

CASE 201 Application of ~~WATER~~
for a ~~possible~~ ~~submarine~~ ~~project~~
in the form of ~~oil~~ ~~fuel~~.

-asa 110.

2484

Application, Transcript,
and Exhibits, 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. 3484
Order No. R-2190**

**APPLICATION OF TENNECO OIL COMPANY
FOR A 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 January 24, 1962, at Santa Fe, New Mexico, before Elvis A. Uta, 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 21st day of February, 1962, the Commission, a quorum being present, having considered the application, the evidence adduced, and the recommendations of the Examiner, Elvis A. Uta, 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 Totah-Gallup Oil Pool in Sections 21, 27, 28, and 33 of Township 29 North, Range 13 West, NMPM, San Juan County, New Mexico, by the injection of water into the Gallup formation initially to be through six wells located in said acreage.

(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 Totah-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 the project in any proportion, provided that no well in the project area which directly or diagonally offsets a well outside

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CASE No. 2484
Order No. R-2190

the project area producing from the same common source of supply should be allowed to produce in excess of top unit allowable for the Totah-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 Totah-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 the Tenneco Oil Company Pressure Maintenance Project, 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:

Callow-Federal Well No. 10, NE/4 SW/4 of Section 27;
Callow-Federal Well No. 13, NE/4 NE/4 of Section 33;
Callow-Federal Well No. 16, SW/4 SW/4 of Section 27;
Callow-Federal Well No. 18, SW/4 NW/4 of Section 28;
Callow-Federal Well No. 19, SW/4 SW/4 of Section 28;
Hagood-Federal Well No. 1, SW/4 SW/4 of Section 21.

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

**SPECIAL RULES AND REGULATIONS
FOR THE**

TENNECO OIL COMPANY TOTAH-GALLUP PRESSURE MAINTENANCE PROJECT

RULE 1. The project area of the Tenneco Oil Company Pressure Maintenance Project, San Juan County, New Mexico, shall comprise the area described as follows:

TOWNSHIP 29 NORTH, RANGE 13 WEST, NMPM

Section 21: S/2 SW/4
Section 27: S/2, NE/4, S/2 NW/4 and NW/4 NW/4
Section 28: All
Section 33: 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 in the project area 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 each project, 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 period 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 production unit shall be top unit allowable for the Totah-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 Totah-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 Totah-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 Totah-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

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Order No. R-2190

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 Tetch-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 8. Credit for daily average net water injected into the Tetch-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:

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

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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_R = Average reservoir pressure at a datum of + 200 feet above sea level, psig + 12.00, as determined from most recent survey
- 15.023 = Pressure base, psi
- 520° = Temperature base of 60° F expressed as absolute temperature
- T_R = Reservoir temperature of 155° F expressed as absolute temperature (615° R)
- Z = Compressibility factor from analysis of Total-Gallup gas at average reservoir pressure, P_R , interpolated from compressibility tabulation below:

Pressure Psig	Z	Pressure Psig	Z	Pressure Psig	Z
0	1.000	550	.902	1100	.856
50	.983	600	.897	1150	.852
100	.969	650	.893	1200	.848
150	.955	700	.888	1250	.845
200	.948	750	.884	1300	.841
250	.939	800	.880	1350	.837
300	.932	850	.876	1400	.833
350	.924	900	.872	1450	.829
400	.918	950	.868	1500	.825
450	.912	1000	.864	1550	.821
500	.907	1050	.860	1600	.817

RULE 9. Each month the operator of the project 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 allowable for the project. The aforesaid

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CASE No. 2484
Order No. R-2190

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 allowables 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 any 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 the 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 in a similar manner when good cause is shown therefor.

(3) That this order shall become effective upon the approval by the Secretary-Director of the Commission of a satisfactory water source.

(4) That jurisdiction of this cause is retained for the entry of such further orders as the Commission may deem necessary.

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CASE No. 2424
Order No. N-2190

NOTE at Santa Fe, New Mexico, on the day and year herein-
above designated.

