

THE UNIVERSITY OF CHICAGO PRESS

Logs of Collegos
Canyon Unit water
injection wells.

Cha Cha Gallup Pool

Q52 / 10.

2516

dictation, Transcript,
all Exhibits, Etc.

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

April 19, 1962

Re: CASE NO. 2516

ORDER NO. R-2211

Mr. Guy Buell
Pan American Petroleum Corporation
Box 1410
Fort Worth, Texas

APPLICANT:
Pan American Petroleum Corporation

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. Kenneth Swanson

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. 2516
Order No. R-2211

APPLICATION OF PAN AMERICAN PETROLEUM
CORPORATION 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 March 28, 1962, 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 18th day of April, 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, Pan American Petroleum Corporation, proposes to institute a pressure maintenance project in its Gallegos Canyon Unit Area, San Juan County, New Mexico, in the Cha Cha-Gallup Oil Pool, with the injection of water initially through 2 wells located in Section 23, Township 28 North, Range 13 West, NMPM, San Juan County, New Mexico.

(3) That the applicant proposes that an administrative procedure be established whereby said proposed 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 Gallegos Canyon Unit 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 the project in any proportion, provided that no well in the project area which directly or diagonally offsets a well outside the

-2-

CASE No. 2516
Order No. R-2211

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 Section 23, Township 28 North, Range 12 West:

Gallegos Canyon Unit Well No. 97, Unit D, and
Gallegos Canyon Unit Well No. 112, Unit I.

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

**SPECIAL RULES AND REGULATIONS
FOR THE GALLEGOS CANYON UNIT CHA CHA-GALLUP
PRESSURE MAINTENANCE PROJECT**

RULE 1. The project area of the Gallegos Canyon Unit 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 28 NORTH, RANGE 12 WEST, NMPM

Section 19: Lot 4

Section 30: Lots 1 and 2

TOWNSHIP 28 NORTH, RANGE 13 WEST, NMPM

Section 14: SW/4

Section 23: All

Section 24: SW/4, S/2 NW/4, SW/4 NE/4,
NW/4 SE/4, S/2 SE/4

Section 25: N/2 N/2, S/2 NE/4

Section 26: N/2 N/2

RULE 2. The allowable for the Project shall be the sum of the allowables of the several wells within the project area, including those wells which are shut-in, curtailed, or used as injection wells. Allowables for all wells shall be determined in a manner hereinafter prescribed.

-3-

CASE No. 2516

Order No. R-2211

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 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 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.

-4-

CASE No. 2516
Order No. R-2211

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 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:

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

-5-
CASE No. 2516
Order No. R-2211

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 + 419 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 (616°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

-6-

CASE No. 2516
Order No. R-2211

Project Operator's Report shall be filed in lieu of Form C-120 for the Project.

RULE 10. The Commission shall, upon review of the report and after any adjustments deemed necessary, calculate the allowable for each well in the Project for the next succeeding month in accordance with these rules. The sum of the allowables so calculated shall be assigned to the Project and may be produced from the wells in the Project in any proportion except that no well in the Project which directly or diagonally offsets a well outside the Project producing from the same common source of supply shall produce in excess of two times top unit allowable for the pool.

RULE 11. The conversion of producing wells to injection, the drilling of additional wells for injection, and expansion of the project area shall be accomplished only after approval of the same by the Secretary-Director of the Commission. To obtain such approval, the Project operator shall file proper application with the Commission, which application, if it seeks authorization to convert additional wells to injection or to drill additional injection wells shall include the following:

(1) A plat showing the location of proposed injection well, all wells within the project area, and offset operators, locating wells which offset the project area.

(2) A schematic drawing of the proposed injection well which fully describes the casing, tubing, perforated interval, and depth showing that the injection of gas or water will be confined to the Gallup formation.

(3) A letter stating that all offset operators to the proposed injection well have been furnished a complete copy of the application and the date of notification.

The Secretary-Director may approve the proposed injection well if, within 20 days after receiving the application, no objection to the proposal is received. The Secretary-Director may grant immediate approval, provided waivers of objection are received from all offset operators.

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

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

-7-

CASE No. 2516
Order No. R-2211

DONE at Santa Fe, New Mexico, on the day and year herein-
above 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/

Case. 2516

Heard 3-28-62

Rec. # 4-4-62

1. Grant Secondary Recovery Project for Pan Am. in the Gallegos unit area.

2. The project area shall be:

28N-12W

Sec. 19 - Lot 4

" 20 - Lots 1 & 2

25N-13W

Sec. 14 - SW/4

" 23 - A11

" 24 - S/2 NW/4, SW/4, SW/4 NE/4,
NW/4 SE/4, ~~S/2 SE/4~~ S/2 SE/4.

" 25 - N/2 N/2, S/2 NE/4.

" 26 - N/2 N/2.

3. Approve injection wells as follows:

Pan Am - Gallegos Canyon unit #88 - D-23-28N-13W

" " " " " #112 - I-23-28N-13W.

4. Project shall be known as ~~the~~ H.C.U. - Chucho - Gallup. Pressure Maintenance project.

5. Use Order R-2154 in all respects except above data.

— Fred A. [Signature]

DOCKET: EXAMINER HEARING - WEDNESDAY - MARCH 28, 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:

Cases 2515 through 2519 will not be heard before 1:00 P.M.

- CASE 2507: Application of Union Oil Company of California for an order creating a new oil pool, establishing special rules and regulations for said pool, and contracting the Anderson Ranch-Wolfcamp Pool, Lea County, New Mexico. Applicant, in the above-styled cause, seeks an order creating a new oil pool to be designated the North Anderson Ranch-Wolfcamp Pool and comprising portions of Sections 28, 32 and 33, Township 15 South, Range 32 East, and Lots 1, 2, 7 and 8 of Section 2, Township 16 South, Range 32 East, Lea County, New Mexico. Applicant proposes the promulgation of special rules and regulations to govern said pool, including a provision for 80-acre proration units; it is further proposed that the Anderson Ranch-Wolfcamp Pool be contracted by the deletion of the SE/4 and S/2 SW/4 of Section 28, E/2 SE/4 of Section 32 and W/2 and NE/4 of Section 33, Township 15 South, Range 32 East, and Lots 1, 2, 7 and 8 of Section 2, Township 16 South, Range 32 East.
- CASE 2508: Application of Westates Petroleum Company for assignment of special allowables to four wells, Lea County, New Mexico. Applicant, in the above-styled cause, pursuant to Order No. R-1776, seeks an order extending the period within which its Carlson-Federal "B" Wells Nos. 2, 3, 4 and 5, located in Section 25, Township 25 South, Range 37 East, Lea County, New Mexico, are assigned a special allowable not to exceed top unit allowable for the Justis Tubb-Drinkard Pool.
- CASE 2509: Application of Amerada Petroleum Corporation for approval of the Langlie Mattix Woolworth Unit Agreement, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval of the Langlie Mattix Woolworth Unit Agreement embracing 2559.48 acres of Federal and fee lands within Sections 27, 28, 33 and 34, Township 24 South, Range 37 East, Lea County, New Mexico.

- CASE 2510: Application of Texaco, Inc. for an exception to Rule 107 (e), Lea County, New Mexico. Applicant, in the above-styled cause, seeks an exception to Rule 107 (e) authorizing the completion of its K. F. Quail-Federal Well No. 1, located 2086 feet from the South line and 556 feet from the West line of Section 1, Township 20 South, Range 34 East, Lea County, New Mexico, as a 2 7/8-inch tubingless completion below the depth of 5,000 feet.
- CASE 2511: Application of Texaco, Inc. for an order pooling all mineral interests in the Basin-Dakota and Blanco-Mesaverde Pools in the W/2 of Section 12, Township 30 North, Range 12 West, San Juan County, New Mexico. Interested parties include Pan American Petroleum Corporation, Southwest Production Company and Tidewater Oil Company.
- CASE 2512: Application of Skelly Oil Company for approval of the Gallegos-Gallup Sand Unit Agreement, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks approval of the Gallegos-Gallup Sand Unit Agreement embracing 22,997.51 acres, more or less, of Federal, State, Indian and fee lands in portions of Townships 26 and 27 North, Ranges 11, 12 and 13 West, San Juan County, New Mexico.
- CASE 2513: Application of Skelly Oil Company for a secondary recovery project, Gallegos-Gallup Oil Pool, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks permission to institute a secondary recovery project in the Gallegos-Gallup Oil Pool in an area underlying its proposed Gallegos-Gallup Sand Unit Area, comprising 22,997.51 acres, more or less, in portions of Townships 26 and 27 North, Ranges 11, 12 and 13 West, San Juan County, New Mexico, the injection of water initially to be through six wells located in Sections 1, 2, 11 and 12, Township 26 North, Range 12 West and the project to be governed by the provisions of Rule 701.
- CASE 2514: Application of Skelly Oil Company for approval of the West Dollarhide Queen Sand Unit Agreement, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval of the West Dollarhide Queen Sand Unit Agreement embracing 2562.52 acres, more or less, of Federal, State and fee lands in Sections 19, 29, 30, 31, 32 and 33, Township 24 South, Range 38 East, and Sections 4, 5, and 6, Township 25 South, Range 38 East, Lea County, New Mexico.

