

*State Oil  
Pan Am operator  
all the other wells  
wells!*

MAIN OFFICE OCC

STATE OIL UNIT WELLS

1962 JUL 9 AM 8:25

UNIT WELL NO.

FORMER OPERATOR, LEASE AND WELL NUMBER

25 17

1	Pan American - State Oil Unit No. 1
2	Aspen - Federal "A" No. 2
3	Pan American - C. J. Holder No. 11
4	Pan American - C. J. Holder No. 12
5	Aspen - Federal "A" No. 3
6	Aspen - Federal "A" No. 1
7	Pan American - C. J. Holder No. 2
8	Pan American - C. J. Holder No. 3
9	Pan American - C. J. Holder No. 6
10	Pan American - C. J. Holder No. 9
11	Benson, Montin & Greer - Jones No. 4
12	Benson, Montin & Greer - Jones No. 6
13	Pan American - C. J. Holder No. 4
14	Pan American - C. J. Holder No. 5
15	Benson, Montin & Greer - Jones No. 3
16	Benson, Montin & Greer - Jones No. 5
17	Pan American - C. J. Holder No. 7
18	Pan American - C. J. Holder No. 8
19	Benson, Montin & Greer - Jones No. 7
20	Benson, Montin & Greer - Jones No. 2
21	Pan American - State "CA" No. 1
22	Pan American - State Holder Oil Unit No. 1
23	Aztec - Robinson "G" No. 9
24	Aztec - Robinson "G" No. 6
25	Benson, Montin & Greer - Jones "A" No. 1
26	Benson, Montin & Greer - Jones No. 1 (Dual)
	Pan American - C. J. Holder No. 14
28	Pan American - C. J. Holder No. 10
29	Aztec - Robinson "G" No. 7
30	Aztec - Robinson "G" No. 5
31	Pan American - C. J. Holder No. 15
32	Aztec - Robinson "G" No. 4 (Dual)
33	Aztec - Robinson "G" No. 8
34	Aztec - Robinson "G" No. 11
35	Aztec - Robinson "G" No. 10

SOUTHEAST CHA CHA UNIT BATTERIES

UNIT BATTERY NO.

FORMER OPERATOR, LEASE AND BATTERY NUMBER

1	Pan American - State Oil Unit No. 1
2	Aspen - Federal "A" No. 1
3	Pan American - C. J. Holder No. 2
4	Benson, Montin & Greer - Jones No. 1 (Wells 1-6)
5	Benson, Montin & Greer - Jones No. 2 (Well 7)
6	Benson, Montin & Greer - Jones "A" No. 1
7	Pan American - State "CA" No. 1
8	Pan American - State Holder Oil Unit No. 1
9	Aztec - Robinson "G" Battery "B"
10	Aztec - Robinson "G" Battery "A"

CASING AND CEMENTING PROGRAMS  
WATER INJECTION WELLS  
PRESSURE MAINTENANCE PROJECT  
SOUTHEAST CHA CHA UNIT  
CHA CHA GALLUP FIELD

Aztec Oil and Gas Company

1. ~~Hagood No. 29-G - (Section 30, T-29-N, R-13-W)~~  
~~8-5/8" casing set at 322' with 225 sacks cement.~~  
~~4-1/2" casing set at 5623' with 400 sacks cement.~~
2. Robinson No. 7-G <sup>unit M</sup> - (Section 15, T-28-N, R-13-W)  
8-5/8" casing set at 317' with 225 sacks cement.  
4-1/2" casing set at 5830' with 400 sacks cement.
3. Robinson No. 9-G <sup>unit L</sup> - (Section 15, T-28-N, R-13-W)  
8-5/8" casing set at 324' with 240 sacks cement.  
4-1/2" casing set at 5855' with 400 sacks cement.
4. Robinson No. 10-G <sup>unit H</sup> - (Section 22, T-28-N, R-13-W)  
8-5/8" casing set at 200' with 170 sacks cement.  
4-1/2" casing set at 5855' with 400 sacks cement.

Benson-Montin-Greer

1. Jones No. 5 <sup>unit H</sup> - (Section 17, T-28-N, R-13-W)  
8-5/8" casing set at 249' with 225 sacks cement.  
4-1/2" casing set at 5824' with 175 sacks cement.
2. Jones No. 6 <sup>unit B</sup> - (Section 17, T-28-N, R-13-W)  
8-5/8" casing set at 272' with 235 sacks cement.  
5-1/2" casing set at 5821' with 175 sacks cement.