STATE OF NEW MEXICO
OIL COMMISSIONER COMMISSION

E. L. Walker

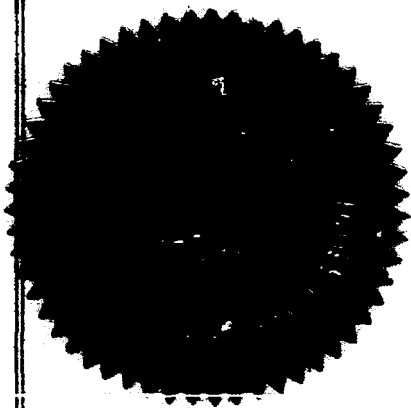
EDWIN L. WALKER, Chairman

E. S. Walker

E. S. WALKER, Member

A. L. Porter, Jr.

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



ccz/

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

February 21, 1962

Mr. Clarence Hinkle
Harvey, Dow & Hinkle
Box 10
Roswell, New Mexico

Re: CASE NO. 2484
ORDER NO. B-2190
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.

A. L. PORTER, JR.
Secretary-Director

ir/

Carbon copy of order also sent to:

Hobbs OCC x
Artesia OCC
Aztec OCC x

OTHER Mr. George Vexity

Case 2484

Heard 1-24-62

Rec. 1-26-62

1. Sumo Tennaco's request for
water flood in the Tolah-Hallup
oil pool on the following acreage.

24a-13W

Sec. 21 S/2 SW/4,

" 27 - ~~NE/4~~ NE/4, S/2 NW/4, NW/4 NE/4,
S/2.

" 28 - A/1

" 33 - N/2

Approximate Injection wells as follow:-

Tennaco - Callow #10 - NE/4 SW/4, 27-29-13

" " #13 - NE/4 NE/4, 33 " "

" " #16 - SW/4 SW/4, 27 " "

" " #18 - SW/4 NW/4, 28 " "

" " #19 - SW/4 SW/4, 28 " "

" - Hagood unit, #1 SW/4 SW/4, 21 " "

2 Use same order as Pan American
case. 2449

Trust

No. 3-62

DOCKET: EXAMINER HEARING - WEDNESDAY - JANUARY 24, 1962

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

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

CASE 2478: Application of Texaco Inc. for a triple completion, Lea County, New Mexico. Applicant, in the above-styled cause, seeks permission to complete its C. H. Weir "B" Well No. 5, located in Unit G of Section 11, Township 20 South, Range 37 East, Lea County, New Mexico, as a triple completion (conventional) in the Skaggs-Drinkard and Skaggs-Glorieta Pools and in an undesignated Blinebry gas pool, with the production of oil from the Drinkard zone to be through a combination string of 2 1/16-inch and 1 1/4-inch tubing, the production of oil from the Glorieta zone to be through a parallel string of 2 1/16-inch tubing and the production of gas from the Blinebry zone to be through the casing-tubing annulus. Applicant further proposes, as an alternative manner of completion in the event the Blinebry gas cannot efficiently be produced through the casing-tubing annulus, to produce gas from the Blinebry zone through a string of 1-inch tubing.

CASE 2479: Application of Shell Oil Company for a 160-acre non-standard gas proration unit, Lea County, New Mexico. Applicant, in the above-styled cause, seeks the establishment of a 160-acre non-standard gas proration unit in the Tubb Gas Pool, comprising Lots 13 and 14 of Section 3, and Lots 9 and 16 of Section 4, Township 21 South, Range 37 East, Lea County, New Mexico, said unit to be dedicated to the Livingston Well No. 11, located 3300 feet from the South line and 660 feet from the West line of said Section 3.

CASE 2314 (Reopened)

Application of Shell Oil Company for an exception to the gas-oil ratio provisions of Rule 26(A), Order No. R-1670, Lea County, New Mexico. The Oil Conservation Commission, on its own motion, will reopen Case No. 2314 in which the applicant seeks an exception to the gas-oil ratio provisions of Rule 26(A), Order No. R-1670, to permit its State Well No. 1-A, located 380 feet from the North line and 380 feet

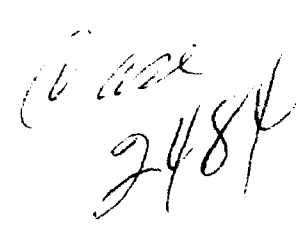
from the West line of Section 26, Township 24 South, Range 36 East, Lea County, New Mexico, to remain classified a gas well in the Jalmat Gas Pool, with a gas-oil ratio below 100,000 to 1.