The following cases will not be heard before 1:00 P.M.

- CASE 2515: Application of D. W. Falls, Inc. for the assignment of a special temporary deliverability for allowable purposes to its Federal Well No. 2-11, located 1190 feet from the South line and 2210 feet from the East line of Section 11, Township 28 North, Range 13 West, San Juan County, New Mexico, which well is completed in the Basin-Dakota Gas Pool. Applicant proposes that the deliverability to be assigned to said well be the average deliverability of all gas wells in the Basin-Dakota Gas Pool.
- CASE 2516: Application of Pan American Petroleum Corporation for a pressure maintenance project, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks permission to institute a pressure maintenance project on its Gallegos Canyon Unit Area, San Juan County, New Mexico, in the Cha Cha-Gallup Oil Pool, with the injection of water initially to be through two wells located in Section 25, Township 28 North, Range 13 West, and requests adoption of special rules to govern the operation of said project.
- CASE 2517: Application of Pan American Petroleum Corporation for a unit agreement and a pressure maintenance project, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks approval of the Southeast Cha Cha Unit Agreement embracing Federal, State and fee lands in portions of Sections 7, 8, 9, 10, 15, 16, 17, 18, 20, 21, 22 and 27, Township 28 North, Range 13 West, and Sections 30, 31, 32 and 33, Township 29 North, Range 13 West, San Juan County, New Mexico. Applicant further seeks authority to institute a unit-wide pressure maintenance project by the injection of water into the Gallup formation through 10 wells located within said unit and requests adoption of special rules to govern the operation of said project.
- CASE 2518: Application of Humble Oil & Refining Company for a dual completion, Lea County, New Mexico. Applicant, in the above-styled cause, seeks permission to complete its D. H. Crockett Well No. 1, located in Unit C of Section 21, Township 18 South, Range 26 East, Lea County, New Mexico, as a dual completion (conventional) in the Caudill Permo-Pennsylvanian and Caudill-Devonian Pools with the production of oil from

the Devonian zone to be through a string of 2 3/8-inch tubing and the production of oil from the Permo-Pennsylvanian zone to be through a parallel string of 1 1/4-inch tubing.

CASE 2519:

Application of The Atlantic Refining Company for a unit agreement, a pressure maintenance project and the reclassification of two wells, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks approval of the Horseshoe-Gallup Unit Agreement embracing 20,925.58 acres, more or less, of Federal, State, Indian and fee lands in Townships 30 and 31 North, Ranges 16 and 17 West, San Juan County, New Mexico. Applicant further seeks permission to institute a pressure maintenance project in the proposed Horseshoe-Gallup Unit Area with water to be injected into the Gallup formation through 112 wells located in said unit, and requests adoption of special rules to govern the operation of said project. Applicant further seeks the reclassification of two wells located in the proposed unit area from Verde-Gallup Oil Pool wells to Horseshoe-Gallup Oil Pool wells, the Verde-Gallup Oil Pool to be contracted by the deletion of the NE/4 NE/4 of Section 2, Township 30 North, Range 16 West, and the SW/4 SW/4 of Section 36, Township 31 North, Range 16 West, said acreage to be included in the Horseshoe-Gallup Oil Pool.

iqg/

MAIN OFFICE OCC
VERITY, BURR & COOLEY
ATTORNEYS AND COUNSELORS AT LAW
SUITE 152 PETROLEUM CENTER BUILDING
1962 MAR 29 AM 2 15
SARASOTA, NEW MEXICO

March 27, 1962

GEO. L. VERITY
JOEL B. BURR, JR.
WM. J. COOLEY
NORMAN S. THAYER
RAY B. JONES

TELEPHONE 325-1702

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

Gentlemen:

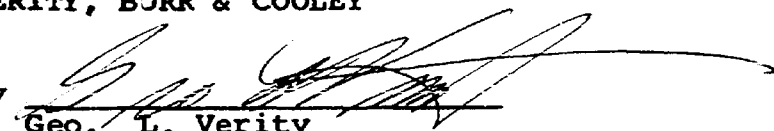
Attention: Mr. Dick Morris

re: Application of Pan American
for Pressure Maintenance,
case No. 2516

Please enter my appearance in the captioned case.
Mr. Kenneth A. Swanson of the Texas Bar will be
appearing with me in this matter and we would
appreciate your extending him the courtesies of an
out-of-state lawyer.

Very truly yours,

VERITY, BURR & COOLEY

By 
Geo. L. Verity

GLV:mts
cc: Mr. Swanson

BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO

March 29, 1962

REGULAR HEARING

IN THE MATTER OF:

Application of Pan American Petroleum Corporation for a pressure maintenance project, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks permission to institute a pressure maintenance project on its Gallegos Canyon Unit Area, San Juan County, New Mexico, in the Cha Cha-Gallup Oil Pool, with the injection of water initially to be through two wells located in Section 23, Township 28 North, Range 13 West, and requests adoption of special rules to govern the operation of said project.

Case No.
2516

IN THE MATTER OF:

Application of Pan American Petroleum Corporation for a unit agreement and a pressure maintenance project, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks approval of the Southeast Cha Cha Unit Agreement embracing Federal, State and fee lands in portions of Sections 7, 8, 9, 10, 15, 16, 17, 18, 20, 21, 22 and 27, Township 28 North, Range 13 West, and Sections 30, 31, 32, and 33, Township 29 North, Range 13 West, San Juan County, New Mexico. Applicant further seeks authority to institute a unit-wide pressure maintenance project by the injection of water into the Gallup formation through 10 wells located within said unit and requests adoption of special rules to govern the operation of said project.

Case No.
2517

DEARNLEY-MEIER REPORTING SERVICE, Inc.

PHONE CH 3-6691

ALBUQUERQUE, NEW MEXICO



BEFORE: CIVIL A. UTZ, Examiner

TRANSCRIPT OF HEARING

MR. UTZ: The hearing will come to order. The first case on the docket will be 2516.

MR. MORRIS: Application of Pan American Petroleum Corporation for a pressure maintenance project, San Juan County, New Mexico.

MR. BUELL: For Pan American Petroleum Corporation, Guy Buell. Mr. Examiner, at this time I would like to move that this case be consolidated for purposes of testimony and record with Case 2517. Both cases are very closely inter-related, and I think it will expedite both hearings to consolidate.

MR. UTZ: 2517 is just the unit part of this hearing, or is this the Gallegos?

MR. BUELL: No, sir. 2517 is the Southeast Cha Cha unit phase and also the pressure maintenance program for the Southeast Cha Cha unit.

MR. UTZ: This is the Gallegos Canyon?

MR. BUELL: Yes, and both pressure maintenance projects are closely interwoven and it would expedite matters to consolidate the record.

MR. UTZ: Without objection the Cases 2516, 2517

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PHONE 243-6691



will be consolidated for the purpose of this hearing. Are there other appearances in this case? You may proceed.

MR. BUELL: We have two witnesses, Mr. Examiner, neither of which have been sworn.

(Witnesses sworn)

BRUCE A. LANDIS, JR., called as a witness, having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. BUELL:

Q Mr. Landis, would you state your complete name, by whom you are employed, and what capacity, and at what location, please?

A My name is Bruce A. Landis, Junior. I am employed by Pan American Petroleum Corporation as Division Unitization Superintendent in the Fort Worth, Texas office.

Q Would you briefly state your educational background, Mr. Landis?

