CASE 2865: Application of HUMBLE for a pressure maintenance project, San Juan County, New Mexico.

2865

Files, Transcripts,

Exhibits, Etc.

Check Z factors w/ Humble

John [illegible] checked these out; they are probably same as [illegible] according to his engineer. Dan

DRAFT

JMD/esr
July 29, 1963

BEFORE THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO

IN THE MATTER OF THE HEARING
CALLED BY THE OIL CONSERVATION
COMMISSION OF NEW MEXICO FOR
THE PURPOSE OF CONSIDERING:

CASE No. 2865

Order No. R-2541

APPLICATION OF HUMBLE OIL & REFINING
COMPANY FOR A PRESSURE MAINTENANCE
PROJECT, SAN JUAN COUNTY, NEW MEXICO.

8/1/63

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 o'clock a.m. on July 24, 1963, at Santa Fe, New Mexico, before Daniel S. Nutter, Examiner duly appointed by the Oil Conservation Commission of New Mexico, hereinafter referred to as the "Commission," in accordance with Rule 1214 of the Commission Rules and Regulations.

NOW, on this ________ day of __________, 1963, the Commission, a quorum being present, having considered the application, the evidence adduced, and the recommendations of the Examiner, Daniel S. Nutter, and being fully advised in the premises,

FINDS:

(1) That due public notice having been given as required by law, the Commission has jurisdiction of this cause and the subject matter thereof.

(2) That the applicant, Humble Oil & Refining Company, seeks authority to institute a pressure maintenance project in the Many Rocks-Gallup Oil Pool, San Juan County, New Mexico, by the injection of water into the Gallup formation initially through nine wells located or to be located within the proposed project area comprising the following-described acreage:

TOWNSHIP 31 NORTH, RANGE 17 WEST, NMPM
Section 1: N/2, SE/4, and SW/4 NE/4
Section 2: NE/4 SE/4
~~Section 11: N/2 NE/4 and SW/4 NE/4~~
Section 12: NE/4 NW/4

(3) That the applicant seeks the promulgation of special rules and regulations governing the proposed project similar to

the special rules and regulations governing the Horseshoe-Gallup Pressure Maintenance Project No. 2 promulgated by Order No. R-1745.

(4) That the applicant proposes that the special rules and regulations provide that any producing well in the project area which directly or diagonally offsets any well outside the project area producing from the same common source of supply shall not produce in excess of top unit allowable for the pool until January 1, 1964, or until the operators of such offset well outside the project area have instituted a pressure maintenance project in the area of such well, whichever shall first occur.

(5) That the proposed pressure maintenance project is in the interest of conservation and should result in greater ultimate recovery of oil, thereby preventing waste.

(6) That the proposed special rules and regulations should be adopted in order to prevent waste and protect correlative rights.

IT IS THEREFORE ORDERED:

(1) That the applicant, Humble Oil & Refining Company, is hereby authorized to institute a pressure maintenance project designated the Many Rocks-Gallup Pressure Maintenance Project No. 1 in the Many Rocks-Gallup Oil Pool, San Juan County, New Mexico, by the injection of water into the Gallup formation through nine injection wells located or to be located in Units F, J, L, and N of Section 1, Unit H of Section 2, and Unit B of Section 12, Township 31 North, Range 17 West, NMPM, San Juan County, New Mexico, with one injection well located on each of the above-described units.

(2) That special rules and regulations governing the Many Rocks-Gallup Pressure Maintenance Project No. 1, San Juan County, New Mexico, are hereby promulgated as follows:

SPECIAL RULES AND REGULATIONS
FOR THE
MANY ROCKS-GALLUP PRESSURE MAINTENANCE PROJECT NO. 1

RULE 1. The project area of the Many Rocks-Gallup Pressure Maintenance Project No. 1, hereinafter referred to as the Project, shall comprise the following-described area:

TOWNSHIP 31 NORTH, RANGE 17 WEST, NMPM
Section 1: ~~All~~ W/2, SE/4, and SW/4 NE/4
Section 2: ~~E/2 and NW/4~~ NE/4 and NE/4 SE/4
~~Section 11: E/2 SE/4 and SE/4 SE/4~~
Section 12: ~~NW/4 and E/2~~ NE/4 and NE/4 NW/4

RULE 2. The allowable for the Project shall be the sum of the allowables of the several wells within the project area, including those wells which are shut-in, curtailed, or used as injection wells. Allowables for all wells shall be determined in a manner hereinafter prescribed.

RULE 3. Allowables for injection wells may be transferred to producing wells within the project area, as may the allowables for producing wells which, in the interest of more efficient operation of the Project, are shut-in or curtailed because of high gas-oil ratio, pressure regulation, control of pattern or sweep efficiencies, or to observe changes in pressures or changes in characteristics of reservoir liquids or progress of sweeps; provided, however, that any producing well in the project area which directly or diagonally offsets any well outside the project area producing from the same common source of supply shall not produce in excess of top unit allowable for the pool until January 1, 1964, or until the operators of such offset well outside the project area have instituted a pressure maintenance project in the area of such well, whichever shall first occur.

RULE 4. The allowable assigned to any well which is shut-in or which is curtailed in accordance with the provisions of Rule 3, which allowable is to be transferred to any well or wells in the project area for production, shall in no event be greater than its ability to produce during the test prescribed by Rule 6, below, or greater than the current top unit allowable for the pool during the month of transfer, whichever is less.

RULE 5. The allowable assigned to any injection well on a 40-acre proration unit shall be top unit allowable for the pool.

RULE 6. The ~~ability to produce of~~ allowable assigned to any well which is shut-in or curtailed in accordance with ~~the special rules and regulations~~ Rule 3 shall be determined by a 24-hour test at a stabilized rate of production which shall be the final 24-hour period of a 72-hour test throughout which the well should be produced in the same

manner and at a constant rate. The daily tolerance limitation set forth in Rule 502 I (a) of the General Rules and Regulations and any limiting gas-oil ratio for the pool shall be waived during such tests. The project operator shall notify the Commission and all offset operators in writing of the exact time and date such tests are to be conducted. The Commission and representatives of the offset operators may witness the tests.

RULE 7. The allowable assigned to each producing well in the Project shall be equal to the well's ability to produce or to top unit allowable for the pool, whichever is less; provided, however, that any producing well in the project area which directly or diagonally offsets a well outside the project area producing from the same common source of supply shall not produce in excess of top unit allowable for the pool until January 1, 1964, or until the operators of such offset well outside the project area have instituted a pressure maintenance project in the area of such well, whichever shall first occur. Each producing well shall be subject to the limiting gas-oil ratio (2,000 to 1) for the pool, except that any well or wells within the project area producing with a gas-oil ratio in excess of 2,000 cubic feet of gas per barrel of oil may be produced on a "net" gas-oil ratio basis, which net gas-oil ratio shall be determined by applying credit for daily average gas injected, if any, into the pool within the project area to such high gas-oil ratio well. The daily adjusted oil allowable for any well receiving gas injection credit shall be determined in accordance with the following formula:

$$A_{adj} = \frac{TUA \times F_a}{\frac{P_g - I_g}{P_o}}$$

where:

A_{adj} = the well's daily adjusted allowable

TUA = top unit allowable for the pool

F_a = the well's acreage factor

P_g = average daily volume of gas produced by the well during the preceding month, cubic feet

I_g = the well's allocated share of the daily average gas injected during the preceding month, cubic feet

P_o = average daily volume of oil produced by the well during the preceding month, barrels

In no event shall the amount of injected gas being credited to a well be such as to cause the net gas-oil ratio, $\frac{P_g - I_g}{P_o}$, to be less than 2,000 cubic feet of gas per barrel of oil produced.

RULE 8. Credit for daily average net water injected into the [redacted] pool through any injection well located within the project area may be converted to its gas equivalent and applied to any well producing with a gas-oil ratio in excess of two thousand cubic feet of gas per barrel of oil. Total credit for net water injected in the project area shall be the gas equivalent volume of the daily average net water injected during a one-month period. The daily average gas equivalent of net water injected shall be computed in accordance with the following formula:

$$E_g = (V_{w\ inj} - V_{w\ prod}) \times 5.61 \times \frac{P_a}{15.025} \times \frac{520^{\circ}}{T_r} \times \frac{1}{Z}$$

where:

E_g = Average daily gas equivalent of net water injected, cubic feet

$V_{w\ inj}$ = Average daily volume of water injected, barrels

5.61 = Cubic foot equivalent of one barrel of water

P_a = Average reservoir pressure at mid-point of the pay-zones of Horseshoe-Gallup Oil Pool in project area, psig + 12.01, as determined from most recent survey

15.025 = Pressure base, psi

520° = Temperature base of 60°F expressed as absolute temperature

T_r = Reservoir temperature of 87°F expressed as absolute temperature (547°R)

Z = Compressibility factor from analysis of Horseshoe-Gallup gas at average reservoir pressure, P_a, interpolated from compressibility tabulation below:

Reservoir Pressure	Z	Reservoir Pressure	Z	Reservoir Pressure	Z
50	.9725	300	.8325	500	.6560
100	.9465	350	.8030	600	.6135
150	.9215	400	.7710	650	.5655
200	.8885	450	.7220	700	.5220
250	.8600	500	.6900	750	.4630
				800	.3935

RULE 9. Each month the project operator shall, within three days after the normal unit allowable for Northwest New Mexico has been established, submit to the Commission a Pressure Maintenance Project Operator's Report, on a form prescribed by the Commission, outlining thereon the data required, and requesting allowables for each of the several wells in the Project as well as the total Project allowable. The aforesaid Pressure Maintenance Project Operator's Report shall be filed in lieu of Form C-120 for the Project.

RULE 10. The Commission shall, upon review of the report and after any adjustments deemed necessary, calculate the allowable for each well in the Project for the next succeeding month in accordance with these rules. The sum of the allowables so calculated shall be assigned to the Project and may be produced from the wells in the Project in any proportion except that no well in the Project which directly or diagonally offsets a well outside the Project producing from the same common source of supply shall produce in excess of two times top unit allowable for the Pool.

$V_{w\ prod}$ = Average daily volume of water produced, barrels

5.61 = Cubic foot equivalent of one barrel of water

P_a = Average reservoir ~~pressure~~ at mid-point of the pay-zones of ~~the~~ pool in the project area, psig + 12.01, as determined from most recent survey

15.025 = Pressure base, psi

520° = Temperature base of 60°F expressed as absolute temperature

T_r = Reservoir temperature of ~~67°F~~ 92°F expressed as absolute temperature ~~(547°R)~~ (552°R)

Z = Compressibility factor from analysis of ~~the~~ gas from the pool at average reservoir pressure, P_a, interpolated from compressibility tabulation below:

Reservoir Pressure	Z	Reservoir Pressure	Z	Reservoir Pressure	Z
50	.9725	300	.8325	500	.6560
100	.9465	350	.8030	600	.6135
150	.9215	400	.7710	650	.5655
200	.8885	450	.7220	700	.5220
250	.8600	500	.6900	750	.4630
				800	.3935

OK

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BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
July 24, 1963

EXAMINER HEARING

CASE 2865

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
July 24, 1963

EXAMINER HEARING

IN THE MATTER OF:

Application of Humble Oil & Refining Company 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 Gallup formation underlying its Navajo "G" lease in Sections 1, 2, 11 and 12, Township 31 North, Range 17 West, San Juan County, New Mexico. Initial injection will be through applicant's Well No. 16 located in Unit G of said Section 1. Applicant further seeks the promulgation of special rules governing the operation of said project. CASE 2865

BEFORE: Daniel S. Nutter, Examiner

TRANSCRIPT OF HEARING

MR. NUTTER: We will call Case 2865.

MR. DURRETT: Application of Humble Oil & Refining Company for a pressure maintenance project, San Juan County, New Mexico.

MR. BRATTON: Howard Bratton, appearing on behalf of the Applicant, John Knodell appearing with me as co-counsel, and we have two witnesses, if they'll both be sworn.

(Witnesses sworn.)

MR. BRATTON: If the Examiner please, I would like to make a brief preliminary statement. This is an application for a

pressure maintenance project in another little Gallup Pool in the Basin. In our application we outlined a project area and tentative wells to be converted. If the Commission would rather pull in the area, we have a suggested outline that they can pull it into. We have no strong feelings, and I'll give that to you at the end of the hearing.

Also, I believe the rules that we have applied for are the exact Horseshoe-Gallup rules, except we have by amendment -- and I don't have a copy of it, but I believe it was sent to the Commission. Do you have that, Mr. Durrett?

MR. DURRETT: We have a copy of a letter from Mr. John Knodell from Humble requesting the application be amended.

MR. BRATTON: Right. Now the rule amendment there, as I understand it, is to this effect: That none of the wells directly offsetting acreage outside of the unit will produce more than a single allowable prior to January 1 of 1964. Then from there on they may produce any amount; the idea, of course, being that the offset operators want to get their floods into operation, so that is the reason for that suggested amendment, and as I understand it, that is the only change from the Horseshoe-Gallup proposed rules.

MR. NUTTER: As I understand it, the amendment is self-restricting, in effect?

MR. BRATTON: That's right. It means you couldn't start producing the wells directly offsetting the acreage at double allowable right now. You produce them at single allowable until

January 1, 1964, the Commission retaining jurisdiction of the case; and of course, if the offset operators and we don't have cooperative matters worked out by then, we might see; but that's the purpose of that at this time.

MR. NUTTER: The application is admitted as hereby amended in accordance with the letter of July 15.

MR. BRATTON: All right.

T. W. FAUTIN

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

DIRECT EXAMINATION

BY MR. BRATTON:

Q Will you state your name, by whom you are employed and in what capacity?

A My name is T. W. Fautin. I'm employed by Humble Oil and Refining Company in the Durango District as a production geologist.

Q Have you previously testified before the Commission?

A No, I have not.

Q State briefly your professional and educational background.

A I received a Bachelor of Science degree in Geology from Brigham Young University in 1950. I have worked as a geologist for the past eleven years, the last six years of which has been in Durango, Colorado, as a production geologist.

Q Are you familiar with the Many Rocks Field and the matters contained in this application?

A Yes, I am.

MR. BRATTON: Are the witness' qualifications acceptable?

MR. NUTTER: Yes, sir.

(Whereupon, Humble's Exhibit No. 4 marked for identification.)

A For orientation purposes, I would like to refer you to Exhibit No. 4 in the handout. The Many Rocks Field is a stratigraphic trap trending northwest-southeast, typical of the Gallup offshore sandbar developments. The discovery well on the northeast-northwest end of the Field was completed by Curtis Little on December 17, 1962; on the southeast edge of the field Atlantic completed their No. 1 Well December 25, 1962. Since the completion of those two wells, approximately 36 additional wells have been drilled in the area on 40-acre spacing. If you'll refer to Exhibit No. 1 --

(Whereupon Humble's Exhibits Nos. 1, 2, 3, and 5, 6, 7 marked for identification.)

Q Now on your Exhibit 4 the red outline is the project area as contained in the application originally submitted?

A That's correct.

Q The green outline is the Many Rocks Field as currently defined by the Commission, is that correct?

A That is correct.

Q And just for purposes of orientation, the producing wells and the proposed injection wells are indicated in accordance with the schedule on there?

A Yes.

Q Now let's go back to Exhibit No. 1, please.

A Exhibit No. 1 is a structure map of the Many Rocks and Horseshoe-Gallup Field. The contour horizon is the top of the Gallup pay sand and the contour interval is 25 feet. Humble acreage is outlined as shown in the legend. The scale of the map is one inch equals 4000 feet. The Many Rocks Field is located on the northeast flank of the Horseshoe-Gallup Field. It is also in the northeast part of the Humble acreage block. The dip in the project area is to the northeast at approximately two degrees. There is no evidence of a gascap, or an underlying water, and therefore structure should have little effect on performance of the field.

Q Is that all that's indicated on your structure map?

A That's right.

Q Let's go then to your cross-section, that's your Exhibit No. 2. The way the cross-sections run are indicated in your index map, your A-A' being northwest-southeast, the length of the pool; and B-B' is southwest-northeast across the pool, is that correct?

A That is correct.

Q What's indicated on your cross-section A-A'?

A Cross-section A-A' is a structural cross-section paralleling the Gallup sandbar trend, and it is located near the center of the sand trend, as you can see from the index map. The mechanical logs used in preparing this cross-section are gamma ray density logs, with the exception of Humble's G-8 Well, and that is a sonic log.

The vertical scale is one inch equals 80 feet, and the horizontal is one inch equals 600 feet. The datum is a plus 4150 feet. The correlation point above the Gallup pay sand is the Gallup "T" point, and this point is easily followed throughout the area. Below the Gallup pay sand is the sonosity. The sand itself is shown on the cross-section as a stippled area and through this line of section, the sand averages about 10-1/2 feet thick. It is my opinion that this is a continuous sand lens.

