

2-616

fiction, Transcript,
// Exhibs. Etc.

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. 2616
Order No. R-2305

APPLICATION OF TENNECO OIL COMPANY
FOR A WATERFLOOD PROJECT, CHA CHA-
GALLUP OIL POOL, 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 8, 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 13th day of August, 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, Tenneco Oil Company, proposes to institute a pressure maintenance project in the Cha Cha-Gallup Oil Pool, said project area to comprise of all of partial Section 31, Township 29 North, Range 13 West, NMPM, San Juan County, New Mexico. Initial injection into the Gallup formation is to be through two wells located in the S/2 of said Section 31.

(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 Tenneco Oil Company Cha Cha-Gallup Pressure Maintenance Project 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

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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 Cha Cha-Gallup Oil Pool until such time as the well has experienced a substantial response from water injection. When such a response has occurred, the well should be permitted to produce up to two times top unit allowable for the Cha Cha-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 Cha Cha-Gallup Oil Pool, San Juan County, New Mexico, by the injection of water into the Gallup formation through the following-described wells in Township 29 North, Range 13 West:

USA Glenn H. Callow "B" Well No. 2, Unit I, Section 31;
USA Glenn H. Callow "B" Oil Unit Well No. 1, Unit K,
Section 31.

(2) That Special Rules and Regulations governing the operation of the Tenneco Oil Company Cha Cha-Gallup Pressure Maintenance Project, San Juan County, New Mexico, are hereby promulgated as follows, effective September 1, 1962:

SPECIAL RULES AND REGULATIONS
FOR THE TENNECO OIL COMPANY
CHA CHA-GALLUP PRESSURE MAINTENANCE PROJECT

RULE 1. The project area of the Tenneco Oil Company Cha Cha-Gallup Pressure Maintenance Project, San Juan County, New Mexico, hereinafter referred to as the Project, shall comprise that area described as follows:

TOWNSHIP 29 NORTH, RANGE 13 WEST, NMPM
Partial Section 31: All

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

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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 Cha Cha-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 Cha Cha-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 Cha Cha-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 Cha Cha-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 Cha Cha-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:

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

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 Cha Cha-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:

$$E_g = (V_w \text{ inj} - V_w \text{ prod}) \times 5.61 \times \frac{P_a}{15.025} \times \frac{520^0}{T_r} \times \frac{1}{Z}$$

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

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CASE No. 2616

Order No. R-2305

- 5.61 = Cubic foot equivalent of one barrel of water
- P_a = Average reservoir pressure at a datum of + 418 feet above sea level, psig + 12.00, 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 158° F expressed as absolute temperature (618° R)
- Z = Compressibility factor from analysis of Cha Cha-Gallup gas at average reservoir pressure, P_a , interpolated from compressibility tabulation below:

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

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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CASE No. 2616
Order No. R-2305

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.

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION



E. L. Mechem

EDWIN L. MECHEM, Chairman

E. S. Walker

E. S. WALKER, Member

A. L. Porter, Jr.

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

esr/

GOVERNOR
EDWIN L. MECHEM
CHAIRMAN

State of New Mexico
Oil Conservation Commission

LAND COMMISSIONER
E. S. JOHNNY WALKER
MEMBER



STATE GEOLOGIST
A. L. PORTER, JR.
SECRETARY - DIRECTOR

P. O. BOX 871
SANTA FE

August 13, 1962

Mr. Richard S. Morris
Seth, Montgomery, Federici &
Andrews
Attorneys at Law
Box 828
Santa Fe, New Mexico

Re: Case No. 2616
Order No. R-2305
Applicant:
Tenneco Oil Company

Dear Sir:

Enclosed herewith are two copies of the above-referenced
Commission order recently entered in the subject case.

Very truly yours,

A. L. PORTER, Jr.
Secretary-Director

ir/

Carbon copy of order also sent to:

Hobbs OCC x

Artesia OCC

Aztec OCC x

OTHER

CASE 2615: Application of Aztec Oil & Gas Company for a waterflood project, Lea and Eddy Counties, New Mexico. Applicant, in the above-styled cause, seeks permission to institute a waterflood project in the Robinson Grayburg-San Andres Oil Pool in an area underlying the E/2 SE/4 and SW/4 SE/4, Section 36, Township 16 South, Range 31 East and the SW/4 SE/4, Section 30 and the W/2, W/2 E/2, and SE/4 SE/4 of Section 31, Township 16 South, Range 32 East, Lea and Eddy Counties, New Mexico, with injection of water to be into the Grayburg formation in six injection wells, said project to be governed by the provisions of Rule 701.