A I'm a graduate in petroleum and natural gas engineering from Pennsylvania State University, and in law from the Dickerson School of Law.

Q How long have you been employed by Pan American?

A About eleven years.

Q How many of those eleven years have been spent in unitization work?

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PHONE 243-6691



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PHONE 243-6691

A The entire period.

Q In your capacity as Division Unitization Superintendent, are you completely familiar with the background and details relating to the Southeast Cha Cha Unit?

A Yes, sir, I am.

(Whereupon, Applicant's Exhibit No. 1 marked for identification.)

Q Mr. Landis, let me direct your attention now to what has been marked as Pan American Exhibit Number 1. What is that exhibit?

A That exhibit is the unit agreement for the development and operation of the Southeast Cha Cha Unit Area, County of San Juan, State of New Mexico.

Q Is that a true and exact copy of the unitization agreement that has been executed by those persons committing their interest to the unit?

A Yes, it is; and in this agreement are several loose pages which were inserted to correct certain minor errors.

Q None of these corrections are substantial in nature?

A No, they are not.

Q How does this agreement, which has been marked as our Exhibit 1, how does it describe the unitized interval?

A It describes it as follows: "The Cha Cha-Gallup sand is that continuous stratigraphical interval occurring



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PHONE 243-6691

between the top of the Gallup formation and the top of the San Mateo formation and which is the same formation which was encountered between the elevations of plus 730 feet and plus 240 feet in the Pan American Petroleum Corporation's C. J. Holder well number 7, located 1030 feet from the North line and 1230 feet from the West line of Section 11, Township 27 North, Range 13 West, no such formation is shown on the well location electric log of said well dated March 30, 1951 and on which said log measurements are taken from the Kelly Buck, the elevation of which is 5,090 feet."

Q Can we look at this agreement and ascertain the surface area that is encompassed by the Southeast Cha Cha unit?

A Yes, you can, in Exhibit A, attached to this agreement, is shown an outline of the unit area.

Q Do you recall how many surface acres are within the unit area?

A There are 5542.44 acres within this surface area.

Q Do you recall how many separate tracts are within the unit area?

A There are 24 separate tracts comprising the unit area.

Q While we are speaking of the unit area, let me ask you this. Does this agreement by its own terms provide for a subsequent enlargement if such should be necessary?

A Yes, the agreement expressly provides for expansion



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of the unit area of new lease.

Q In making up this agreement, no attempt was made to incorporate in its terms and provisions that in any way could be construed as relating to pool rules for the Cha Cha-Gallup Oil Pool?

A No, sir, no such provisions were included.

Q Is there any provision in the agreement that contemplates a pressure maintenance program?

A The agreement expressly provides for a pressure maintenance program in the Gallup formation.

Q How is the basic royalty owned within this unit area?

A The basic royalty is owned in its entirety by the Federal Government and the State of New Mexico.

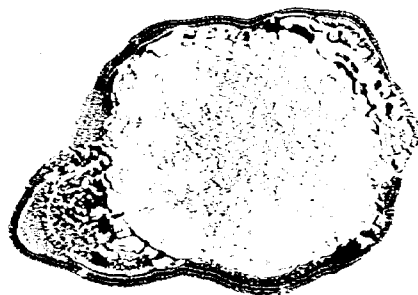
Q In that connection, have formal applications been made and submitted to the proper authorities for approval by those two royalty owners?

A Yes, sir, formal applications have been submitted to the Land Office of the State of New Mexico and to the USGS of the Federal Government.

Q Are there any overriding royalty interests in any of the tracts in the unit area?

A Yes, there are a total of 65 overriding royalty interest owners.

Q At this time, Mr. Landis, how many of these over-



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riding royalties have committed their interest to this unit operation?

A There are 45 effective as of now.

Q Are these ratifications of these type interests continuing to come in on a day by day basis?

A Yes, sir, they are being received daily.

Q Have any of this type interest owners refused to join the unit?

A No, sir, they have not.

Q As of this time, what percent of the working interest owners in the unit area are committed to this unitized program?

A Slightly in excess of 81 percent of the working interest is now committed.

(Whereupon, Applicant's
Exhibit No. 2 marked
for identification)

Q Mr. Landis, I wish you would refer to what has been marked as our Exhibit 2, which is over on the wall here, and in conjunction with that exhibit, would you point out for the record and the Examiner, those tracts which contain working interests which is not committed at this time?

A Yes, I will. As was explained a moment ago, the basic royalty is held here by the Federal Government and the State of New Mexico. On this Exhibit the Federal lands are shown in red, the lands of the State of New Mexico are shown in yellow.



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The status of working interest commitment within this area is as follows: Tenneco, on tracts we have marked 2 and 3, has not committed its working interest. Tenneco also owns the working interest in what we have designated as Tract 9, which has not been committed. Texaco, owning interest in Tract 8 and Tract 17, has not committed their interest. I have been advised that we have received a ratification of some form from Texaco. I don't know, however, what it involves at this time.

The El Paso is a working interest owner in Tract 6, and this interest has not been committed. In what we have called Tract 13, divided into three parts, a part in Section 7, a part in Section 10, and a part in Section 18, we originally were advised that Aspen Drilling Company owned all the working interest. Aspen has signed, however we have since discovered that on the partial in Section 10 and on the partial in Section 18 that the working interest is in fact owned by Gas Producers. We are now talking to Gas Producers to secure its commitment.

In Tract 19, there is a portion of the working interest that has not been committed. This is owned by Bonanza; however, though that interest was not committed by the terms of the unit agreement, it would be possible to qualify this tract for participation in the unit.

Q Are negotiations still going on with the unsigned working interests in Tract 19?



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A Yes, sir, that was.

Q With respect to Tennes and El Paso, assuming that an effort has not resulted in a commitment from Tennes, do you know if they have elected not to join the unit?

A Yes, I do. We have been advised that because there is no production on their lands that they are hesitant at this time to make the outlay that would be required for the investment in facilities and to pay assessment to qualify that acreage for participation.

Q Since those tracts are not developed, they would have to make a cash payment to come into the unit?

A That is correct.

Q I believe that leaves one working interest owner that we haven't discussed, Tenneco. Did Tenneco serve on the various committees that investigated and analyzed the formation of this unit?

A Yes, sir, they were a party to all such committees.

Q With respect to the Tenneco operated tracts, what would be the results of this unitized pressure maintenance program on those tracts?

A According to engineering estimates, the Tenneco tract would have something on the order of three hundred plus barrels allocated to it out of the future reserves recovered from the Gallup formation within the unitized area.

Q You said three hundred, did you mean a little over



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300,000?

A It's plus 300,000, three hundred fifteen to twenty thousand, something on that order. I could calculate it exactly; on the estimate basis, this was just an estimate.

Q That approximates it closely enough. Have you been advised or informed as to why Tenneco has elected not to join the unit at this time?

A Yes, we have. Despite the fact that Tenneco will probably produce something like twenty to forty thousand barrels under competitive operations on this tract as compared to the more than 300,000 barrels that would be allocated to it from total future reserves, they have suggested to us that the reason for not joining is because their current income would be decreased.

Q In your many years of experience in unitization matters and unitization negotiations and the resultant formation of units, is a decrease in current income a continual and recurring problem that comes up in the formation of almost every unit?

A Yes, sir, I do not know of any unit where you are unitizing a productive formation where you don't have both current income decreases, and increases upon the effective date of the unitization.

Q It kind of resolves itself into a moment of truth for the operator, he has to look at one end on the significant



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conservation benefit through a unitized pressure maintenance program and weigh that and attempt to reconcile that with a decrease perhaps in current income?

A That's exactly right.

Q With respect to the Tenneco operated tracts, what would be their percent of the unit's production under the participation formula?

A That participation would be about 14.12 percent.

Q Mr. Landis, have you had available to you recent production reports, not only on the Tenneco operated tracts, but every tract within the Southeast Cha Cha Unit Area?

A Yes, sir, I have had access to such figures that are filed with the New Mexico Oil Conservation Commission.

Q In that connection, what is the latest production reports in the Commission files which you've examined?

A For the month of February of this year.

Q Using those reports, what percent of the total production from the unit area for the month of February did the Tenneco properties produce?

A The Tenneco properties produced 11.2 percent as compared to the 14.12 percent which would be allocated.

