

CASE 2483: Application of ARTEC
OIL & GAS CO. for a pressure main-
tenance project, TOTAH-GALLUP POOL.

Please mail
to all parties
to be
checked or
application. You
of application.
Cph Jch

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2483

plication, Transcript,
all Exhibits, Etc.

AZTEC OIL & GAS COMPANY

Data Sheet

Reservoir Rock and Fluid Properties
Totah-Gallup Field
San Juan County, New Mexico

Proposed Aztec Totah Pressure Maintenance Project

EXHIBIT No. 5

Original Reservoir Pressure, psig @ + 200'	1623
Reservoir Temperature, °F.	155 ✓
Saturation Pressure @ 155° F., psig	1463
Estimated Original Solution Gas-Oil Ratio, Cu. Ft./Bbl.	550 -
Formation Volume Factor @ 1623 psig	1.360
Crude Viscosity, cp @ 1463 psig and 155° F.	.470
Crude Gravity, °API	41
Producing Mechanism	Solution Gas Drive
Average Porosity, %	14.1
Average Permeability, Md	121.0
Average Water Saturation, %	20
Average Net Pay Thickness, Ft.	6.2
	2.7
Gas-Oil or Water-Oil Contacts	None Indicated
Type Accumulation	Stratigraphic Trap (Sand Bar)

Case 2483

AZTEC OIL & GAS COMPANY

920 MERCANTILE SECURITIES BLDG.
DALLAS 1, TEXAS

December 29, 1961

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

Re: Application of Aztec Oil & Gas
Company for Hearing on Pressure
Maintenance Program for a Portion
of the Totah (Gallup) Oil Pool,
San Juan County, New Mexico

Dear Mr. Porter:

Application is hereby made by Aztec Oil & Gas Company for approval of a pressure maintenance project to be known as the Aztec Totah Pressure Maintenance Project. The proposed project would cover the area described by sections or subdivisions thereof set out in Exhibit "A" and designated on the plat attached hereto as Exhibit "B".

It is proposed that water obtained from the Morrison (Cretaceous) formation be injected into the Gallup (Cretaceous) formation encountered at a depth of about four thousand nine hundred and fifty feet (4950') to five thousand six hundred and fifty feet (5650') through approximately seven injection wells. It is expected that injection will commence at a rate of approximately 1,000 barrels per day per injection well.

The casing program of the proposed injection wells is shown on Exhibit "C".

Logs of the proposed injection wells are enclosed with this application.

A list of the names and addresses of all the lessees within a two-mile radius of the proposed project area known to Applicant is appended to this application.

Pursuant to Rule 701, Aztec Oil & Gas Company respectfully requests permission for such pressure maintenance project and requests that the

1cc to
all 9 people
on each page (3)

Mr. A. L. Porter, Jr.

-2-

December 29, 1961

matter be set for hearing at an early date.

Respectfully submitted,

AZTEC OIL & GAS COMPANY

By Kenneth A. Swanson
Kenneth A. Swanson
Attorney

KAS/et

cc: Elliot Production, Inc.
Texaco, Inc.
Tenneco Oil Company
Pan American Petroleum Corporation
Aspen Crude Purchasing Company
Southwest Production Company

Case 2483

LIST OF LESSEES AND ADDRESSES KNOWN TO
APPLICANT WITHIN TWO MILES OF PROPOSED
PROJECT AREA

✓
Texaco, Inc.
P. O. Box 817
Farmington, New Mexico

✓
Pubco Petroleum Corporation
P. O. Box 1419
Albuquerque, New Mexico

✓
Pan American Petroleum Corporation
P. O. Box 480
Farmington, New Mexico

✓
Humble Oil & Refining Company
P. O. Box 120
Denver, Colorado

✓
Elliot, Inc.
P. O. Box 703
Roswell, New Mexico

✓
Southern Union Production Company
Fidelity Union Tower
Dallas 1, Texas

✓
Sunray Mid-Continent Oil Company
P. O. Box 381
Tulsa, Oklahoma

✓
Gas Producers Corporation
P. O. Box 176
Dallas, Texas

✓
Aspen Crude Purchasing Company
P. O. Box 2060
Farmington, New Mexico

✓
Southwest Production Company
3108 Southland Center
Dallas, Texas

✓
R. B. Moncrief
1417 W.T. Waggoner Building
Fort Worth, Texas

✓
Tenneco Oil Company
P. O. Box 1714
Durango, Colorado

✓
Within
two miles

EXHIBIT "A"

AZTEC TOTAL PRESSURE MAINTENANCE PROJECT AREA

Township 29 North, Range 13 West, N.M.P.M.

Section 18: $S\frac{1}{2}$
Section 19: Lots 1,2,3,4, $E\frac{1}{2}W\frac{1}{2}$, $E\frac{1}{2}$
Section 20: $SE\frac{1}{4}NE\frac{1}{4}$, $NW\frac{1}{4}$, $S\frac{1}{2}$
Section 29: All
Section 30: Lots 1,2, $E\frac{1}{2}NW\frac{1}{4}$, $NE\frac{1}{4}$, $NW\frac{1}{4}SE\frac{1}{4}$, $NE\frac{1}{4}SE\frac{1}{4}$
Section 34: All

San Juan County, New Mexico

AZTEC OIL & GAS COMPANY

Casing Programs
 Producing Wells to be Converted to Injection Wells
 Proposed Aztec ~~Salt~~-Totah Pressure Maintenance Project
 Totah-Gallup Field
 San Juan County, New Mexico

