

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

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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:

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

where:

- $E_g$  = Average daily gas equivalent of net water injected, cubic feet
- $V_{w \text{ inj}}$  = Average daily volume of water injected, barrels

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- $V_w$  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° = 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.

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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.

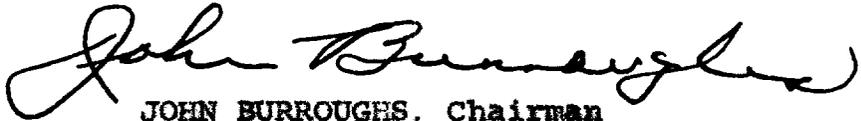
(3) A letter stating that all offset operators to the proposed injection well have been furnished a complete copy of the application and the date of notification.

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.

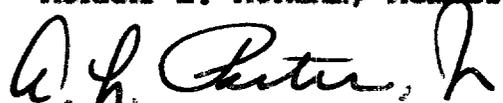
Expansion of the project area may be approved by the Secretary-Director of the Commission administratively when good cause is shown therefor.

DONE at Santa Fe, New Mexico, on the day and year herein-above designated.

STATE OF NEW MEXICO  
OIL CONSERVATION COMMISSION

  
JOHN BURROUGHS, Chairman

  
MURRAY E. MORGAN, Member

  
A. L. PORTER, Jr., Secretary-Director

