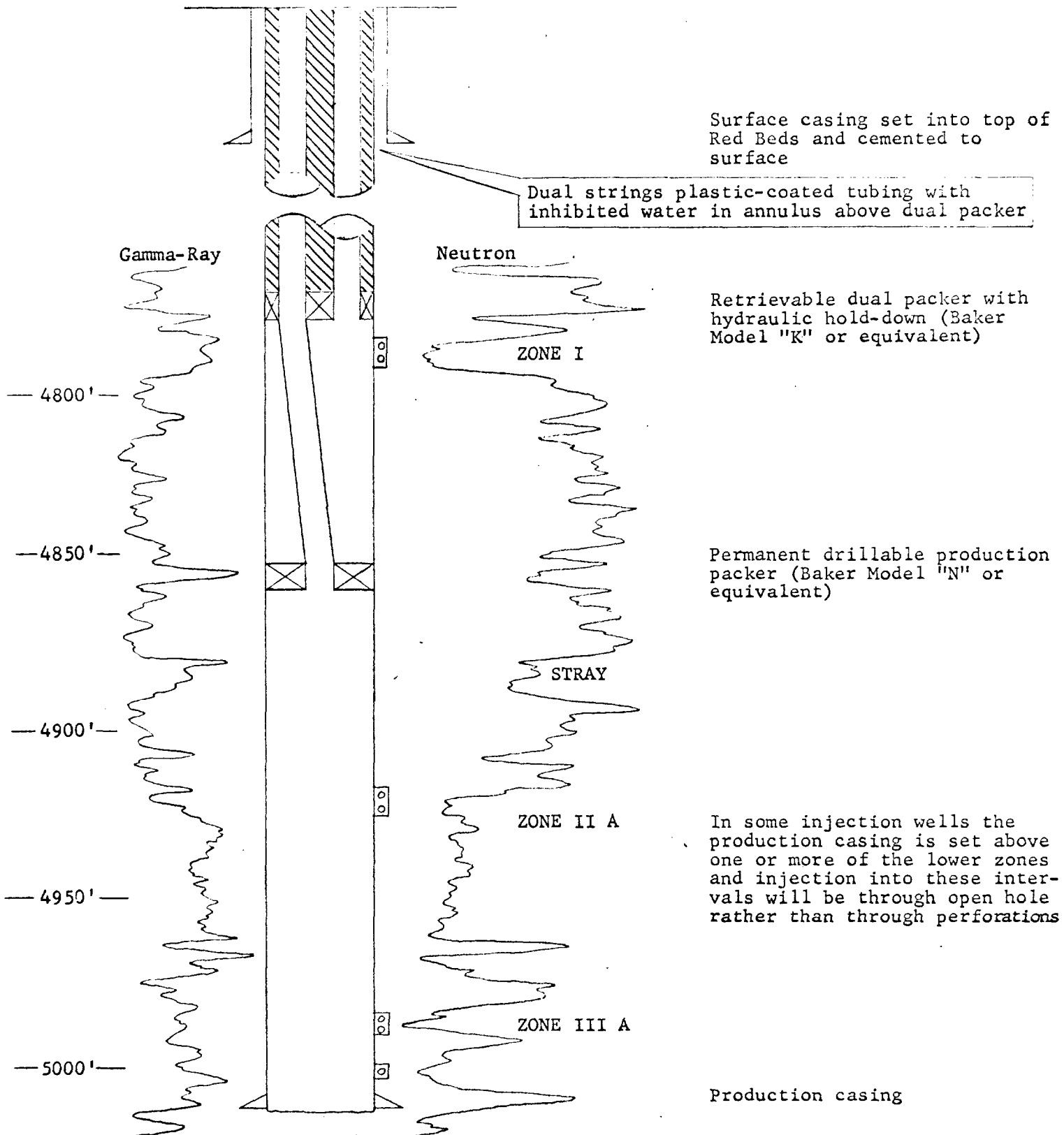


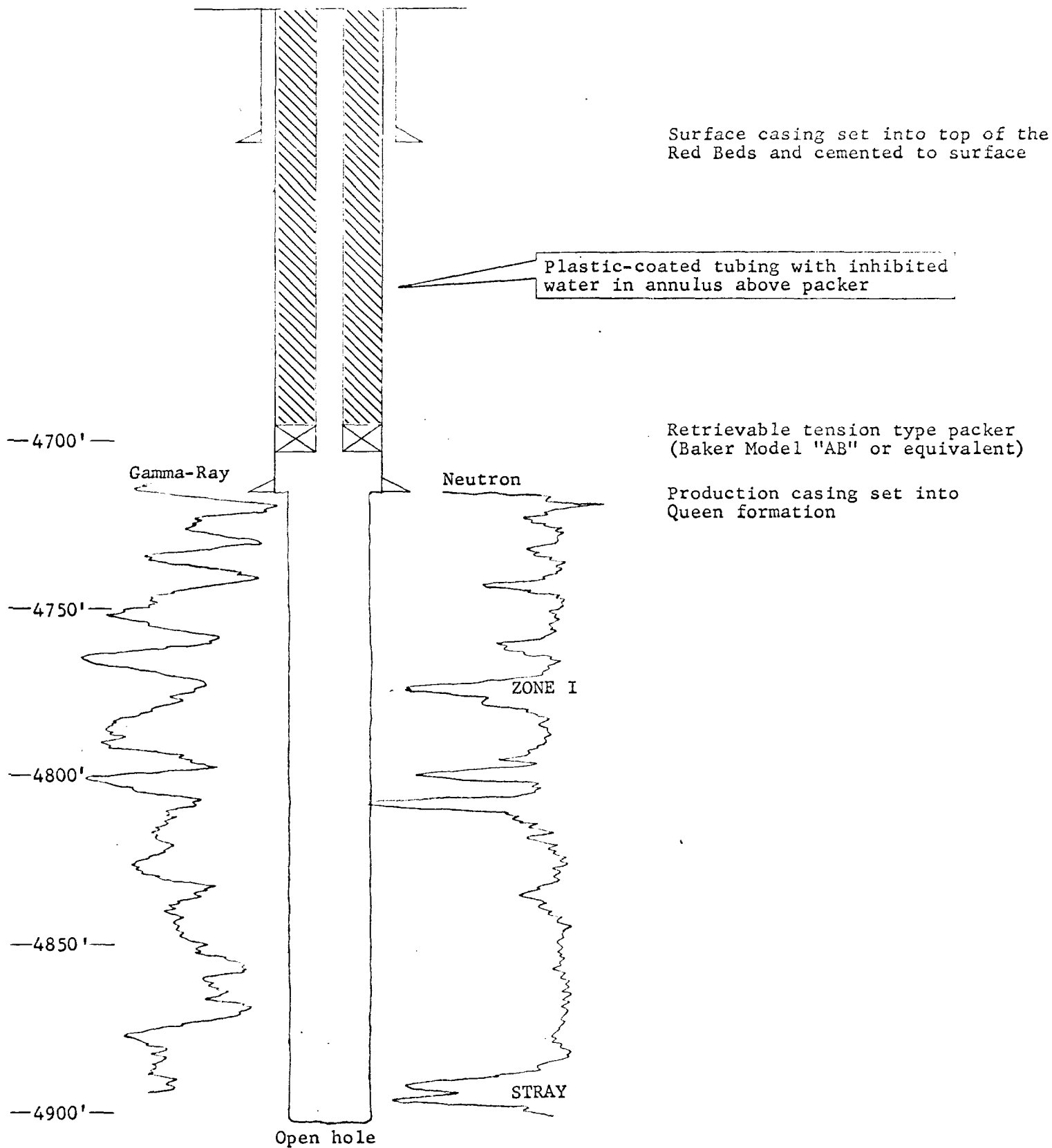
DIAGRAMMATIC SKETCH
TYPICAL DUAL INJECTION WELL

West Pearl Queen Unit
Lea County, New Mexico



DIAGRAMMATIC SKETCH
TYPICAL SINGLE INJECTION WELL

West Pearl Queen Unit
Lea County, New Mexico



INJECTION WELL DETAIL
TWO TUBING STRINGS IN ALL DUAL WELLS
WEST PEARL QUEEN UNIT
LEA COUNTY, NEW MEXICO

SECTION I
CASING AND CEMENT

INJECTION WELL	UNIT DESIG- NATION	SIZE (INCHES)	SURFACE CASING			TOP CEMENT (FEET)	SIZE (INCHES)	DEPTH (FEET)	PRODUCTION CASING			ADDITIONAL CEMENTED INTERVALS #
			DEPTH (FEET)	CEMENT (SACKS)	CEMENT (FEET)				CEMENT (SACKS)	CEMENT (FEET)	*	
HAMON ST. E-8182	NO. 3 NO. 4	28- 4 28- 6	8- 5/8 8- 5/8	327 326	300 300	Surface Surface	4-1/2 4-1/2	4991 4961	350 350	3423 3393	E E	
CABOT ST. NEW MEX. "G"	NO. 5 NO. 1 NO. 4 NO. 7	28-10 28-12 28-14 28-16	8- 5/8 8- 5/8 8- 5/8 8- 5/8	304 313 302 305	300 300 300 300	Surface Surface Surface Surface	5-1/2 5-1/2 5-1/2 4-1/2	4931 4904 4919 4932	200 300 200 200	3753 3180 3920 4036	E E E E	