Case 2483

Well No.	Location	Surface Casing					Production Casing					Injection Tubing		Perfs
		Cement					Cement					Est Size OD (")	Depth Pkr (')	
		Size OD (")	Depth (')	Sx	Top Depth (')	Base Depth (')	Size OD (")	Depth (')	Sx	Top Depth (')	Base Depth (')			
Hagood #7-G	710 FNL, 390 FEL Sec. 29-29N-13W	8-5/8	321	225	Surface	321	4-1/2	5500	250 150	4400-5500 920-1533	2-3/8	5300	5362-76	
Hagood #16-G	2310 FSL, 330 FEL Sec. 29-29N-13W	8-5/8	203	175	Surface	203	4-1/2	5675	250 150	4500-5675 1400-1737	2-3/8	5560	5614-26	
Hagood #27-G	2130 FSL, 3450 FEL Sec. 19-29N-13W	8-5/8	199	225	Surface	199	4-1/2	5199	250 150	3925-5199 900-1207	2-3/8	5050	5104-16	
Hagood #28-G	765 FNL, 3175 FEL Sec. 30-29N-13W	8-5/8	203	175	Surface	203	4-1/2	5355	250 150	4015-5355 1060-1438	2-3/8	5150	5210-26 5246-52	
Smith "C" #1	705 FSL, 2110 FEL Sec. 18-29N-13W	8-5/8	200	225	Surface	200	4-1/2	5085	250	3890-5085 725-1166	2-3/8	4900	4960-80 5022-30 5064-74	
Hagood #13-G	660 FSL, 660 FEL Sec. 34-29N-13W	8-5/8	320	225	Surface	320	4-1/2	5799	250 150	4800-5799 1520-1926	2-3/8	5630	5682-94 5726-34	
Hagood #14-G	700 FEL, 2100 FNL Sec. 34-29N-13W	8-5/8	191	140	Surface	191	4-1/2	5752	250 150	4625-5752 1410-1855	2-3/8	5600	5656-73	

JFB:gt
 12-26-61

EXHIBIT "C"

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. Kenneth Swanson
Astec Oil & Gas Company
920 Mercantile Securities Building
Dallas, 1, Texas

Re: CASE NO. 2483
ORDER NO. R-2189
APPLICANT:
Astec Oil & Gas Company

Dear Sir:

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

Very truly yours,

A. L. PORTER, JR.
Secretary-Director

ir/

Carbon copy of order also sent to:

Hobbs OCC X
Artesia OCC
Aztec OCC X

OTHER Mr. Booker Kelly
Mr. George Verity

**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. 3403
Order No. R-2189**

**APPLICATION OF ASTEC OIL & GAS
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. Ute, 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. Ute, 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, Astec Oil & Gas Company, proposes to institute two pressure maintenance projects in the Totah-Gallup Oil Pool, one project area to lie in Sections 18, 19, 20, 29 and 30, Township 29 North, Range 13 West, NMPM, San Juan County, New Mexico, and one project area to lie in Section 34, Township 29 North, Range 13 West, NMPM, San Juan County, New Mexico. Initial injection into the Gallup formation would be through certain wells located in said Sections 18, 19, 29, 30 and 34.

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

(4) That Special Rules and Regulations for the operation of the Astec Oil & Gas Company Totah-Gallup Pressure Maintenance Projects should be promulgated and, for operational convenience, such rules should provide certain flexibility in authorizing the production of each project allowable from any well or wells in

CASE No. 2483
Order No. R-2189

each respective project in any proportion, provided that no well in either project area which directly or diagonally offsets a well outside that 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.

(5) That inasmuch as the working interest and royalty ownership is diverse in one of the project areas, approval of the pressure maintenance project in that area should be conditioned upon the formation of a unit comprising all of that area.

IT IS THEREFORE ORDERED:

(1) That the applicant is hereby authorized to institute the Aztec Oil & Gas Company Totah-Gallup Pressure Maintenance Project No. 1, 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:

Hagood-Federal Well No. 7-G, NE/4 NE/4 of Section 29;
Hagood-Federal Well No. 16-G, NE/4 SE/4 of Section 29;
Hagood-Federal Well No. 27-G, NW/4 SW/4 of Section 19;
Hagood-Federal Well No. 28-G, NW/4 NW/4 of Section 30;
Smith "C" Well No. 1, SE/4 SW/4 of Section 18.

PROVIDED HOWEVER, That approval of this project shall not be effective until a unit comprising all of the acreage within said project has been approved by the Director of the United States Geological Survey, the Commissioner of Public Lands for the State of New Mexico, and the Commission.

(2) That the applicant is hereby authorized to institute the Aztec Oil & Gas Company Totah-Gallup Pressure Maintenance Project No. 2, 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:

Hagood-Federal Well No. 13-G, SE/4 SE/4 of Section 34;
Hagood-Federal Well No. 14-G, SE/4 NE/4 of Section 34.

(3) That Special Rules and Regulations governing the operation of Aztec Oil & Gas Company Totah-Gallup Pressure

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CASE No. 2483
Order No. R-2189

Maintenance Projects Nos. 1 and 2, San Juan County, New Mexico, are hereby promulgated as follows:

**SPECIAL RULES AND REGULATIONS FOR ASTEC OIL & GAS
COMPANY TOTAL-GALLUP PRESSURE MAINTENANCE PROJECTS
NO. 1 AND 2**

RULE 1. The project area of Astec Oil & Gas Company Total-Gallup Pressure Maintenance Project No. 1, San Juan County, New Mexico, shall comprise that area described as follows:

TOWNSHIP 29 NORTH, RANGE 13 WEST, NEPM

Section 18: S/2
Section 19: All
Section 20: S/2, NW/4, and SE/4 NE/4
Section 29: All
Section 30: N/2 and N/2 NE/4

RULE 2. That the project area of Astec Oil & Gas Company Total-Gallup Pressure Maintenance Project No. 2, San Juan County, New Mexico, shall comprise all of Section 34, Township 29 North, Range 13 West, NEPM.