Q So actually, if the February production reports are representative, Tenneco, rather than taking a decrease in current income by joining the unit, would actually achieve an increase in current income?



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A Yes, sir, on the basis of those figures.

Q Mr. Landis, we have been talking of some of these tracts containing working interests which are not committed. Let me ask you this: Does the unit agreement provide for a contraction of the unit area?

A Yes, sir, each tract within this proposed unit area stands on its own two feet. It must qualify according to specific provisions of the unit agreement. The unit agreement provides that the unit area, upon its effective date, will be composed of those tracts that qualify in accordance with the terms of such agreement.

(Whereupon, Applicant's Exhibit No. 3 marked for identification.)

Q In that connection, Mr. Landis, let me direct your attention to what has been marked as our Exhibit Number 3, what does that exhibit reflect?

A This exhibit, Number 3, reflects the area that we think could qualify now under the terms of the unit agreement.

Q In that connection, and comparing the Exhibit 3 with the Exhibit 2, it appears to me that there is a tract North of the Tenneco tract we have been discussing that's on Exhibit 2 that is deleted from Exhibit 3, is that observation correct?

A That is correct. That is this tract that is owned



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Q Yes, sir.

Q Has A-1 been in the unit since it was included in the unit?

A Yes, sir.

Q Now have you eliminated that tract from those tracts that qualify as reflected on Exhibit 3?

A According to the terms of the unit agreement, the tracts composing such area to the unit area must be cornering, adjoining or contiguous. The failure of Tract 2 and 3 to qualify automatically eliminates Tract 1 as a part of the unit agreement.

Q Here we have a case where the operator wants to commit the tract but is going to be unable to do so?

A That is correct.

Q How many wells on that Aztec tract?

A There is a single well.

Q Do you know how an operator can conduct a pressure maintenance program with a one well lease?

A No, sir, I think it's an impossibility.

Q So that tract is going to be, unless we get additional working interest commitment, that tract is going to be out of a pressure maintenance program?

A That is correct.

Q I believe in looking at 3 and comparing it with 2,

I also see a Pan American tract that is on Exhibit 2 and not



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on Exhibit 3, why is that?

A That is what we have designated as Tract 7. These are State of New Mexico lands, Tract 7 is a portion of the basic lease as we have designated here Tract 5. It is held by production. This was included although it has no participation in the unit because our original plans included the formation of a Totah-Gallup Unit Area which would have a coincident boundary with this portion. Mrs. Ray pointed out to us the fact that this tract does not receive participation in the unit because the Totah-Gallup Field will be a cooperative rather than a unit program; and despite the fact that we can hold the acreage because of production on other portions of the lease, we have conceded to extract this tract from the unit area.

Q Looking at the contracted unit area, as depicted by Exhibit 3, Mr. Landis, approximately what percent of the working interest in the contracted area is committed at this time?

A As of right now, slightly in excess of 96 percent.

Q With reference to the contracted area, are you hopeful that this contracted area will become one hundred percent working interest committed?

A Yes, sir.

Q Again comparing Exhibits 2 and 3, have you closed out the formation of a unit on the original size contemplated as reflected by Exhibit 2 or will those people, in the event they have a change of heart, do they still have the opportunity



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to come in?

A In accordance with the terms of the agreement, until it actually becomes effective, anybody in this area is entitled to join in such unit agreement.

Q In fact, speaking for Pan American, we would welcome such joinder, would we not?

A Yes, sir, we think the area, as outlined, would be the optimum area; however, we feel that we can also conduct a fine program in this area.

Q From the aspect of the unitization of this unit, do you have any other comments that you would care to make?

A I would like to make this statement. The pressure maintenance program that we will conduct in the Gallup formation is a conservation project of the highest order known to the petroleum industry. For this reason, I would urge the immediate approval of this unit agreement.

MR. BUELL: That's all we have of Mr. Landis at this time.

MR. UTZ: Are there questions of Mr. Landis?

MR. MORRIS: I have one or two.

CROSS EXAMINATION

BY MR. MORRIS:

Q Just to review your testimony a moment. Tracts 2 and 3 both are owned by Tenneco, is that correct?

A They are operated by Tenneco. There are actually



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other working interest owner. I don't go through this. I tell it you wish, how it's broken down, this is a very casual and incidental thing.

Q It's not necessary. I'm trying to find out what interests have refused to join and for what reason.

A On the Tracts 2 and 3, Tenneco has refused; the other working interest owners as we know are Big Chief and Elliot, and said they would abide by their operator's decision.

Q What was the basic reason that the two tracts --

A Tenneco advised us they would not be committed because of a decrease in current income.

Q With reference to Tract 8, the Texaco tract, are they the only working interest owners in that one?

A Yes.

Q And they refused to join because they would have to put up a share?

A This was the initial advice from Texaco. However, as I mentioned, we did have some kind of a ratification that I have not seen yet, it was received at Fort Worth yesterday. I can't give you the details of what they wish to accomplish here.

Q With reference to Tract 6, what is the situation again with respect to that?

A This is owned by El Paso Products Company and their reason was the same as Texaco, they did not wish to make the



initial cash investment.

Q And Tract 9 of Tennessee would be in the same category?

A Yes, sir, Tract 9 is in the same category. It's true there's no production here. I didn't intend to distinguish a separate reason for them not committing this tract.

Q So those are the only tracts, Tract 14 over here I believe has also been completed?

A This is Texaco.

Q That falls in the same category?

A Yes, that's right.

Q So Tracts 2, 3, 6, 8, 9, and 17 are the only ones effectively involved in this category of actual refusal to join?

A At this time, yes, that is correct.

Q Do you feel that the refusal of the owners of these tracts and the deletion of those areas will adversely affect the operation of this unit?

A It won't adversely affect it, it will complicate it. There will be subsequent testimony that I'm sure will cover that point.

MR. MORRIS: I believe that's all I have. One more question, please.

Q What is your proposal for the boundary of the unit area?

A We would like to have this boundary approved. We

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are going to exert every effort to get everybody committed within this area. It should be understood, however, that within the terms of the unit agreement, we can qualify such areas as I have shown here.

Q With respect to the unit boundaries that you have said that you wished to have approved, wouldn't the 140 acre tract be deleted, that being Tract 7?

A Yes, we have agreed that we would withdraw that.

Q That exhibit you are referring to is Exhibit A?

A Yes, sir. Your term here, this is Exhibit 2 in this hearing, but this is also a duplicate of Exhibit A of the unit agreement.

MR. BUELL: Both Exhibits 2 and 3 are a blow-up of Exhibit A, which is attached to our official Exhibit Number 1.

Q (By Mr. Morris) Mr. Landis, is there going to be a participating area in this unit?

A The unit area and the participating area are coincidental.

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

(Witness excused)

MR. BUELL: We would like to call Mr. Eaton as our next witness, Mr. Examiner.



GEORGE W. EATON, JR., called as a witness, having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. DUELL:

Q Mr. Eaton, would you state your complete name, by whom you are employed, and in what capacity, and at what location, please?

A George W. Eaton, Junior. I am senior petroleum engineer for Pan American Petroleum Corporation in Farmington, New Mexico.

Q Mr. Eaton, you testified at prior Commission hearings and your qualifications as a petroleum engineer are a matter of public record, are they not?

A Yes, sir, they are.

(Whereupon, Applicant's Exhibit No. 4 marked for identification.)

Q Let me direct your attention to what has been marked as Pan American Exhibit Number 4, and would you briefly state for the record what that exhibit reflects?

A Our Exhibit Number 4 is a map of a portion of the San Juan basin in San Juan County, New Mexico, showing the area in the vicinity of the Cha Cha-Gallup and Totah-Gallup oil pools.

Q Mr. Eaton, what is the significance of the area colored in yellow and the area colored in green on that exhibit?

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A The green color is shown in the south east Cha Cha Unit Area which is also shown as a maintenance project in the Southeast Cha Cha pressure maintenance project area. The area colored in green is a portion of the Gallegos Canyon Unit lying within the Cha Cha-Gallup oil pool. The specific significance of the green color is that this is the area which we recommend for adoption as the Gallegos Canyon Unit pressure maintenance project in the Cha Cha-Gallup Pool.

Q Mr. Maton, has this Commission approved other pressure maintenance projects in the Totah-Gallup and Cha Cha-Gallup Pool?