- CASE 2480: Application of Shell Oil Company for temporary 80-acre proration units, Henshaw-Wolfcamp Pool, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks a temporary order establishing 80-acre oil proration units for the Henshaw-Wolfcamp Pool, Eddy County, New Mexico. Applicant further seeks the establishment of special rules for said pool including a provision assigning the 80-acre proportional factor of 4.00 for allowable purposes.
- CASE 2481: Application of El Paso Natural Gas Company for an exception to Order No. R-1670. Applicant, in the above-styled cause, seeks an exception to Rule 14(a) of the General Rules and Regulations for the Prorated Gas Pools of Northwestern New Mexico, Order No. R-1670, to permit the extension from February 1, 1962, to August 1, 1962, of the period during which underproduction of certain wells in the Basin-Dakota Gas Pool, San Juan County, New Mexico, may be produced.
- CASE 2482: Application of El Paso Natural Gas Company for an exception to Order No. R-333-E. Applicant, in the above-styled cause, seeks the establishment of an administrative procedure whereby all operators, for good cause shown, may obtain an exception to Order No. R-333-E to permit the extension of the terminal date for the 1961 deliverability test period from December 15, 1961, to March 1, 1962, and the continued calculation and assignment of allowables to wells so excepted on the basis of currently effective deliverability tests with retroactive adjustment of allowables to February 1, 1962, being made upon the timely filing of the new deliverability test.
- CASE 2483: Application of Aztec Oil & Gas Company for a pressure maintenance project, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks permission to institute the Aztec Totah Pressure Maintenance Project in Sections 18, 19, 20, 29, 30 and 34, Township 29 North, Range 13 West, San Juan County, New Mexico, in the Totah-Gallup Oil Pool with water injection initially to be through seven wells located in said project area, and requests adoption of special rules to govern the operation of said project.

CASE 2484: Application of Tenneco Oil Company for a pressure maintenance project in the Totah-Gallup Oil Pool, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks permission to institute a pressure maintenance project in the Totah-Gallup Oil Pool by the injection of water into the Gallup formation on its Glenn H. Callow Lease in Sections 27, 28 and 33, Township 29 North, Range 13 West, San Juan County, New Mexico. Applicant further proposes the promulgation of special rules and regulations to govern the operation of said project.

CASE 2485: Application of Union Oil Company of California for approval of the Red Tank Unit Agreement, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval of the Red Tank Unit Agreement embracing 3,680 acres, more or less, of Federal lands in Sections 14, 15, 22, 23, 26, 27 and 28, Township 22 South, Range 32 East, Lea County, New Mexico.

CASE 2486: Application of Union Oil Company of California for permission to take interference tests and transfer allowables, Anderson Ranch-Wolfcamp Pool, Lea County, New Mexico. Applicant, in the above-styled cause, seeks permission to take interference tests and to transfer allowables between eight wells in the Anderson Ranch-Wolfcamp Pool located in Sections 28 and 33, Township 15 South, Range 32 East, Lea County, New Mexico.



January 5, 1962

Gentlemen:

It is requested that this application be set for hearing during January, 1962, if possible.

TENNECO OIL COMPANY

Handwritten: *1-11-6*

LBPRbjco
Attach.
cc: New
Azt

cc: New Mexico Oil Conservation Commission
Aztec, New Mexico

APPLICATION FOR WATERFLOOD
TOTAH GALLUP POOL
TENNECO OIL COMPANY

INJECTION WELL DATA SHEET

<u>PROPOSED INJECTION WELL</u>	<u>TD</u>	<u>CASING SIZE</u>	<u>DEPTH SET</u>	<u>CEMENT USED</u>	<u>CEMENT TOP*</u>	<u>STAGE COLLAR SETTING</u>	<u>PERFORATED INTERVAL</u>
USA Glenn H. Callow No. 10	5331	4-1/2"	5260	240 sx	4030	1351 50 sx	5195-5210 **
USA Glenn H. Callow No. 13	5308	4-1/2"	5278	185 sx	3700	1400 50 sx	5235-5245
USA Glenn H. Callow No. 16	5278	4-1/2"	5275	190 sx	3930	1350 50 sx	5114-5122
USA Glenn H. Callow No. 18	5679	4-1/2"	5675	190 sx	4340	1750 50 sx	5613-5621
USA Glenn H. Callow No. 19	5693	5-1/2"	5693	190 sx	3725	1748 50 sx	Notch @ 5628
Hagood Gallup Oil Unit No. 1	5245	4-1/2"	5245	100 sx	4600	1280 50 sx	5136-37 5143-46 5186-90

* All cement tops determined by temperature survey

** Original perfs 5087-98, 5108-24, 5140-5210
Squeeze cemented 5087-5195 with 85 sacks; tested to 1500 psi

This is a fast message unless its deferred character is indicated by the proper symbol.