RULE 3. The allowable for each project shall be the sum of the allowables of the several wells within each respective 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 4. Allowables for injection wells in each project area may be transferred to producing wells within each respective 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 5. The allowable assigned to any well which is shut-in or which is curtailed in accordance with the provisions of Rule 4, which allowable is to be transferred to any well or wells in the same project area for production, shall in no event be greater than its ability to produce during the test period prescribed by Rule 7, below, or greater than the current top unit allowable for the pool during the month of transfer, whichever is less.

RULE 6. The allowable assigned to any injection well on an 80-acre proration unit shall be top unit allowable for the Total-Gallup Oil Pool.

RULE 7. The allowable assigned to any well which is shut-in or curtailed in accordance with Rule 4, 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 802 I (a) and the limiting gas-oil ratio (2,000 to 1) for the Total-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 8. The allowable assigned to each producing well in each project shall be equal to the well's ability to produce or to top unit allowable for the Total-Gallup Oil Pool, whichever is less, provided that any producing well in either project area which directly or diagonally offsets a well outside that 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 Total-Gallup Oil Pool, except that any well or wells within either 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 Total-Gallup Oil Pool within that 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

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CASE No. 2403
Order No. R-2189

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.

PAR 2. Credit for daily average net water injected into the Teth-Gallup Oil Pool through any injection well located within each 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 each 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:

$$E_g = (V_{w \text{ inj}} - V_{w \text{ prod}}) \times 5.61 \times \frac{P_a}{15.025} \times \frac{520^\circ}{T_r} \times \frac{1}{2}$$

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 + 200 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 155° F expressed as absolute temperature (615° R)

Z = Compressibility factor from analysis of total-galling gas at average reservoir pressure, P_R , interpolated from compressibility tabulation below:

Pressure P_{R1}	Z	Pressure P_{R1}	Z	Pressure P_{R1}	Z
0	1.000	550	.982	1100	.856
50	.983	600	.897	1150	.852
100	.969	650	.893	1200	.848
150	.958	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 10. Each month the operator of the projects 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 each project as well as the total allowable for each project. The aforesaid Pressure Maintenance Project Operator's Report shall be filed in lieu of Form C-120 for each project.

RULE 11. The Commission shall, upon review of the report and after any adjustments deemed necessary, calculate the allowable for each well in each project for the next succeeding month in accordance with these rules. The sum of the allowables so calculated shall be assigned to each project and may be produced from the wells in each respective project in any proportion except that no well in either project which directly or diagonally offsets a well outside that project producing from the same common source of supply shall produce in excess of two times top unit allowable for the pool.

RULE 12. The conversion of any producing wells to injection, the drilling of additional wells for injection, and expansion of each 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

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CASE No. 2493
Order No. R-2189

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 Gailip 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.

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

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

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION



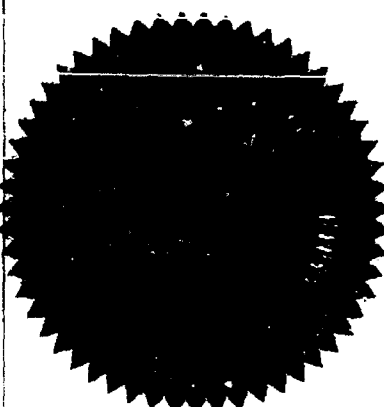
EDWIN L. MECHEM, Chairman



E. S. WALKER, Member



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



esr/

Case 2443

Heard 1-24-62

Rec. 1-26-62

1. Grant Ayleen request for a
Waterflood in the Totah-Hallup
oil Pool consisting of 2 areas:
Area #1

29N-13W

Sec. 18 - S/2

19 - All

20 - SE/4 NE/4, NW/4, S/2.

29 - All

30 - N/2, N/2 SE/4.

Approximate Injection wells as follows:
Ayleen-Hagood #78, ^{NE/4 NE/4} ~~SE/4 SE/4~~ 29-29-13
" " #168, NE/4 SE/4 29 " "
" " #278, NW/4 SW/4, 19-29-13
" " #288, NW/4 NW/4, 30-29-13
" Smith " #1, SE/4 SW/4, 18-29-13

Area #2

29N-13W

Sec. 34, All,

Approximate Injection wells:

Ayleen-Hagood #138, SE/4 NE/4, 34-29-13
" " #148, SE/4 SE/4, " " "

2. Use the same order as was issued
Per Am in Case 2449

Thur. [Signature]

AZTEC OIL & GAS COMPANY

Casing Programs
Producing Wells to be Converted to Injection Wells
Totah-Gallup Field
San Juan County, New Mexico
Proposed Aztec Totah Pressure Maintenance Project
EXHIBIT No. 4

Well No.	Location	Surface Casing					Production Casing					Injection Tubing		Perfs
		Size OD Depth (") (')		Cement			Size OD Depth (") (')		Cement			Size OD Depth (") (')	Est. Depth Pkr (')	
				Sx	Top Depth (')	Base Depth (')			Sx	Top Depth (')	Base Depth (')			
Hagood #7-G	710 FNL, 390 FEL Sec. 29-29N-13W	8-5/8	321	225	Surface	321	4-1/2	5500	250 150	4400-5500 920-1533	2-3/8	5300	5362-76	
Hagood #16-G	2310 FSL, 330 FEL Sec. 29-29N-13W	8-5/8	203	175	Surface	203	4-1/2	5675	250 150	4500-5675 1400-1737	2-3/8	5560	5614-26	
Hagood #27-G	2130 FSL, 3450 FEL Sec. 19-29N-13W	8-5/8	199	225	Surface	199	4-1/2	5199	250 150	3925-5199 900-1207	2-3/8	5050	5104-16	
Hagood #28-G	765 FNL, 3175 FEL Sec. 30-29N-13W	8-5/8	203	175	Surface	203	4-1/2	5355	250 150	4015-5355 1060-1438	2-3/8	5150	5210-26 5246-52	
Smith "C" #1	705 FSL, 2110 FEL Sec. 18-29N-13W	8-5/8	200	225	Surface	200	4-1/2	5085	250	3890-5085 725-1166	2-3/8	4900	4960-80 5022-30 5064-74	
Hagood #13-G	660 FSL, 660 FEL Sec. 34-29N-13W	8-5/8	320	225	Surface	320	4-1/2	5799	250 150	4800-5799 1520-1926	2-3/8	5630	5682-94 5726-34	
Hagood #14-G	700 FEL, 2100 FNL Sec. 34-29N-13W	8-5/8	191	140	Surface	191	4-1/2	5752	250 150	4625-5752 1410-1855	2-3/8	5600	5656-73	