INMAN SUPERIOR-FED.	NO. 2	29- 2	8- 5/8	328	265	Surface	4-1/2	5049	240	2980	E	
SHELL ST. "PK"	NO. 2	29- 4	8- 5/8	96	85	Surface	5-1/2	5145	200	3967	E	
CACTUS PARKS	NO. 1	29- 6	13-3/8	100	80	Surface	7	4932	150	3061	E	
SKELLY HOBBS "J" ST.	NO. 1	29- 8	13-3/8	88	80	Surface	5-1/4	4920	300	3153	E	
GULF LEA ST. "TH"	NO. 1 NO. 4	29-10 29-12	8- 5/8 8- 5/8	308 144	300 100	Surface Surface	4-1/2 4-1/2	5009 4974	2050 250	795 4078	S E	1914-1864
CACTUS GULF ST.	NO. 4 NO. 2	29-14 29-16	13-3/8 13-3/8	100 90	50 80	Surface Surface	5-1/2 5-1/2	4965 4939	350 300	3026 3277	E E	
GULF LEA ST. "AP"	NO. 3 NO. 1	30- 8 30-16	8- 5/8 8- 5/8	143 137	100 100	Surface Surface	4-1/2 4-1/2	5075 4981	250 250	3597 4085	E E	1875-1825 1924-1874
CACTUS AZTEC ST.	NO. 2 NO. 6 NO. 4 NO. 7	31- 2 31- 6 31- 8 31-10	13-3/8 13-3/8 13-3/8 13-3/8	107 108 102 105	100 90 100 100	Surface Surface Surface Surface	7 7 7 5-1/2	4832 4714 4874 4714	125 150 150 150	3273 2843 3003 3300	E E E E	
