February 28, 1964

Re: OCC Case 2994

Mr. J. W. George
Assistant District Superintendent
Skelly Oil Company
Drawer 510
Farmington, New Mexico

Dear Mr. George:

Receipt of your letter of February 26, 1964 and the attached recent analysis of the water from Humble Oil and Refining Company's Navajo F waterflood souree well 1 is gratefully acknowledged.

Very truly yours,

S. E. Reynolds
State Engineer

By:
Frank E. Irby
Chief
Water Rights Div.

FEI/ma
cc-A. L. Porter, Jr.

MAIN OFFICE OCC

1964 FEB 27 PM 1:24

Drawer 510
Farmington, New Mexico
February 26, 1964

Re: Morrison Water Analysis
Many Rocks Gallup Field Area
San Juan County, New Mexico

Mr. Frank E. Irby
New Mexico State Engineer
Santa Fe, New Mexico

Dear Mr. Irby:

In response to your request to Mr. William Singley of this office at the Oil Conservation Commission Hearing of Case 2994 regarding a water analysis from Humble Oil & Refining Company's Morrison Water Supply well, attached is a copy of an analysis run by Core Laboratories on August 26, 1963.

If you should require any additional data concerning this matter please contact us.

Yours very truly,
SKELLY OIL COMPANY

J. W. George

J. W. George
Assistant District Superintendent

WS:gm
Attach: (2)
cc: Mr. Elvis A. Utz
Oil Conservation Commission
State Land Office Building
Santa Fe, New Mexico

bcc: Mr. H. E. Aab - also attached is an analysis of the Gallup Water.

CORE LABORATORIES, INC
Petroleum Reservoir Engineering
DALLAS, TEXAS

WATER ANALYSIS

File RP-3-WA-506

Company HUMBLE OIL & REFINING COMPANY Well Name Sample No. 2

Formation MORRISON Depth Sampled From MORRISON SCOURCE WATER

Location Field HORSESHOE GALLUP County SAN JUAN State NEW MEXICO

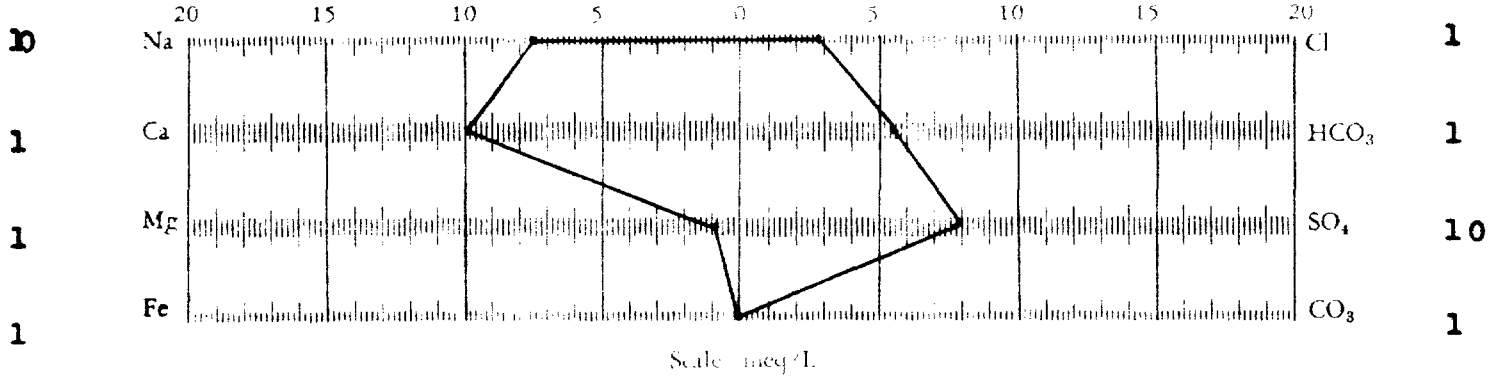
Date Sampled Date Analyzed 8-26-63 Engineer McCOMAS

Total Dissolved Solids 6201 mg/L calc. Sp. Gr. 1.001 @ 82 °F

Resistivity 1.325 ohm-meters @ 82 °F meas. Hydrogen Sulfide ABSENT

pH 7.5

Constituents	meq/L	mg/L	Constituents	meq/L	mg/L
Sodium	76.7	1764	Chloride	2.8	99
Calcium	9.9	200	Bicarbonate	5.6	341
Magnesium	0.8	10	Sulfate	79.0	3800
Iron	ABSENT		Carbonate	ABSENT	
Barium	ABSENT		Hydroxide	ABSENT	



Scale meq/L

All analyses except iron determinations performed on a filtered sample.

MANY ROCKS-GALLUP POOL
(Many Rocks-Gallup Pressure Maintenance Project No. 1)
San Juan County, New Mexico

Order No. R-2541, Authorizing Humble Oil & Refining Company to Institute and Adopting Operating Rules for a Pressure Maintenance Project in the Many Rocks-Gallup Pool, San Juan County, New Mexico, August 7, 1963.

Application of Humble Oil & Refining Company for a Pressure Maintenance Project, San Juan County, New Mexico.

CASE NO. 2865
Order No. R-2541

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

(MANY ROCKS-GALLUP (MANY ROCKS-GALLUP PRESSURE MAINTENANCE PROJECT NO. 1) POOL—Cont'd.)

(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:

$$Aadj = \frac{TUA \times Fa \times 2{,}000}{\frac{Pg - Ig}{Po}}$$

where:

Aadj = the well's daily adjusted allowable
TUA = top unit allowable for the pool
Fa = the well's acreage factor
Pg = average daily volume of gas produced by the well during the preceding month, cubic feet
Ig = the well's allocated share of the daily average gas injected during the preceding month, cubic feet
Po = 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, $\frac{Pg - Ig}{Po}$ 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:

$$Eg = (Vw\ inj - Vw\ prod) \times 5.61 \times \frac{Pa}{15.025} \times \frac{520°}{Tr} \times \frac{1}{Z}$$

where:

Eg = Average daily gas equivalent of net water injected, cubic feet
Vw inj = Average daily volume of water injected, barrels
Vw prod = Average daily volume of water produced, barrels
5.61 = Cubic foot equivalent of one barrel of water
Pa = 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
Tr = Reservoir temperature of 92°F expressed as absolute temperature (552°R)
Z = Compressiblity factor from analysis gas from the pool at average reservoir pressure, Pa, 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 alowable 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.