Q Now turn to your B-B'.

A Section B-B' trends southwest-northeast across the sand trend; the scale and datum are the same as Section A-A'. This section shows the Gallup sandbar thinning in a southwest and northeast direction. It is my opinion that the sand in a southwest direction becomes impermeable and is not connected to the main producing sand in the Horseshoe Field.

Q This is based on the datum from your G-13 Well, is that correct?

A Yes. Production tests on the G-13 Well failed to recover all the load oil, and we can see from the log that this

sand is very thin. We do not have core analyses on this well; however, production tests would indicate that it is very prolific.

Q You just have the one lens in this area, is that correct? You don't have an upper and a lower?

A There is an upper lens that is developed just to the east of the area. It is present in Mobil's 14-6 Well. But in the project area, this sand is either non-developed or very poorly developed.

Q Is there anything else you care to bring out in connection with your cross-sections?

A No, I don't believe so.

Q Let's go then to your Exhibit No. 3.

A Exhibit No. 3 is a formation density log, the same type of log that was used in the construction of the cross-section. This is of Humble's Navajo Tract G-16 Well, and it is a typical well in the Many Rocks Field. The Gallup "T" correlation point is shown at a depth of 1081, the sonosity at a depth of 1252, and the Gallup pay sand is shown as a stippled area.

Based on twelve cored wells in the Many Rocks Field, the average porosity is 15.4 percent and the average permeability is 135 millidarcies. The Gallup sand is a medium-grained light grey to green, slightly calcareous sand. It is approximately 950 feet above the Morrison formation. The Morrison formation is a water source for the flood in the Horseshoe-Gallup Field. This 950 feet is composed of primarily impermeable shales and sands.

Q What other water is there in the area?

A We have a slight surface water in the alluvium that is found in this old river channel that cuts through the area.

Q What depths are you talking about there?

A It varies in depth from, oh, less than 30 feet to approximately 70 feet. In some areas we spud directly on the Mancus shale and there is no surface waters there.

Q So between that surface water and your Morrison, there are no other fresh waters in the area?

A No, there is not.

Q How does this formation correlate as to your porosities and permeabilities with the Horseshoe and as to your other characteristics?

A The porosity and permeability and sand characteristics are almost identical with the Horseshoe-Gallup Field.

Q You just have the pinching out between the two fields; that is, it becomes impervious in between the two fields so there's no connection between them, otherwise, it's the same sand, same formation?

A Same general character, yes, sir.

Q Is there anything else you care to state about the geological characteristics of this area?

A No, not at this time.

Q From your study of the geological characteristics, would this formation be susceptible to a pressure maintenance

project?

A Yes, it would.

Q Is there anything in the area that would make it react to pressure maintenance any different than the Horseshoe?

A Not to my knowledge.

Q Were these Exhibits 1 through 4 prepared by you or under your supervision?

A 1 and 2 were prepared by me and 3 was prepared in our Denver area office.

MR. BRATTON: That's all the questions we have of this witness at this time.

MR. NUTTER: Are there any questions of Mr. Fautin?

CROSS EXAMINATION

BY MR. NUTTER:

Q This sand is continuous across to the Horseshoe-Gallup but pinched out of porosity and permeability?

A We don't have the control to say it's continuous. It thins very rapidly, as we see on the G-13 Well that is shown on the left side of Section B-B'. All there is is just a very slight remnant of the sand, approximately three feet left, as indicated from the log it is very tight and impermeable; and we also see this thinning happening in a northeast direction from the Horseshoe-Gallup Field. The sand becomes very thin and shaly and impermeable.

Q Well, this "CH" Well of yours up in Section 3, which

would be about midway between the two pools, did it encounter no sand at all, or what?

A I would say it encountered no effective sand. Quite often it's very shaly and it's difficult to tell whether you want to call this a sandy shale or shaly sand, but there would be no effectiveness in that well.

Q Your Exhibit No. 1 is a structure map of the Gallup pay sand, and it would indicate it's a continuous sand from one pool to the other dipping to the northeast. Is this the pay in the Horseshoe, one of the pays?

A Yes, it is.

Q Which is this, the lower or the upper?

A This is the lower pay. The upper pay in the Horseshoe Field is not present on Humble acreage. It is present to the southeast.

Q So in this area of the Horseshoe, you only have the one pay, anyway?

A That is correct.

Q You stated that a second sand was developing in the Mobil 14-6 well?

A That is right. That is an upper sand. It is about 130 feet above the main Gallup pay.

Q Has it been encountered in any of the other wells to the southeast there, or is that the only one --

A It has been encountered in some wells to the southeast

that are not shown on the map. It's the Atlantic, I believe 2-17.

MR. NUTTER: Are there any other questions of Mr. Fautin? He may be excused.

(Witness excused.)

DONALD V. EMERY

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

DIRECT EXAMINATION

BY MR. BRATTON:

Q Would you state your name, by whom you are employed and in what capacity?

A Donald V. Emery, Humble Oil and Refining Company. I am District Engineer of the Durango District.

Q State briefly your professional and educational qualifications, Mr. Emery.

A I have a Bachelor of Science degree in Petroleum Engineering from the University of Tulsa. I have a total of ten years experience, three years as a Petroleum Production Engineer, two years as a Reservoir Engineer, and three years as a section head in Reservoir and Production Engineering.

Q Have you studied the Many Rocks Field, are you familiar with the matters contained in this application?

A Yes, I am.

MR. BRATTON: Are the witness' qualifications acceptable?

MR. NUTTER: Yes.

Q (By Mr. Bratton) Mr. Emery, let's go then to your Exhibit No. 4 and referring back to it, explain what it reflects and what you propose to do in the way of injection wells, producing wells and so forth.

A The outlined area indicates the proposed project area and the wells with the red arrows through them indicate the injection wells as proposed initially. We anticipate further expansion upon the completion of cooperative agreements with offset operators on either side.

Q Those would be in the northwest there, after you finalize a cooperative agreement with, I believe, Skelly and Cities Service?

A Yes.

Q In the southeast, as soon as you firm up with Mobil and Atlantic and those people owning theirs?

A Yes.

Q That's the reason they haven't progressed further, and that's the reason we have proposed this amendment about a single allowable offsetting them until January of '64, is that correct?

A That's correct.

Q What is the status of these various proposed injection wells?

A Going on the row of wells with the No. 18 there in the southeast northeast of Section 2, that well is currently being tested after being treated, and I do not have the results. We

encountered approximately five feet of sand in that well. The next location in the diagonal has not been drilled or completed as of this date. The No. 20 Well has been tested and has not recovered completely the load oil. We anticipate it will recover approximately 20 barrels of oil per day on test.

The next well on the diagonal has not been drilled nor completed. Going to the next row to the northeast, Well No. 16 has been completed as an injector. However, we perforated and fractured that well and currently, with our allowable are currently flowing the well at top allowable. The next well following that diagonal has not been drilled but is planned to be drilled.

Q So the three proposed wells will be drilled as injection wells which would formulate roughly an 80-acre five-spot?

A An 80-acre five-spot. We do have one exception on that matter, that we may leave 20 or 18 as a producer, dependent upon determinations of the injection tests.

Q You might produce them for a while and then convert them?

A Or if not necessary, we would not convert them.

Q All right. Is there anything else you care to point out in connection with this map?

A No, sir.

Q Let's turn then to your next exhibit.

A Exhibit 5 shows a proposed method of water injection into the wells as described. This particular exhibit shows a schematic of the Humble's Navajo G-16. This well, a 7-inch surface

casing was set to depth of 33 feet, and in other cases we set two joints or three joints to protect against these sub-surface water flows as described by the geologic testimony. We drilled that well to a total depth and in the G-16 have set 2-7/8ths inch O.D. casing. This was conditioned two casing, however, the grade is high grade and there were no leaks or anything like that. The casing is then cemented to approximately 800 foot calculated, The well was perforated two holes per foot and fracture-treated. We anticipate that the future injection wells would be so developed.

Q Now, the injection wells that you've been talking about so far, I believe we haven't had the information on all of them as yet to give to Mr. Irby as to the casing and cementing program, but we're going to submit that information?

A Similar schematics.

Q In your judgment is that sufficient to protect any fresh surface waters in the area?

A Yes, sir, and we can recognize this as we are drilling these with air and it becomes obvious when the water comes in drilling with air; and then we set the casing to protect through any of those alluvial beds.

Q Likewise, as testified, the only other water is down in the Morrison way down below this, is that correct?

A That is correct.

Q Is there anything else you care to testify in connection with this?

A We anticipate that the surface injection pressure will be approximately 600 pounds, placing a sub-surface pressure at the Gallup of approximately 1200 pounds or less.

Q Turn then to your next exhibit. What information does this exhibit reflect?

A Exhibit 6 reflects the well status and the production data of Humble Oil wells in the project area drilled to date. There are a total of 14 wells drilled at this present time. From left to right, the lease and well number is given, the total depth, the production casing, size and depth set, the estimated top of cement, the perforated interval, the completion date, the initial potential in barrels of oil per day, and gas-oil ratio in cubic feet per barrel.

The production for June by individual wells is tabulated along with the gas-oil ratio, and the cumulative oil production to July 1 is shown for each well. The total production to date is 19,000 barrels to July 1, 1963. The current allowable is 608 barrels of oil per day. We have a total of eight top allowable wells.

The last column on the right shows the waterflood well status as we see it at the present time and anticipate it, showing those which are producers, those which we probably will convert, and those which we will definitely use as injectors, as we see the project at this time.

Q In addition, you have your proposed wells to be drilled

as injection wells?

A That is correct.

Q What further information do you care to put in in connection with this exhibit?

A I would like to give an engineering opinion on the reservoir characteristics.

Q All right.

A The Gallup reservoir in the Many Rocks Field is, in my opinion, distinctly similar to the Horseshoe area to the west, as shown by Exhibit 4. The porosity is 15.4 percent, an average of twelve wells cored in the area. The permeability is 135 millidarcies. We have estimated the connate water saturation at 35 percent. We have not taken a sub-surface fluid sample; however, by direct analogy of their Gallup fluid samples, we estimate the solution gas-oil ratio at 250 standard cubic feet per barrel, the formation volume factor at 1.1, the reservoir viscosity at reservoir temperature is 1.4 centipoises, and the reservoir temperature we estimate is 92 degrees Fahrenheit.

The surface crude as produced has an API gravity of 41 degrees at 60 degrees Fahrenheit. In the completion of the Humble G-7 Well in May of '63, Humble took a bottom hole pressure of that well. It was determined that the pressure was 465 pounds per square inch absolute at a datum of plus 4123.feet.

It is my opinion that this is very close to the original reservoir pressure of this Gallup sand trend as there were only

minor withdrawals to that date.

Q What are your calculations, Mr. Emery, on primary and pressure maintenance recovery out of this pool?

A Well, from known production performance and the absence of water production, and from an analogy of the other Gallup reservoirs, I conclude that the primary producing mechanism is a solution gas drive, and that primary recovery will be 15 percent of the original oil in place. The expected results of the proposed pressure maintenance project will be to increase ultimate recovery -- pardon me, to increase recovery to an ultimate of 33 percent of oil in place, or approximately 120 percent increased oil over primary production.

Q What are we talking about in terms of total barrels?

A In terms of total barrels, the increased oil due to pressure maintenance is expected to be 760,000 barrels of oil in the project area.

Q So that would mean, oh, approximately 700,000 barrels of primary by the primary mechanism?

A Yes, sir.

Q Doubling, to a total of a little over a million and a half barrels with a pressure maintenance project?

A Right.

Q Turn to your next exhibit.

A Exhibit No. 7?

Q Yes, go ahead.

A Humble has every reason, and I have every reason to believe that this will be a successful pressure maintenance project. I think an outstanding point is Exhibit 7, showing our performance of the Horseshoe-Gallup pressure maintenance project number 2. Exhibit 4 shows that area outlined. It will be noted that peak primary production occurred in late '59 at approximately 1400 barrels of oil per day. The next principal point is the rapid production decline indicating a very rapid pressure depletion of the reservoir. Then in October of '60, upon approval, water injection was commenced. The conversion of wells had caused a great drop there through '61. Water was injected, project received definite gains in late 1961.

At this current time we are producing 1250 barrels of oil per day, just 150 barrels less than peak primary. I think this is highly illustrative of the success of a Gallup flood and we have distinctly similar characteristics indicated to us in this Gallup sand in the Many Rocks Field.

Q What volumes are you contemplating injecting, Mr. Emery?

A We contemplate injecting approximately 1,000 barrels a day upon ultimate completion of the project. A round number would be 100 barrels of water per day per well.

Q What's your source of water?

A The source of water is the Morrison, in the pressure maintenance project, too, we have developed a Morrison water supply which has a capacity in excess of our demand of approximately twelve

to fifteen hundred barrels of water. We will utilize this water, these facilities, to carry out the flood of this small project.

Q That's the same water that you are using in your Horseshoe flood?

A Yes.

Q The same well?

A Yes.

Q What's your royalty situation here, is this all Navajo acreage?

A It is.

Q And you've submitted an application for approval of this to the U.S.G.S., of course?

A Yes.

Q Is there anything further you care to state in connection with any of your exhibits?

A No.

Q I think it's self-evident, but from your engineering opinion, the institution of this pressure maintenance project will result in increased ultimate recovery and result in the prevention of waste, is that correct?

A It will.

Q With the proposed rules leading up to cooperative agreements along the line, is it your opinion that correlative rights will be protected?

A It is my opinion they will be protected.

Q Is there anything further you care to state in connection with any of these exhibits?

A No, sir.

MR. BRATTON: We would offer in evidence Applicant's Exhibits 1 through 7.

MR. NUTTER: Humble's Exhibits 1 through 7 will be admitted in evidence.

(Whereupon, Humble's Exhibits Nos. 1 through 7 admitted in evidence.)

MR. NUTTER: Any questions of Mr. Emery? Mr. Irby.

MR. IRBY: Frank Irby, State Engineer's Office.

CROSS EXAMINATION

BY MR. IRBY:

Q Mr. Emery, as I interpreted your testimony, the surface casing will be set and cemented below all of the shallow water into an impermeable zone?

A That is correct.

Q Then I won't need these other additional diagrammatic sketches of the individual wells. Are you going to ~~recircle~~ re-cycle all of your produced water?

A Yes, we are.

Q Is it going to be necessary to treat this water?

A Very small amount of treatment. Our process would be to try to keep the water oxygen-free, filter the water, treat it with a bactericide, keep it all totally closed, excluding oxygen,

and reinject it into the formation.

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

BY MR. NUTTER:

Q I wanted to run through the completion status of the wells. In the project area as depicted on Exhibit 4, there are indicated six injection wells and quite a number of producing wells. All the wells that are shown as producing wells have been completed, is that correct?

A Yes, sir. 18 is shown as a producing well. Are you referring to 18 in this case?

Q Well, 18 is indicated as an injection well.

A That is correct. We are making a completion effort on it to see what type of oil production we could get out of this well. however. We are asking for it to be our option whether to make it a producer or an injector as a result of the test.

Q You are not firm, then, on this actual pattern that you have shown here for injection wells?

A That is correct, with regards to 18 and 20.

Q And they may or may not be injection wells or producers, you don't know which?

A That is correct.

Q Are the remainder of the producing wells all completed?

A Yes, they are.

Q 16 is definitely going to be an injection well, is it?

A It falls in the same classification as 18.

Q So it might not be an injection well?

A That is correct. May I clarify?

Q Yes, sir.

A It is my opinion that we will convert each well as shown. However, we would like the opportunity to test and see the injectivity rate into the injector wells which we're asking for permission to inject.

Q Normally, Mr. Emergy, in an order of this type, the Commission designates the wells that will be injection wells. It looks like here we might have to designate some maybe injection wells. How about the location in the Northwest of the Northeast of Section 12? That well has not been drilled, has it?

A No, it has not.

Q Will that definitely be an injection well?

A Yes, sir, to the best of my knowledge at this time.

Q The location in the Northwest of the Southeast of Section 1, that hasn't been drilled has it?

A No, it has not.

Q Will it be an injection well?

A Yes.

MR. BRATTON: If the Examiner please, I know what the problem is. I would like to suggest if the Commission would designate what we have designated here as the injection pattern, with the provision that if we propose to do anything else we come back and advise the Commission and ask for administrative order.

MR. NUTTER: I am sure that the project rules provide for additional injection wells, don't they?

MR. BRATTON: Yes, standard.

MR. NUTTER: In other words, it would be your proposal here to authorize these six wells and then if any change is made from that injection pattern --

MR. BRATTON: It would be normal application.