GULF LEA ST. "AQ"	NO. 2 NO. 4 NO. 5 NO. 7	32- 2 32- 4 32- 6 32- 8	8- 5/8 8- 5/8 8- 5/8 8- 5/8	108 101 130 145	60 100 100 100	Surface Surface Surface Surface	4-1/2 4-1/2 4-1/2 4-1/2	4959 4948 4936 4979	250 250 250 250	4144 4063 4052 4081	E E E E	1895-1845 1935-1885 1920-1870 1909-1859
PHILLIPS NEW MEX. "C"	NO. 1 NO. 3	32-10 33- 2	8- 5/8 8- 5/8	144 327	145 300	Surface Surface	5-1/2 4-1/2	5060 4932	300 1850	3293 465	E S	
GULF LEA ST. "BG"	NO. 1 NO. 6 NO. 8	33- 4 33- 6 33- 8	8- 5/8 8- 5/8 8- 5/8	349 146 141	300 100 100	Surface Surface Surface	4-1/2 4-1/2 4-1/2	4969 4965 5005	1800 250 250	415 3487 3527	S E E	1882-1833 1896-1846
GULF LEA ST. "AR"	NO. 4	33-10	8- 5/8	140	100	Surface	4-1/2	5011	250	3533	E	1865-1815

* E - Estimated
Two-stage cementing tool set at lower depth and 50 sacks cement spotted at top of salt and anhydrite section.

