

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. 2656  
Order No. R-2405

APPLICATION OF WESTERN DEVELOPMENT  
COMPANY FOR A SECONDARY RECOVERY  
PROJECT, EAST MILLMAN QUEEN-GRAYBURG  
FIELD, EDDY COUNTY, NEW MEXICO.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 o'clock a.m. on October 10, 1962, 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 31st day of December, 1962, 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, Western Development Company of Delaware, hereinafter referred to as Western Development Company, proposes to institute a secondary recovery project in the East Millman Queen-Grayburg Pool by the injection of water into the Queen and Grayburg formations through 13 injection wells located in Sections 14, 15, 22, and 23, Township 19 South, Range 28 East, NMPM, Eddy County, New Mexico.

(3) That the applicant proposes that said project be classified as a pressure maintenance project and further that the Secretary-Director of the Commission be authorized to re-classify said project as a bona fide waterflood project at such time as the extrapolated production decline curve indicates that the producing capacity of the wells in the project area are in an advanced state of depletion and can properly be classified as "stripper" wells were it not for the water injection occurring during the pressure maintenance phase of the secondary recovery program.

(4) That special rules and regulations for the operation of the Western Development Company East Millman Queen-Grayburg Pressure Maintenance Project should be promulgated and, for operational convenience, such rules should include 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 and belonging to any other operator should be allowed to produce in excess of top unit allowable for the East Millman Queen-Grayburg Pool until such time as the well has experienced a substantial response from water injection. When such response has occurred, the well should be permitted to produce up to two times top unit allowable for the East Millman Queen-Grayburg Pool. Production of such well at a higher rate should be authorized only after notice and hearing.

(5) That the productivity of wells in the subject area has declined to the point where reasonable accuracy may be expected in extrapolation of the production decline curve; that said extrapolation indicates that the subject area, without benefit of pressure maintenance, will reach an advanced state of depletion on or about September 1, 1963.

(6) That approval of said project will neither cause waste nor impair correlative rights, but will result in the recovery of oil which otherwise might not be recovered.

(7) That the proposed pressure maintenance project and the proposed procedure for reclassification of said project to a water-flood should be approved.

IT IS THEREFORE ORDERED:

(I) That the applicant, Western Development Company, is hereby authorized to institute a pressure maintenance project in the East Millman Queen-Grayburg Pool, Eddy County, New Mexico, by the injection of water into the Queen and Grayburg formations through the following-described wells:

Western Yates State 648 Well No. 143, Unit K, Section 14;  
Western Yates State 648 Well No. 145, Unit M, Section 14;  
Western Yates State 648 Well No. 147, Unit E, Section 14;  
Western Yates State 648 Well No. 151, Unit I, Section 15;  
Western Yates State 648 Well No. 152, Unit A, Section 22;  
Western Yates State 648 Well No. 153, Unit C, Section 14;  
Western Yates State 648 Well No. 156, Unit O, Section 15;  
Western Yates State 648 Well No. 158, Unit G, Section 22;  
Western Yates State 648 Well No. 182, Unit O, Section 14;  
Western Yates State 648 Well No. 184, Unit G, Section 14;

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Western Yates Malco-State Well No. 2, Unit C, Section 23;  
Western Yates Malco-State Well No. 3, Unit E, Section 23;  
Western Yates State E-5003 Well No. 1, Unit A, Section 15;

all in Township 19 South, Range 28 East, NMPM.

(II) That Special Rules and Regulations governing the operation of the Western Development Company East Millman Queen-Grayburg Pressure Maintenance Project, Eddy County, New Mexico, are hereby promulgated as follows, effective January 1, 1963.

SPECIAL RULES AND REGULATIONS  
FOR THE WESTERN DEVELOPMENT COMPANY  
EAST MILLMAN QUEEN-GRAYBURG PRESSURE MAINTENANCE PROJECT

RULE 1. The project area of the Western Development Company East Millman Queen-Grayburg Pressure Maintenance Project, hereinafter referred to as the project, Eddy County, New Mexico, shall comprise that area described as follows:

TOWNSHIP 19 SOUTH, RANGE 28 EAST, NMPM

Section 14: SW/4 NE/4, NW/4, SW/4, W/2 SE/4

Section 15: E/2 NE/4, SE/4 SW/4, SE/4

Section 22: NE/4

Section 23: N/2 NW/4, SW/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 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 an 80-acre proration unit shall be top unit allowable for the East Millman Queen-Grayburg 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 East Millman Queen-Grayburg 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 East Millman Queen-Grayburg 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 East Millman Queen-Grayburg 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 East Millman Queen-Grayburg 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 East Millman Queen-Grayburg 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

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

5.61 = Cubic foot equivalent of one barrel of water

$P_a$  = Average reservoir pressure at a datum of + 1700 feet above sea level, psig + 12.00, as determined from most recent survey

15.025 = Pressure base, psi

$520^\circ$  = Temperature base of  $60^\circ$  F expressed as absolute temperature

$T_r$  = Reservoir temperature of  $85^\circ$  F expressed as absolute temperature ( $545^\circ$  R)

Z = Compressibility factor from analysis of East Millman Queen-Grayburg gas at average reservoir pressure,  $P_a$ , interpolated from compressibility tabulation below:

Pressure Psig	Z	Pressure Psig	Z	Pressure Psig	Z
0	.998	400	.900	800	.802
50	.986	450	.887	850	.790
100	.973	500	.875	900	.777
150	.961	550	.863	950	.765
200	.949	600	.851	1000	.753
250	.936	650	.838	1050	.741
300	.924	700	.826	1100	.729
350	.912	750	.816		

RULE 9. Each month the project operator shall, within three days after the normal unit allowable for Southeast 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 Queen and/or Grayburg formations.

(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.

(III) That the Secretary-Director of the Commission is hereby authorized to reclassify the Western Development Company East Millman Queen-Grayburg Pressure Maintenance Project as a waterflood project, effective September 1, 1963, upon receipt of written request for such reclassification from Western Development Company. Upon reclassification, the above rules governing the pressure maintenance project shall terminate ipso facto and the waterflood project shall in all ways be governed by Commission Rule 701-E, including the allowable provisions thereof, and including the provisions with respect to expansion of the waterflood project.

(IV) 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

*Tom B. Campbell*  
~~JACK M. CAMPBELL~~, Chairman

E. S. WALKER, Member

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

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