JFB:gta
1-19-62

Case 2483

ARTEC OIL & GAS COMPANY

920 MERCANTILE SECURITIES BLDG.
DALLAS 1, TEXAS

LAND DEPARTMENT
H. L. SNIDER, JR., MANAGER
KENNETH A. SWANSON, ATTORNEY

January 2, 1962

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

Re: Application of Aztec Oil & Gas
Company for Hearing on Pressure
Maintenance Program for a Portion
of the Totah (Gallup) Oil Pool,
San Juan County, New Mexico

Dear Mr. Porter:

Enclosed are four additional logs of proposed injection wells that were inadvertently omitted from those previously furnished you with our captioned application. These four, along with the three previously received by you, will provide one log for each proposed injection well.

We apologize for this oversight.

Yours very truly,

Kenneth A. Swanson
et

KAS/et
Enclosures (4)

Kenneth A. Swanson
1-11-62
et

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.

CARL M. GILBERT
L. C. WHITE
WILLIAM W. GILBERT
SUMNER S. KOCH
WILLIAM B. KELLY

GILBERT, WHITE AND GILBERT
ATTORNEYS AND COUNSELORS AT LAW
BISHOP BUILDING
SANTA FE, NEW MEXICO

MAIN OFFICE OCC

1962 JAN 23 PM 1:43

JANUARY 23, 1962

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

Dear Mr. Porter:

This letter represents an entry of appearance in Case
No. 2483, set for hearing Wednesday, January 24, 1962, whereby
this firm is associated with Mr. Kenneth A. Swanson, a Texas
attorney representing Aztec Oil and Gas Company.

Very truly yours,

William B. Kelly

WILLIAM B. KELLY

WHK/ab

2483

AZTEC OIL & GAS COMPANY

920 MERCANTILE SECURITIES BLDG.
DALLAS 1, TEXAS

December 29, 1961

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

Re: Application of Aztec Oil & Gas
Company for Hearing on Pressure
Maintenance Program for a Portion
of the Totah (Gallup) Oil Pool,
San Juan County, New Mexico

Dear Mr. Porter:

Application is hereby made by Aztec Oil & Gas Company for approval of a pressure maintenance project to be known as the Aztec Totah Pressure Maintenance Project. The proposed project would cover the area described by sections or subdivisions thereof set out in Exhibit "A" and designated on the plat attached hereto as Exhibit "B".

It is proposed that water obtained from the Morrison (Cretaceous) formation be injected into the Gallup (Cretaceous) formation encountered at a depth of about four thousand nine hundred and fifty feet (4950') to five thousand six hundred and fifty feet (5650') through approximately seven injection wells. It is expected that injection will commence at a rate of approximately 1,000 barrels per day per injection well.

The casing program of the proposed injection wells is shown on Exhibit "C".

Logs of the proposed injection wells are enclosed with this application.

A list of the names and addresses of all the lessees within a two-mile radius of the proposed project area known to Applicant is appended to this application.

Pursuant to Rule 701, Aztec Oil & Gas Company respectfully requests permission for such pressure maintenance project and requests that the

Mr. A. L. Porter, Jr.

-2-

December 29, 1961

matter be set for hearing at an early date.

Respectfully submitted,

AZTEC OIL & GAS COMPANY

By Kenneth A. Swanson
Kenneth A. Swanson
Attorney

KAS/et

cc: Elliot Production, Inc.
Texaco, Inc.
Tenneco Oil Company
Pan American Petroleum Corporation
Aspen Crude Purchasing Company
Southwest Production Company

LIST OF LESSEES AND ADDRESSES KNOWN TO
APPLICANT WITHIN TWO MILES OF PROPOSED
PROJECT AREA

Texaco, Inc.
P. O. Box 817
Farmington, New Mexico

Pubco Petroleum Corporation
P. O. Box 1419
Albuquerque, New Mexico

Pan American Petroleum Corporation
P. O. Box 480
Farmington, New Mexico

Humble Oil & Refining Company
P. O. Box 120
Denver, Colorado

Elliot, Inc.
P. O. Box 703
Roswell, New Mexico

Southern Union Production Company
Fidelity Union Tower
Dallas 1, Texas

Sunray Mid-Continent Oil Company
P. O. Box 381
Tulsa, Oklahoma

Gas Producers Corporation
P. O. Box 176
Dallas, Texas

Aspen Crude Purchasing Company
P. O. Box 2060
Farmington, New Mexico

Southwest Production Company
3108 Southland Center
Dallas, Texas

R. B. Moncrief
1417 W.T. Waggoner Building
Fort Worth, Texas

Tenneco Oil Company
P. O. Box 1714
Durango, Colorado

EXHIBIT "A"

AZTEC TOTAL PRESSURE MAINTENANCE PROJECT AREA

Township 29 North, Range 13 West, N.M.P.M.