W. F. MARSHALL, President

The filing time shown in the date line on domestic telegrams is LOCAL TIME at point of origin. Time of receipt is shown in the date line on international telegrams.

DL = Day Letter

NL=Night Letter

1. **Introduction**

B-4-2

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1962 JUN 3 3 31 1 1962

K DRAG20 LONG PD-DURANGO COLO 5 1154A MST=
-NEW MEXICO OIL CONSERVATION COMMISSION-
PO BOX 871 SANTA FE NMEX=

Case 2484

TENNECO OIL COMPANY BY L B PLUMB:

TOTAL 27 28 33 T 29 N R 13 W 5200-5700 5000 BWPD 1962 701.

Hochet
Märker

~~THE~~ COMPANY WILL APPRECIATE SUGGESTIONS FROM ITS PATRONS CONCERNING ITS SERVICE

EXHIBIT NO. 2

APPLICATION FOR WATERFLOOD
TOTAH GALLUP POOL
TENNECO OIL COMPANY

INJECTION WELL DATA SHEET

<u>PROPOSED INJECTION WELL</u>	<u>TD</u>	<u>CASING SIZE</u>	<u>DEPTH SET</u>	<u>CEMENT USED</u>	<u>CEMENT TOP*</u>	<u>STAGE COLLAR SETTING</u>	<u>PERFORATED INTERVAL</u>
USA Glenn H. Callow No. 10	5331	4 1/2"	5260	240 sx	4030	1351 50 sx	5195-5210**
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USA Glenn H. Callow No. 16	5278	4 1/2"	5275	190 sx	3930	1350 50 sx	5114-5122
USA Glenn H. Callow No. 18	5679	4 1/2"	5675	190 sx	4340	1750 50 sx	5613-5621
USA Glenn H. Callow No. 19	5693	5 1/2"	5693	190 sx	3725	1748 50 sx	Notch @ 5628
Hagood Gallup Oil Unit No. 1	5245	4 1/2"	5245	100 sx	4600	1280 50 sx	5136-37 5143-46 5186-90