A Yes, sir, they have. Those particular project areas which have been approved by prior orders are shown on our Exhibit Number 4. I will briefly locate those areas for you. Lying immediately to the northwest of our proposed Southeast Cha Cha Unit Area and Southeast Cha Cha pressure maintenance project is the Humble operated Northwest Cha Cha Area which was authorized for conduction of pressure maintenance operations under New Mexico Oil Conservation Commission Order R-2154. That area is outlined with dashed blue line on Exhibit 4. At this time that is the only other pressure maintenance project area in the Cha Cha-Gallup Pool.

Q What about Totah, how many projects have been approved there, and would you briefly relate those projects for the record?



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A Yes, sir. A number of pressure maintenance project areas have been authorized for the adjacent Totah-Gallup Pool. Looking at the extreme northwest portion of the Totah-Gallup Pool, there is an area which is outlined in red which is the Pan American pressure maintenance project number 1 under R-2152. Moving along to the southeast of that area, there is an area outlined in orange which is the Aztec Oil and Gas Company project number 1 under R-2189. Moving along to the southeast again, the area outlined in purple is the Tenneco project under R-2190. Again the area outlined in orange in Section 34 is the Aztec project number 2 under R-2189. The red outline at the extreme southeast portion of the Totah-Gallup Pool is the Pan American project number 2 under R-2152.

Q Mr. Eaton, looking at Cha Cha for a moment, assuming the Commission approves our two applications here today, about what percent of the Cha Cha Pool, as it is now defined by development, will be included in a pressure maintenance project area?

A Better than 95 percent of the entire pool will be under pressure maintenance operations upon approval of these two particular project areas.

Q Mr. Eaton, I notice on this exhibit you have colored some wells with a large red dot. What is the significance of that?

A These wells to which you referred are the proposed



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injection wells which will be used in the two project areas which we propose.

Q I notice another, it's a line on your exhibit which connects several wells and runs approximately through the two project areas, what is that line, Mr. Eaton?

A The line to which you refer has been designated Line A-A'. It represents the trace of a cross section through the proposed project areas.

Q Are you ready to discuss that section at this time?

A Yes, sir. The cross section which is drawn through the trace A-A' will be shown as our Exhibit Number 5.

(Whereupon, Applicant's Exhibit No. 5 marked for identification.)

Q What does it reflect, Mr. Eaton, from the standpoint of the purpose of this hearing?

A Exhibit Number 5 simply illustrates that the Gallup sands are continuous and correlative throughout the proposed project areas and that therefore they represent a good opportunity for conducting a pressure maintenance operation.

(Whereupon, Applicant's Exhibit No. 5 marked for identification.)

Q Mr. Eaton, would you look now at what has been marked as Pan American Exhibit 6, and state for the record what that Exhibit reflects?



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A Exhibit Number 1 is a pertinent data sheet showing the pertinent reservoir data for the Cha Cha-Gallup Pool, more specifically the pertinent data pertaining to the south-east portion of that pool.

Q These data appear to be self explanatory, Mr. Eaton, but do you have any comments you'd like to make on any of these data?

A I might point out that both the reservoir rock characteristics as well as certain of the reservoir fluid properties are shown in this exhibit.

Q Mr. Eaton, with respect to the injection wells that we have just discussed on your Exhibit Number 4, has the Commission, in conjunction with our application, been furnished the casing program on these injection wells?

A Yes, sir, they have.

Q Was the Commission also furnished with a log of each of these proposed initial injection wells?

A Yes, sir, they were.

Q Let's not burden the record with any lengthy discussion of the casing program or the logs of the wells, but let me ask you this: Do you personally feel that the casing program on these injection wells will assure us that water will go where we want it to go and no other place?

A Yes, sir. My opinion is that the casing program and the cementing program which was used in each of these



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wells will properly confine the water to the interval in which we wish it to be confined.

Q Mr. Eaton, this pressure maintenance project in both the Southeast Cha Cha Unit Area, as well as the Gallegos Canyon Unit Area portion, will be conducted by the injection of water, will it not?

A Yes, sir, that is true.

Q What will be the water source for our injecting water?

A The Morrison formation will be the source.

Q Does Pan American, as a unit operator, contemplate drilling a well to the Morrison for that water supply?

A Pan American, in cooperation with two other working interest owners in the Southeast Cha Cha Unit Area, both working interest owners being Aztec Oil and Gas Company and the Southern Union Production Company, have drilled a well to the Morrison formation. That well has been completed and is presently being tested for capacity.

Q Mr. Eaton, it's a little unusual that these three operators would put up money to drill a supply well prior to the formation of the unit. Do you know why they did it?

A Yes, sir. The purpose in drilling the well prior to the actual unitization of the property was so that the pressure maintenance operation could be commenced as soon as



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possible after the effective date of the unit so there would be no delay in establishing an adequate water supply with which to conduct the operation.

Q Mr. Eaton, since this well already has been drilled and completed and is currently being tested, have you prepared a pertinent data sheet on that water supply well?

A Yes, sir.

Q Let' identify that as our Exhibit Number 7.

(Whereupon, Applicant's
Exhibit Number 7 marked
for identification)

A All right.

Q Would you care to make any comments about any of the data on that Exhibit?

A I believe that the data on Exhibit Number 7 are self explanatory. I might comment briefly on these testing operations which, as I mentioned previously, are still in progress. The well has been somewhat disappointing in that not as much capacity was achieved from the well as we had initially anticipated. We do believe that we do have a well that can be produced at sufficient capacity to conduct the operation. However, to do so will require the installation of larger pumping equipment and a deeper setting depth of the pump. This just simply means it's going to cost us more than we had originally anticipated. We believe we have enough water to do it with, but it's going to cost more to get it out and



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get it injected.

Q Now, Mr. Eaton, going back to our injection program, our pressure maintenance program, and looking at Exhibit 4 and the location of the injection wells on that Exhibit, how would you describe the proposed injection pattern?

A This pattern is a line drive which we for simplicity's sake, because it is somewhat descriptive, have designated as a crestal line drive. That just simply means that the wells down the center of the pool have been selected as injection wells.

Q Now, Mr. Eaton, earlier, when you were discussing the various pressure maintenance programs that have been approved by the Commission in these pools, you mentioned the Humble program in Northwest Cha Cha. Will our injection pattern conform with and blend in with the proposed injection pattern in that project area?

A Yes, sir. As a matter of fact, the Humble project area, as well as the Southeast Cha Cha project area, was originally designed as a single project. In other words, there was a single engineering committee which made the study of the Cha Cha-Gallup Pool and recommended this type of an operation. The fact that we will now have two project areas rather than a single one will not affect the blending in and proper operation of the projects at all.

Q Mr. Eaton, have you already had a meeting with



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Humble representatives with respect to a lease line or co-operative agreement; I don't know how you engineers refer to that, but has such a meeting already been held?

A Yes, it has. In that regard, of course, neither Humble, who is the operator of the Northwest project, nor Pan American, who is the operator of the Southeast project, will commence injection along that common boundary until some such agreement on a cooperative basis has been reached.

Q Mr. Eaton, you heard Mr. Landis' testimony with respect to the various tracts that at this time do not qualify for admission?

A Yes, sir.

Q With particular reference to the Tenneco operated tract, which is adjacent to the Humble project area on the west and adjacent to our project area on the south, from an engineering standpoint will the fact that that tract is not in our program be a complicating factor?

A It will certainly pose a problem which we will have to solve one way or the other. It poses a problem to Humble as operator of the Northwest project; it poses a problem to Pan American as operator of the Southeast project. I would suggest that it poses a much greater problem to Tenneco itself. The reason for that is that our having been associated with Tenneco in the operation of the engineering committee work, I'm convinced that they are as well aware as anyone that



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significant increases in recovery can be achieved by this pressure maintenance operation. Therefore, since they do not wish to put their lease in the big project area, they will very likely want to conduct a separate operation consisting only of their lease. Should they do so, it simply means that they will have to work out a cooperative line agreement, not only with the Southeast area, but also with the Northwest area.

Q Actually that Tenneco operated tract that we are speaking of has a longer common boundary with the Humble project area than it does with the Southeast Cha Cha Area, does it not?

A That is very true.

Q And while it will be a complicating factor, in your opinion as a reservoir engineer, do you think it will adversely affect the operation of the Southeast Cha Cha Unit?