Section 18: $S\frac{1}{2}$
Section 19: Lots 1,2,3,4, $E\frac{1}{2}W\frac{1}{2}$, $E\frac{1}{2}$
Section 20: $SE\frac{1}{4}NE\frac{1}{4}$, $NW\frac{1}{4}$, $S\frac{1}{2}$
Section 29: All
Section 30: Lots 1,2, $E\frac{1}{2}NW\frac{1}{4}$, $NE\frac{1}{4}$, $NW\frac{1}{4}SE\frac{1}{4}$, $NE\frac{1}{4}SE\frac{1}{4}$
Section 34: All

San Juan County, New Mexico

AZTEC OIL & GAS COMPANY

Casing Programs
Producing Wells to be Converted to Injection Wells
Proposed Aztec ~~Salt~~-Totah Pressure Maintenance Project
Totah-Gallup Field
San Juan County, New Mexico

Well No.	Location	Surface Casing					Production Casing					Injection Tubing		Perfs
		Cement					Cement					Est Size OD Depth Pkr		
		Size OD Depth (") (')		Sx	Top Depth (')	Base Depth (')	Size OD Depth (") (')		Sx	Top Depth (')	Base Depth (')			
Hagood #7-G	710 FNL, 390 FEL Sec. 29-29N-13W	8-5/8	321	225	Surface	321	4-1/2	5500	250 150	4400-5500 920-1533	2-3/8	5300	5362-76	
Hagood #16-G	2310 FSL, 330 FEL Sec. 29-29N-13W	8-5/8	203	175	Surface	203	4-1/2	5675	250 150	4500-5675 1400-1737	2-3/8	5560	5614-26	
Hagood #27-G	2130 FSL, 3450 FEL Sec. 19-29N-13W	8-5/8	199	225	Surface	199	4-1/2	5199	250 150	3925-5199 900-1207	2-3/8	5050	5104-16	
Hagood #28-G	765 FNL, 3175 FEL Sec. 30-29N-13W	8-5/8	203	175	Surface	203	4-1/2	5355	250 150	4015-5355 1060-1438	2-3/8	5150	5210-26 5246-52	
Smith "C" #1	705 FSL, 2110 FEL Sec. 18-29N-13W	8-5/8	200	225	Surface	200	4-1/2	5085	250	3890-5085 725-1166	2-3/8	4900	4960-80 5022-30 5064-74	
Hagood #13-G	660 FSL, 660 FEL Sec. 34-29N-13W	8-5/8	320	225	Surface	320	4-1/2	5799	250 150	4800-5799 1520-1926	2-3/8	5630	5682-94 5726-34	
Hagood #14-G	700 FEL, 2100 FNL Sec. 34-29N-13W	8-5/8	191	140	Surface	191	4-1/2	5752	250 150	4625-5752 1410-1855	2-3/8	5600	5656-73	

JFR:gta
12-26-61

EXHIBIT "C"

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

DEARNLEY-MEIER REPORTING SERVICE, Inc.

FARMINGTON, N. M.
PHONE 325-1182

ALBUQUERQUE, N. M.
PHONE 243-6691

IN THE MATTER OF:

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
2483

BEFORE:

ELVIS UTZ, EXAMINER

TRANSCRIPT OF HEARING

MR. UTZ: Case 2483.

MR. MORRIS: Application of Aztec Oil & Gas Company for a
Pressure Maintenance Project, San Juan County, New Mexico.

MR. SWANSON: I am Kenneth A. Swanson, representing the
Applicant associated with the firm of Gilbert, White & Gilbert.
We have one witness to testify in this case.

MR. UTZ: Are there any other appearances?

MR. VERITY: I am George L. Verity of Verity, Burr & Cooley.
We represent Southwest Production Company.

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. BURROWS: I do.

JIM F. BURROWS,

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

DIRECT EXAMINATION

BY MR. SWANSON:

Q Will you please state your name and occupation and in what capacity you are employed with Aztec Oil and Gas Company?

A My name is Jim F. Burrows, and I am employed with Aztec Oil & Gas Company as a Staff Petroleum Engineer in Dallas, Texas.

Q Would you briefly review your educational and professional background?

A I graduated from the University of Oklahoma in 1957 with a B. S. Degree in Petroleum Engineering. Since that time I worked approximately two and a half years for Standard Oil Company of Texas in various capacities as Petroleum Engineer and then I have been employed by Aztec Oil & Gas Company for the past two and a half years as Petroleum Engineer.

MR. SWANSON: Are the witness's qualifications acceptable?

MR. UTZ: Yes, sir, they are.

Q (By Mr. Swanson) Mr. Burrows, are you in general familiar with the subject matter of this Application?

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A Yes.

Q Have you prepared a series of Exhibits to be presented at this time?

(Aztec Oil and Gas Company's Exhibit 1 thru 8 inclusive marked for identification)

A Yes, sir, I have.

Q Will you please refer to your first Exhibit and explain it?

A Exhibit No. 1 is a base map showing the lease ownership and well locations in the vicinity of the Totah-Gallup Pool in San Juan County, New Mexico. The dash lines have been constructed along the northeast and southwest flags of the pool and labeled approximate productive limit generally to define the area in which this pool is located. Two areas have been colored and are outlined by hatch lines. These areas represent the areas for which our Application has been entered. The northwest area is designated Project Area No. 1. The acreage colored in yellow in this area is acreage leased and operated by Aztec Oil & Gas Company. The acreage colored in light blue is operated by Elliott, Inc. We have included this acreage in our Application because tentative agreement has been reached concerning unit participation and it is anticipated that this area will be unitized with the other acreage in Project Area 1. The 40 acre tract colored in brown is leased by Texaco, Inc. and Aztec has approached Texaco concerning unitizing this tract with the Aztec acreage in this area and there has

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been no indication that an agreement cannot be reached.

MR. UTZ: Has there been any indication it can be reached?

