

*Entered November 3, 1961*  
*W. R.*

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. 2360  
Order No. R-2065

APPLICATION OF SHELL OIL COMPANY  
FOR APPROVAL OF THE CARSON BISTI-  
LOWER GALLUP 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 August 30, 1961, at Santa Fe, New Mexico, before Elvis A. Utz, 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 19th day of September, 1961, the Commission, a quorum being present, having considered the application, the evidence adduced, and the recommendations of the Examiner, Elvis A. Utz, 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, Shell Oil Company, proposes to institute a pressure maintenance project in the Bisti-Lower Gallup Oil Pool by the injection of water into the Gallup formation in the Carson Unit Area in Sections 7, 17, 18, 19, 20 and 30, Township 25 North, Range 11 West, NMPM, and in Sections 11, 12, 13, 14, 23 and 24, Township 25 North, Range 12 West, NMPM, and in the proposed expansion of said Carson Unit Area in Sections 10 and 15, Township 25 North, Range 12 West, NMPM, all in San Juan County, New Mexico.

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

(4) That Special Rules and Regulations for the operation of the Carson Bisti-Lower Gallup Pressure Maintenance Project should be promulgated and, for operational convenience, such rules should provide certain flexibility in authorizing the production of the

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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 Bisti-Lower 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 Bisti-Lower 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 is hereby authorized to institute a pressure maintenance project in the Bisti-Lower Gallup Oil Pool, San Juan County, New Mexico, to be designated as the Carson Bisti Lower-Gallup Pressure Maintenance Project, by the injection of water into the Gallup formation through the following wells:

TOWNSHIP 25 NORTH, RANGE 11 WEST, NMPM

Section 7: No. 24-7;  
Section 17: Nos. 1, 23-17, 24-17, 31-17,  
43-17;  
Section 18: Nos. 21-18, 22-18, 23-18, 24-18;  
Section 19: Nos. 21-19, 22-19;  
Section 20: Nos. 11-20, 23-20, 32-20, 41-20;  
Section 30: No. 11-30;

TOWNSHIP 25 NORTH, RANGE 12 WEST, NMPM

Section 10: No. 31-10;  
Section 11: Nos. 22-11, 23-11, 24-11;  
Section 12: No. 13-12;  
Section 13: Nos. 21-13, 22-13, 23-13, 24-13;  
Section 14: Nos. 21-14, 22-14, 23-14, 24-14;  
Section 15: No. 14-15;  
Section 23: No. 21-23;  
Section 24: Nos. 21-24, 23-24, 32-24;

In addition, Mudge 6 Lease Wells No. 12-16A and 14-16A, located in the SW/4 NW/4 and SW/4 SW/4, respectively, of Section 16, Township 25 North, Range 11 West, NMPM, are hereby approved for conversion to water injection, to form a water barrier between the Carson Unit Area and the acreage to the east thereof.

(2) That Special Rules and Regulations governing the operation of the Carson Bisti Lower-Gallup Pressure Maintenance Project, San Juan County, New Mexico, are hereby promulgated as follows:

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SPECIAL RULES AND REGULATIONS  
FOR THE  
CARSON BISTI LOWER-GALLUP PRESSURE MAINTENANCE PROJECT

RULE 1. The project area of the Carson Bisti Lower-Gallup Pressure Maintenance Project, hereinafter referred to as the Project, shall comprise that area described as follows:

TOWNSHIP 25 NORTH, RANGE 11 WEST

Section 7: SW/4, S/2 SE/4  
Section 17: All  
Section 18: All  
Section 19: All  
Section 20: All  
Section 30: N/2 NW/4

TOWNSHIP 25 NORTH, RANGE 12 WEST

Section 10: E/2, E/2 SW/4  
Section 11: S/2, SW/4 NE/4, SE/4 NW/4,  
W/2 NW/4  
Section 12: SW/4, S/2 SE/4  
Section 13: All  
Section 14: All  
Section 15: E/2, SW/4, E/2 NW/4  
Section 22: NE/4 NE/4  
Section 23: NE/4, N/2 SE/4, SE/4 SE/4,  
E/2 NW/4, NW/4 NW/4  
Section 24: All  
Section 25: N/2 N/2

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 each 80-acre proration unit with one or more injection wells located thereon shall be top unit allowable for the pool. The presence of a producing well on such a unit shall not entitle the unit to any increase in allowable. The allowable assigned to each 40-acre proration unit shall be one-half the top unit allowable for the pool.

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RULE 5. 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 Bisti-Lower 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 6. The allowable assigned to a proration unit with one or more producing wells but no injection wells located thereon shall be equal to the wells' ability to produce or to top unit allowable for the Bisti-Lower Gallup Oil Pool subject to the proration units' acreage factor, whichever is less. Each producing well shall be subject to the limiting gas-oil ratio (2,000 to 1) for the Bisti-Lower 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 Bisti-Lower 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 7. Credit for daily average net water injected into the Bisti-Lower 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
- $V_w \text{ prod}$  = Average daily volume of water produced, barrels
- 5.61 = Cubic foot equivalent of one barrel of water
- $P_a$  = Average reservoir pressure at mid-point of the pay-zones of Bisti Lower-Gallup Oil Pool in project area, psig + 11.5, as determined from most recent survey
- 15.025 = Pressure base, psi
- $520^\circ$  = Temperature base of  $60^\circ\text{F}$  expressed as absolute temperature
- $T_r$  = Reservoir temperature of  $145^\circ\text{F}$  expressed as absolute temperature ( $605^\circ\text{R}$ )
- $Z$  = Compressibility factor from analysis of Bisti-Lower Gallup gas at average reservoir

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pressure,  $P_a$ , interpolated from compressibility  
tabulation below:

Reservoir Pressure	Z	Reservoir Pressure	Z
50	.9950	800	.9000
100	.9900	850	.8938
150	.9825	900	.8875
200	.9775	950	.8825
250	.9725	1000	.8775
300	.9625	1050	.8713
350	.9563	1100	.8663
400	.9500	1150	.8600
450	.9425	1200	.8550
500	.9363	1250	.8500
550	.9300	1300	.8450
600	.9238	1350	.8400
650	.9175	1400	.8360
700	.9115	1450	.8325
750	.9050		

RULE 8. 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 9. 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.

RULE 10. 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

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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.

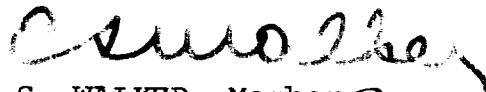
Expansion of the project area may be approved by the Secretary-Director of the Commission administratively when good cause is shown therefor.

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

STATE OF NEW MEXICO  
OIL CONSERVATION COMMISSION



EDWIN L. MECHEM, Chairman



E. S. WALKER, Member



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

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