MR. NUTTER: Normal administrative routine with notification to offset operators?

MR. BRATTON: Yes, sir.

Q (By Mr. Nutter) Now,Mr. Emery, with all this reservoir data, what calculates to be the original oil in place per 40-acre tract or per 80-acre tract?

A I would have to make a calculation.

Q You don't have that?

A 706 barrels per acre foot.

Q 706 per acre foot?

A 706 per acre foot.

Q And the average thickness here, I believe, was given as 10.5 or something like that, is that correct?

A Within the project area the average is approximately eight feet, over-all.

Q In your project area, you calculated approximately 700,000 barrels on primary, or 760,000 primary and pressure maintenance?

A 700,000 on primary, 760,000 additional.

Q Additional?

A Yes, sir.

Q For a total of 1,400,000 for this area?

A Yes, sir.

MR. NUTTER: Are there any other questions of Mr. Emery?

MR. DURRETT: Yes, sir, I have one or two.

MR. NUTTER: Mr. Durrett.

BY MR. DURRETT:

Q Do I understand correctly that you do have a permit from the State Engineer's Office to use your Morrison well in your Horseshoe-Gallup project as an injection -- for injection purposes?

A Yes.

Q And what type of water is this, just briefly?

A It is a brackish water and not fit for man nor beast.

MR. DURRETT: Thank you.

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

(Witness excused.)

MR. NUTTER: Do you have anything further, Mr. Bratton?

MR. BRATTON: No, sir. If the Examiner please, we would just as soon go ahead and designate what's in the red as the project area, although, as indicated, subsequent development has indicated that we're not going to get out as far out on the flanks

as we possibly hoped to, and if the Examiner wants to pull it in, we have a proposed outline. We don't think it makes much difference one way or the other.

MR. NUTTER: The proposed rules provide for the further development of the project area and further development on the flanks, I presume?

MR. BRATTON: Yes.

MR. NUTTER: Does anyone else have anything to offer in this case?

MR. DURRETT: The Commission has received a communication in the form of a telegram from Tidewater Oil. This telegram states that they support the amendment to the application that Mr. Bratton offered earlier that no top allowable production will be permitted until January 1, 1964, on the wells on the fringes of the unit, unless there is an offsetting pressure maintenance project. They also request an opportunity to come before the Commission for an extension of time on the January 1, 1964, if they feel it's necessary, which would automatically be their right if they want to file an application. This telegram will be placed in the file if anyone would like to read it in its entirety.

MR. NUTTER: I believe the provision of the telegram should be that no production in excess of top allowable on the fringes.

MR. DURRETT: Yes, that's correct. I may have mis-stated it.

MR. NUTTER: Is there anything further?

MR. MOTTER: Yes. Motter with Cities Service. We have an interest in the Skelly operated leases to the north. We are at present looking over a line agreement submitted by Humble, and we urge the approval of this request.

MR. NUTTER: Thank you.

MR. SPERLING: Mr. Examiner, Jim Sperling on behalf of Mobil Oil Company. Mobil supports the application of Humble as amended, feeling that the application as amended is in the best interest of conservation and prevention of waste and the protection of correlative rights. It is anticipated that a similar project will be instituted to the southeast where there is diverse ownership, as shown by the exhibits offered by Humble. Because of the diverse ownership, efforts to form the project have not proceeded as rapidly as the Humble project, in view of their single ownership. It is anticipated that the owners within the project will have a plan formulated for presentation to the Commission prior to January 1, 1964.

Recognizing, of course, that the Commission retains jurisdiction in the event unanticipated difficulties are encountered, we would expect to make a showing of those to the Commission with a view toward obtaining an extension, if necessary, and if the Commission felt that we were justified in so doing. With these remarks, we support the application.

MR. NUTTER: Thank you, Mr. Sperling. Anyone else?

If there is nothing further in this case, we will take it under advisement and take a 15-minute recess.

(Whereupon, a short recess was taken.)

* * *

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 13th day of August, 1963.

Ada Dearnley
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. 2866
heard by me on 7/24, 1963.
..... Examiner
New Mexico Oil Conservation Commission

BEFORE THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO

IN THE MATTER OF THE HEARING
CALLED BY THE OIL CONSERVATION
COMMISSION OF NEW MEXICO FOR
THE PURPOSE OF CONSIDERING:

CASE No. 2024
Order No. R-1745

APPLICATION OF HUMBLE OIL & REFINING
COMPANY FOR A PRESSURE MAINTENANCE
PROJECT IN THE HORSESHOE-GALLUP OIL
POOL, SAN JUAN COUNTY, NEW MEXICO,
AND FOR THE PROMULGATION OF SPECIAL
RULES GOVERNING THE OPERATION OF
SAID PROJECT.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 o'clock a.m. on July 27, 1960, at Santa Fe, New Mexico, before Daniel S. Nutter, Examiner duly appointed by the Oil Conservation Commission of New Mexico, hereinafter referred to as the "Commission," in accordance with Rule 1214 of the Commission Rules and Regulations.

NOW, on this 9th day of August, 1960, the Commission, a quorum being present, having considered the application, the evidence adduced, and the recommendations of the Examiner, Daniel S. Nutter, and being fully advised in the premises,

FINDS:

(1) That due public notice having been given as required by law, the Commission has jurisdiction of this cause and the subject matter thereof.

(2) That the applicant, Humble Oil & Refining Company, proposes to institute a pressure maintenance project in the Horseshoe-Gallup Oil Pool, San Juan County, New Mexico, by the injection of water into the Gallup formation through 29 wells initially, all of which wells are within the proposed project area which consists of the following-described acreage:

TOWNSHIP 31 NORTH, RANGE 17 WEST, NMPM	
Section 3:	SW/4 SE/4, S/2 SW/4 and NW/4 SW/4
Section 4:	N/2 NW/4, S/2 N/2 and S/2
Section 9:	N/2 N/2, SE/4 NW/4, S/2 NE/4, N/2 SE/4 and SE/4 SE/4
Section 10:	N/2, N/2 S/2, SW/4 SW/4 and SW/4 SE/4
Section 11:	SW/4 NW/4, SW/4 and SW/4 SE/4

(3) That in regard to provisions governing allowables for the project, the applicant seeks an order identical to the one approved

for The Atlantic Refining Company in Case No. 1979, Order No. R-1699, which order provides that top unit allowable is to be assigned to each injection well and that the allowable assigned to any producing well in the project area shall be no greater than the demonstrated ability of the well to produce, subject to top unit allowable for the pool. In the case of curtailed or shut-in producing wells, the allowable shall be no greater than the demonstrated ability of such well to produce as reflected by a 24-hour test at a stabilized rate of production immediately prior to such shut-in or curtailment. In no event is such allowable to be greater than the current normal unit allowable for the Horseshoe-Gallup Oil Pool during the month of transfer.

(4) That the applicant also proposes that an administrative procedure be established whereby the pressure maintenance project may be expanded for good cause shown, and whereby additional wells in the project area may be converted to water injection.

(5) That Special Rules and Regulations for the operation of the Horseshoe-Gallup Pressure Maintenance Project Number 2 should be promulgated and, for operational convenience, such rules should provide certain flexibility in authorizing the production of the project allowable from any well or wells in the project in any proportion, provided that no well in the project area which directly or diagonally offsets a well outside the project area producing from the same common source of supply should be allowed to produce in excess of top unit allowable for the Horseshoe-Gallup Oil Pool until such time as the well has experienced a substantial response to water injection. When such a response has occurred, the well should be permitted to produce up to two times top unit allowable for the Horseshoe-Gallup Oil Pool. Production of such well at a higher rate should be authorized only after notice and hearing.

IT IS THEREFORE ORDERED:

(1) That the applicant be and the same is hereby authorized to institute a pressure maintenance project in the Horseshoe-Gallup Oil Pool, San Juan County, New Mexico, to be designated as the Horseshoe-Gallup Pressure Maintenance Project No. 2, by the injection of water into the Gallup formation through the following-described wells in Township 31 North, Range 17 West, NMPM, San Juan County, New Mexico:

Navajo "F" Well No. 1, Unit D, Section 4
Navajo "F" Well No. 3, Unit L, Section 4
Navajo "F" Well No. 8, Unit E, Section 10
Navajo "F" Well No. 9, Unit K, Section 10
Navajo "F" Well No. 11, Unit I, Section 10
Navajo "F" Well No. 14, Unit M, Section 10
Navajo "F" Well No. 15, Unit J, Section 9
Navajo "F" Well No. 17, Unit G, Section 10
Navajo "F" Well No. 18, Unit C, Section 10

Navajo "F" Well No. 21,	Unit D,	Section	10
Navajo "F" Well No. 22,	Unit H,	Section	9
Navajo "F" Well No. 23,	Unit B,	Section	9
Navajo "F" Well No. 24,	Unit P,	Section	4
Navajo "F" Well No. 25,	Unit N,	Section	4
Navajo "F" Well No. 27,	Unit J,	Section	4
Navajo "F" Well No. 28,	Unit F,	Section	4
Navajo "F" Well No. 31,	Unit N,	Section	3
Navajo "F" Well No. 32,	Unit L,	Section	3
Navajo "F" Well No. 33,	Unit D,	Section	9
Navajo "F" Well No. 34,	Unit F,	Section	9
Navajo "F" Well No. 36,	Unit A,	Section	10
Navajo "F" Well No. 38,	Unit H,	Section	4
Navajo "F" Well No. 40,	Unit P,	Section	9
Navajo "F" Well No. 43,	Unit O,	Section	3
Navajo "F" Well No. 44,	Unit O,	Section	10
Navajo "G" Well No. 3,	Unit K,	Section	11
Navajo "G" Well No. 4,	Unit M,	Section	11
Navajo "G" Well No. 5,	Unit O,	Section	11
Navajo "G" Well No. 6,	Unit E,	Section	11

(2) That Special Rules and Regulations governing the operation of the Horseshoe-Gallup Pressure Maintenance Project No. 2, San Juan County, New Mexico, be and the same are hereby promulgated as follows, effective September 1, 1960:

SPECIAL RULES AND REGULATIONS FOR THE HORSESHOE-GALLUP PRESSURE MAINTENANCE PROJECT NO. 2

RULE 1. The project area of the Horseshoe-Gallup Pressure Maintenance Project No. 2, hereinafter referred to as the Project, shall comprise that area described as follows:

TOWNSHIP 31 NORTH, RANGE 17 WEST, NMPM

Section 3:	SW/4 SE/4, S/2 SW/4 and NW/4 SW/4
Section 4:	N/2 NW/4, S/2 N/2 and S/2
Section 9:	N/2 N/2, SE/4 NW/4, S/2 NE/4, N/2 SE/4 and SE/4 SE/4
Section 10:	N/2, N/2 S/2, SW/4 SW/4 and SW/4 SE/4
Section 11:	SW/4 NW/4, SW/4 and SW/4 SE/4

RULE 2. The allowable for the Project shall be the sum of the allowables of the several wells within the project area, including those wells which are shut-in, curtailed, or used as injection wells. Allowables for all wells shall be determined in a manner hereinafter prescribed.

RULE 3. Allowables for injection wells may be transferred to producing wells within the project area, as may the allowables for producing wells which, in the interest of more efficient

operation of the Project, are shut-in or curtailed because of high gas-oil ratio or are shut-in for any of the following reasons: pressure regulation, control of pattern or sweep efficiencies, or to observe changes in pressures or changes in characteristics of reservoir liquids or progress of sweep.

RULE 4. The allowable assigned to any well which is shut-in or which is curtailed in accordance with the provisions of Rule 3, which allowable is to be transferred to any well or wells in the project area for production, shall in no event be greater than its ability to produce during the test prescribed by Rule 6, below, or greater than the current top unit allowable for the pool during the month of transfer, whichever is less.

RULE 5. The allowable assigned to any injection well on a 40-acre proration unit shall be top unit allowable for the Horseshoe-Gallup Oil Pool.

RULE 6. The allowable assigned to any well which is shut-in or curtailed in accordance with Rule 3, shall be determined by a 24-hour test at a stabilized rate of production, which shall be the final 24-hour period of a 72-hour test throughout which the well should be produced in the same manner and at a constant rate. The daily tolerance limitation set forth in Commission Rule 502 I (a) and the limiting gas-oil ratio (2,000 to 1) for the Horseshoe-Gallup Oil Pool shall be waived during such tests. The project operator shall notify all operators offsetting the well, as well as the Commission, of the exact time such tests are to be conducted. Tests may be witnessed by representatives of the offsetting operators and the Commission, if they so desire.

RULE 7. The allowable assigned to each producing well in the Project shall be equal to the well's ability to produce or to top unit allowable for the Horseshoe-Gallup Oil Pool, whichever is less, provided that any producing well in the project area which directly or diagonally offsets a well outside the project area producing from the same common source of supply shall not produce in excess of top unit allowable for the pool until such time as the well receives a substantial response to water injection. When such a response has occurred, the well shall be permitted to produce up to two times top unit allowable for the Pool. Production of such well at a higher rate shall be authorized only after notice and hearing. Each producing well shall be subject to the limiting gas-oil ratio (2,000 to 1) for the Horseshoe-Gallup Oil Pool, except that any well or wells within the project area producing with a gas-oil ratio in excess of 2,000 cubic feet of gas per barrel of oil may be produced on a "net" gas-oil ratio basis, which net gas-oil ratio shall be determined by applying credit for daily average gas injected, if any, into the Horseshoe-Gallup Oil Pool within the project area to such high gas-oil ratio well. The daily adjusted

oil allowable for any well receiving gas injection credit shall be determined in accordance with the following formula:

$$A_{adj} = \frac{TUA \times F_a \times 2{,}000}{\frac{P_g - I_g}{P_o}}$$

where:

A_{adj} = the well's daily adjusted allowable

TUA = top unit allowable for the pool

F_a = the well's acreage factor

P_g = average daily volume of gas produced by the well during the preceding month, cubic feet

I_g = the well's allocated share of the daily average gas injected during the preceding month, cubic feet

P_o = average daily volume of oil produced by the well during the preceding month, barrels

In no event shall the amount of injected gas being credited to a well be such as to cause the net gas-oil ratio, $\frac{P_g - I_g}{P_o}$, to be less than 2,000 cubic feet of gas per barrel of oil produced.

RULE 8. Credit for daily average net water injected into the Horseshoe-Gallup Oil Pool through any injection well located within the project area may be converted to its gas equivalent and applied to any well producing with a gas-oil ratio in excess of two thousand cubic feet of gas per barrel of oil. Total credit for net water injected in the project area shall be the gas equivalent volume of the daily average net water injected during a one-month period. The daily average gas equivalent of net water injected shall be computed in accordance with the following formula:

$$E_g = (V_{w\ inj} - V_{w\ prod}) \times 5.61 \times \frac{P_a}{15.025} \times \frac{520^{o}}{T_r} \times \frac{1}{Z}$$

where:

E_g = Average daily gas equivalent of net water injected, cubic feet

$V_{w\ inj}$ = Average daily volume of water injected, barrels

$V_{w\ prod}$ = Average daily volume of water produced, barrels

5.61 = Cubic foot equivalent of one barrel of water

P_a = Average reservoir pressure at mid-point of the pay-zones of Horseshoe-Gallup Oil Pool in project area, psig + 12.01, as determined from most recent survey

15.025 = Pressure base, psi

520^o = Temperature base of 60^oF expressed as absolute temperature

T_r = Reservoir temperature of 87^oF expressed as absolute temperature (547^oR)

Z = Compressibility factor from analysis of Horseshoe-Gallup gas at average reservoir pressure, P_a, interpolated from compressibility tabulation below:

Reservoir Pressure	Z	Reservoir Pressure	Z	Reservoir Pressure	Z
50	.9725	300	.8325	500	.6560
100	.9465	350	.8030	600	.6135
150	.9215	400	.7710	650	.5655
200	.8885	450	.7220	700	.5220
250	.8600	500	.6900	750	.4630
				800	.3935

RULE 9. Each month the project operator shall, within three days after the normal unit allowable for Northwest New Mexico has been established, submit to the Commission a Pressure Maintenance Project Operator's Report, on a form prescribed by the Commission, outlining thereon the data required, and requesting allowables for each of the several wells in the Project as well as the total Project allowable. The aforesaid Pressure Maintenance Project Operator's Report shall be filed in lieu of Form C-120 for the Project.

RULE 10. The Commission shall, upon review of the report and after any adjustments deemed necessary, calculate the allowable for each well in the Project for the next succeeding month in accordance with these rules. The sum of the allowables so calculated shall be assigned to the Project and may be produced from the wells in the Project in any proportion except that no well in the Project which directly or diagonally offsets a well outside the Project producing from the same common source of supply shall produce in excess of two times top unit allowable for the Pool.