CASE 2616: Application of Tenneco Oil Company for a waterflood project, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks permission to institute a waterflood project in the Cha Cha-Gallup Oil Pool in an area underlying Section 31, Township 29 North, Range 13 West, San Juan County, New Mexico, with injection of water into the Gallup formation at an approximate depth of 5500-5700 feet, said project to be governed by the provisions of Rule 701.

CASE 2355: (Reopened)
In the matter of the application of H. L. Brown, Jr., and Clem E. George for establishment of special rules and regulations for the Bluit-Wolfcamp Gas Pool, Roosevelt County, New Mexico. Case 2355 will be reopened pursuant to Order No. R-2051 to permit the applicant and other interested parties to appear and show cause why the Bluit-Wolfcamp Gas Pool should not be developed on 160-acre proration units.

CASE 2345: (Reopened)
In the matter of the application of Continental Oil Company for the establishment of special rules and regulations for the Rattlesnake-Pennsylvanian Pool, San Juan County, New Mexico. Case 2345 will be reopened pursuant to Order No. R-2049 to permit the applicant and other interested parties to appear and show cause why the subject pool should not be developed on 40-acre proration units.

CASE 2617: Application of Continental Oil Company for a dual completion, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks permission to complete its Rattlesnake Well No. 140, located in Unit H of Section 11, Township 29 North, Range 19 West, San Juan County, New Mexico, as a dual completion (conventional) in the Organ Rock and Pennsylvanian-Paradox formations in the Rattlesnake-Pennsylvanian Field, with the production of oil and gas from the Pennsylvanian-Paradox formation to be through 2 7/8-inch tubing at a depth of 6658 to 6710 feet, Applicant proposes to dispose of salt water into the Organ Rock formation at a depth of 4175 to 4320 feet through a parallel string of 2 7/8 inch tubing.

DOCKET: EXAMINER HEARING - WEDNESDAY - AUGUST 8, 1962

9 A.M. - OIL CONSERVATION COMMISSION CONFERENCE ROOM,
STATE LAND OFFICE BUILDING - SANTA FE, NEW MEXICO

The following cases will be heard before Daniel S. Nutter, Examiner, or
Elvis A. Utz, as alternate examiner:

CASE 2009: (Reopened)

Application of Gulf Oil Corporation for a four-month extension of the effectiveness of Order No. R-1726, Lea County, New Mexico. Applicant, in the above-styled cause, seeks a four-month extension of the effectiveness of Order No. R-1726, which established a temporary 200-acre non-standard gas proration unit in the SW/4 and the SW/4 SE/4 of Section 23, Township 22 South, Range 37 East, Blinebry Gas Pool, Lea County, New Mexico.

CASE 2612:

Application of Texaco Inc. for a tubing exception, Lea County, New Mexico. Applicant, in the above-styled cause, seeks permission to produce its C. C. Fristoe (b) NCT-2 Well No. 6, located in Unit H of Section 35, Township 25 South, Range 37 East, Lea County, New Mexico, North Justis-Devonian Pool, through a string of 1 1/2 inch OD tubing run with a packer inside of a 2 7/8 inch OD casing.

CASE 2613:

Application of Shell Oil Company for a triple completion, Lea County, New Mexico. Applicant, in the above-styled cause, seeks permission to complete its Middleton Federal "A" Well No. 1, located in Unit H of Section 18, Township 19 South, Range 32 East, Lea County, New Mexico, as a triple completion (conventional) in the Bone Spring, Wolfcamp and Pennsylvanian formations, with the production of oil from all zones to be through parallel strings of 2 3/8 inch tubing.

CASE 2614:

Application of Pan American Petroleum Corporation for a triple completion, Lea County, New Mexico. Applicant, in the above-styled cause, seeks permission to complete its USA E. V. Pike Well No. 1, located in Unit A of Section 6, Township 23 South, Range 30 East, Lea County, New Mexico as a triple completion (conventional) in the Blinebry Oil Pool, Tubb Gas Pool and Drinkard Oil Pool, with the production of oil from the Blinebry and Drinkard formations and gas from the Tubb formations through parallel strings of tubing.