Pan American Petroleum Corporation

1. C. J. Holder No. 2 <sup>unit M</sup> - (Section 8, T-28-N, R-13-W)  
8-5/8" casing set at 208' with 175 sacks cement.  
4-1/2" casing set at 5810' with 225 sacks cement.

SOUTHEAST CHA CHA UNIT

2. C. J. Holder No. 7 - *unit F,* (Section 16, T-28-N, R-13-W)  
8-5/8" casing set at 208' with 135 sacks cement.  
4-1/2" casing set at 5884' with 200 sacks cement.
3. C. J. Holder No. 11 - *Lot of cement L,* (Section 8, T-28-N, R-13-W)  
8-5/8" casing set at 204' with 135 sacks cement.  
4-1/2" casing set at 5670' with 200 sacks cement.
4. State Holder Oil Unit - *unit J,* (Section 16, T-28-N, R-13-W)  
8-5/8" casing set at 265' with 275 sacks cement.  
4-1/2" casing set at 5860' with 200 sacks cement.

**BEFORE EXAMINER UTZ**  
**OIL CONSERVATION COMMISSION**  
*New Am* EXHIBIT NO. 10  
SECTION IV  
CASE NO. 2516 & 2517

(SQUARE LAKE (LOWER GRAYBURG AND UPPER SAN ANDRES WATERFLOOD) POOL—Cont'd.)

TOWNSHIP 16 SOUTH, RANGE 31 EAST, NMPM  
EDDY COUNTY, NEW MEXICO

- Section 19: S/2 SE/4
- Section 28: W/2 SW/4
- Section 29: S/2 N/2 and S/2
- Section 30: NE/4 and E/2 SE/4
- Section 32: N/2
- Section 33: N/2, SE/4 and E/2 SW/4
- Section 34: S/2, W/2 NW/4 and SW/4 NE/4

(2) That all of the above-described acreage which was not included in the previously authorized Square Lake Waterflood Project is hereby designated a legitimate expansion of said project, and shall be exempt from the allowable provisions of Rule 701 E.

(3) That the provisions of Orders Nos. R-1110 and R-1110-A shall remain in full force and effect.

(4) That the waterflood project as expanded by this order shall be operated in accordance with the provisions of Rule 701 E of the Commission Rules and Regulations, except as provided in Paragraph 2 above.

(5) 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.

**HORSESHOE-GALLUP POOL**  
(Pan American Pressure Maintenance)  
San Juan County, New Mexico

Order No. R-2026, Authorizing Pan American Petroleum Corporation to Institute a Pressure Maintenance Project in the Horseshoe-Gallup Pool, San Juan County, New Mexico, July 13, 1961.

*Application of Pan American Petroleum Corporation for a Pressure Maintenance Project in the Horseshoe-Gallup Oil Pool, San Juan County, New Mexico, and for special rules governing the operation of said project.*

CASE NO. 2317  
Order No. R-2026

**ORDER OF THE COMMISSION**

BY THE COMMISSION: This cause came on for hearing at 9 o'clock a.m. on June 28, 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 13th day of July, 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, Pan American Petroleum Corporation, proposes to institute a pressure maintenance project in the Horseshoe-Gallup Oil Pool in Township 30 North, Range 16 West, San Juan County, New Mexico, by the injection of water into the Gallup formation through 20 wells initially, all of which wells are within the proposed project area.

(3) That the proposed pressure maintenance project, to be known as the Northeast Hogback Pressure Maintenance Project, includes lands formerly designated by Order No. R-1494 as part of the Northeast Hogback Unit.

(4) That the applicant proposes that the Special Rules and Regulations to be established for the Northeast Hogback Pressure Maintenance Project be identical with the rules established by Order No. R-1699 for The Atlantic Refining Company Horseshoe-Gallup Pressure Maintenance Project.

(5) That such identical rules should be established in order to prevent conflict in the event the two projects eventually merge.