A No, sir. I might point out one thing in that regard. You will notice that one of our proposed injection wells, which is colored in red, is immediately adjacent to the Tenneco tract. That well is the Pan American, the present Pan American C. J. Holder Number 11 in the Northwest, Northwest, Section 8. Now, what the noncommittal of Tenneco will mean is that that well at least will not be converted to injection immediately after the effective date of the unit. It won't be used until some agreement is worked out with Tenneco for cooperative injection along that common boundary.



(whereupon, Applicant's Exhibit No. 6 marked for identification.)

Q Mr. Eaton, could you look now at what has been marked as Exhibit Number 6, and state for the record what that Exhibit reflects?

A Exhibit Number 6 is a graph showing the oil production rate for the Southeast Cha Cha Unit as a function of time. Both actual primary and projected primary, as well as the pressure maintenance portion of the project are shown on this Exhibit. Primary is shown in green, pressure maintenance is shown in red. This graph shows that primary production peaked out in June, 1961. It is projected that primary production will be completed in approximately one year from now. This graph was prepared on the basis that injection could commence on March 1st, 1962. Of course this will not be possible. The performance is not expected to be adversely affected by that fact. Approximately nine months after commencement of injection operations, we expect to receive our initial increase in producing rate. That increase in producing rate is substantial and continues for approximately one year thereafter. After that time pressure maintenance production also commences to decline. This graph further shows that the pressure maintenance project is expected to be completed during the year 1966.

Q Mr. Eaton, based on your analysis of the data

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reflected on that Exhibit, what will be the incremental increase in ultimate recovery in the Southeast Cha Cha Unit Area due to this unitized pressure maintenance program?

A If we assume that the entire Southeast Cha Cha Unit Area will ultimately be formed, by that I refer to that area shown in our Exhibit Number 2, the increase in ultimate recovery due to the pressure maintenance project will amount to 2,250,000 barrels. On the basis that the entire area will not be unitized, but as in the area depicted by our Exhibit Number 3, will be subjected to pressure maintenance operations, the increase in ultimate recovery due to the pressure maintenance project on the contracted unit will amount to 2,000,000 barrels.

Q Decrease of some 250,000 barrels due to the contracted area that is being subjected to pressure maintenance operations?

A Yes, sir.

(Whereupon, Applicant's Exhibit No. 9 marked for identification.)

Q Would you look now at what has been marked as Exhibit Number 9, and state for the record what that Exhibit reflects?

A Before we get off of Exhibit Number 8, I have one more comment to put in. That just simply means that we are contacting less oil in the contracted unit area with our pressure operations. The factor for that portion contracted



is the same.

Q You are just operating with a smaller surface area?

A That's true. Our Exhibit 9 is similar in many respects to our Exhibit 8. The difference is that Exhibit 9 refers to that portion of the Gallegos Canyon Unit lying in the Cha Cha-Gallup Pool which will be subjected to pressure maintenance operations under our proposed project area shown in green on Exhibit 4. Again this Exhibit 9 shows oil production rate for the Gallegos Canyon Unit Area both for primary and for the pressure maintenance project. The graph shows that we can expect to receive between now and the termination of the project in the year 1966, an additional recovery of some 520,000 barrels of oil.

Q Mr. Eaton, what rules are you recommending that the Commission adopt for the operation of both of these pressure maintenance projects?

A I'm recommending that the Commission adopt rules for these projects similar in all pertinent respects to Order R-2026, dated July 13, 1961, which set forth the special rules and regulations pertaining to the Pan American Petroleum Corporation's Northeast Hogback Unit pressure maintenance project in the Horseshoe Gallup Pool in San Juan County, New Mexico.

Q Do you have a copy of that Order that you mentioned, Mr. Eaton?

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(Whereupon, Applicant's Exhibit No. 10 marked for identification.)

A Yes, sir, that Order, a copy of that Order, has been designated our Exhibit Number 10.

Q Will there need to be any changes in the provisions in that Order to properly relate it to these two projects in Cha Cha?

A The only change that need be made in the pertinent portions is that a new gas deviation factor tabulation needs to be used in the Cha Cha-Gallup Pool rather than the one which is a portion of Order R-2026.

Q Have you made the proper factors an attachment to our Exhibit No. 10?

A Yes, sir, I have.

Q Mr. Eaton, going back to these two project areas for just a moment, what will be the total incremental increase from both areas?

A On the basis of the original unit area for the Southeast Cha Cha Unit, as depicted by Exhibit 2, plus the portion of the Gallegos Canyon Unit which will be subjected to pressure maintenance, the increase in ultimate recovery from both of these areas would amount to 2.75 million barrels. Assuming that the contracted Southeast Cha Cha Unit Area is ultimately the largest area that can be subjected to this operation, plus the Gallegos Canyon Unit, will result in an

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Increase in ultimate recovery amounting to approximately 2.5 million barrels.

Q Mr. Eaton, assuming, for the purpose of this question, that neither of these pressure maintenance projects are initiated and that these areas of the Cha Cha-Gallup Oil Pool are depleted under primary operations, what would you predict is the remaining primary recovery in these two areas?

A Approximately two hundred to two hundred fifty thousand barrels.

Q As compared with the recovery of some almost three million barrels under the pressure maintenance project?

A Yes, sir.

Q Certainly then, from an engineering standpoint, these two projects are a significant conservation effort?

A There's no question about it.

Q Do you have anything else you would care to add at this time, Mr. Eaton, with respect to the engineering aspects of this application?

A Only this. I might point out that for all practical purposes the engineering design for the pressure maintenance project has been completed, the route that the injection lines will take has been surveyed. It has been checked by field inspection, it's something that we know that we can build, we can construct it very economically. The design of the



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injection facilities themselves have been completed. The injection pumps have been designed from an engineering standpoint. The orders have not been placed for these materials, but it can be done at a moment's notice. In other words, it is the desire of the working interest in the Southeast Cha Cha Unit Area to commence these projects just as soon as it is possible and feasible to do so.

Q From the standpoint of the maximum conservation effort, time is of the essence, is that correct?

A Yes, sir.

MR. BUELL: That's all we have from Mr. Eaton at this time. May I formally offer Pan American Exhibits 1 through 10 inclusive?

MR. UTZ: Without objection the Exhibits 1 through 10 will be entered into the record of this case.

CROSS EXAMINATION

BY MR. UTZ:

Q Mr. Eaton, was it R-2154 that approved the Humble Cha Cha Unit?

A Yes, sir, it was.

Q Now, the pertinent reservoir data in Rule 7 of your suggested rules, well, your reservoir pressure and your absolute pressure or atmospheric correction is somewhat different than 2154. Would it be your recommendation to use 2154 factors in this rule? The reservoir temperature -- did I say pressure?



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MR. BUELL: Yes, you said pressure.

A I would have no objection, Mr. Utz. I didn't notice that, incidentally. It appears to me --

Q (By Mr. Utz) Those data were given to us by Humble as actual data for that portion of the Cha Cha Pool.

A There shouldn't be any difference in the reservoir temperature between the Northwest area and the Southeast area. May I ask what the Humble data showed?

A 618 Rankine, 58 Fahrenheit.

Q That is the temperature on our pertinent data sheet.

MR. MORRIS: If I might interject, Mr. Eaton.

A Yes.

BY MR. MORRIS:

Q Wouldn't it be more equitable to adopt the rule similar to the rules for the Humble project as promulgated for 2154 as the rules of the Southeast Cha Cha project including all the rules with relationship to the transfer of allowables? If you are going to have rules in force in one part of the pool, don't you feel it would be more equitable to have the same rules in force and effect in the adjoining area?

A That is a good point. The reason that I am recommending the Northeast Hogback Unit type rules, is that I feel that the provision in the Humble type rules to which you referred is unnecessarily restrictive. It is not necessary for the



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protection of correlative rights. It could conceivably, because it is more confining on the operation of the project, even affect the thing adversely. For that reason, I recommend the adoption of these other rules. I concede that you have a good point, that since a similar order has been issued in the Cha Cha-Gallup Pool, perhaps this order, this type order, might be also more appropriately adopted in the Southeast Cha Cha. It was my purpose in recommending the other rule because I prefer that type of rule.

Q It would actually be inequitable, though, would it not, even though you think the Humble rule is too restrictive, it would be inequitable to adopt any other rule in this area?