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 Cha Cha-Gallup Oil Pool until such time as the well has experienced a substantial response from water injection. When such a response has occurred, the well should be permitted to produce up to two times top unit allowable for the Cha Cha-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 Cha Cha-Gallup Oil Pool, San Juan County, New Mexico, by the injection of water into the Gallup formation through the following-described wells in Township 29 North, Range 14 West:

Pan American-Navajo "E" No. 3, Unit K, Section 21;

Pan American-Navajo "E" No. 2, Unit I, Section 21;

El Paso Natural Gas Products-Ojo Amarillo No. 2,
Unit C, Section 27;

Humble-Navajo "L" No. 1, Unit E, Section 26;

Humble-Navajo "L" No. 4, Unit O, Section 26;

Humble-Navajo "L" No. 5, Unit E, Section 36.

(2) That Special Rules and Regulations governing the operation of The Humble Oil & Refining Company Cha Cha-Gallup Pressure Maintenance Project, San Juan County, New Mexico, are hereby promulgated as follows, effective January 1, 1962:

SPECIAL RULES AND REGULATIONS
FOR THE HUMBLE OIL & REFINING COMPANY
CHA CHA-GALLUP PRESSURE MAINTENANCE PROJECT

RULE 1. The project area of The Humble Oil & Refining Company Cha Cha-Gallup Pressure Maintenance Project, San Juan County, New Mexico, hereinafter referred to as the Project, shall comprise that area described as follows:

TOWNSHIP 29 NORTH, RANGE 14 WEST, NMPM
Section 15: That portion of the S/2
lying South of the mid-
channel of the San Juan
River

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. 2447
Order No. R-2154

APPLICATION OF HUMBLE OIL & REFINING
COMPANY FOR APPROVAL OF THE CHA CHA-
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 December 11, 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 3rd day of January, 1962, 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, Humble Oil & Refining Company, proposes to institute a pressure maintenance project in the Cha Cha-Gallup Oil Pool, said project area to comprise Navajo Indian Reservation Lands constituting portions of Sections 15, 16, 17, 18, 19, 23, 24, 28, and 34, and all of Sections 20, 21, 22, 25, 26, 27, 35, and 36, all in Township 29 North, Range 14 West, NMPM, San Juan County, New Mexico. Initial injection into the Gallup formation would be through certain wells located in Sections 21, 26, 27, and 36 of the same Township.

(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 Humble Oil & Refining Company Cha Cha-Gallup Pressure Maintenance Project should be promulgated and, for operational

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 Cha Cha-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 Cha Cha-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 Cha Cha-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 Cha Cha-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

- Section 16: All that portion lying South of the mid-channel of the San Juan River
- Section 17: All that portion lying South of the mid-channel of the San Juan River
- Section 18: All that portion lying South of the mid-channel of the San Juan River
- Section 19: NE/4
- Section 20: All
- Section 21: All
- Section 22: All
- Section 23: S/2 and NW/4
- Section 24: SW/4 SE/4 and S/2 SW/4
- Section 25: All
- Section 26: All
- Section 27: All
- Section 28: E/2 and NW/4
- Section 34: N/2
- Section 35: All
- Section 36: All

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 Cha Cha-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

Z = Compressibility factor from analysis of
Cha Cha-Gallup gas at average reservoir
pressure, P_a , interpolated from compressi-
bility tabulation below:

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

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.

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 Cha Cha-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 a datum of + 418 feet above sea level, psig + 12.00, 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 158°F expressed as absolute temperature (618°R)

(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 herein-above designated.

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

EDWIN L. MECHEM, Chairman

E. S. WALKER, Member

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

S E A L

esr/

July 10, 1962

Mr. L. B. Plumb
District Production Superintendent
Tenneco Oil Company
Durango, Colorado

Dear Mr. Plumb

Receipt of a copy of your letter to the New Mexico Oil Conservation Commission under date of July 6, 1962 applying for permission to conduct a water flood operation in the Cha Cha Gallup Pool, San Juan County, New Mexico is herewith acknowledged. Since none of the information referred to in the letter was submitted to this office, it will be impossible for me to determine, at this time, what the State Engineer's position may be with regard to your proposal. If the necessary information on which to base a decision is not received prior to setting for the hearing, then I will endeavor to appear at the hearing, ask questions that occur to me with regard to the proposed project and determine at that time whether the State Engineer should object to the granting of your application.