RULE 11. The conversion of producing wells to injection, the drilling of additional wells for injection, and expansion of the project area shall be accomplished only after approval of the same by the Secretary-Director of the Commission. To obtain such approval, the Project operator shall file proper application with the Commission, which application, if it seeks authorization to convert additional wells to injection or to drill additional injection wells shall include the following:

(1) A plat showing the location of proposed injection well, all wells within the project area, and offset operators, locating wells which offset the project area.

(2) A schematic drawing of the proposed injection well which fully describes the casing, tubing, perforated interval, and depth showing that the injection of gas or water will be confined to the Gallup formation.

(3) A letter stating that all offset operators to the proposed injection well have been furnished a complete copy of the application and the date of notification.

The Secretary-Director may approve the proposed injection well if, within 20 days after receiving the application, no objection to the proposal is received. The Secretary-Director may grant immediate approval, provided waivers of objection are received from all offset operators.

Expansion of the project area may be approved by the Secretary-Director of the Commission administratively when good cause is shown therefor.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

JOHN BURROUGHS, Chairman

MURRAY E. MORGAN, Member

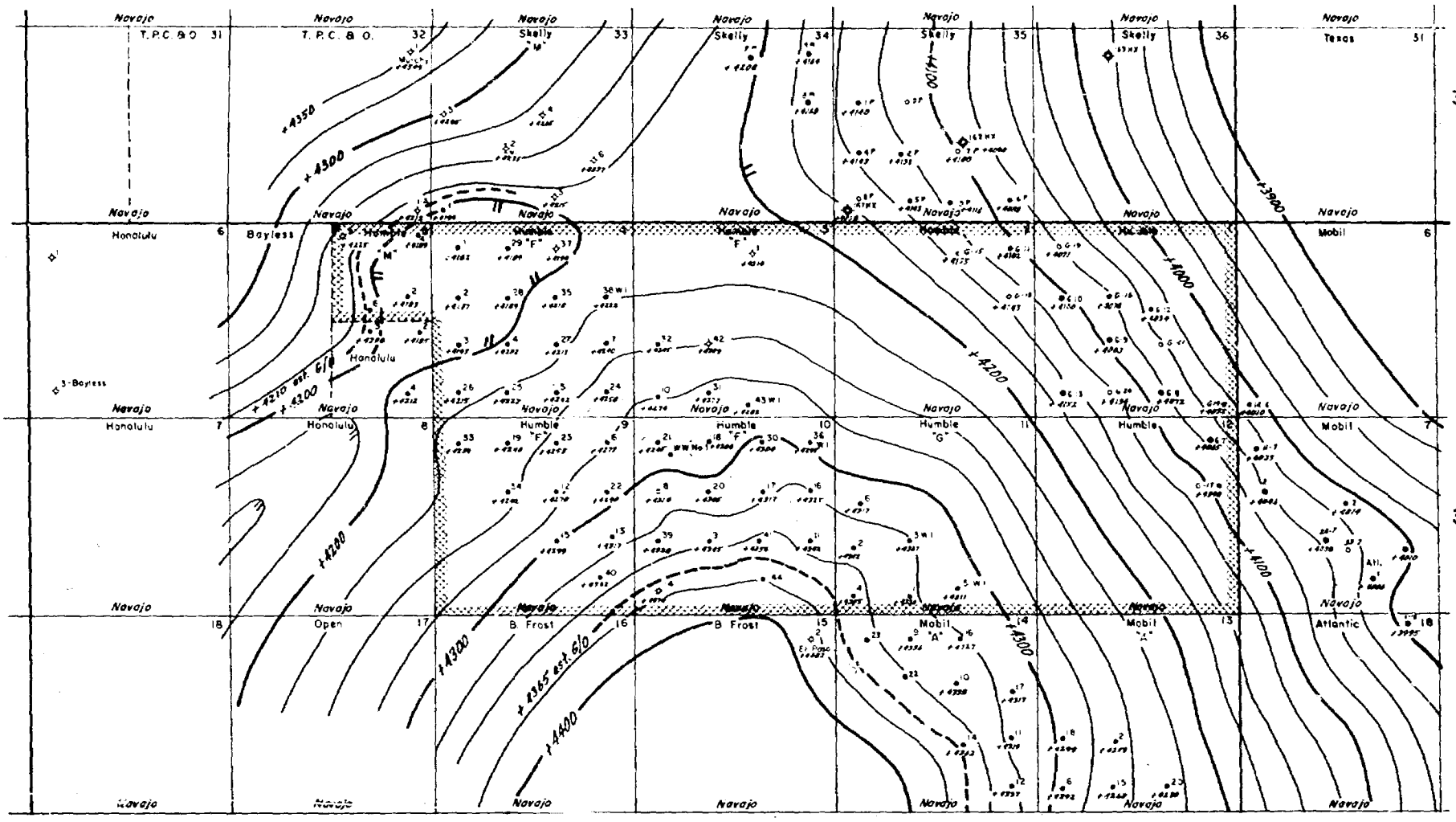
S E A L

A. L. PORTER, Jr., Member & Secretary

esr/

TABLE OF EXHIBITS

	Exhibit No.
Structure Map	1
Structural Cross-Sections	2
Formation Density-Gamma Ray Log	3
Aerial Plat - Horseshoe and Many Rocks Fields	4
Proposed Water Injection Method	5
Well Status - Production Data	6
Production Statistics - Project No. 2	7



LEGEND

Contour Horizon – Top of Gallup Pay Sand

Contour Interval = 25 Feet

Outline of Humble Acreage

2000 0 2000 4000 6000 Feet

SCALE

STRUCTURE MAP

MANY ROCKS

&

HORSESHOE GALLUP FIELDS

SAN JUAN CO., NEW MEXICO

Exhibit No. 4

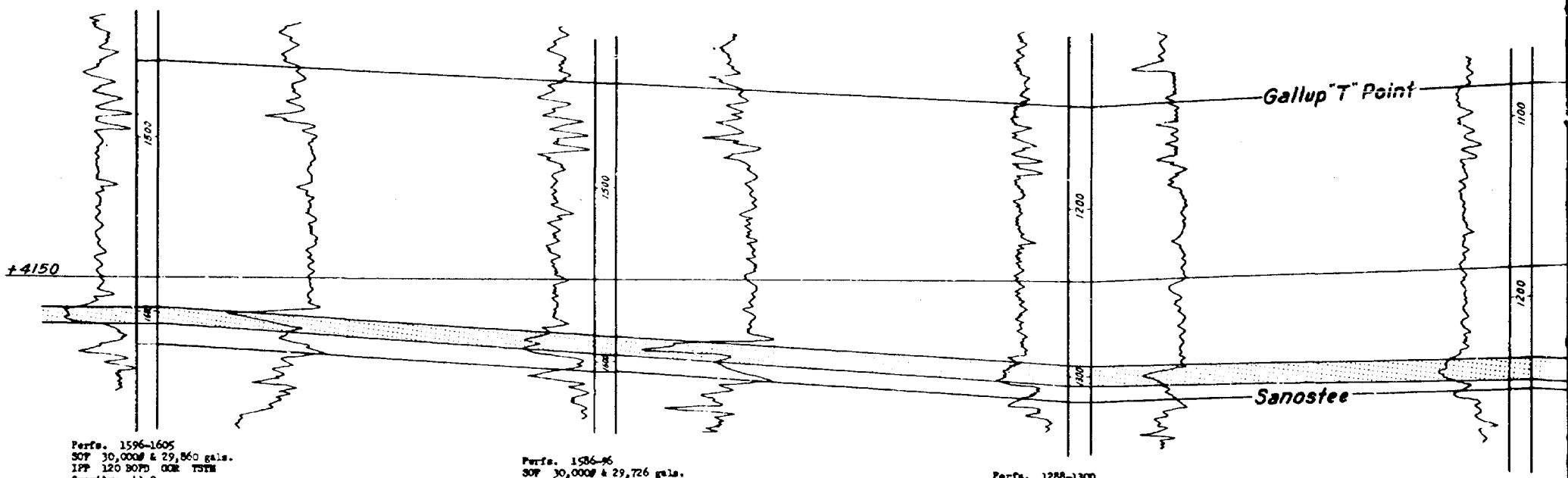
A

Shelly #2 Navajo F
1920 FSL x 1820 FWL
Sec. 35-T32N-R17W
San Juan County, New Mexico
Elevation: 5730 Gr.
Gamma Ray-Density Log

Shelly #3 Navajo F
580 FSL x 2215 FEL
Sec. 35-T32N-R17W
San Juan County, New Mexico
Elevation: 5702 Gr.
Gamma Ray-Density Log

Humble NTI G-11
660 FWL x 660 FSL
Sec. 2-T31N-R17W
San Juan County, New Mexico
Elevation: 5390 Gr.
Gamma Ray-Density Log

Humble NTI G-10
1980 FWL x 660 FWL
Sec. 1-T31N-R17W
San Juan County,
Elevation: 5393
Gamma Ray Density



Perfs. 1596-1605
SOF 30,000# & 29,860 gals.
IPF 120 BOPD GOR TSTM
Gravity: 41.2
Completed: 5-23-63

TD 1660
PBD 1649

Perfs. 1586-96
SOF 30,000# & 29,726 gals.
IPF 164 BOPD GOR TSTM
Gravity: 41.2°

Perfs. 1288-1300
SOF 15,000# & 6000 gals.
IPF 203 BOPD GOR est. 360
Gravity: 40.4°
Completed: 5-23-63

TD 1340
PBD 1320

Perfs. 1234-50
SOF 17,500# & 7000
IPF 208 BOPD GOR
Gravity: 41.1°
Completed: 5-19-63

TD 1282
PBD 1262

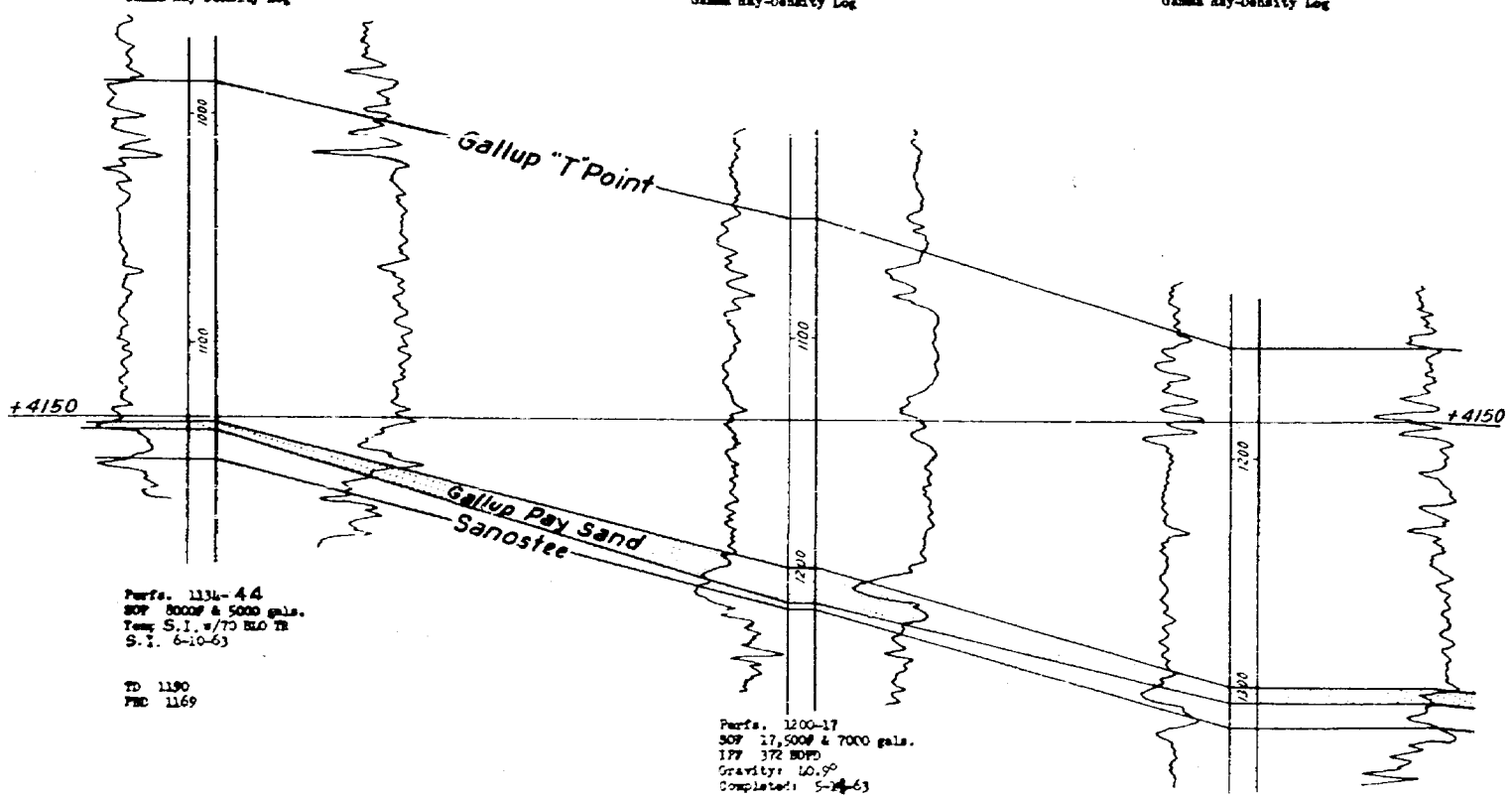
B

Humble NTI G-13
660 FSL x 660 FWL
Sec. 1-T31N-R17W
San Juan County, New Mexico
Elevation: 5282 Gr.
Gamma Ray-Density Log

Humble NTI G-9
1980 FSL x 1980 FWL
Sec. 1-T31N-R17W
San Juan County, New Mexico
Elevation: 5285 Gr.
Gamma Ray-Density Log

Humble NTI G-12
2305 FEL x 2235 FEL
Sec. 1-T31N-R17W
San Juan County, New Mexico
Elevation: 5334 Gr.
Gamma Ray-Density Log

B'



Perfs. 1134-44
SOF 8000# & 5000 gals.
Temp S.I. s/70 BLO TR
S.I. 6-10-63

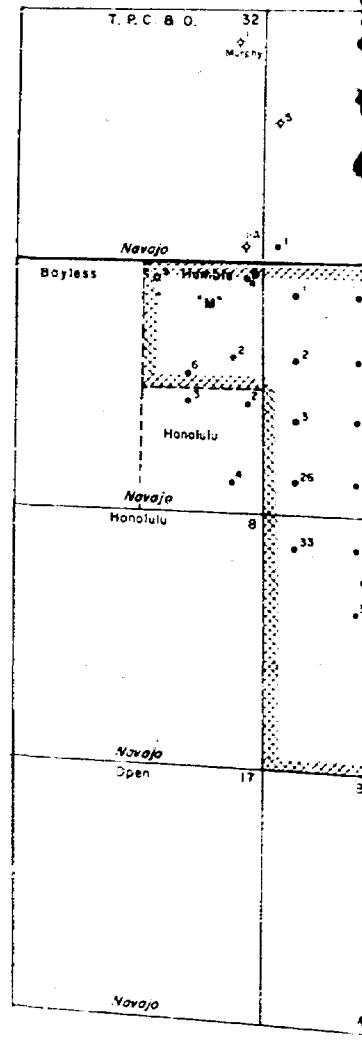
TD 1190
PBD 1169

Perfs. 1200-17
SOF 17,500# & 7000 gals.
IPF 372 BOPD
Gravity: 40.9°
Completed: 5-24-63

TD 1260
PBD 1238

Perfs. 1298-1308
SOF 10,000# & 7000 gals.
IPF 10 BOPD GOR 2762
Gravity: 41°
Completed: 6-10-63

TD 1345
PBD 1325



Gallup T Point

Sanostee

Gallup Pay Sand

Perfs. 1235-53
SOF 15,000# & 5000 gals.
IFP 233 BOPD MCF est. 255
Gravity: 41°
Completed: 5-[illegible]-63

TD 1250
PBD 1242

Perfs. 1240-47
SOF 15,000# & 5000 gals.
IFP 172 BOPD
Gravity: 42°
Completed: 5-[illegible]-63

TD 1250
PBD 1248

Perfs. 1233-43
SOF 15,000# & 5000 gals.
IFP 215 BOPD MCF est. 266
Gravity: 41°
Completed: 5-11-63

TD 1255
PBD 1248

Perfs. 1236-60
SOF 15,000# & 10,000 gals.
IFP 333 BOPD MCF 266
Gravity: 41°
Completed: 5-[illegible]-63

TD 1300
PBD 1278

T. 32 N.

T. 31 N.

R. 7 W.

R. 6 W.

A

A'