MR. SWANSON: Yes, sir, there has. If you will allow me to answer, since my department has been working on it more than Jim's has, as a matter of fact we have executed communication agreement with Texaco designating 80 acre prorated of 40 acres and south of that Aztec owns, and we contemplate drilling a well. The reason I think Mr. Burrows statement was stated that way is because we have proposed participation to Texaco and the people with whom we have talked have no objection to that participation but they did state it would have to be with the management's approval. We are not in a position to say unequivocal.

MR. UTZ: You may proceed.

A The area to the southeast has been designated Project Area 2 and this entire area is lease and operated by Aztec Oil & Gas Company. It is anticipated that this area will be unitized with the Tenneco Oil Company acreage to the north and east and tentative agreement has been reached concerning unit participation and we anticipate that this will be unitized.

Returning to Project Area 1, five producing wells have been circled and colored in red. Aztec proposes to convert these five wells for injection into the "A" sand of the lower Gallup formation. The two rows of wells represented by these five wells represent a transverse line drive back maintenance project. The larger circled one colored in green is the approximate location of a proposed

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Morrison Battery source well, which is to furnish water for the injection wells in this area. In the Project Area No. 2, two producing wells have also been circled and colored in red, and these are the wells which we propose to convert for injection in this area. It is noticed that no additional wells have been proposed for injection wells and no source well has been included for this area, since we strongly anticipate this area will be unitized with the Tennaco acreage and we believe that the injection wells proposed by Tennaco and their source wells will complete the pressure maintenance picture in this area. The final item on this Exhibit is a trace of cross section A prime which is colored in orange.

Q Have you prepared an Exhibit showing that cross section, Mr. Burrows?

A Yes, sir I have. That is Exhibit No. 2.

Q Let's refer to it, please.

A This is a cross section drawn down the axis of the field northwest to southeast of the Gallup formation. This cross section was presented primarily to define the interval into which we propose to inject water. This interval is designated the Gallup A sand and has been colored in red. This Exhibit also illustrates the continuity of this sand throughout both project areas and in the interval between the project areas and indicates that this zone is subject to pressure maintenance.

Q Are there any faults or present mobility barriers present within these areas which might prevent the success of the pressure



maintenance project?

A There are none to my knowledge.

Q Let's proceed to your next Exhibit.

A Exhibit No. 3 is a proposed drill and completion program for the Morrison water supply well located in Project area No. 1. We proposed to set approximately 200 feet of 13 3/8 inch casing and cement this casing to the surface. We then propose to drill approximately 6600 feet and set 8 and 5/8 inch casing on the bottom and cement it in two stages as indicated on this Exhibit. We then propose to perforate the Morrison water zones to treat, if necessary, and place the well on production as a water source. We anticipate a productivity of approximately eight thousand barrels of water per day.

Q Let's proceed to what has been marked Exhibit 4.

A Exhibit No. 4 is a casing program, casing and cementing program, which was utilized on the seven producing wells which we propose to convert for injection. We believe that these casing and cementing programs present in these wells will be satisfactory for injection wells, also, where only the Gallup A sand has been perforated, while other zones in the lower Gallup formation might respond to water injection. We propose initially to take proper steps to insure the water selectivity injected into the "A" Sand. We propose further to protect the casing by injecting through tubing and below a packer. We propose also to fill the annular space between the casing and tubing with water and treat this water to

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prevent corrosion of the casing and tubing.

Q There are some wells that are planned to be converted to injection wells that have perforations in zones other than the "A" sand?

A Yes.

Q Would you enumerate where those perforations are?

A In one well C No. 1, two additional intervals have been perforated. The one interval "A" is approximately 34 feet below the "A" sand and the other interval is approximately 42 above the "A" sand. And two additional wells in the upper zone has been perforated approximately 30 above the "A" sand.

Q What are the present plans for perforation in the well that lies below the A sand?

A For the lower perforations, we propose to plug the well back to point "A" above these perforations to prevent injection into that zone and the upper intervals which are perforated, we initially plan to set a packer below these perforations to inject into only the "A" sand.

Q Will you refer to your next Exhibit and explain that, please?

A Exhibit No. 5 is a data sheet which gives the pertinent reservoir rock and crude property. This sheet is fairly self-explanatory but we will mention a few of the most important items. We believe this to be a sand bar type stratigraphic trap and that the reservoir mechanism is a solution gas drive. The average porosity is approximately 14.1 per cent. The average permeability is approximately 121 millidarcies. The average water satur-



ation is approximately 20 per cent. The average net pay thickness in Area 1 is approximately 6.2 feet, and Area 2, 9.7 feet. I believe this covers most of it.

Q Will you refer to what has been marked Exhibit 6 and explain it, please?

A Exhibit No. 6 is past and predicted future performance curves for Project Area No. 1. These curves indicate a primary recovery of approximately 985,000 barrels and ultimate recovery of approximately 3,185,000 barrels, subtracting these results in a recovery of approximately 2,200,000 due to pressure maintenance operation. It is noted that our date to start injection has been shown as being in June of 1962. This is the latest date at which we anticipate we will start watering the ground and it will be that late only if bad weather conditions prevent our installation of the system.

Q What amount of time do you predict will be necessary to complete the pressure maintenance for this area?

A For this area we have estimated approximately nine and a half years from the inception of water injection.

Q Will you proceed to your next Exhibit and explain it, please?

A Exhibit No. 7 is past and predicted future performance in Project Area No. 2. These curves indicate a primary recovery of approximately 600,000 barrels and ultimate recovery of approximately 1,560,000 barrels. Subtracting these results in a recovery

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due to pressure maintenance operation of 960,000 barrels.

Q Is it anticipated that water will be injected at approximately the same date in this area as in area No. 1?

A Yes, sir, they will probably be the same.

Q What would be the estimated life of this pressure maintenance project?