**IT IS THEREFORE ORDERED:**

(1) That the applicant, Pan American Petroleum Corporation, is hereby authorized 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 the following-described wells in Township 30 North, Range 16 West:

**PAN AMERICAN PETROLEUM CORPORATION**

- Northeast Hogback Unit Well No. 4, Unit J, Section 14
- Northeast Hogback Unit Well No. 6, Unit B, Section 15
- Northeast Hogback Unit Well No. 10, Unit E, Section 14
- Northeast Hogback Unit Well No. 11, Unit F, Section 14
- Northeast Hogback Unit Well No. 13, Unit E, Section 13
- Northeast Hogback Unit Well No. 14, Unit I, Section 14
- Northeast Hogback Unit Well No. 16, Unit K, Section 13
- Northeast Hogback Unit Well No. 17, Unit M, Section 13
- Northeast Hogback Unit Well No. 20, Unit B, Section 24
- Northeast Hogback Unit Well No. 21, Unit D, Section 15
- Northeast Hogback Unit Well No. 22, Unit G, Section 15
- Northeast Hogback Unit Well No. 23, Unit B, Section 10
- Northeast Hogback Unit Well No. 25, Unit D, Section 11
- Northeast Hogback Unit Well No. 29, Unit F, Section 11
- Northeast Hogback Unit Well No. 30, Unit L, Section 10
- Northeast Hogback Unit Well No. 32, Unit L, Section 11
- Northeast Hogback Unit Well No. 37, Unit P, Section 10

**EL PASO NATURAL GAS PRODUCTS COMPANY**

- Williams Well No. 2, Unit P, Section 11
- Williams Well No. 3, Unit J, Section 11

**ABRAHAM**

- Federal Well No. 3, Unit B, Section 14

(2) That Special Rules and Regulations governing the operation of the Northeast Hogback Pressure Maintenance Project, San Juan County, New Mexico, are hereby promulgated, as follows:

**SPECIAL RULES AND REGULATIONS**

**FOR THE  
NORTHEAST HOGBACK PRESSURE MAINTENANCE  
PROJECT**

**RULE 1.** The project area of the Northeast Hogback Pressure Maintenance Project, hereinafter referred to as the Project, shall comprise the following-described acreage in San Juan County, New Mexico:

- TOWNSHIP 30 NORTH, RANGE 16 WEST, NMPM
- Section 10: E/2 and SW/4
- Section 11: SW/4 NE/4, W/2 and the SE/4
- Section 12: W/2 SW/4
- Section 13: SW/4, W/2 NW/4 and the W/2 SE/4
- Section 14: N/2, N/2 SW/4 and the SE/4
- Section 15: NE/4 and the N/2 NW/4
- Section 23: NE/4 NE/4
- Section 24: NW/4 NE/4 and the N/2 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

**(HORSESHOE-GALLUP (PAN AMERICAN PRESSURE MAINTENANCE) POOL—Cont'd.)**

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 two times top unit allowable for the pool. 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:

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

where:

- A<sub>adj</sub> = the well's daily adjusted allowable
- TUA = top unit allowable for the pool
- Fa = the well's acreage factor
- P<sub>g</sub> = average daily volume of gas produced by the well during the preceding month, cubic feet
- I<sub>g</sub> = the well's allocated share of the daily average gas injected during the preceding month, cubic feet
- P<sub>o</sub> = 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:

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

where:

- E<sub>g</sub> = Average daily gas equivalent of net water injected, cubic feet

- V<sub>w inj</sub> = Average daily volume of water injected, barrels
- V<sub>w prod</sub> = Average daily volume of water produced, barrels
- 5.61 = Cubic foot equivalent of one barrel of water
- P<sub>a</sub> = 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
- Tr = 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<sub>a</sub>, interpolated from compressibility tabulation below:

Reservoir Pressure	Z	Reservoir Pressure	Z	Reservoir Pressure	Z
50	.9725	300	.8325	550	.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.

(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.

CASINGHEAD GAS  
COMPRESSIBILITY TABULATION  
CHA CHA GALLUP OIL POOL

<u>Pressure</u> <u>psig</u>	<u>Z</u>
0	.986
50	.976
100	.963
150	.952
200	.943
250	.935
300	.930
350	.927
400	.923
450	.918
500	.912
550	.906
600	.902
650	.899
700	.895
750	.891
800	.886
850	.882
900	.877
950	.873
1000	.869
1050	.865
1100	.860
1150	.857
1200	.853
1250	.849
1300	.845
1350	.842
1400	.838