Yours very truly,

S. E. Reynolds
State Engineer

By:
Frank E. Irby
Chief
Water Rights Division

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

C
O
P
Y

APPLICATION FOR WATER FLOOD
Cha Cha Gallup Field
Tenneco Oil Company
Well Completion History

<u>Lease and Well No.</u>	<u>T. D.</u>	<u>Casing Size</u>	<u>Depth Set</u>	<u>Cement Used</u>	<u>Cement Top</u>	<u>Stage Collar</u>	<u>Perforated Interval</u>
USA Glenn H. Callow "B" No. 1	5715	4 1/2"	5715	100 sx.	5150*	1771'	5593-98
USA Glenn H. Callow "B" No. 2	5650	4 1/2"	5649	100 sx.	--	50 sx. 1690'	Jet Notch @ 5655' 5542-47**
USA Glenn H. Callow "B" No. 3	6323	5 1/2"	6323	275 sx.	4575*	50 sx. 1800'	5543-49***
USA Glenn H. Callow "B" Oil Unit No. 1	5711	4 1/2"	5706	100 sx.	--	50 sx. 1750'	5592-98
USA Glenn H. Callow "C" Oil Unit No. 1	5660	4 1/2"	5660	130 sx.	--	50 sx. 1697'	5650-55 5595-99

* Cement Top from Temperature Survey

** Original perforations jet notches @ 5545 & 5602 squeezed with 100 sx. cement. Tested to 3000 psi.

*** Completion attempt in Dakota unsuccessful. Bridge plug with cement on top set at 5650.

NOTE: At the present time, USA Callow "B" No. 2 and Callow "C" Oil Unit No. 1 are proposed for injection wells.



TENNECO OIL COMPANY • P. O. BOX 1714 • 835 SECOND AVENUE • DURANGO, COLORADO

July 6, 1962

New Mexico Oil Conservation Commission
P. O. Box 871
Santa Fe, New Mexico

Gentlemen:

Tenneco Oil Company hereby applies for permission to conduct a water-flood operation in the Cha Cha Gallup Pool, San Juan County, New Mexico. Tenneco proposes to inject water into several wells located in Section 31, T29N, R13W. In compliance with Rule 701, the following are attached:

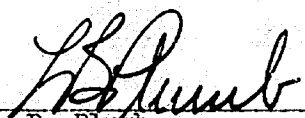
1. A plat showing the location of all wells in the area with injection wells so marked.
2. Electric log of each injection well.
3. A Data Sheet giving pertinent data on each of these proposed injection wells.

It is proposed that water will be injected into the Gallup formation at an approximate depth of 5500-5700'. It is anticipated that the injection rate will be approximately 2000 BWPd. The source of this water will be from either sub-surface formations or the San Juan River.

It is requested that this application be set for hearing as soon as possible.

Yours very truly,

TENNECO OIL COMPANY


L. B. Plumb
District Production Superintendent

LBP:pk

Attach.

cc New Mexico Oil Conservation Commission - Aztec

*Docket
mailed
7/25/62*

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FARMINGTON, N. M.
PHONE 325-1182

ALBUQUERQUE, N. M.
PHONE 243-6691

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
August 8, 1962

EXAMINER HEARING

IN THE MATTER OF:

Application of Tenneco Oil Company for
a waterflood project, San Juan County,
New Mexico. Applicant, in the above-
styled cause, seeks permission to in-
stitute a waterflood project in the
Cha Cha-Gallup Oil Pool in an area
underlying Section 31, Township 29
North, Range 13 West, San Juan County,
New Mexico, with injection of water
into the Gallup formation at an approxi-
mate depth of 5500-5700 feet, said
project to be governed by the provisions
of Rule 701.

Case 2616

BEFORE: Mr. Daniel S. Nutter, Examiner.

TRANSCRIPT OF HEARING

MR. NUTTER: The hearing will come to order, please.

We will take next Case 2616.

MR. FLINT: Application of Tenneco Oil Company for a
waterflood project, San Juan County, New Mexico.

MR. MORRIS: If the Examiner please, I am Richard
Morris of the firm of Seth, Montgomery, Federici & Andrews,
Santa Fe, New Mexico, appearing on behalf of the applicant,



Tenneco Oil Company. We have one witness, Mr. Les Plumb.

(Witness sworn.)

(Whereupon, Applicant's Exhibits 1, 2 & 3 were marked for identification.)

L. B. PLUMB

called as a witness, having been first duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. MORRIS:

Q Mr. Plumb, will you please state your name and position for the record, please?

A L. B. Plumb. I'm District Production Superintendent for Tenneco Oil Company in Durango, Colorado.