A I will say that in this particular case, it would make no difference because more than twice the top allowable could be transferred to the well adjacent to the unit boundary; it would have had to receive substantial response.

Q If it makes no difference, then you wouldn't object to either order?

A That is true.

MR. UTZ: You are just objecting to the principle?

A I am objecting to the principle.

Q (By Mr. Morris) Mr. Eaton, if the Commission sees fit to adopt the type of an order for this particular unit that is entered in the Humble unit, is there any provision in the order that would have to be changed, any of the pertinent



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data?

A No, sir.

Q In view of the difficulties that we have been discussing here concerning the joinder of Tenneco and some of the other tracts in this area, what is Pan American recommending as the area to be contained within the pressure maintenance project for which you are seeking approval?

A We recommend that the Southeast Cha Cha pressure maintenance project area be coincidental with the Southeast Cha Cha Unit Area as it is finally established.

Q I see.

A Now, in the Gallegos Canyon Unit portion there is no question. It's under a unitized operation already. Our initial project area there is recommended as that area outlined in green on Exhibit 4. I might point this out too. The Cha Cha-Gallup Pool limits on that southeast end are not completely defined. Now, assuming that the Pool does extend further down to the southeast, that project area in the Gallegos Canyon might need to be enlarged. There's very little likelihood that the Southeast Cha Cha portion would ever have to be enlarged beyond that area on Exhibit 2.

Q My questions were directed to the Southeast Cha Cha Unit.

A Yes, sir.

Q Now, the Commission customarily approves the



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injection wells that are going to be used in the project. Are you also seeking approval of these two injection wells, I see one in the northwest quarter or the northwest corner, I should say, of Section 8 in 28 North, 13 West, that's the one bordering the Tenneco tract; and the other one up on the Aztec property, being in the southwest corner of Section 30, 29 North, 13 West?

A I have left on this Exhibit 4, I have left that Aztec, the well on the Aztec property uncolored because there is such a serious question at this time as to whether or not that tract can be included in the Southeast Cha Cha Unit. Our proposed project rules are sufficiently broad enough that additional wells might be added as injection wells by administrative action. So in that regard, the only optimistic assumption that ultimately this Aztec tract might be brought into the unit and an injection well needed at that location, I would recommend that we let that be one that we obtain by administrative approval and not list it as such in the initial order.

With respect to the C. J. Holder Number 11, the well to which you refer in the Northwest corner of Section 8, it would be my recommendation that that well be listed as an injection well in the order. I feel that we will be able to do one of two things, work out an arrangement with Tenneco by which a common boundary line protection can be accomplished, at which time that well can be used for injection; or that

Tenneco will reconsider its position and commit its acreage to



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the unit.

MR. BUELL: So, in summation you are asking that every well designated as an injection well on your Exhibit 4 be approved in the initial order?

A That is true.

Q (By Mr. Morris) Our Exhibits are colored a little differently, this one shows an injection well on the Aztec tract.

A Yes, sir. The reason for that is that at the time we filed the application, we had no knowledge at that time that this full unit would not be formed.

Q Now, Mr. Eaton, in the Humble project to the northwest of your Southeast Cha Cha Unit, the nearest injection well, I believe, is the Well Number 5 in Section 36, is that correct?

A Yes, sir. In the Northwest quarter of Section 36. Now it is Humble's intention to place additional wells on injection nearer the southwest, the southeast corner of their unit. Again they are in the same position we are. They can't commence injection down there until an agreement is worked out between those parties who have boundary lines that have to be protected, but it is their intention to move down closer to that corner. The precise wells which will be used have not finally been selected although the engineers are in agreement, or were in agreement until we found out that Tenneco would not join this unit, and that completely necessitates re-engineering



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that common boundary protection agreement. What all it means is that both Humble and Pan American will have to start down near the center of their projects and work toward the edge.

Q Mr. Eaton, in these two unit areas in which you are going to have your pressure maintenance projects, do those areas include all of the producing properties that are in each general area, or have you left out any wells that might be along the edges of the two units, any adjacent areas?

A I suspect that you refer to the Pan American C. J. Holder Number 1, which is in the Southeast, Southeast of Section 21, an old Gallup well which has been included by nomenclature orders in the Cha Cha-Gallup Pool. I don't think it properly belongs there. It has no correlative sand development equal to the yellow lines on our Exhibit 5. It has not produced like a typical Cha Cha-Gallup Pool well. It was a limited capacity well at the time of its completion, it has always been one. It's approaching the economic limit of production and it is very unlikely, and this opinion is shared by the members of the engineering committee, that it would ever benefit from pressure maintenance and so it was just left out of the project area.

Q Are there any other wells in areas immediately adjacent to your two unit areas which have not been included in one of the two units?

A No, sir.



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Q That's the only one?

A Yes, sir.

Q If Tenneco does not join its interest in Section 31, the wells of Aztec Oil and Gas Company in Section 30 immediately to the north will be left out of any project?

A That is true.

MR. BUELL: You said wells, Mr. Morris, there's only one well.

MR. MORRIS: Just one well?

MR. BUELL: Yes.

Q (By Mr. Morris) Is there a possibility that that well and that acreage could be joined in the Humble project? Would you care to speculate upon that possibility?

A Yes, sir, I'll be glad to speculate. I would say my answer would be no, with this qualifying statement. The reason for the Humble project having its boundaries drawn where they are is that it lies entirely on Navajo Indian lands. The reason that it was done that way is so that the operation could be conducted under an operating agreement rather than a full scale unit agreement. Should some land other than Navajo Indian land be included, it would necessitate preparation and execution of a full unit instrument.

Q If Tenneco does not join its interests in Section 31 in this unit, Aztec is out on a limb?

A That is very true.



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MR. BUELL: You might also state for the record, Mr. Eaton, if you know, why the Humble project was formed as it was, including only Navajo lands; was it not since time was of the essence and that could effectuate pressure maintenance operations much quicker?

A Yes, sir, that's true. As a matter of fact, I believe I'm correct in this, the effective date of that operating agreement was prior to the date of the pressure maintenance order. In other words, the companies had already agreed that it could be done in this manner expeditiously and then they sought the pressure maintenance order..

BY MR. UTZ:

Q In reference to your injection wells, what do you intend to use for the injection string?

A That really hasn't been fully decided yet. We normally plan to inject through tubing set on a packer. As I say, that really hasn't been fully decided, whether we will here or not. It probably will be two and a half inch tubing, if we use tubing. If we find that the water is of such quality that no corrosion might result, then we might elect to inject down casing.

Q If you do suspect corrosion, then you will use tubing?

A Yes, sir, and probably treat the water too; it could be very serious.



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Q Is the casing on these injection wells all set through the pay?

A Yes, sir.

Q And selectively perforated?

A Yes, sir.

Q Will you inject water in all zones?

A Yes, sir. By all zones you mean the sand, what we designated as the A and B sand?

Q Yes.

A That's the only thing that's open in these wells.

Q Just the two sands?

A Yes, sir.

Q Is there a third sand in this area?

A No, sir. There are a few wells, I had better qualify that. There are a few wells that have some perforation open in this interval approximately one hundred feet above the A sand, but for the most part, as a matter of fact I said a few wells. I only know of one, and it is this Aztec well that we have been talking about up in Section 30. It's extremely stripper, the material, and it's not really sand, it's a silty shale, fractured.

Q If you should include the Aztec acreage, would you inject water in the upper zone?

A If it would take it, yes, sir, which I doubt.

MR. UTZ: Are there other questions of the witness?



MR. SWANSON: Yes, Mr. Examiner. I'm Kenneth Swanson, associated with local counsel representing Aztec Oil and Gas Company.

BY MR. SWANSON:

Q Mr. Eaton, with reference to the Gallegos Canyon Unit portion, would you explain the reason that the boundary was drawn in the manner it's drawn? Why are you taking in this particular area that you have shown?

A According to our interpretation, this approximately represents the production. Which boundary do you refer to?

Q I was wondering if it was an attempt to define the area that is reasonably presumed to be productive?

A That is true. I might add this, too; this proposed project area in the Gallegos Canyon Unit is also coincident and identical to, with one exception, our proposed participating area for the Gallup Formation in the Cha Cha-Gallup Pool. That one exception is the fact that the Gallegos Canyon Unit Number 84 in the Northwest, Northwest 26, is a marginal well under the terms of the Gallegos Canyon Unit agreement. Accordingly, it can not be included in the participating area, the acreage around that well is not in the participating area, but we feel that that well might benefit from our injection program and should properly be included in the project area.