*All cement tops determined by temperature survey

**Original perms 5087-98, 5108-24, 5140-5210

Squeeze cemented 5087-5195 with 85 sacks; tested to 1500 psi

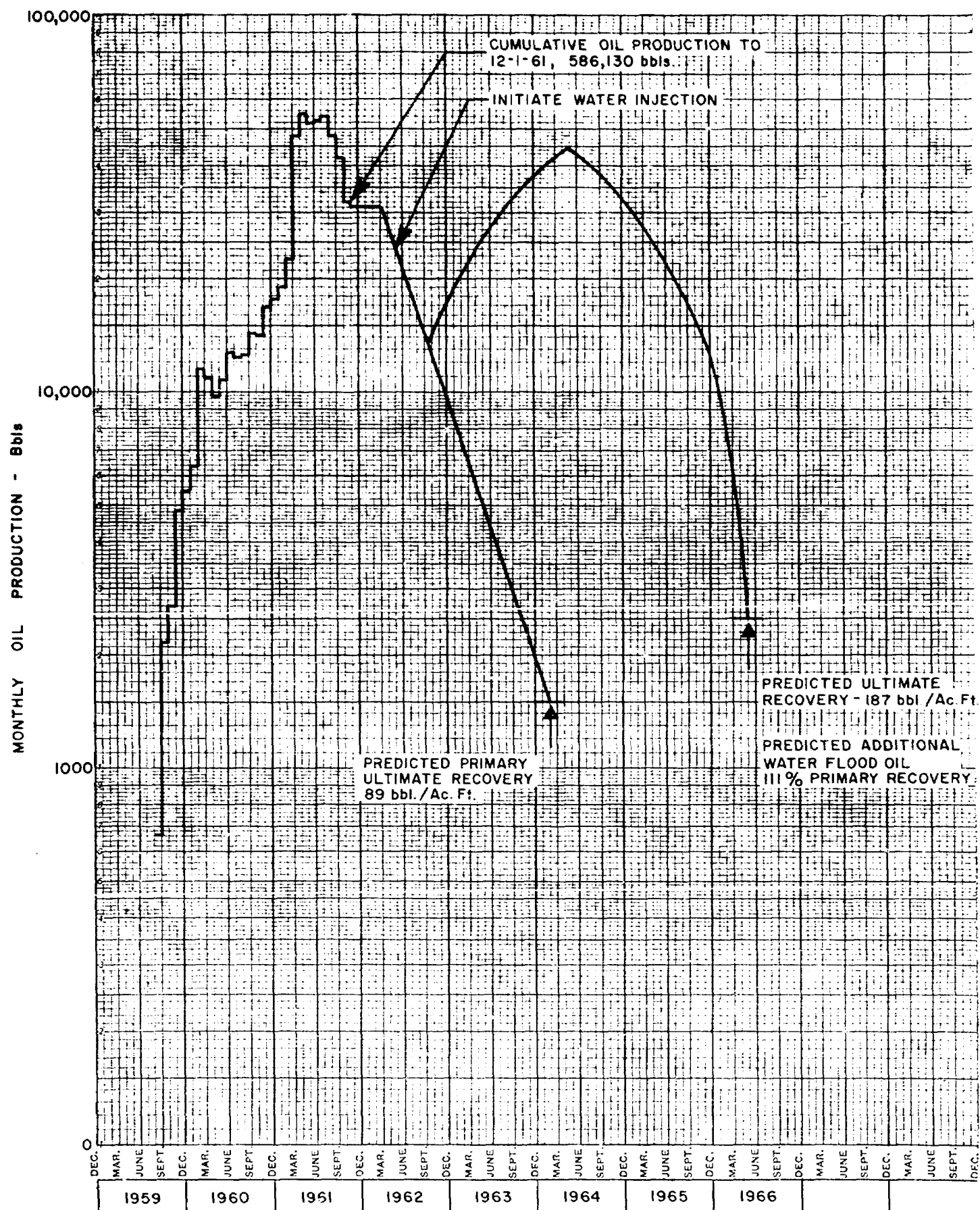


EXHIBIT No. 4
 TENNECO OIL COMPANY
 SUBSIDIARY OF TENNECO CORPORATION
 TOTAH GALLUP FIELD
 SAN JUAN COUNTY, NEW MEXICO
 PROPOSED WATER FLOOD
 ACTUAL AND PREDICTED PRODUCTION HISTORY

EXHIBIT NO. 3

RESERVOIR AND ROCK PROPERTIES
TENNECO OIL COMPANY
GLENN H. CALLOW LEASE
TOTAH GALLUP FIELD
SAN JUAN COUNTY, NEW MEXICO

Reservoir Properties

Original BHP
Saturation Pressure
Original Solution GOR
Gravity of Residual Oil @ 60° F.
Original RVF
BHP as of 12-1-61
GOR @ 800 psig producing
RVF @ 800 psig

1610 psig
1463 psig
615 cu.ft./STB
41° API
1.37
800 psig
3,000 cu.ft./STB
1.28

Rock Properties

Porosity, percent
Permeability, Md. Aug.
Connate Water Saturation (EST.), percent
Residual Oil Saturation (EST.), percent

14.2
143
25
28

Producing Mechanism

Volumetric Depletion

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
January 24, 1962
EXAMINERS HEARING

-V- - - - -

IN THE MATTER OF:

Application of Tenneco Oil Company for a pressure
maintenance project in the Totah-Gallup Oil Pool, San
Juan County, New Mexico. Applicant, in the above-styled
cause, seeks permission to institute a pressure mainten- : CASE
ance project in the Totah-Gallup Oil Pool by the inject- : NO. 2483
ion of water into the Gallup formation on its Glenn H.
Callow Lease in Sections 27, 28 and 33, Township 29 North,
Range 13 West, San Juan County, New Mexico. Applicant
further proposes the promulgation of special rules and
regulations to govern the operation of said project.

REPORT:

ELVIS UTZ, EXAMINER

TRANSCRIPT OF HEARING

MR. HINKLE: I would like to enter an Appearance on
behalf of Clarence Hinkle, Roswell. We have one witness, Mr. Lacey.

MR. UTZ: Are there any other appearances?

MR. VERITY: George Verity of Verity, Burr & Cooley of
the above case 2483, for Southwest Production.

MR. HINKLE: Mr. Examiner, this case is more or less a
repetition of Case 2483 in that the Application of Aztec and the
Application of Tenneco are quite similar. The same Pool is involved,
there is only a different acreage. We have four Exhibits, all of
which are in order here which you can pass out.

DEARNLEY-MEIER REPORTING SERVICE, Inc.

FARMINGTON, N. M.
PHONE 325-1182

ALBUQUERQUE, N. M.
PHONE 243-6041



DEARNLEY-MEIER REPORTING SERVICE, Inc.