Q Mr. Plumb, you have previously appeared before the Commission or its Examiners as an expert witness and had your qualifications accepted?

A Yes, I have.

Q Are you familiar with Tenneco's application in this case, Case 2616?

A Yes, I'm familiar with it.

Q Have you prepared several exhibits to substantiate your proposals in this application?

A Yes.

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 PHONE 325-1152

Q Referring to what has been marked as Exhibit No. 1, would you briefly describe the basic area that is depicted upon this plat and the location generally of other pressure maintenance projects in this area?

A Exhibit No. 1 encompasses Tenneco Oil Company's properties in the Cha Cha-Gallup Pool. It also shows the producing properties of other operators adjacent to Tenneco's properties in both the Cha Cha-Gallup Pool and the Totah-Gallup Pool. Tenneco's lease specifically consists of Section 31, 13 West, 29 North.

Q There are two pressure maintenance projects in this area that have already been approved by the Commission, are there not, one being designated the Northwest Cha Cha pressure maintenance project, another the Southeast Cha Cha pressure maintenance project?

A Yes, that is correct.

Q And the Northwest project lies immediately to the west and north of Section 31, which is shown as Tenneco's property here?

A Yes.

Q And that project is operated by Humble Oil and Refining Company?

A That's correct.

Q The area to the south and east of Tenneco's property



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as shown here is the Southeast pressure maintenance project, which is operated by Pan American Petroleum Corporation?

A That's correct.

Q Referring to the Tenneco properties in Section 31, 29 North, 13 West, would you describe the lease ownership in that section?

A Tenneco is operator of all the leases in Section 31. The ownership is as follows: the East Half of Section 31 is a regular Half Section, the working interest is owned 7/8ths by Tenneco Oil Company, 1/8th by Big Chief Drilling Company of Oklahoma; the East Half of Section 31 is an irregular Half Section. There are two leases there, the B Oil Unit lease and the C Oil Unit lease. Elliott, Inc. of Roswell, New Mexico owns approximately eleven percent of each of those two leases, the remaining eight-nine percent is owned 7/8ths by Tenneco and 1/8th by Big Chief.

Q Elliott, Inc. owned the lots along the west side of this Section 31 which were communitized to form proration units in the Northwest Quarter and the Southwest Quarter of Section 31?

A That's correct.

Q All of the land in Section 31 is federal land; is that correct?

A Yes. It's all federal acreage.



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Q Now, Mr. Plumb, what is Tenneco's proposal with respect to pressure maintenance operations in Section 31 and surrounding areas?

A We propose to inject water into two wells in Section 31, our Oil Unit B No. 1 and our Callow B No. 2.

Q Those wells shown circled in red on Exhibit No. 1?

A Correct. These wells will establish an acceptable cooperative pattern with the operators of the two units adjacent to us, the northwest unit and the southeast unit. We have had discussions with these operators and this pattern is mutually agreeable with all three of us.

Q Mr. Plumb, do you contemplate pressure maintenance operations just upon your lease in Section 31, or is it anticipated that any other acreage in this vicinity might be taken into an eventual unit to be formed?

A To the north of us in Section 30, 29 North, 13 West, Aztec Oil and Gas Company has a lease on which they have their Hagood Federal No. 29-G. We propose to form a unit including Tenneco's acreage and Aztec's acreage if they accept our proposal and choose to join our unit. That would include all of the leases in the Cha Cha-Gallup Pool in one waterflood unit or another.

Q Mr. Plumb, if I may summarize what you have just said



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here, in Section 31 Oil Unit B Well No. 1 and your Callow B Well No. 2-B would be injection wells. The other three wells shown in Section 31 would be producing wells and if satisfactory arrangements can be worked out with Aztec Oil and Gas Company with respect to their Well No. 29-G to the north, that also would be a producing well?

A That is correct.

Q Do you have anything else you would like to point out on Exhibit No. 1 before we go to Exhibit No. 2?

A No, sir.

Q Referring to your Exhibit No. 2, does this exhibit show the casing and cementing program on the two proposed injection wells?

A Yes, it does.

Q Is there anything on this exhibit that you would particularly like to point out to the Examiner?

A I would like to point out that the amount of cement used in these wells is sufficient to cover an interval much greater than the Gallup sand, and that the perforated interval shows that the water to be injected here will be contained wholly within the Gallup sand interval.