B

B'

-SCALE-

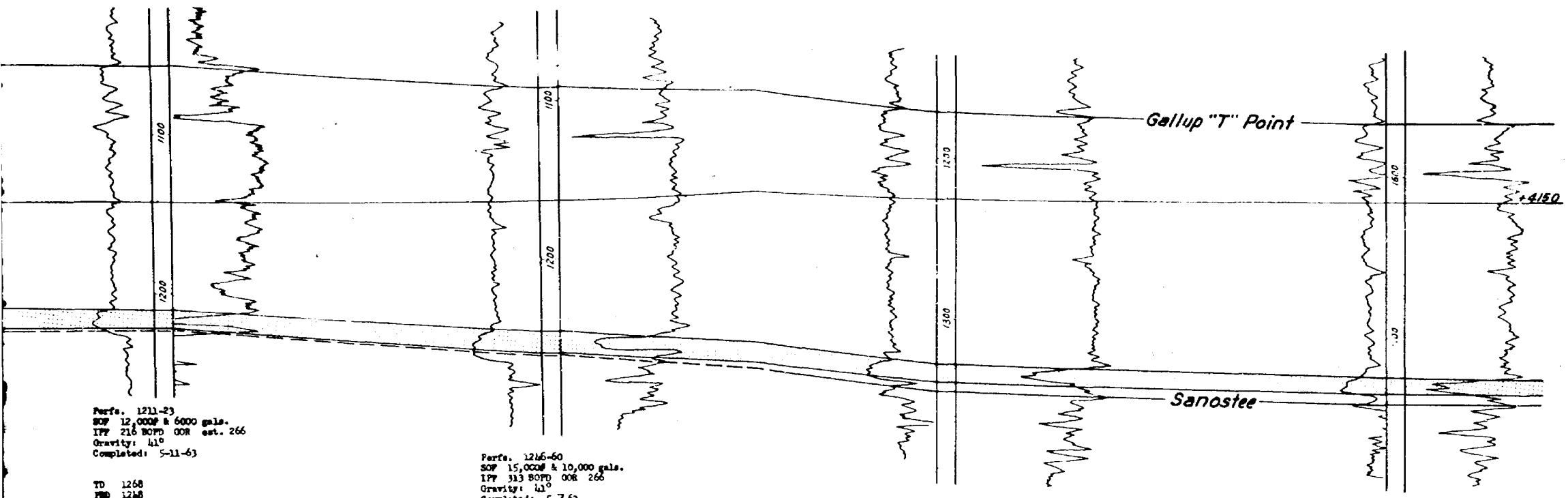
Humble MTI 0-6
660 FSL x 1980 FEL
Sec. 1-T31N-R17W
San Juan County, New Mexico
Elevation: 5284 Gr.
Gamma Ray-Sonic Log

Humble MTI 0-7
720 FNL x 710 FEL
Sec. 12-T31N-R17W
San Juan County, New Mexico
Elevation: 5313 Gr.
Gamma Ray-Density Log

Atlantic #2 Mobil-Navajo
1900 FNL x 850 FWL
Sec. 7-T31N-R16W
San Juan County, New Mexico
Elevation: 5375 Gr.
Gamma Ray-Density Log

Mobil Chimney Rock #23-7
1990 FSL x 2310 FWL
Sec. 7-T31N-R16W
San Juan County, New Mexico
Elevation: 5763 Gr.
Gamma Ray-Density Log

A'



Perfs. 1211-23
SOF 12,000# & 6000 gals.
IPF 216 BOPD 00R est. 266
Gravity: 41°
Completed: 5-11-63

TD 1268
PBD 1268

Perfs. 1266-60
SOF 15,000# & 10,000 gals.
IPF 313 BOPD 00R 266
Gravity: 41°
Completed: 5-7-63

TD 1300
PBD 1279

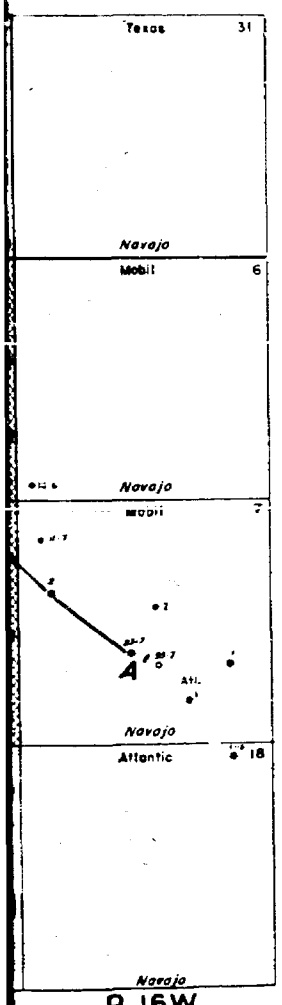
Perfs. 1332-39
SOF 18,000# & 27,720 gals.
IPF 665 BOPD
Gravity: 41°
Completed: 5-23-63

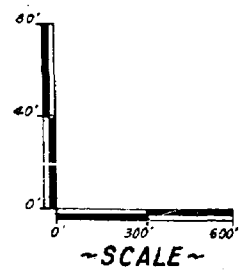
TD 1402
PBD 1368

Perfs. 1726-36
SOF 57,000# & 38,731 gals.
IPF 85 BOPD
Gravity: 40.2°
Completed: 4-5-63

TD 1800
PBD 1786

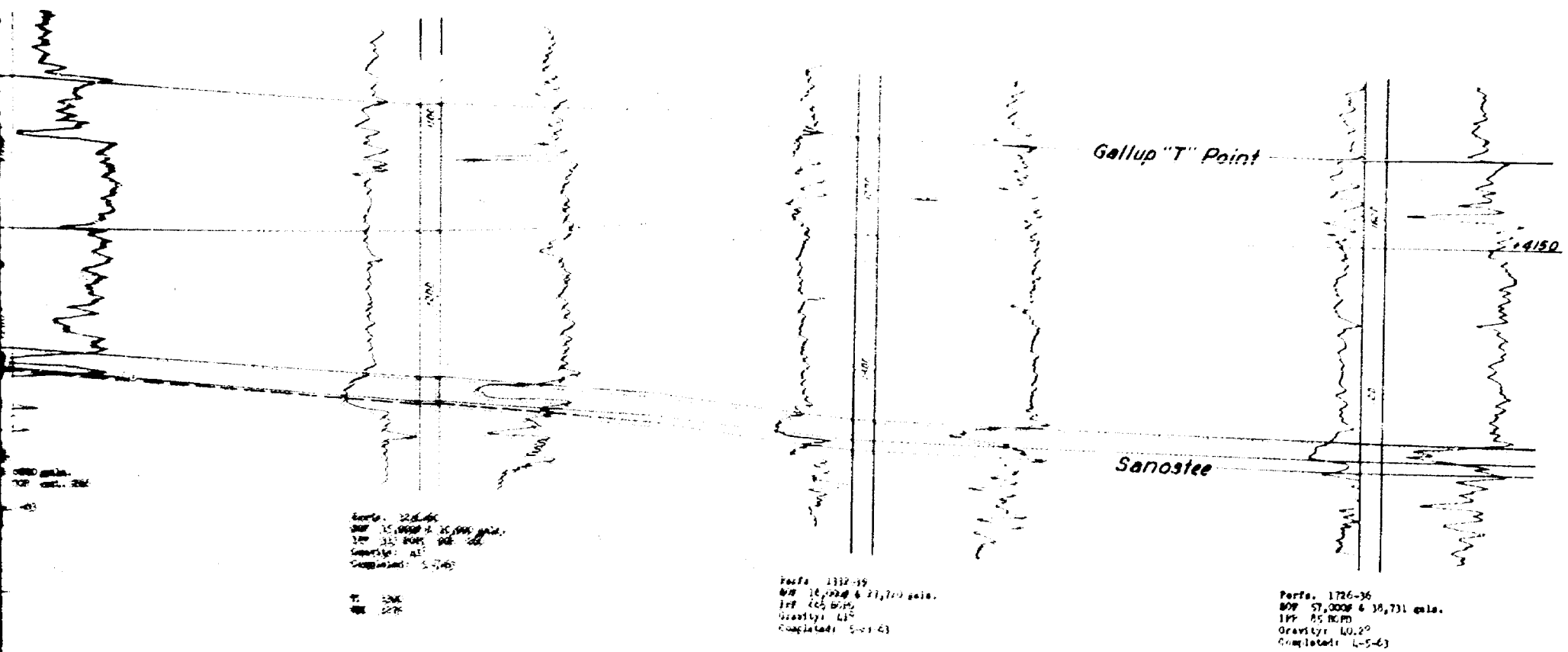
We thicken to 10.5 ft





STRUCTURAL CROSS-SECTIONS
MANY ROCKS FIELD
SAN JUAN CO., NEW MEXICO
EXHIBIT N° 2

A'

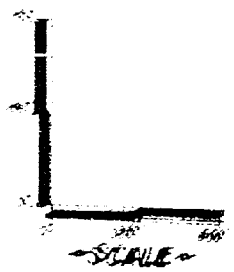


Perfs. 1726-36
BDP 57,000# & 38,731 gals.
IPF 85 MCFPD
Gravity: 40.2°
Completed: 4-5-63

TD 1800
PBD 1786

T. 32 N.

T. 31 N.



STRUCTURAL CROSS-SECTIONS

MANY ROCKS FIELD

SAN JUAN CO., NEW MEXICO

EXHIBIT Nº

EXHIBIT NUMBER 3

SCHLUMBERGER — FORMATION DENSITY LOG

COUNTY SAN JUAN NEW MEX
FIELD or LOCATION UNDESIGNATED
WELL NAVAJO TRIBE G-16
COMPANY HUMBLE OIL & REF.

COMPANY HUMBLE OIL AND REFINING COMPANY

WELL NAVAJO TRIBE OF INDIANS G-16

FIELD UNDESIGNATED

COUNTY SAN JUAN STATE NEW MEXICO

Location:
1980' FNL & 1980' FWL
Sec. 1 Twp. 31N Rge. 17W

Other Services:
NONE

Permanent Datum: G.L. ; Elev.: 5310'
Log Measured From G.L. 0 Ft. Above Perm. Datum
Drilling Measured From G.L.

Elev.: K.B. --
D.F. --
G.L. 5310'

Date	6-25-63
Run No.	ONE
Type Log	FORMATION DENSITY - GAMMA RAY
Depth—Driller	1303
Depth—Logger	1302
Bottom logged interval	1301
Top logged interval	100
Type fluid in hole	OIL EMULSION
Salinity, PPM Cl.	--
Density	9.5
Level	FULL
Max rec. temp., deg F.	--
Operating rig time	2 HOURS
Recorded by	DILLI
Witnessed by	MR. SLADE

RUN No.	BORE-HOLE RECORD Bit	From	To	CASING RECORD Size	Wgt.	From	To
1	6 1/4	CSG.	T.D.	7"	-	SURFACE	31'

EQUIPMENT DATA

Gamma-Gamma — General
Run No. ONE
Hoist Truck No. 3520 FARM
Instr. Truck No. 3520 FARM
Type Serial No.
Location FARMINGTON

Gamma-Gamma
Run No. ONE
Tool Model No. PGT-C
Diameter 4 1/4"
Det'r Model No. PGD-68
Type SCINTILLATION

LOGGING DATA

General Depths	Speed Ft. Min.	Gamma Ray Sens. Settings	T.C. Sec.	Gamma-Gamma Sens. Settings	T.C. Sec.
From 100		API Units per Log Div.		Zero Div. # of Standard CPS per Log Div.	
To T.D.	30	16	2	290	2
		Zero Det. I or II		Zero of Track II	
		ZERO		300	
		REPEAT SECTION		200	
				300	

Run No. 1

*PGS-67C
PGD-68C
PGM-66A
CGS-850
SFIB1-66

Remarks:

CALIPER
HOLE DIAM. IN INCHES
5 7 9 11 13 15
6 8 10 12 14

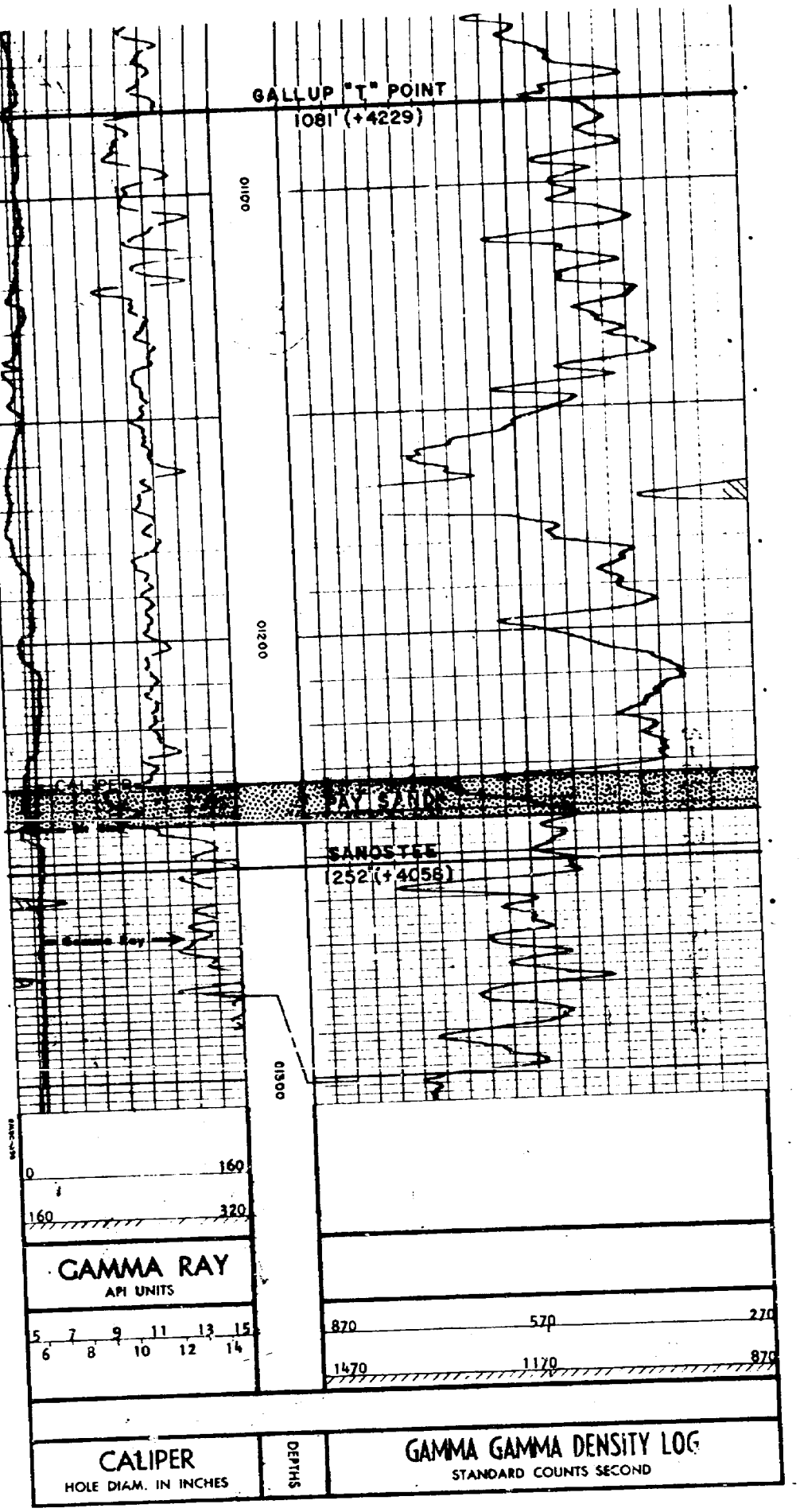
DEPTHS

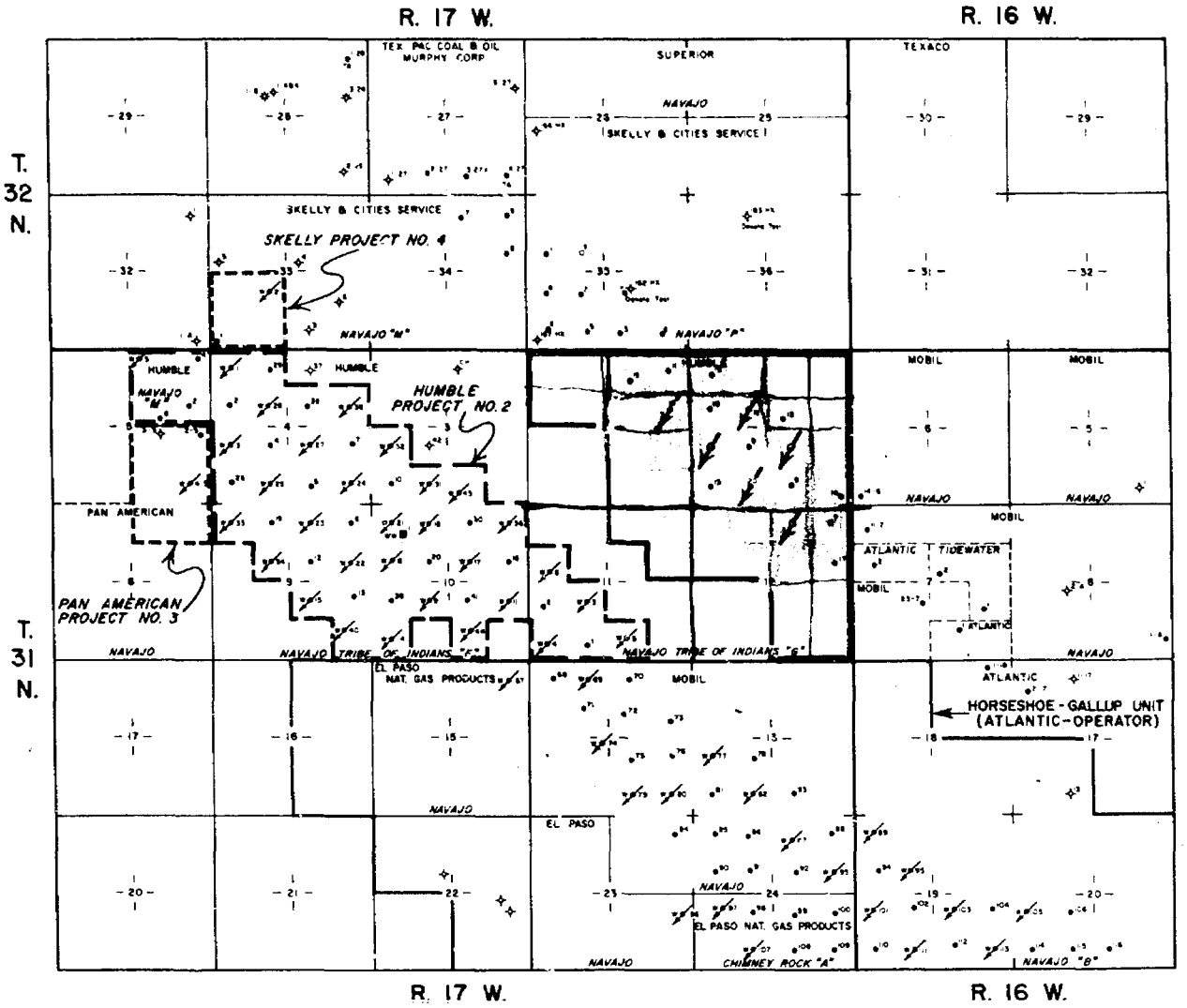
GAMMA GAMMA DENSITY LOG
STANDARD COUNTS SECOND

GAMMA RAY
API UNITS.
0 160
160 320

870 570 270
1470 1170 870

01000


GALLUP "T" POINT
1081' (+4229)
01100
01200
CALIPER
DAY SAND
SANOSTEE
1252' (+4056)
Gamma Ray
01300
0
160
160
320
GAMMA RAY
API UNITS
5 7 9 11 13 15
6 8 10 12 14
870
570
270
1470
1170
870
CALIPER
HOLE DIAM. IN INCHES
DEPTHS
GAMMA GAMMA DENSITY LOG
STANDARD COUNTS SECOND



LEGEND

- Gallup Formation Producer
- Current Gallup Injection Well
- Morrison Formation Water Source Well
- Drilling Well
- Proposed Gallup Injection Well – Completed
- Proposed Gallup Injection Well – To Be Drilled
- Project Area – Proposed

HUMBLE OIL & REFINING COMPANY

HORSESHOE & MANY ROCKS FIELDS

SAN JUAN COUNTY, NEW MEXICO

EXHIBIT NUMBER 4

PROPOSED WATER INJECTION METHOD

Humble Oil & Refining Company Pressure Maintenance Project
Many Rocks Field, Section 1, 2 and 12-T31N-R17W
San Juan County, New Mexico

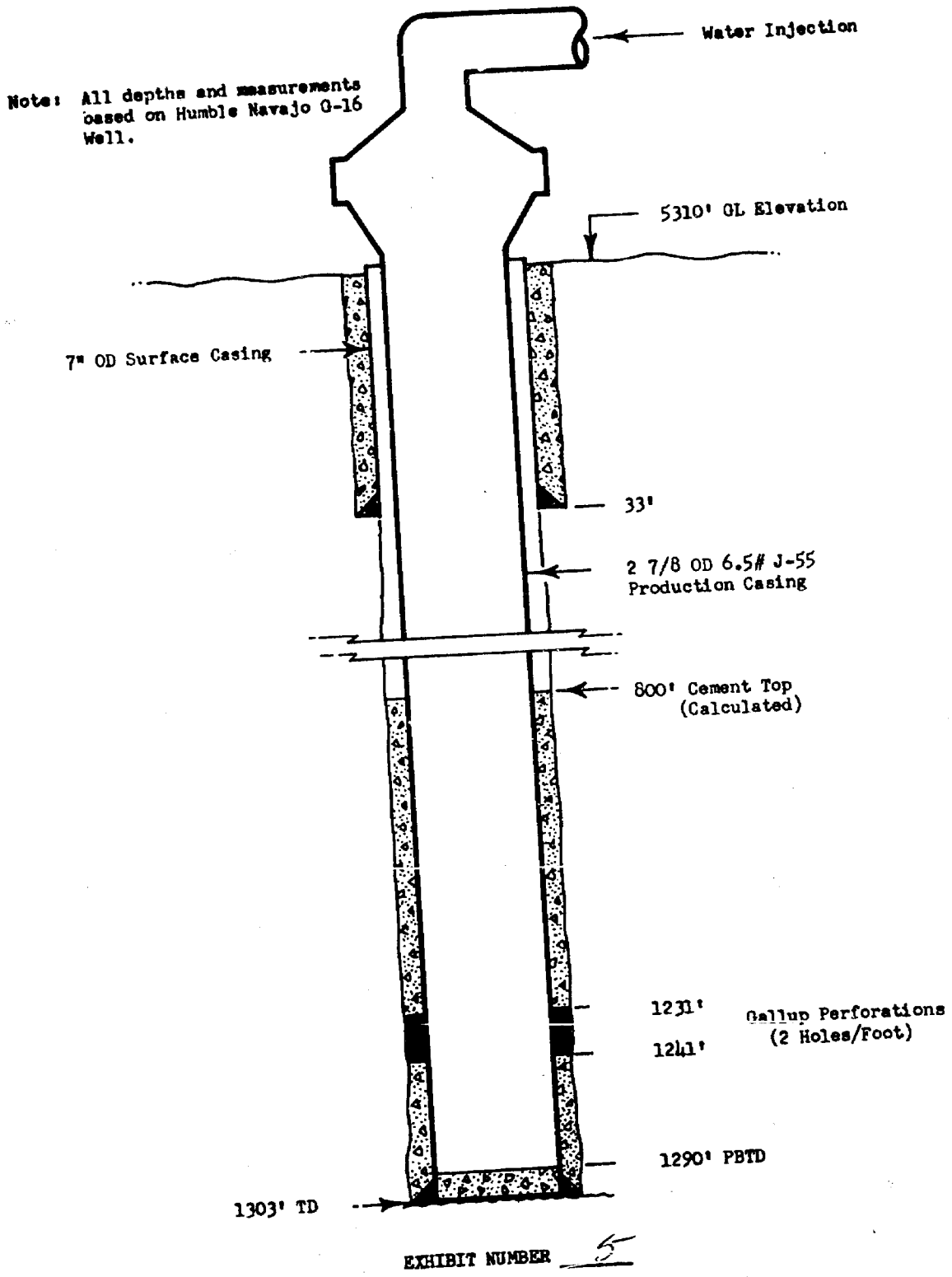


EXHIBIT NUMBER 5

EXHIBIT NUMBER _____

WELL STATUS - PRODUCTION DATA
HUMBLE OIL & REFINING COMPANY
MANY ROCKS FIELD, SAN JUAN COUNTY, NEW MEXICO

Completion Date	Initial Potential Barrels Oil/Day	Initial Potential GOR Cu.Ft./Bbl.	Production-June, 1963 Barrels Oil/Day	Production-June, 1963 GOR Cu.Ft./Bbl	Cumulative Oil Prod. to 7/1/63 Bbls	July-1963 Allowable Bbls/Day	Waterflood Well-Status
5-7-63	313	266	57	438	3820	70	Prod.
5-11-63	217	266 (est)	57	506	3750	70	Prod.
5-14-63	372	266 (est)	57	267	3400	70	Prod.
5-19-63	208	350 (est)	57	96	3027	70	Prod.
5-23-63	203	360 (est)	69	197	2835	70	Prod.
6-10-63	10	2762	9	7286	266	10	Prod.
6-10-63	Shut-in (2)			-	-	0	Prod.
6-16-63	95	360 (est)	39	430	1171	70	Prod.
6-23-63	170	360 (est)	21	558	622	70	Prod.(3)
7-8-63	219	360 (est)	-	-	-	70	Inj.
7-16-63	38	360 (est)	-	-	-	38	Prod.(3)
	Testing for Completion						Inj.
	Testing for Completion						Prod.
	Testing for Completion						Inj.
TOTALS:	18,891					608	

(1) Survey

(2) Load oil not recovered. Tested 1 BOD 6-10-63 and temporarily shut-in.

(3) Probable conversion to injection for lease line compensation.

EXHIBIT NUMBER 6

EXHIBIT NUMBER ____

WELL STATUS - PRODUCTION DATA
HUMBLE OIL & REFINING COMPANY
MANY ROCKS FIELD, SAN JUAN COUNTY, NEW MEXICO

Lease & Well	Total Depth (Ft)	Production Casing Size (In)	Production Casing Depth Set(Ft)	Est. Top Cement (Ft)	Perforated Interval(Ft)	Completion Date	Initial Potential Barrels Oil/Day	Initial Potential GOR Cu.Ft./Bbl.	Production-June,1963 Barrels Oil/Day	Production-June,1963 GOR Cu.Ft./Bbl	Cumulative Oil Prod. to 7/1/63 Bbls	July-1963 Allowable Bbls/Day	Waterflood Well-Status
Humble Navajo Tribe of Indians													
G-7	1300	4 1/2	1299	753	1246 - 60	5-7-63	313	266	57	438	3820	70	Prod.
G-8	1268	4 1/2	1268	726	1211 - 23	5-11-63	217	266 (est)	57	506	3750	70	Prod.
G-9	1260	4 1/2	1260	830 (1)	1200 - 17	5-14-63	372	266 (est)	57	267	3400	70	Prod.
G-10	1282	4 1/2	1282	789	1234 - 50	5-19-63	208	350 (est)	57	96	3027	70	Prod.
G-11	1340	4 1/2	1340	798	1288 - 1300	5-23-63	203	360 (est)	69	197	2835	70	Prod.
G-12	1345	4 1/2	1345	803	1298 - 1308	6-10-63	10	2762	9	7286	266	10	Prod.
G-13	1190	4 1/2	1190	648	1134 - 44	6-10-63	Shut-in (2)			-	-	0	Prod.
G-14	1324	4 1/2	1324	103	1271 - 80	6-16-63	95	360 (est)	39	430	1171	70	Prod.
G-15	1350	4 1/2	1350	129	1294 - 1306	6-23-63	170	360 (est)	21	558	622	70	Prod.(3)
G-16	1303	2 7/8	1303	668	1231 - 41	7-8-63	219	360 (est)	-	-	-	70	Inj.
G-17	1305	4 1/2	1305	636	1245 - 53	7-16-63	38	360 (est)	-	-	-	38	Prod.(3)
G-18	1275	2 7/8	1275	640	1213 - 20		Testing for Completion						Inj.
G-19	1330	4 1/2	1330	661	1284 - 91		Testing for Completion						Prod.
G-20	1213	4 1/2	1213	543	1132 - 59		Testing for Completion						Inj.
TOTALS:									18,891	608			

(1) Survey

(2) Load oil not recovered. Tested 1 BOD 6-10-63 and temporarily shut-in.

(3) Probable conversion to injection for lease line compensation.

EXHIBIT NUMBER 6

PRODUCTION STATISTICS

HUMBLE OIL & REFINING COMPANY PRESSURE MAINTENANCE PROJECT

HORSESHOE-GALLUP OIL POOL

SECTIONS 3, 4, 5, 9, 10 & 11 - T 31 N - R 17 W
SAN JUAN COUNTY, NEW MEXICO

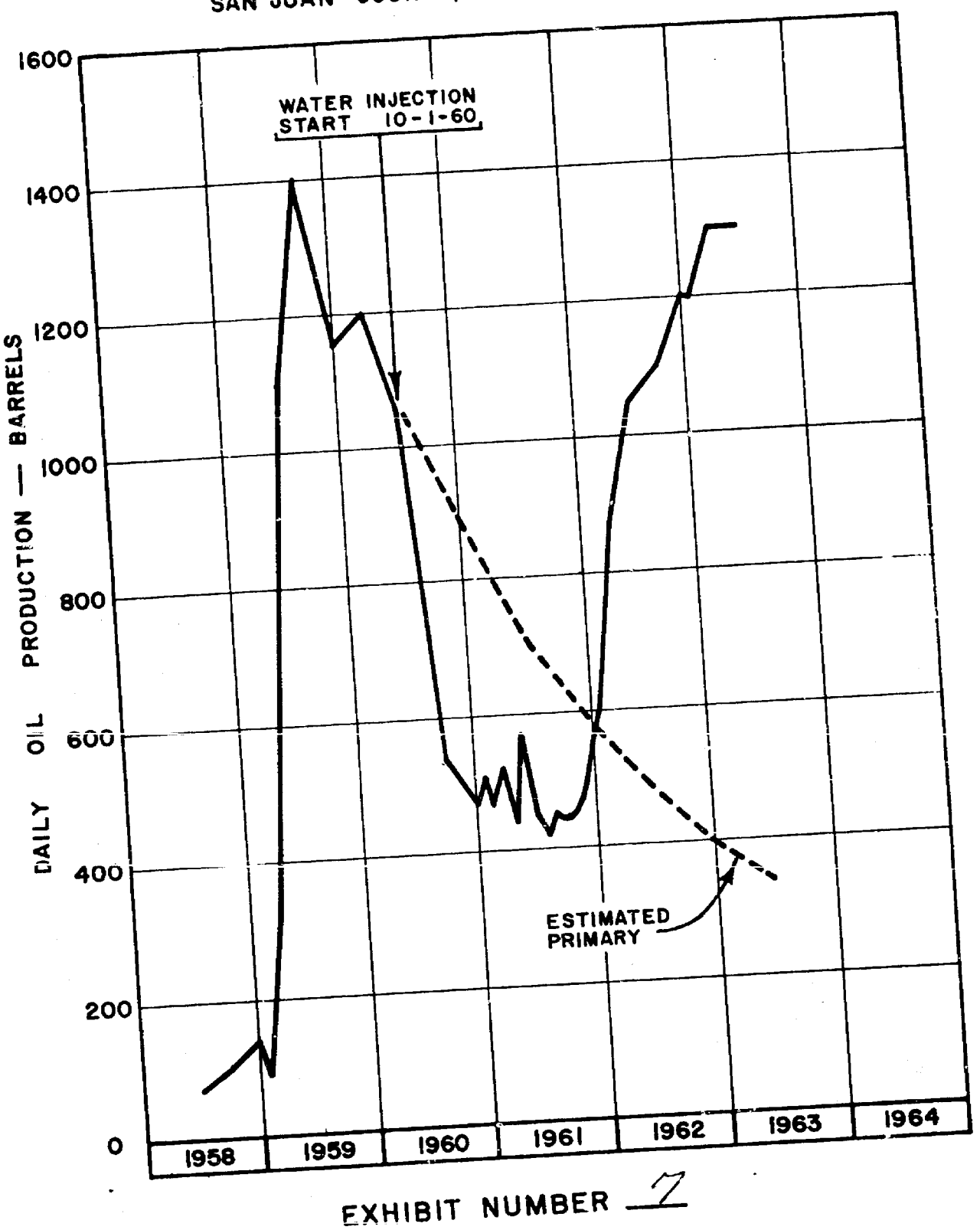


EXHIBIT NUMBER 7

Case 2865

BEFORE THE OIL CONSERVATION COMMISSION

OF THE STATE OF NEW MEXICO

APPLICATION OF HUMBLE OIL & REFINING COMPANY FOR AN ORDER AUTHORIZING THE INJECTION OF WATER FOR PRESSURE MAINTENANCE AND SECONDARY RECOVERY PURPOSES INTO THE GALLUP (TOCITO) SANDSTONE FORMATION UNDERLYING APPLICANT'S NAVAJO "G" LEASE, SECTIONS 1, 2, 11 AND 12, TOWNSHIP 31 NORTH, RANGE 17 WEST, SAN JUAN COUNTY, NEW MEXICO AND FOR PROMULGATION OF SPECIAL RULES GOVERNING THE OPERATION OF SAID PROJECT

CASE NO. _____

TO: THE HONORABLE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO AND THE
SECRETARY-DIRECTOR THEREOF

NOW COMES Humble Oil & Refining Company, a Delaware corporation authorized to do business in the State of New Mexico, as owner and operator of that certain oil and gas lease commonly called Applicant's Navajo "G" Lease, executed by the Navajo Tribe of Indians, as lessor, which said lease covers Sections 1, 2, 11 and 12 described above, and hereby makes application to the New Mexico Oil Conservation Commission for an order authorizing the injection of water for pressure maintenance and secondary recovery purposes into the Gallup (Tocito) Sandstone formation underlying the said Navajo "G" Lease, pursuant to Rule 701 of this Commission, and for promulgation of special rules governing the operation of said project. In support of this application, Applicant respectfully shows:

I.