FARMINGTON, N. M.
PHONE 385-1182

ALBUQUERQUE, N. M.
PHONE 243-6691

MR. MORRIS: Will you stand and raise your right hand, please? (Witness complies.) Do you solemnly swear that the testimony you are about to give will be the truth, the whole truth, and nothing but the truth, so help you God?

MR. LACEY: I do.

JOHN J. LACEY

called as a witness herein, having been first duly sworn on oath, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. HINKLE:

Q Your name is J. J. Lacey.

A Yes, it is.

Q What is your position with Tenneco, Mr. Lacey?

A I am employed as a District Engineer, Tenneco's District, Durango, Colorado.

Q How long have you been employed by Tenneco?

A Approximately four and a half years. I have been in Durango three and a half years.

Q Are you familiar with the development in the San Juan area?

A Yes, I am.

Q Are you familiar with the Application which Tenneco has made in this particular case?

A Yes, I am.

Q Have you ever testified before the Oil Conservation



DEARNLEY-MEIER REPORTING SERVICE, Inc.

FARMINGTON, N. M.
PHONE 325-1182

ALBUQUERQUE, N. M.
PHONE 243-6691

Commission? A Yes, I have.

Q Did you testify in the case in which an 80-acre spacing was set up in this field?

A Yes, I was a witness when temporary field roads were established.

Q What is the nature of the Application which has been filed?

A We are requesting permission to institute a pressure maintenance project by injecting water in certain Gallup Wells in the Totah-Gallup Pool.

Q In your previous testimony in connection with the 80-acre spacing, did you introduce Exhibits in that case, showing the cross section of this area?

A Yes, approximately a year ago when temporary fields were established we estimated cross sections showing geological evidence that a continuous reservoir extending MTA.

Q And you have prepared some Exhibits for this hearing in connection with this case? A Yes, I have.

(Marked Tenneco's Exhibit 1 for Identification.)

Q I refer you to Tenneco's Exhibit No. 1 and ask you to explain to the Commission what it shows.

A Exhibit No. 1 is a map showing the location of the Gallup Wells on Tenneco's Callow lease, and the wells of the near by off-set operators and those wells circled in red are the ones we proposed to convert to injection wells, and the project areas



outlined in hatched lines which consist of our Callow lease and 80-acre

Q Is this in between the projects No. 1 and No. 2 of Aztec, which was justified to in Case 2483?

A Yes, it is. This is the area in between the two project areas shown in Aztec's previous hearing. I might point out that to their Exhibits 1 and 2 presented in the previous hearing, we are in general agreement with that they are equally applicable to our testimony.

Q Do you agree with the limits of the producing area as shown on Aztec's Exhibit No. 1 which was introduced in Case No. 2483?

A Yes, we are in general agreement with the outline, with the outlines as shown on that Exhibit.

Q In connection with your application, did you file copies of the electrical logs of the wells which are shown in red on Exhibit No. 1?

A Yes, we have introduced with our Application electrical logs on the wells we propose to convert to injection wells.

Q Do you have any comment to make with respect to the electrical logs?

A None, other than except they show the zone sand in the lower Gallup in which we propose to inject water.

(Marked Tenneco's Exhibit 2 for identification.)

Q Now, Mr. Lacey, would you refer to Tenneco's Exhibit No. 2 and explain what it shows?



A Exhibit No. 2 is a list of the proposed wells, the wells we propose to convert to injection, it shows the casing size, the depth set, the cement used to cement these, the cement tops and the intervals perforated open to production. This Exhibit, in conjunction with a log submitted on our Application will show that we have the zone. There is just one zone open and it is isolated from all other geological formations that we propose to inject water with.

(Mark Exhibit 3 for identification.)

Q Now, refer to your Exhibit No. 3 and explain what that shows.

A I might point out that there is a typographical error in Exhibit 3. The rock properties permeability says the month of August, that should be Md. August, and this Exhibit 3 shows the properties of the reservoir fluid, what they were, and what we estimated them to be now, in the vicinity of our lease; and the porosity, permeability, Connate Water Saturation and estimated residual water saturation at the water plug of the reservoir well, and currently oil is being produced by Volumetric Depletion.

Q Does this show substantially the same thing as Aztec's No. 5?

A Yes, it does.

Q That is in Case No. 2483?

A There are some slight difference in the numbers, but it essentially is identical to Aztec's Exhibit.

Q What is your source of information for Exhibit No. 3?