Q Referring to Exhibit No. 3, Mr. Plumb, which is entitled "Actual and Predicted Primary Production Performance",



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would you summarize the information shown there?

A Up through July 1, 1962, the line drawn here represents the actual lease performance of the five wells in Section 31, showing the monthly oil production. After 7-1-62, the line there is our prediction of the primary performance of the lease, which extends to a cumulative primary oil recovery of 173,000.

Q The sharp decline in monthly production shown in December, 1961 there was as a result of the No Flare order entered by the Commission?

A Yes, December 1, 1962 the No Flare order became effective. The production was sharply curtailed thereafter. During the first quarter of 1962 the gas compressor serving the casinghead gathering system on this lease had very faulty operation. It was down most of the time, which resulted in a much lower production during the months of February, March and April than normally would have been expected.

Q By the middle of 1962, then, most of the problems had been ironed out with respect to the gas gathering facility and your production leveled off?

A Yes, sir, it's reasonably satisfactory now, although takes in the field are still not quite rateable and some productive capacity is limited by the amount of gas that we can put through the compression system available to us.



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Q Now, you've shown by means of your decline curve that the ultimate recovery from primary production would be anticipated to be in the neighborhood of 173,000 barrels from all five wells on your lease in Section 31, correct?

A That's correct.

Q Would you say that that is an unusually high or low recovery for five wells in this field?

A It will not be high for any five wells in this field drilled on the 80-acre well density pattern. The average recovery you can see will be approximately 35,000 barrels per well, which is barely an economic well considering the expense of drilling. The other wells in the area perform similarly and there is no reason to think that our wells are particularly better nor worse than any others.

Q Under your proposed pressured maintenance project in this area, what is the total ultimate recovery that you would expect from both primary and secondary means?

A Our reservoir engineering studies indicate that the secondary recovery will be approximately equal to the primary recovery, which will give us an estimated cumulative recovery both primary and secondary of 350,000 barrels.

Q Mr. Plumb, we have seen in the hearings that have been held before this Commission and its Examiners with respect



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to the Northwest Cha Cha pressure maintenance project and the Southeast Cha Cha pressure maintenance project the need for pressure maintenance projects and some form of secondary recovery in the Cha Cha-Gallup Oil Pool. Are you of the opinion that the reservoir characteristics in this pool in this particular area where you are proposing a pressure maintenance project is similar to the area, and the wells are similar to the wells in the other portions of the pool already under pressure maintenance?

A Yes. The wells in Section 31, in the Gallup sand the reservoir is contiguous through this lease with the rest of the Cha Cha-Gallup reservoir, which includes the Southeast of the Northwest Cha Cha unit.

Q Your lease in question here and the wells thereon lie along the northeast flank of the Cha Cha-Gallup Pool?

A Yes.

Q It would be your conclusion that there is a definite need for pressure maintenance in this particular area and that without the institution of such a project, waste would occur?

A That's correct.

Q Do you have an opinion to express with respect to the efficiency of the drainage pattern that you are proposing on your lease here in question?

A With the pattern indicated here and the patterns



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established by the Southeast Unit and the Northwest Unit, it appears that drainage of oil will be equitable in all directions from our lease here.

Q You feel that the pattern that you have proposed will inure to the benefit of your offset operators as well as to yourselves?

A Yes, we feel there will be no inequitable pushing of oil by water injection across lease lines. Each unit operating here will give compensatory injection, which will result in an equitable distribution of the oil to be derived from here.

Q Mr. Plumb, what is the water source that you anticipate using for the water to be injected into the Gallup formation?

A We propose to use water taken from the alluvial sands of the San Juan River.

Q What is the rate of injection that you anticipate with respect to each of these two injection wells?

A It is not definitely established yet. We predict approximately 500 barrels per day. However, we do propose that we will maintain an equitable flood front advance with the injection wells of the two units offsetting us.

Q Mr. Plumb, when Tenneco applied to the Oil Conservation Commission for this hearing, was a copy of the application in the case furnished to the State Engineer showing the casing and



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cementing programs on all five wells in Section 31?

A Yes, that was done.

Q And has Tenneco received any indication from the State Engineer of its disapproval of its application?

A No, sir, he acknowledged receipt of the application.

Q With respect to your proposal for rules governing your project area, is it your proposal that the rules governing your project be the same or similar to the rules governing the project operated by Humble to the northwest and by Pan American to the southeast?

A Yes. We would request the same type order as was issued in those two cases.