Q Well, this is no attempt to make coincident the

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unit boundary that you are proposing to the Commission and that will participate in the production?

A No, sir.

Q The rights and obligations between the parties are covered by the G llogos Canyon Unit agreement and unit operating agreement?

A That is true.

Q As I understand it, a participating area will be established which will take in an area that is reasonably presumed to be productive and subject to approval by the USGS?

A That is true.

Q And that acreage will participate in production and finance the project?

A Yes, sir, we thought it was a good idea to make this proposed project area as nearly coincident with what we will propose to the other working interest for the participating area as possible, simply from the standpoint of not having so many maps around showing different areas on it, and it's only logical, too, it should be. But that's the only significance, that the participating area establishment and adjustment of investment and adjustment of participation are covered with the unit operating agreement, and it will govern

Q Well, it's a fact that Aztec owns an appreciable amount of acreage in the area?

A That is very true.



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Q And as far as mechanics of the operation are concerned, there will be a meeting of the owners holding interest in the area or some communication between them as to the details of operation in this area?

A Yes, sir.

MR. SWANSON: No further questions.

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

(Witness excused)

MR. UTZ: Are there any statements in this case? Do you have anything further, Mr. Buell?

MR. BUELL: No, sir, that's all we have, Mr. Examiner.

MR. SWANSON: I have a statement, Mr. Examiner.

MR. UTZ: You may proceed, Mr. Swanson.

MR. SWANSON: Aztec is also an interest owner in the Southeast Cha Cha area. We would like to concur with Pan American in their request for approval of this unit area. We have, at this time, executed the instruments conditionally. That is, we reserve final approval in order that we would be able to tell what the situation might be as it develops. It looks as though perhaps Tenneco may not be a participant. It is Aztec's position that every reasonable probability is that we will join in this unit. We do feel, however, that every



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effort should be made to include Tenneco's acreage in this unit because the operation of the project will be facilitated. There are going to be serious questions of correlative rights if their acreage is not included, and we would like to see, and we are happy to hear that Pan American intends to exert every effort to bring Tenneco into the unit.

MR. UTZ: Any other statements?

MR. MORRIS: Yes, sir. Mr. Examiner, with reference to Case Number 2517, I have correspondence from Rocanville Corporation, from Marine Drilling, Inc., and from Texaco, Inc., urging the Commission approve the application of Pan American. I have also been asked by Aspen Drilling Company and D. W. Falls to state their concurrence in both of these two cases with the application of Pan American.

MR. UTZ: Are there other statements? The case will be taken under advisement. We will take a ten minute recess.



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STATE OF NEW MEXICO)
COUNTY OF BERNALILLO) ss

I, ADA DEARNLEY, Notary Public in and for the County of Bernalillo, State of New Mexico, do hereby certify that the foregoing and attached Transcript of Hearing was reported by me in Stenotype and that the same was reduced to typewritten transcript under my personal supervision and contains a true and correct record of said proceedings, to the best of my knowledge, skill and ability.

DATED this 29th day of March, 1962, in the City of Albuquerque, County of Bernalillo, State of New Mexico.

Ada Dearnley
NOTARY PUBLIC

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. 2516027 heard by *[Signature]* 1962.
[Signature], Examiner
New Mexico Oil Conservation Commission



PAN AMERICAN PETROLEUM CORPORATION
FORT WORTH, TEXAS

March 2, 1962

File: GHP-75-986.510.1 x 416

Subject: Request for Hearing
Southeast Cha Cha Unit
Cha Cha-Gallup Field
San Juan County, New Mexico

Mr. A. L. Porter, Jr. (3)
Secretary-Director
New Mexico Oil Conservation Commission
P. O. Box 871
Santa Fe, New Mexico

Dear Sir:

Pan American Petroleum Corporation respectfully requests that a hearing be docketed for the last Examiner Hearing to be held in March, 1962, to consider its application for approval of a Unit Agreement for the Southeast Cha Cha Unit, Cha Cha-Gallup Field, San Juan County, New Mexico, and also for permission to initiate a pressure maintenance project in this Unit. Pan American also requests that a separate hearing be docketed for the same hearing to consider its application for approval of a pressure maintenance project for the Cha Cha-Gallup Field underlying its Gallagos Canyon Unit, San Juan County, New Mexico. Orders similar to Commission's Order No. B-2026 which approved a pressure maintenance project for Pan American's Northeast Hogback Unit, Horseshoe-Gallup Field, San Juan County, New Mexico, will be requested for each of these projects.

Attached is a map showing the boundary of the Southeast Cha Cha Unit together with the location of proposed initial injection wells. The maintenance of pressure in this project is to be accomplished by the injection of water into the Gallup horizon of the Cha Cha Gallup Field at an approximate depth of 5700 feet. It is anticipated that initially approximately 800-1000 barrels of water per day will be injected into each injection well. Injection water will be obtained from the Morrison Formation through a Morrison well located in the Southeast Cha Cha Unit.

Also shown on the attached map is the portion of our Gallagos Canyon Unit to be flooded. Location of proposed injection wells for the Gallagos Canyon Unit project are denoted on the map. This project will also be carried out by injection of water from the Morrison Formation at a rate of 800-1000 barrels of water per day per well into the Gallup horizon occurring at a depth of approximately 5700 feet.

COPY

File: GWF-75-986.510.1 x 416

- 2 -

March 2, 1962

Logs on the injection wells to be used in each of the two projects together with a description of the casing program utilized in the injection wells will be furnished by our Farmington office under separate cover.

Yours very truly,

KENNETH J. BARR
Division Engineer

GJB:bw
Attachment

Case 2516

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

1. Gallegos Canyon Unit No. 97 - (Section 23, T-28-N, R-13-W)

8-5/8" casing set at 214' with 200 sacks cement.
4-1/2" casing set at 5876' with 200 sacks cement.

2. Gallegos Canyon Unit No. 112 - (Section 23, T-28-N, R-13-W)

8-5/8" casing set at 212' with 150 sacks cement.
4-1/2" casing set at 5699' in stages. First stage
cemented with 125 sacks 6% gel cement plus 100
sacks neat. Second stage with 150 sacks 6% gel
cement.

PERTINENT DATA SHEET

RESERVOIR ROCK AND RESERVOIR FLUID PROPERTIES
SOUTHEAST AREA OF CHA CHA GALLUP FIELD

Original Reservoir Pressure, psig	1560
Reservoir Temperature, °F	158
Saturation Pressure, psig	1560
Estimated Original Solution Gas-Oil Ratio, cu. ft./bbl.	649
Original Formation Volume Factor	1.392
Crude Viscosity, cp	.415
Crude Gravity, °API	43
Producing Mechanism	Solution Gas Drive
Average Porosity ("A" Sand), %	15.4
Average Porosity ("B" Sand), %	8.4
Average Permeability ("A" Sand), Md	50.4
Average Permeability ("B" Sand), Md	0.32
Average Water Saturation ("A" Sand), %	30
Average Water Saturation ("B" Sand), %	40
Average Net Pay Thickness ("A" Sand), ft.	4
Average Net Pay Thickness ("B" Sand), ft.	4.5
Gas-Oil or Water-Oil Contacts	None Indicated
Type Accumulation	Stratigraphic Trap (Sand Bar)

BEFORE EXAMINER UTZ
OIL CONSERVATION COMMISSION
Pan Am EXHIBIT NO. 6
CASE NO. 2516 & 2517

COMPLETION DATA
G. J. HOLDER WATER WELL NO. 1

Location	910' FNL & 1850' FEL, Section 16, T-28-N, R-13-W, San Juan County, New Mexico
Elevation	6055' DF
Total Depth	7150'
Top Morrison	6467'
Surface Casing	13-3/8" CSA 206'
Oil String Casing	1191' of 9-5/8" and 5949' of 8-5/8" CSA 7,140'
Perforations	158' of perforations between 6573'-7122'
Stimulation	Sand-water frac with 93,500 gals. water and 55,000 lbs. 20-40 mesh sand.
Test Rates	Pump 1500 barrels water per day with pump set at 1000' and static fluid level at 500'. Estimated capacity of 10,000 barrels water per day with pump set at 4000'.

