment will be made of the water, and in addition the wells, the casing in the injection wells will be protected adequately.

Q I think it might be well also, Mr. Sipes, to get into the record of this hearing your proposed disposal of the produced water.

A Yes, sir.

Q If you would state that into the record, I would appreciate it.

A Murphy Oil Corporation at the present time is not producing a sufficient quantity of water to warrant any type of disposal system. In view of the fact that at a later time substantial quantities of water will be produced, this water will be either disposed of in approved pits or be tied back into the water injection system.

Q How will the Commission and the State Engineer be advised of the quality of the water being produced so that we can make a determination as to what disposition should be made of this water? I realize we get the quantities in the Oil and Gas Association reports, but we will need chemical analyses occasionally to determine the quality of this water.

We have to avoid contamination of all surface and underground water sources which exist, whether a basin be declared or not, so we need to know not only the quantities but the quality of the water being produced and the disposition that's being made of it.

Can we at this time set up some sort of, we will call it an information service from Core Labs or from Murphy to the Commission and to my office which will give us an opportunity to avoid any threat of contamination?

A Yes, sir. We can set up this information service furnishing that information to you on whatever basis you desire it.

Q I would leave that to the judgment of the Commission as to what manner it be set up in and you and Mr. Cooter, I am sure, have some thoughts along this line.

MR. COOTER: For informational purposes, how do the other, Humble, Atlantic, Skelly and Little, how do they handle this with your office?

MR. IRBY: As I recall, they are injecting all of their produced water. They are keeping records of the effects on the well equipment.

MR. UTZ: You are agreeable to supplying us this information, I gather?

A Yes, sir.

MR. UTZ: The details of which we'll work out later in connection with your regular injection report.

A That is correct. I'd like to offer this suggestion, that we furnish this information in the event that all of the produced water is not reinjected.

MR. UTZ: That would be satisfactory.

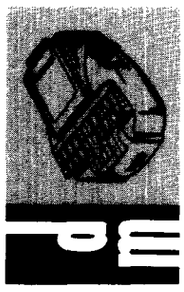
MR. IRBY: Yes. I think we should be advised if he is reinjecting produced water.

MR. UTZ: That's right.

MR. COOTER: Sure.

MR. UTZ: Any other questions? The witness may be excused.

(Witness excused.)



MR. UTZ: Any statements in this case?

MR. COOTER: I would like to state that the Commission has adopted special rules and regulations for four pressure maintenance projects in the Many Rocks Field, Order No. 2541, 2622, 2664 and 2700. We believe, well, I haven't proffered them verbatim, I suppose they are substantially similar.

MR. DURRETT: They're similar, yes.

MR. COOTER: We have gone over the ones adopted originally for the Humble project, which is Order No. 2541. We would make the suggestion that Rules 7 and 10 thereof be changed to some extent. Rule 7 being changed to eliminate after the semicolon in the first sentence, commencing with the word "provide" through the remainder of that sentence.

Rule 10 be changed in the second sentence, commencing with the word "except that no well on the project" clear through that sentence be eliminated. The reason for these eliminations being that as this area is proposed, that there is no problem or reason to provide for offset. Murphy Oil Corporation is the owner of the entire lease in there, including the offset.

I might also state that with the gentlemen from the United States Geological Survey here, that Murphy has received approval from the Acting Supervisor in Roswell for the project.

MR. UTZ: The portions of these orders which you recommend be used as containing Z factors and so forth, that data is pertinent to this area, can you answer that question?

MR. SIPES: Yes, sir.

MR. UTZ: Any other statements? The case will be taken under advisement. Does that conclude your statement, Mr. Cooter?

MR. COOTER: Yes, sir. We would like to offer Exhibits A through P into evidence.

MR. UTZ: Without objection Exhibits A through P will be admitted in evidence.

(Whereupon, Applicant's Exhibits A through P were offered and admitted in evidence.)

MR. UTZ: The case will be taken under advisement. The hearing is adjourned.

STATE OF NEW MEXICO)
) ss
COUNTY OF BERNALILLO)

I, ADA DEARNLEY, Notary Public in and for the County of Bernalillo, State of New Mexico, do hereby certify that the foregoing and attached Transcript of Hearing before the New Mexico Oil Conservation Commission was reported by me; and that the same is a true and correct record of the said proceedings, to the best of my knowledge, skill and ability.

Witness my Hand and Seal this 19th day of October, 1964.

NOTARY PUBLIC

My Commission Expires:

June 19, 1967.

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 3126, heard by me on Oct. 13, 1964.

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

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