MR. MORRIS: If the Examiner please, the Southeast Cha Cha pressure maintenance project was authorized by Order No. R-2214, and the Northwest Cha Cha pressure maintenance project was authorized by Order No. R-2154. Insofar as I am able to tell, those orders are similar with respect to the rules that are promulgated for the government of the pressure maintenance projects and inasmuch as Tenneco's proposal today is part of the same pool and fills the niche between these two projects, Tenneco proposes and requests that similar rules be adopted governing the subject project.

Q (By Mr. Morris) Mr. Plumb, were Exhibits 1, 2 and 3



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prepared under your direction?

A Yes, they were.

MR. MORRIS: At this time, Mr. Examiner, we offer Tenneco's Exhibits 1, 2 and 3 into evidence, and that completes the direct examination of Mr. Plumb.

MR. NUTTER: Tenneco's Exhibits 1 through 3 will be admitted in evidence.

(Whereupon, Applicant's Exhibits Nos. 1, 2 & 3 were admitted in evidence.)

MR. NUTTER: Are there any questions of Mr. Plumb?

CROSS EXAMINATION

BY MR. NUTTER:

Q Mr. Plumb, with your application you sent logs of these wells. I have been looking them over and I see that some of the wells appear to have two benches of the Gallup present in them?

A Yes, they do.

Q Is the second bench present in the Callow No. 2 well?

A Not having the log in front of me, I cannot answer exactly, but I do not believe it is. Yes, that zone is present in our Callow B No. 2.

Q Well, is the perforated interval as shown on Exhibit No. 2 such that the lower bench will be flooded by that well?

A No, sir, it is not. The reason for that is as follows:



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in attempting to complete this well as a producer, we perforated the two benches of the Gallup sand there and attempted to stimulate them separately using bridge plugs to separate the two zones. In attempting to break down the lower zone, we pumped on it with a pressure of 4200 psi and we are unable to establish a breakdown. We then pumped acid into it and at a pressure of somewhere close to 3,000 psi we broke down and established communication with the upper set of perforations. We were then convinced that the lower bench of the B sand was so impermeable that we could neither inject or get production from it, so we squeezed it off and completed the upper bench.

Q You calculate now that it would be futile to inject water into that zone?

A Yes, I feel very strongly it would be futile to do that.

MR. NUTTER: Are there any other questions of Mr. Plumb?
Mr. Irby.

MR. IRBY: Frank Irby, State Engineer's Office. I didn't bring my file with me. Will you state whether or not injection is down the casing or through the tubing?

A Injection will be through the tubing.

MR. IRBY: Thank you, that's all.

MR. NUTTER: Any further questions? Mr. Plumb may be excused.



(Witness excused.)

MR. NUTTER: Do you have anything further, Mr. Morris?

MR. MORRIS: No, sir.

MR. NUTTER: Does anyone have anything they wish to offer in Case 2616? We'll take the case under advisement.

STATE OF NEW MEXICO)
) ss
 COUNTY OF BERNALILLO)

I, ADA DEARNLEY, Court Reporter, do hereby certify that the foregoing and attached transcript of proceedings before the New Mexico Oil Conservation Commission at Santa Fe, New Mexico, is a true and correct record to the best of my knowledge, skill and ability.

IN WITNESS WHEREOF I have affixed my hand and notarial seal this 1st day of September, 1962.

Ada Dearnley
 Notary Public-Court Reporter

My commission expires:

June 19, 1963.

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 2616 heard by me on Aug 8, 1962.

[Signature], Examiner
 New Mexico Oil Conservation Commission

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EXHIBIT NO. II

APPLICATION FOR WATER FLOOD Chia Cha Gelling Fluid Tenneco Oil Company Proposed Water Injection Wells

Lease and Well No.	T. D.	Casing Size	Depth Set	Cement Used	Cement Top	Stage Collar	Perforated Interval
USA Glenn H. Callow "B" No. 2	5650	4 1/2"	5649	100 sz.	--	1690' 50 sz.	5542-17 *
USA Glenn H. Callow "B" C11 Unit No. 1	5711	4 1/2"	5706	100 sz.	--	1750' 50 sz.	5592-58 5650-55

* Original perforations jet notches @ 5545 & 5602 squeezed with 100 sz. cement. Tested to 3000 psi.