There is attached hereto, made a part hereof, and for purposes of identification marked Exhibit "A," a plat showing the said Navajo "G" Lease of Applicant, the location of all wells drilled thereon and all wells drilled within a radius of two (2) miles from the proposed injection wells hereinafter identified. All wells shown on said Exhibit "A" and located in Sections 6, 7, 8, 17 and 18, Township 31 North, Range 16 West and all

wells shown on said Exhibit "A" located in Sections 1, 2 and 12, Township 31 North, Range 17 West, and all wells shown on said Exhibit "A" located in Sections 27, 34 and 35, Township 32 North, Range 17 West are producing from the Gallup (Tocito) Sandstone formation which is a member of the Mancos formation of Cretaceous age. Said Exhibit "A" also shows the location of the proposed injection wells for which authorization is requested herein and the ownership of the respective leasehold interests within a radius of two (2) miles from all of said proposed injection wells.

II.

There is outlined in red on Exhibit "A" attached hereto, the proposed project area which is a part of the lands embraced in the Navajo "G" Lease identified above, and which includes the following described lands, to-wit:

Township 31 North, Range 17 West, N.M.P.M.

Section 1: All
Section 2: $E\frac{1}{2}$ and $NW\frac{1}{4}$
Section 11: $N\frac{1}{2}NE\frac{1}{4}$ and $SE\frac{1}{4}NE\frac{1}{4}$
Section 12: $NW\frac{1}{4}$ and $E\frac{1}{2}$

III.

There is also attached hereto, made a part hereof, and for purposes of identification marked Exhibit "B," a schedule listing all proposed injection wells drilled to this date upon Applicant's Navajo "G" Lease within the proposed project area, and which shows the total depth of each well, the size of production casing in each well, the depth to which the casing in each well has been set, the estimated top of the cement used in setting the casing in each well, the perforated interval in each well and the completion date of each well. Promptly after all of the other proposed water injection wells are drilled by Applicant, Applicant will submit a supplement to said Exhibit "B" showing the same information with regard to said proposed water injection wells hereafter drilled by Applicant.

IV.

At the time of filing this application the only proposed injection well which has been drilled by Applicant is the Navajo "G" Well No. 16, located approximately 1,980 feet south of the North line and 1,980 feet east of the West line of Section 1, Township 31 North, Range 17 West. There is

attached hereto, made a part hereof, and for purposes of identification marked Exhibit "C," an electric survey run in said well. In addition, Applicant proposes to drill wells at the following locations and, if permission is granted as herein requested, to operate said wells as water injection wells:

Township 31 North, Range 17 West, N.M.P.M.

Section 1: NW¼SW¼, NW¼SE¼, SE¼SW¼
Section 2: SE¼NE¼
Section 12: NW¼NE¼

Promptly after those proposed water injection wells have been drilled and electric surveys run, Applicant will file with this Commission electric surveys run by Applicant in those wells.

V.

Applicant proposes to inject water in the proposed water injection wells into the Gallup (Tocito) Sandstone producing formation which is encountered beneath the project area at depths from 1,175 feet to 1,275 feet beneath the surface, such water to be injected at rates ranging from 90 barrels to 300 barrels per day per well.

VI.

Applicant proposes to obtain the water for such injection from Applicant's water source well which produces water from the Morrison formation and which is located in Section 10, Township 31 North, Range 17 West, San Juan County, New Mexico. Said well has been heretofore drilled by Applicant and is presently furnishing water for injection into the injection wells in Applicant's pressure maintenance project in the Horseshoe-Gallup Pool, which said pressure maintenance project was authorized by Order No. R-1745 in Case No. 2024 before this Commission. The producing capacity of that well has been tested and is sufficient to produce water in quantities sufficient for both Applicant's pressure maintenance projects in the Horseshoe-Gallup Pool and the pressure maintenance project for which authorization is requested herein. The New Mexico State Engineer has issued a permit authorizing Applicant to obtain water for injection from such

source, and Applicant has furnished said engineer an analysis of the water obtained from such source.

VII.

Applicant is the sole owner of the said Navajo "G" lease identified herein and the Navajo Tribe of Indians is the sole royalty owner under said lease. Therefore, no unit agreement and no unit operating agreement will be needed in order to institute the pressure maintenance project for which authority is requested herein. Applicant is presently negotiating cooperative lease line pressure maintenance agreements by and between Applicant and the operators of leases to the northwest of Sections 1, 2 and 12 described above and by and between Applicant and the operators of oil and gas leases to the southeast of said sections. Applicant and all said operators propose to institute pressure maintenance operations on a cooperative basis with each operator continuing to operate its own leases.

VIII.

Applicant believes and asserts that it will be in the interest of conservation and the prevention of waste to inaugurate a water injection program for pressure maintenance and secondary recovery purposes as soon as possible by the injection of water into the injection wells for which authority is requested herein, and that said project is in the interest of obtaining the greatest ultimate recovery of oil and gas from said Gallup (Tocito) Sandstone formation. Applicant, therefore, respectfully requests that its proposed pressure maintenance program be approved, that the area hereinabove described be designated as the project area, that an allowable formula be fixed therefor, and in connection therewith, Applicant recommends the adoption of special field rules governing said project as follows:

(A) The completion and operation of the proposed water injection wells listed in paragraph III hereof be approved and Applicant be authorized to institute the pressure maintenance project proposed herein.

(B) That the allowable for the project area be the sum of the allowables of the several wells completed within the project area including those wells which may be shut in curtailed, or used as injection wells.

(C) That allowables for injection wells be transferred to producing wells within the project area as well as allowables for producing wells which, in the interest of more efficient operation of the project, are shut in or curtailed because of high gas-oil ratio or are shut in for any of the following reasons: pressure regulations, control of pattern or sweep efficiencies, or to observe changes in pressures or changes in characteristics of reservoir liquids or progress of sweep.

(D) That the allowable assigned to any well which is shut in or which may be curtailed in accordance with the applicable special rules, and which allowable is to be transferred to any well or wells in the project area for production, shall in no event be greater than its ability to produce during the test period prescribed by the special rules, or greater than the top unit allowable for the pool during the month of transfer, whichever is less.

(E) That the allowable assigned to any injection well on a 40-acre proration unit shall be the top unit allowable for the pool.

(F) That the ability to produce of any well which is shut in or curtailed in accordance with the special rules shall be determined by a 24-hour test at a stabilized rate of production, which shall be the final 24-hour period of a 72-hour test throughout which the well should be produced in the same manner and at the constant rate. The daily tolerance limitation set forth in Commission Rule 502 I(a) and any limiting gas-oil ratio for the pool shall be waived during such tests. The project operator shall notify all operators offsetting the well, as well as the Commission, of the exact time such tests are to be conducted. Tests may be witnessed by representatives of the offsetting operators and the Commission if so desired.

(G) That the top allowable assigned to each producing well in the project shall be equal to the well's ability to produce or to the top unit allowable of the pool, whichever is less.

(H) That the project operator submit each month, within a reasonable time after the normal unit allowable for northwest New Mexico has been established, to the Commission, a pressure maintenance project operator's report on a form prescribed by the Commission, requesting allowables for each of the several wells in the project area as well as the total project allowable.

(I) That the Commission calculate the allowable for each well in the project area, and that the sum of the allowables so calculated be assigned to the project so that the same may be produced from any well or wells in the project in any proportion.

(J) That provision be made for the administrative approval by the Commission of the conversion of additional producing wells to injection wells, and the

drilling of additional producing and injection wells, and the expansion of the project area under such reasonable conditions as may be prescribed by this Commission.

WHEREFORE, Applicant requests that this application be set down for hearing before an examiner after due notice as required by law and the rules and regulations of this Commission.

Respectfully submitted,

HUMBLE OIL & REFINING COMPANY

By _____
Denver Area Attorney

HERVEY, DOW & HINKLE

By _____
Roswell, New Mexico
Attorneys for Applicant

CLASS OF SERVICE
This is a fast message unless its deferred character is indicated by the proper symbol.

WESTERN UNION
TELEGRAM
W. P. MARSHALL, PRESIDENT

1201 (4-60)

SYMBOLS
DL=Day Letter
NL=Night Letter
LT=International Letter Telegram

The filing time shown in the date line on domestic telegrams is LOCAL TIME at point of origin. Time of receipt is LOCAL TIME at point of destination

(38)

LA145 DB217

July 24th hearing

D MDA104 PD=MIDLAND TEX 23 227P CST=

NEW MEXICO OIL CONSERVATION COMMISSION, A L PORTER=

STATE CAPITOL BLDG SANTA FE NMEX=

RE CASE #2865 APPLICATION OF HUMBLE OIL AND REFINING COMPANY.

¶ GENTLEMEN:

¶ TIDEWATER OIL COMPANY HAS BEEN ADVISED THAT HUMBLE OIL AND REFINING COMPANY WILL REQUEST THAT A PROVISION PERTAINING TO LEASE LINE PRODUCTION RATES BE INCLUDED IN ANY ORDER ISSUED AS A RESULT TO ITS APPLICATION. IT IS OUR UNDERSTANDING THAT THE PROVISION WILL LIMIT PRODUCTION FROM THE HUMBLE LEASE LINE WELLS

CLASS OF SERVICE
This is a fast message unless its deferred character is indicated by the proper symbol.

WESTERN UNION
TELEGRAM

W. P. MARSHALL, PRESIDENT

1201 (4-00)

SYMBOLS
DL = Day Letter
NL = Night Letter
LT = International Letter Telegram

The filing time shown in the date line on domestic telegrams is LOCAL TIME at point of origin. Time of receipt is LOCAL TIME at point of destination

ON THE SE SIDE OF THE PROJECT AREA TO A MAXIMUM OF THE PREVAILING ALLOWABLE FOR PRIMARY PRODUCERS. THIS PROVISION TO BE IN EFFECT UNTIL JANUARY 1, 1964 OR UNTIL THE OFFSET OPERATORS TO THE SE HAVE INITIATED A PRESSURE MAINTENANCE PROJECT WHICHEVER IS SOONER TIDEWATER OIL COMPANY BELIEVES THIS PROVISION IS FAIR AND REASONABLE AND IS IN THE INTEREST OF PROTECTION OF CORRELATIVE RIGHTS AND THE PREVENTION OF WASTE OF NATURAL RESOURCES. TIDEWATER OIL COMPANY HAS NEGOTIATED WITH HUMBLE AND OTHER OPERATORS IN THIS FIELD FOR THE ESTABLISHMENT OF A FIELD WIDE UNIT FOR PRESSURE MAINTENANCE. HUMBLE DESIRES TO OPERATE A UNIT CONSISTING SOLEY OF ITS OWN

CLASS OF SERVICE
This is a fast message unless its deferred character is indicated by the proper symbol.

WESTERN UNION
TELEGRAM

W. P. MARSHALL, PRESIDENT

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LEASES, BECAUSE OF THIS IT IS NECESSARY THAT THE OPERATORS TO THE SE OF HUMBLES LEASES FARM A UNIT FOR THE PURPOSE OF PRESSURE MAINTENANCE, BECAUSE OF THE DEVELOPMENT STAGE AND DIVERSIFIED OWNERSHIP WE HAVE NOT BEEN ABLE TO DEVELOP OUR PLANS AS QUICKLY AS HUMBLE. SHOULD WE NOT COMPLETE OUR PLANS FOR A PRESSURE MAINTENANCE UNIT BY JANUARY 1, 1964 WE REQUEST THE OPPORTUNITY TO COME TO THE COMMISSION FOR THE EXTENSION OF TIME AND SUCH OTHER REASONABLE RELIEF AS MIGHT BE NECESSARY. WE THEREFORE REQUEST THAT THE COMMISSION KEEP THIS MATTER OPEN ON THE DOCKETT FOR THIS PURPOSE. RESPECTFULLY=

TIDEWATER OIL CO R H COE=

OM ITS PATRONS CONCERNING ITS SERVICE

GOVERNOR
JACK M. CAMPBELL
CHAIRMAN

State of New Mexico
Oil Conservation Commission

LAND COMMISSIONER
E. S. JOHNNY WALKER
MEMBER

P. O. BOX 871
SANTA FE

STATE GEOLOGIST
A. L. PORTER, JR.
SECRETARY - DIRECTOR

August 7, 1963

Mr. Howard Bratton
Hervey, Dow & Hinkle
Attorneys at Law
Post Office Box 10
Roswell, New Mexico

Re: Case No. 3865
Order No. R-2541
Applicant:

Humble Oil & Refining Company

Dear Sir:

Enclosed herewith are two copies of the above-referenced Commission order recently entered in the subject case.

Very truly yours,

A. L. Porter, Jr.

A. L. PORTER, Jr.
Secretary-Director

ir/

Carbon copy of order also sent to:

Hobbs OCC x
Artesia OCC
Aztec OCC x
OTHER Mr. John D. Knodell, Jr.
Mr. Frank Irby

BEFORE THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO

IN THE MATTER OF THE HEARING
CALLED BY THE OIL CONSERVATION
COMMISSION OF NEW MEXICO FOR
THE PURPOSE OF CONSIDERING:

CASE No. 2865
Order No. R-2541

APPLICATION OF HUMBLE OIL & REFINING
COMPANY FOR A PRESSURE MAINTENANCE
PROJECT, SAN JUAN COUNTY, NEW MEXICO.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 o'clock a.m. on July 24, 1963, at Santa Fe, New Mexico, before Daniel S. Nutter, Examiner duly appointed by the Oil Conservation Commission of New Mexico, hereinafter referred to as the "Commission," in accordance with Rule 1214 of the Commission Rules and Regulations.

NOW, on this 7th day of August, 1963, the Commission, a quorum being present, having considered the application, the evidence adduced, and the recommendations of the Examiner, Daniel S. Nutter, and being fully advised in the premises,

FINDS:

(1) That due public notice having been given as required by law, the Commission has jurisdiction of this cause and the subject matter thereof.

(2) That the applicant, Humble Oil & Refining Company, seeks authority to institute a pressure maintenance project in the Many Rocks-Gallup Oil Pool, San Juan County, New Mexico, by the injection of water into the Gallup formation initially through nine wells located or to be located within the proposed project area comprising the following-described acreage:

TOWNSHIP 31 NORTH, RANGE 17 WEST, NMPM	
Section 1:	W/2, SE/4, and SW/4 NE/4
Section 2:	NE/4 and NE/4 SE/4
Section 12:	NE/4 and NE/4 NW/4

(3) That the applicant seeks the promulgation of special rules and regulations governing the proposed project similar to the special rules and regulations governing the Horseshoe-Gallup Pressure Maintenance Project No. 2 promulgated by Order No. R-1745.

(4) That the applicant proposes that the special rules and regulations provide that any producing well in the project area which directly or diagonally offsets any well outside the project area producing from the same common source of supply shall not produce in excess of top unit allowable for the pool until January 1, 1964, or until the operators of such offset well outside the project area have instituted a pressure maintenance project in the area of such well, whichever shall first occur.

(5) That the proposed pressure maintenance project is in the interest of conservation and should result in greater ultimate recovery of oil, thereby preventing waste.

(6) That the proposed special rules and regulations should be adopted in order to prevent waste and protect correlative rights.