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A Our source of information is the testimony in data which we presented originally in the order established of temporary field rules and the data we obtained on the wells on our lease and in the immediate areas.

(Mark Exhibit 4 for identification.)

Q Now, refer to your Exhibit No. 4 and explain what that shows.

A Exhibit No. 4 is a plot of production rate on log written scale versus time and it shows the actual producing rate from our lease as of December 1, 1961 and shows what we estimate to be the predicted producing rates on continued primary operations and what they would be under pressure maintenance. It shows the predicted primary recovery as 89 barrels and the acre foot. The predicted ultimate recovery is 187 barrels. We estimate that the additional oil recovery will be 111 per cent of primary recovery.

Q This also indicates that you intend to start your injection of water about June, 1962, is that right?

A Yes, it does appear that we would anticipate some response then in the latter part of '62, September.

Q I believe you heard the testimony of Mr. Burrows in the Aztec case this morning and there was some mention of the possibility that this area would be unitized with that of Aztec, either in connection with Section 34 and also acreage which lies to the northwest,

A Yes, Tenneco Oil Company has been negotiating with Aztec and we are regarding the unitization of their property in Section



34 with our proposed water flood pressure maintenance of our properties in Section 27 and the north half of 23. We are in very nearly an agreement as far as the participation is concerned and we anticipate within the very near future that ~~units~~ be formed consisting of our properties and their properties in Section 27, 28 and 34 and proposed injection wells are so located with this in mind.

Q And even if you do unitize, there would be no change in the location of injection wells?

A No, there would not be.

Q There would be no necessity for it?

A Right.

Q What is the character of the land, that is, Federal or State or what not, that is involved in your leases?

A All of the acreage closed in the Hatched line is Federal acreage and I believe Aztec.

Q Is it all included in one lease?

A No, it is not. There is the south half of the southwest border of 21, that is a separate lease.

Q But all the rest is one?

A But the acreage in 27, 28 and the north half of 33 would be basic.

Q Are you asking for an increased allowable in connection with this Application?

A No, we are not, we are asking just for permission for



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water injection.

Q Do you have anything you would like to say with regard to the adoption of special Federal Rules in connection with these projects?

A No, we have no objection to the rules that are proposed by Pan-American in their hearing for water flood, for pressure maintenance in the Totah-Gallup Pool and we are in general agreement with that and they would be acceptable to us.

Q State whether or not, in your opinion, that if you are successful in injection of water in this area, would it be in the interest of conservation and waste?

A Yes, if the field is produced only by primary, there is going to be a substantial amount of oil left in the ground which could be recovered.

Q This would promote the greater ultimate recovery in the field?

A Yes, it would.

MR. HINKLE: And that is all of my testimony.

MR. UTZ: Do you wish to offer the Exhibits?

MR. HINKLE: Yes. I would like to offer Exhibits 1 through 4.

MR. UTZ: Without objection they will be accepted into the record.

(Whereupon Tenneco's Exhibits 1 through 4 admitted in evidence.)



CROSS EXAMINATION

BY MR. UTZ:

Q Mr. Lacey, if the unitization is successful, do you plan to maintain the suggested injection pattern?

A Yes, we do. We anticipate the unit will be formed at leased Aztec property in Section 34 and we would follow the injection pattern as described or located on our map and Aztec's map.

Q Why would it be necessary to have five injection wells along your Aztec lease line in Section 28 and 29?

A The proposed pattern here is, I suppose, to be described as a double ended line drive and we are in effect having a line of injectors on each end of the unit and pushing the oil toward the center. By having all injectors along this line, we feel that a minimum amount of oil is going to cross lease lines and we will be able to maintain the proper injectivity that we desire in order to make the flood front advance the way we think it should.

Q Well, if the area is unitized, would the oil in the cross lease lines be of any consequence?

A I am speaking here now of the unit consisting of the four sections essentially 27, 28, 34 and the north half of 33. There has been, this is the unit I am talking of which would be a separate entry from the Projection Area 1, described in Aztec's testimony.

Q But my question was pointed toward this, that if you were successful in unitizing the whole area with Aztec?

A If we were successful in unitizing the entire area, our

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leases with Aztec's area as Projects 1 and 2 are proposed patterns of water injection, would still be essentially the same if it would be a traverse line of injectors across the field, this double end line drive, as differentiated from Pan-American's proposed Crystal Center Line Drive.

Q You feel this is a more efficient drive?