BEFORE EXAMINER NOTED
OR
Tenneco Oil Co. <u>2</u>
CASE NO. <u>2616</u>

NO. 3120. TEN YEARS BY MONTHS X 100 DIVISIONS

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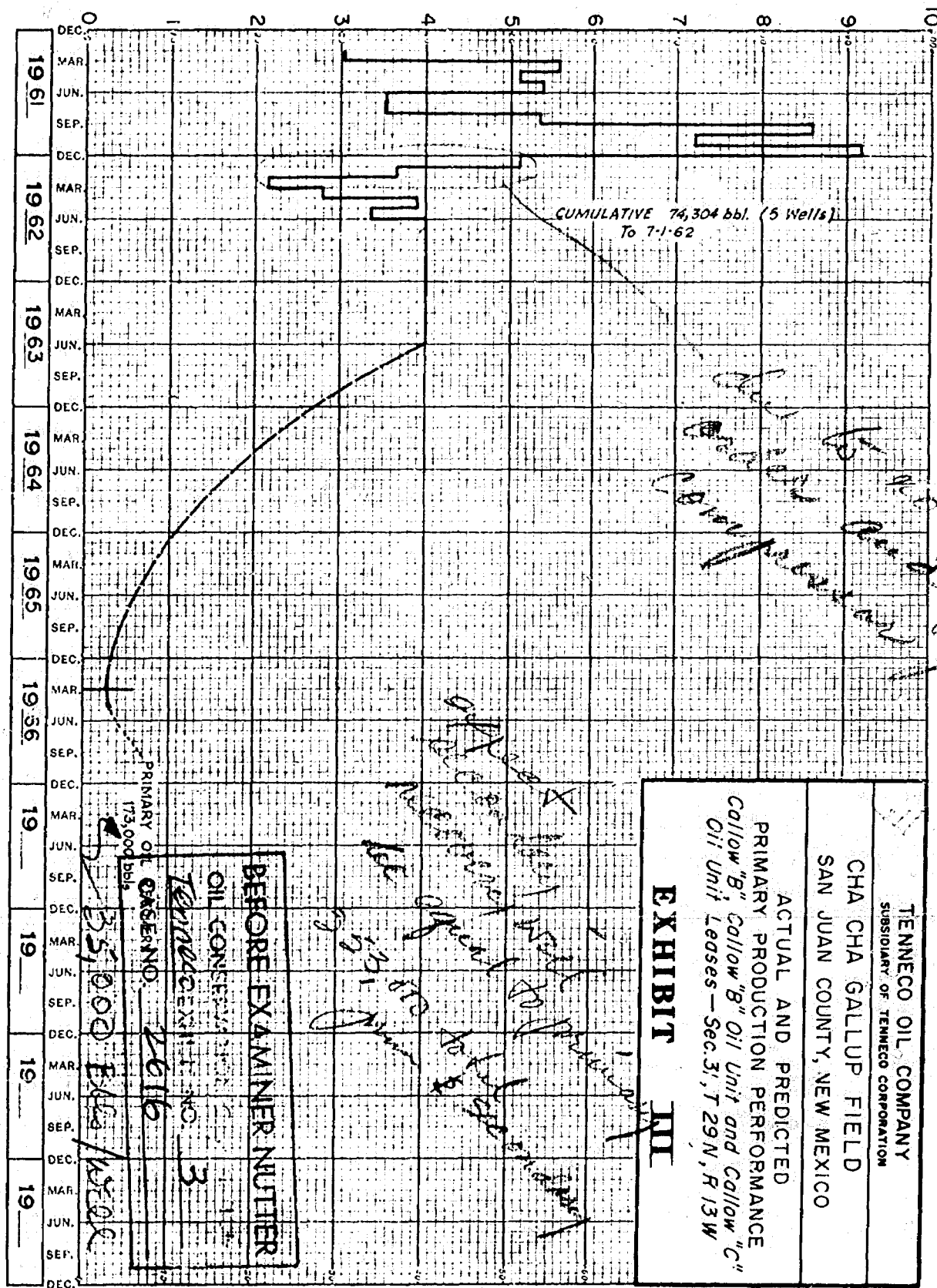


EXHIBIT III

TENNECO OIL COMPANY
SUBSIDIARY OF TENNECO CORPORATION

CHA CHA GALLUP FIELD

SAN JUAN COUNTY, NEW MEXICO

ACTUAL AND PREDICTED

PRIMARY PRODUCTION PERFORMANCE

Oil Unit Leases—Sec. 31, T 29 N, R 13 W

EXHIBIT III