A I believe the configuration of the injection wells that we anticipate for this area will allow a life of about seven and a half years from the time we started water injection.

Q What is the significance of the flattening of the secondary curve that occurs in the middle of 1963 to the first of 1964?

A This indicates that during this period it is believed that the capacity of these wells will be in excess of the top allowable times the number of wells in the area.

Q In your opinion, Mr. Burrows, are these pressure maintenance programs in the interests of conservation and the prevention of waste?

A Very definitely so, due the additional recovery that I stated for Project Area No. 2 of 960,000 barrels and the additional recovery of 2,200,000 barrels in Area No. 1, due to the pressure maintenance.

Q In your judgment, could the present productive rate of wells within this area be classified as being what is sometimes called a stripper state?

A In my judgment, it is not.

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Q Will you proceed to your next Exhibit and explain it, please?

A Exhibit No. 8 is a duplicate of the Commission's Order No. R2,026 authorizing Pan-American Petroleum Corporation to institute a Pressure Maintenance Project in the Horseshoe-Gallup Pool. We request that similar rules be provided for our Project Area in the Totah-Gallup Pool with the exceptions that we will note: first, we believe an obvious change should be made in places where reference is made to 40-acre proration unit and that 80-acre proration unit should be substituted. We have also presented the same gas compressibility versus reservoir curve which was presented by Pan-American Petroleum Corporation in their Application for a Pressure Maintenance Project in the Totah Pool and we have data which supports this curve, if necessary. The only additional comment I have is that we have no objection to allowing a producing well which is outside of the Project Area and directly and diagonally offsets a well inside the Project Area also having a maximum allowable equivalent to twice the top unit allowable as has been provided for a lease line well inside the project, which diagonally or directly offsets the well.

Q Your feeling there is that the project of correlative rights might require some sort of rule to give equal treatment to wells both inside and outside that are directly opposite each other?

A Yes, sir.

Q In that regard if the Commission should make a rule



objecting to Project Area Pan-American, not Totah Pool, is it your feeling that they should be identical within the Totah Pool?

A Yes.

Q What is the estimated injection rate of water in these project areas?

A In Area 1 we anticipate a total injectivity of approximately 4,000 barrels per day. On four or five wells this would be an average of 800 barrels per day, per well. In Project Area 2, the anticipated injectivity of approximately 2500 barrels per day of which would be 1250 barrels per day, per well.

Q What would be the range of injection pressure necessary to obtain this?

A We anticipate a surface pressure which will range from approximately 1700 to 1950 pounds due to the wide range of difference in elevation in this area in order that the bottom hole pressure may be approximately the same in all injection wells.

Q Do you have any additional comments to make in regard to this application as a whole?

A I'd like to make one comment, that this injection pattern which we have proposed here within being primary that a unitization of the entire Totah-Gallup Pool and that if it should turn out that there are more than one pressure magnet projectors or pressure maintenance carried out on a lease basis some amount of casing could possibly be necessitated on lease line injection wells to provide equitable injection on the lease line.

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Q Have all these Exhibits been prepared by you or under your supervision?

A Yes.

MR. SWANSON: At this time we would like to offer as Aztec's Exhibits, 1 through 8.

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

(Whereupon Aztec's Exhibits 1 through 8 admitted in evidence)

MR. SWANSON: This concludes our presentation of evidence in this Application.

CROSS EXAMINATION

BY MR. UTZ:

Q Mr. Burrows, do you have a reservoir temperature for this Pool --

A Yes, sir.

Q -- or do you recommend to use the same one that Pan-American uses?

A In their Totah, I believe 155 degrees is listed on Exhibit 5.

Q And your atmospheric pressure would be twelve pounds?

A Yes, sir, 12.01.

Q What would be your recommendation as to datum?

A Plus 200 feet.

Q Identical to Pan-American datum?



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A Yes, sir, I believe it is.

Q I believe you recommended the same factors be identical to Pan American?

A Yes, sir.

Q If I understand you correctly, you recommended that regardless of what the allowable situation was for each well, it would be identical to Pan-American's order entered in this Pool?

A Yes, sir.

MR. MORRIS: Along those lines, if I may interrupt Mr. Utz, Rule 10 as contained in the Horseshoe-Gallup Pool Rules do not correspond with the rules entered in the Pan-American case, in that each well within the project area which directly or diagonally offsets outside the project were limited to producing two times the top unit allowable and only that after they had experienced a substantial response to the water flooding. Now, is it still your proposal that the Rules to be adopted in this case for your area would be identical with those adopted in the Pan-American area?

A Yes, sir.

MR. SWANSON: Has an order been issued covering Pan American's Application?

MR. MORRIS: I believe that it has.

Q (By Mr. Utz) Mr. Burrows, referring to your Exhibit No. 6 and 7, particularly to the curves about 1961, I noticed that curve makes an upswing at that point, what is the reason for that?



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A On December, this curve is dropped down, due to the no flare order and its installation of compression equipment.

Q After all casing head gas is taken, you feel that current will come back up to where you projected to?

A Yes, sir.

Q Did I understand you to indicate that the Tenneco area in between these two areas which we heard today in Case 2484, is there a possibility of unitization in both of these areas?

A I believe there is a strong possibility that Project Area 2 will be unitized with Tenneco Company acreage and there could be a possibility that the entire area between and including, and also Project Area 1 would be unitized or left, the whole pool would be unitized.

MR. SWANSON: If I might interject, it is Aztec's hope that all the productivity within the limit of the Totah Oil Pool can be placed in one unit for pressure maintenance purposes. We do have to recognize that it may not be possible. We designed our Application with the hope of covering any of the three situations that we contemplate as being; first, that the whole field will be unitized; second, that there will be pressure maintenance projects conducted by Pan-American covering the areas northwest and southeast in the Totah Pool and the unit comprised of the remaining area will be formed under one or more operators. That may not eventuate, in which case we are confident that there will be units as we designated here, that in consisting of Project Area 1 and another one



consisting of Project Area 2 and the remaining production acreage went to that area.