IT IS THEREFORE ORDERED:

(1) That the applicant, Humble Oil & Refining Company, is hereby authorized to institute a pressure maintenance project designated the Many Rocks-Gallup Pressure Maintenance Project No. 1 in the Many Rocks-Gallup Oil Pool, San Juan County, New Mexico, by the injection of water into the Gallup formation through nine injection wells located or to be located in Units F, J, L, and N of Section 1, Unit H of Section 2, and Unit B of Section 12, Township 31 North, Range 17 West, NMPM, San Juan County, New Mexico, with one injection well located on each of the above-described units.

(2) That special rules and regulations governing the Many Rocks-Gallup Pressure Maintenance Project No. 1, San Juan County, New Mexico, are hereby promulgated as follows:

SPECIAL RULES AND REGULATIONS
FOR THE
MANY ROCKS-GALLUP PRESSURE MAINTENANCE PROJECT NO. 1

RULE 1. The project area of the Many Rocks-Gallup Pressure Maintenance Project No. 1, hereinafter referred to as the Project, shall comprise the following-described area:

TOWNSHIP 31 NORTH, RANGE 17 WEST, NMPM	
Section 1:	W/2, SE/4, and SW/4 NE/4
Section 2:	NE/4 and NE/4 SE/4
Section 12:	NE/4 and NE/4 NW/4

RULE 2. The allowable for the Project shall be the sum of the allowables of the several wells within the project area, including those wells which are shut-in, curtailed, or used as injection wells. Allowables for all wells shall be determined in a manner hereinafter prescribed.

RULE 3. Allowables for injection wells may be transferred to producing wells within the project area, as may the allowables for producing wells which, in the interest of more efficient operation of the Project, are shut-in or curtailed because of high gas-oil ratio, pressure regulation, control of pattern or sweep efficiencies, or to observe changes in pressures or changes in characteristics of reservoir liquids or progress of sweep.

RULE 4. The allowable assigned to any well which is shut-in or which is curtailed in accordance with the provisions of Rule 3, which allowable is to be transferred to any well or wells in the project area for production, shall in no event be greater than its ability to produce during the test prescribed by Rule 6, below, or greater than the current top unit allowable for the pool during the month of transfer, whichever is less.

RULE 5. The allowable assigned to any injection well on a 40-acre proration unit shall be top unit allowable for the pool.

RULE 6. The allowable assigned to any well which is shut-in or curtailed in accordance with Rule 3 shall be determined by a 24-hour test at a stabilized rate of production which shall be the final 24-hour period of a 72-hour test throughout which the well should be produced in the same manner and at a constant rate. The daily tolerance limitation set forth in Rule 502 I (a) of the General Rules and Regulations and any limiting gas-oil ratio for the pool shall be waived during such tests. The project operator shall notify the Commission and all offset operators in writing of the exact time and date such tests are to be conducted. The Commission and representatives of the offset operators may witness the tests.

RULE 7. The allowable assigned to each producing well in the Project shall be equal to the well's ability to produce or to top unit allowable for the pool, whichever is less; provided, however, that any producing well in the project area which directly or diagonally offsets a well outside the project area producing from the same common source of supply shall not produce in excess of top unit allowable for the pool until January 1, 1964, or until the operators of such offset well outside the project area have instituted a pressure maintenance project in the area of such well, whichever shall first occur. Each producing well shall be subject to the limiting gas-oil ratio (2,000 to 1) for the pool, except that any well or wells within the project area producing with a gas-oil ratio in excess of 2,000 cubic feet of gas per barrel of oil may be produced on a "net" gas-oil ratio basis, which net gas-oil ratio shall be determined by applying credit for daily average gas injected, if any, into the pool within the project area to such high gas-oil ratio well. The daily adjusted oil allowable for any well receiving gas injection credit shall be

determined in accordance with the following formula:

$$A_{adj} = \frac{TUA \times F_a \times 2,000}{\frac{P_g - I_g}{P_o}}$$

where:

A_{adj} = the well's daily adjusted allowable

TUA = top unit allowable for the pool

F_a = the well's acreage factor

P_g = average daily volume of gas produced by the well during the preceding month, cubic feet

I_g = the well's allocated share of the daily average gas injected during the preceding month, cubic feet

P_o = average daily volume of oil produced by the well during the preceding month, barrels

In no event shall the amount of injected gas being credited to a well be such as to cause the net gas-oil ratio, $\frac{P_g - I_g}{P_o}$, to be less than 2,000 cubic feet of gas per barrel of oil produced.

RULE 8. Credit for daily average net water injected into the pool through any injection well located within the project area may be converted to its gas equivalent and applied to any well producing with a gas-oil ratio in excess of two thousand cubic feet of gas per barrel of oil. Total credit for net water injected in the project area shall be the gas equivalent volume of the daily average net water injected during a one-month period. The daily average gas equivalent of net water injected shall be computed in accordance with the following formula:

$$E_g = (V_{w\ inj} - V_{w\ prod}) \times 5.61 \times \frac{P_a}{15,025} \times \frac{520^\circ}{T_r} \times \frac{1}{Z}$$

where:

E_g = Average daily gas equivalent of net water injected, cubic feet

$V_{w\ inj}$ = Average daily volume of water injected, barrels

$V_{w\ prod}$ = Average daily volume of water produced, barrels

5.61 = Cubic foot equivalent of one barrel of water

P_a = Average reservoir pressure at mid-point of the pay-zones of the pool in the project area, psig + 12.01, as determined from most recent survey

15.025 = Pressure base, psi

520° = Temperature base of 60°F expressed as absolute temperature

T_r = Reservoir temperature of 92°F expressed as absolute temperature (552°R)

Z = Compressibility factor from analysis of gas from the pool at average reservoir pressure, P_a, interpolated from compressibility tabulation below:

Reservoir Pressure	Z	Reservoir Pressure	Z	Reservoir Pressure	Z
50	.9725	300	.8325	500	.6560
100	.9465	350	.8030	600	.6135
150	.9215	400	.7710	650	.5655
200	.8885	450	.7220	700	.5220
250	.8600	500	.6900	750	.4630
				800	.3935

RULE 9. Each month the project operator shall, within three days after the normal unit allowable for Northwest New Mexico has been established, submit to the Commission a Pressure Maintenance Project Operator's Report, on a form prescribed by the Commission, outlining thereon the data required, and requesting allowables for each of the several wells in the Project as well as the total Project allowable. The aforesaid Pressure Maintenance Project Operator's Report shall be filed in lieu of Form C-120 for the Project.

RULE 10. The Commission shall, upon review of the report and after any adjustments deemed necessary, calculate the allowable for each well in the Project for the next succeeding month in accordance with these rules. The sum of the allowables so calculated shall be assigned to the Project and may be produced from the wells

in the Project in any proportion except that no well in the Project which directly or diagonally offsets a well outside the Project producing from the same common source of supply shall produce in excess of top unit allowable for the pool until January 1, 1964, or until the operators of such offset well outside the project area have instituted a pressure maintenance project in the area of such well, whichever shall first occur.

RULE 11. The conversion of producing wells to injection, the drilling of additional wells for injection, and expansion of the project area shall be accomplished only after approval of the same by the Secretary-Director of the Commission. To obtain such approval, the project operator shall file proper application with the Commission, which application, if it seeks authorization to convert additional wells to injection or to drill additional injection wells shall be filed in accordance with Commission Rule 701-B and shall be accompanied by a statement that all offset operators to the proposed injection well have been furnished a complete copy of the application and the date of notification.

The Secretary-Director may approve the proposed injection well if, within 15 days after receiving the application, no objection to the proposal is received. The Secretary-Director may grant immediate approval, provided waivers of objection are received from all offset operators and from the State Engineer.

Expansion of the project area may be approved by the Secretary-Director of the Commission administratively when good cause is shown therefor.

(3) That jurisdiction of this cause is retained for the entry of such further orders as the Commission may deem necessary.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

Jack M Campbell
JACK M. CAMPBELL, Chairman

E. S. Walker
E. S. WALKER, Member

A. L. Porter, Jr.
A. L. PORTER, Jr., Member & Secretary

esr/

No. 21-63

DOCKET: EXAMINER HEARING - WEDNESDAY - JULY 24, 1963

9:00 A.M. - OIL CONSERVATION COMMISSION CONFERENCE ROOM, STATE LAND OFFICE BUILDING, SANTA FE, NEW MEXICO

The following cases will be heard before Daniel S. Nutter, Examiner, or Elvis A. Utz, as alternate examiner:

CASE 2864: Application of Midwest Oil Corporation for a unit agreement, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval of the Custer Mountain Unit Area comprising 11,523.68 acres of State, Federal and Fee lands in Township 24 South, Range 35 East, Lea County, New Mexico.

CASE 2865: Application of Humble Oil & Refining Company 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 Gallup formation underlying its Navajo "G" lease in Sections 1, 2, 11 and 12, Township 31 North, Range 17 West, San Juan County, New Mexico. Initial injection will be through applicant's Well No. 16 located in Unit G of said Section 1. Applicant further seeks the promulgation of special rules governing the operation of said project.

CASE 2866: Application of Humble Oil & Refining Company for a dual completion, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval of the dual completion (combination) of its State "BV" Well No. 1, located in Unit A of Section 18, Township 18 South, Range 35 East, Lea County, New Mexico, to produce oil from the Bone Springs and Devonian formations through parallel strings of 2 7/8 inch casing and 4 1/2 inch casing cemented in a common well bore.

CASE 2867: Application of George L. Buckles Company for a waterflood project, Lea County, New Mexico. Applicant, in the above-styled cause, seeks authority to institute a waterflood project in the Langlie-Mattix Pool by the injection of water into the Queen formation through nine wells on its Knight lease comprising the E/2 SE/4 of Section 21, W/2 SW/4 of Section 22, Township 24 South, Range 37 East, Lea County, New Mexico.

CASE 2868: Application of Continental Oil Company for a non-standard oil proration unit, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval of a 48.99-acre non-standard oil proration unit comprising Lots 2 and 3, Section 31, Township 26 South, Range 32 East, North Mason-Delaware Pool, Lea County, New Mexico, to be dedicated to its Russell Federal 31 Well No. 1, located in Lot 3 of said Section 31.

CASE 2841: (Cont'd from June 26,1963) Application of Shell Oil Company for an unorthodox location, Lea County, New Mexico. Applicant, in the above-styled cause, seeks permission to drill its Middleton Federal Well No. B-1 at an unorthodox location 660 feet from the North and West lines of Section 31, Township 19 South, Range 32 East, Lusk-Morrow Gas Pool, Lea County, New Mexico.

(Continued from July 10, 1963 examiner hearing)

CASE 2850: Application of Shell Oil Company for a unit agreement, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval of the East Pearl-Queen Unit Area comprising 2440 acres of State and Fee lands in Township 19 South, Range 35 East, Lea County, New Mexico.

CASE 2851: (Continued from July 10, 1963 examiner hearing and readvertised)

Application of Shell Oil Company for a waterflood project, Lea County, New Mexico. Applicant, in the above-styled cause, seeks authority to institute a waterflood project on its East Pearl Queen Unit by the injection of water into the Queen formation through 31 wells in Sections 15, 21, 22, 26, 27, 28, 34, and 35, Township 19 South, Range 35 East, Lea County, New Mexico.

CASE 2869: Application of Marathon Oil Company for a dual completion, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval of the dual completion (conventional) of its State Warn A/c 3 Well No. 5, located in Unit H of Section 33, Township 17 South, Range 35 East, Lea County, New Mexico, to produce from the Vacuum-Abo Reef Pool and either an undesignated Blinebry or Glorieta pool through parallel strings of 2 1/16" OD tubing.

CASE 2870: Application of J. Gregory Merrion & Associates for compulsory pooling, Rio Arriba County, New Mexico. Applicant, in the above-styled cause, seeks an order force-pooling all mineral irterests in the Basin-Dakota Gas Pool underlying the S/2 of Section 34, Township 25 North, Range 6 West, Rio Arriba County, New Mexico.

HUMBLE OIL & REFINING COMPANY

ENCO

DENVER 1, COLORADO

CENTRAL REGION
DENVER AREA
JOHN D. KNODELL, JR.
AREA ATTORNEY

July 1, 1963

P. O. BOX 120

New Mexico Oil Conservation Commission
P. O. Box 871
Santa Fe, New Mexico

Attention Mr. A. L. Porter, Jr.
Secretary-Director

Gentlemen:

RE: Application of Humble Oil & Refining Company for Pressure Maintenance Project in Many Rocks Oil Field

Herewith please find three (3) copies of Humble's application for permission to institute a pressure maintenance project in Sections 1, 2, 11 and 12, Township 31 North, Range 14 West, San Juan County, New Mexico. Will you please publish the required notice in order that this application may be heard at the examiner hearing which is scheduled for July 24, 1963.

Very truly yours,

John D. Knodell, Jr.

JDK:ch
Enclosures (3)

DOCKET MAILED
Date 7/12/63

AMERICA'S LEADING ENERGY COMPANY

ENCO

HUMBLE OIL & REFINING COMPANY

DENVER 1, COLORADO

CENTRAL REGION
DENVER AREA
JOHN D. KNODELL, JR.
AREA ATTORNEY

P. O. BOX 120

July 19, 1963

Case 2865

New Mexico Oil Conservation Commission
P. O. Box 871
Santa Fe, New Mexico

Attention Mr. A. L. Porter, Jr.
Secretary-Director

Gentlemen:

Re: Amendment of Application of Humble Oil & Refining Company for Approval of a Pressure Maintenance Project in Many Rocks Gallup Oil Field (Case No. 2865)

We have heretofore transmitted to you Humble's application for permission to institute a pressure maintenance project in Sections 1, 2, 11 and 12, Township 31 North, Range 14 West, San Juan County, New Mexico, and that application has been docketed by you as Case No. 2865. That application requests approval to complete and operate six proposed water injection wells, all described in paragraph III of that application. In addition, that application requests permission to transfer allowables of injection wells or wells which are shut in or curtailed to other producing wells within the project area without limitation on oil which may be produced from wells within the project area offsetting wells in the pool operated by other operators.

Since filing our application, Humble has drilled and completed in the project area additional wells which have more accurately defined the limits of the Many Rocks Gallup Oil Pool. It now appears that some of the wells which Humble initially planned to use as water injection wells may not be suitable for use as water injection wells, and it may be necessary in order to institute and maintain the most efficient pressure maintenance program for Humble to modify its pressure maintenance program and/or drill substitute injection wells at locations more suitable from the standpoint of an efficient pressure maintenance program. In addition, Humble has been informed that certain offset operators will not be able to institute cooperative pressure maintenance programs on their offsetting leases immediately, and such operators feel that some limitation on production from wells offsetting their leases in the pool should be established for a limited period of time in order to protect correlative rights.

Humble, therefore, hereby requests permission to amend its application for approval of its proposed pressure maintenance project in the Many Rocks

Gallup Oil Field, and if such permission is granted, hereby amends said application in the following respects:

(1) Subparagraph (C) of paragraph VIII is amended to read as follows:

> (C) That allowables for injection wells be transferred to producing wells within the project area as well as allowables for producing wells which, in the interest of more efficient operation of the project, are shut in or curtailed because of high gas-oil ratio or are shut in for any of the following reasons: pressure regulations, control of pattern or sweep efficiencies, or to observe changes in pressures or changes in characteristics of reservoir liquids or progress of sweep, provided that any producing well in the project area which directly or diagonally offsets any well outside the project area producing from the same common source of supply shall not produce in excess of top unit allowable for the pool until January 1, 1964, or until the operators of such offset well outside the project area have instituted a pressure maintenance project in the area of such well, whichever shall first occur.

(2) The following subparagraph (K) is added to said paragraph VIII:

> (K) That provision be made for the administrative approval by the Commission for drilling, completing and operating water injection wells in substitution for andin lieu of the injection wells for which approval is requested herein.

Respectfully submitted,

HUMBLE OIL & REFINING COMPANY

John D. Knodell, Jr.
by B.H.

John D. Knodell, Jr.
Denver Area Attorney

JDK:ch

cc: See Attached List

Carbon copies to:

Mr. F. M. Burback
Mobil Oil Company
10737 South Shoemaker Road
Santa Fe Springs, California

Mr. D. G. Kingman
Mobil Oil Company
612 South Flower Street
Los Angeles, California

Mr. Burns H. Errebo
Mobil Oil Company
500 Petroleum Club Building
Denver, Colorado

Mr. E. F. Motter
Cities Service Oil Company
P. O. Box 97
Hobbs, New Mexico

Mr. Barton W. Ratliff
Skelly Oil Company
P. O. Box 1650
Tulsa, Oklahoma

Atlantic Refining Company
760 Petroleum Club Building
Denver, Colorado

Tidewater Oil Company
P. O. Box 1231
Midland, Texas

Mr. Curtis J. Little
2929 Monte Vista Boulevard, NE
Albuquerque, New Mexico