A No, I would not say more efficient, it is essential modification line drive. Pan-American's proposal is a line drive of sorts and so is this. I would say they would very nearly be the same.

Q Do you plan on adding injection wells in this unit?

A No, we would not, we might delay putting some of the wells on injection, for example, the wells of 10, 16, and 13, those might be delayed being put on injection, in other words, we would put injectors first along these other lines and then add additional ones, depending on the project.

Q You think the center of your Section 28 would be sufficiently swept by the water, if you don't add any wells?

A Yes, we do.

Q That is quite a distance across there?

A Yes, it is, but, however, we don't feel that the distance -- there are several advantages to flooding in this manner, so to speak, of lease water is handled. There would be lease put through and it will proceed at a rapid rate and we will have the flood over with and wouldn't handle a lot of produced water and have it



taking off and that you might anticipate is a five spot value or something like that.

Q Now, was the suggested order you made the same as Pan-American's order?

A Well, we were going to propose to the Commission that we be allowed as much flexibility in producing the oil from this project as possible since it is vitally important to control the advance of the flood project for maximum first and recovery. However, since the orders are probably already issued for Pan-American that the Commission will probably want uniformity or standardization of the orders issued in the Pool that we would certainly have no objection.

MR. UTZ: Are there any other questions?

MR. VERITY: I have a question.

CROSS EXAMINATION

BY MR. VERITY:

Q Do you propose in injecting water in your No. 13 well in your north half of Section 33, is it your opinion, that injection of water in this well, in no way will offset the correlative well?

A Yes.

Q Is it further your representation that injection of water into that well, will in no way lessen or decrease the ultimate recovery of oil to be had from the two wells in the south half of 33?

A My opinion is that it would not hurt them but it will

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probably increase their ultimate output by the maintenance of pressure in the reservoir.

MR. VERITY: That is all.

MR. UTZ: Are there any other questions?

MR. IRBY: Frank Irby, State Engineer.

CROSS EXAMINATION

BY MR. IRBY:

Q Mr. Lacey, did you give any testimony concerning the source of the water for this project?

A No, I have not. We have not yet decided from where we are going to obtain a water source since there are several alternatives, however, I might make mention of the fact that we are considering as a possible source of supply, the lower portion of the Pictured Cliff formation which is gas bearing in the very upper part but primary and by and large a water-bearing sand in this area in the lower parts. The log suggested that the lower water-bearing portion might be successfully produced, water produced from them, without in any way damaging or injuring the gas producing building formation.

MR. IRBY: Thank you.

CROSS EXAMINATION

BY MR. UTZ:

Q You don't know which wells you will make water wells out of?

A We have producing Pictured Cliff wells on our lease. We

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have one which is temporarily abandoned because of excessive water production and we are considering the possibility of deepening this well for the purposes of testing the Pictured Cliff to see if the water will be adequate in both volume and characteristic, compatible with the Gallup.

Q Where is that well located?

A It is located approximately between our No. 12 and No. 13. I think Aztec's Exhibit 1 shows these Pictured Cliff wells. Yes, it does. This Pictured, temporarily abandoned Pictured Cliff well is on a line between our No. 12 and 13.

Q Would that be the No. 2 well?

A Yes, it would. I might point out that our Callow lease is on the extreme western edge of the West Kutz Pictured Cliff field. There are no producing Pictured Cliff wells to the west and southwest of our lease. The Pictured Cliff formation is entirely water bearing.

REDIRECT EXAMINATION

BY MR. HINKLE:

Q You heard the testimony Mr. Burrows gave in Aztec's case in regard to the possibility of developing a water Morrison formation in a well which they propose to drill. If you unitize this area with Aztec is there a possibility that you would also use that water in the area which is now under consideration?

A I would say very definitely that in the event that our properties are unitized in their entirety with Aztec, it would be



very possible we would use the Morrison formation as a source of supply.

Q So that is one reason why you are not definite with your water supply as until you know what the situation is with reference to where this unit will be?

A Yes.

MR. UTZ: Are there any other questions? The witness may be excused.

(Witness excused.)

MR. UTZ: Are there any statements? The case will be taken under advisement.

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I, KATHERINE PETERSON, 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.

Katherine Peterson
COURT REPORTER

I do hereby certify that the foregoing is a complete record of the proceedings in the Ex. Inst. hearing of Case No. 2484, heard by me on Jan. 24, 1962.

W. A. [Signature], Examiner
New Mexico Oil Conservation Commission

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