Q (By Mr. Utz) Mr. Burrows, in the event this unitization is not possible, you would use the injection plan as recommended here in this case?

A We anticipate using one very similar but that there are some modifications that may be necessary along these lines.

Q If it is unitized, would you change your injection program?

A If the entire area is unitized, we believe that this injection pattern here is the one that we anticipate.

Q Even if it is unitized, you would inject along these lines anyway?

A Yes, sir, this is congruous with the installation of the whole field and that in other patterns which are proposed by Pan-American.

Q Well, this injection pattern as proposed does leave some pretty big gaps particularly in your Area No. 1, does it not?

A Well, it covers as much area as possible.

MR. SWANSON: Mr. Burrows, perhaps it would help in explaining this point if you could show Mr. Utz what we understand of Tenneco's injection wells, then on a field well basis, we will see how they are spaced.

MR. UTZ: I have that information platted here as to Tenneco's proposals.

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Q (By Mr. Utz) I notice that all these, yours and Tenneco's injection wells tend to try to protect loose lines in each case rather than using the so-called crystal pattern that Pan-American proposed on each end of the Pool?

A We believe this pattern, although it coincides with lease lines, is congruous with pressure maintenance operations of the whole field.

Q Would you add any injection wells, say, somewhere in the middle of Area 1 as proposed today?

A Possibly we would desire to convert additional wells in that area, yes, at a later date, after we determine our injectivity to a pretty good degree.

Q Do you think that you would have efficient sweep if you did not put these injection wells in the center of this area?

A Yes, we would believe that we would have an efficient sweep if we increase the life of the secondary lines.

Q If you don't put injection wells in the center of Area 1 then, you'd have to pump several locations until you reach the center wells, isn't that true?

A Yes, sir, as one row offsetting another row of producing wells next to the row of injection wells, high water shuts these in and continues to inject or convert these to injection wells

Q As the flood bank progressed then?

A Yes, sir.



MR. UTZ: Are there any other questions?

MR. VERITY: I have some questions.

CROSS EXAMINATION

BY MR. VERITY:

Q Do you have an opinion as to whether or not the injection of the water in the two project areas will damage production from any wells outside the project area or will it reduce production and ultimate recovery from any of the wells outside?

A We do not anticipate that it will damage.

Q You represent to the Commission that the wells of Southwest Production Company in the south half of Section north, 13 west will in no way be damaged by your injection of water into the formation?

A No, sir, we believe if there are flood built pressure maintenance programs, they probably will increase their production.

MR. VERITY: That is all.

CROSS EXAMINATION

BY MR. IRBY:

Q I didn't have a copy of your Exhibit 3, and I am interested in your water production well. What was the size of that surface casing you were to use there?

A 13 3/8 inch.

Q And what was the cement on that, circulation to the surface?

A Yes.



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Q And 200 foot string?

A Yes, sir.

Q And on your water production string, what was the length of that?

A 6600 feet.

Q And the size?

A 8 and 5/8 inch.

Q And you said you were going to cement that in two stages, would you tell me what the final result will be?

A The final result will be that the first stage will be cemented a total depth to approximately the top of the Gallup formation, the second stage will be cemented to a stage collar approximately 100 feet below the Pictured Cliff to the surface.

Q Do you know what the static level of that water is?

A No, sir.

Q You don't know what your pumping level would be either?

A No, sir, we anticipate that it will be approximately 2500 feet.

Q Do you have an analysis of this water?

A Yes, sir, I believe an analysis that was run on water recovered from a drill stem test, I think it was 22 G, it was within this.

Q Would you send me a copy of that analysis if I give you my address?

A Yes, sir.

Q It is anticipated that any of these other proposed secondary recovery plans will use water from this well, for example



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Tenneco, which would be in between?

A I believe there is a possibility that some of this water might be utilized on it in that area.

Q Do you anticipate the well will furnish sufficient water for your proposal and others?

A We anticipate that it will furnish the excess of quantity required by the wells we have proposed.

MR. IRBY: Thank you.

MR. UTZ: Are there any other questions?

MR. SWANSON: I have one point I would like to ask Mr. Burrows.

REDIRECT EXAMINATION

BY MR. SWANSON:

Q You said, I believe, that this pattern of injection wells has a transferred line pipe drive, did I understand you to testify that, in your opinion, probably ultimately more oil would be recovered in this area than if injection pattern utilizing injection to increase the wells only was used?

A Yes, sir, we believe this will spread out the pattern covered, flushed by water to some extent, and give some additional recovery, if possible.

MR. UTZ: Providing you follow up the, back up the structure?

A Yes.

MR. MORRIS: I have one question.



CROSS EXAMINATION

BY MR. MORRIS:

Q Mr. Burrows, in computing your primary recovery, what it would have been if the pressure maintenance project had not been instituted, what recovery factor did you use in this Pool?

A I believe it is approximately 12 1/2 per cent of the oil factor.

MR. MORRIS: Thank you.

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

(Witness excused.)

MR. UTZ: Are there any statements in this case?

MR. VERITY: Southwest Production has no objection to the granting of the application particularly in lieu of their agreement to accept the same provisions with regard to lease line wells being limited to a top unit allowable.

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

The hearing will recess until 1:30 o'clock P.M.

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STATE OF NEW MEXICO)
COUNTY OF BERNALILLO) ss

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

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I do hereby certify that the foregoing is a correct transcript of the proceedings in the hearing of Case No. 2483 heard by me on Jan. 24, 1962

Thomas G. [Signature]
Examiner
New Mexico Oil Conservation Commission