INJECTION WELL DETAIL
TWO TUBING STRINGS IN ALL DUAL WELLS
WEST PEARL QUEEN UNIT
LEA COUNTY, NEW MEXICO

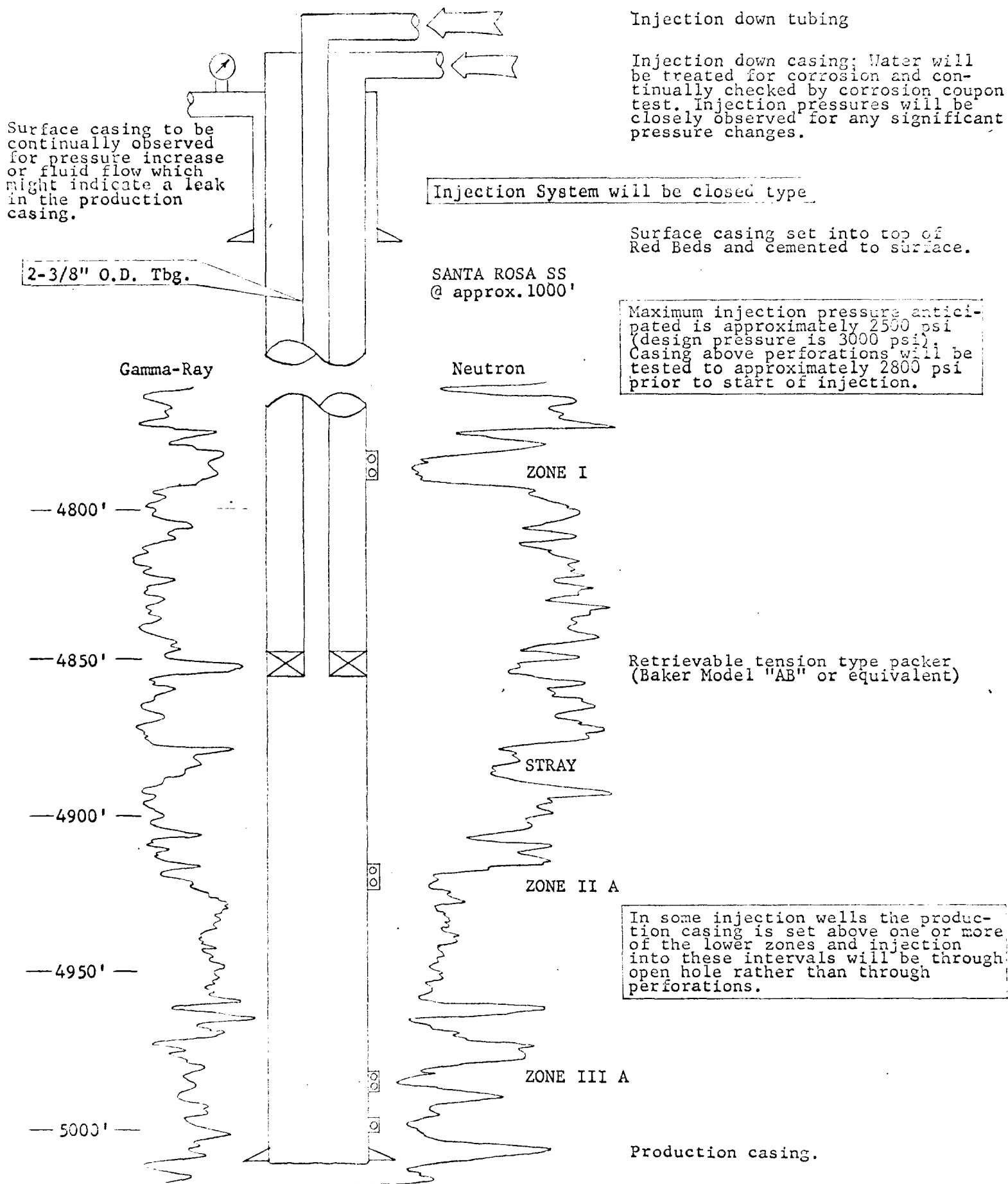
SECTION II
TUBING, PACKERS AND PERFORATIONS

INJECTION WELL	UNIT DESIGNATION	GROSS PERF. AND/OR OPEN HOLE INTERVALS	UPPER INJECTION INTERVAL				GROSS PERF. AND/OR OPEN HOLE INTERVALS	LOWER INJECTION INTERVAL			
			TUBING		PACKER	DEPTH		TUBING		PACKER	DEPTH
			SIZE (OD)	DEPTH				SIZE (OD)	DEPTH		
HAMON ST. E-8182	NO.3	4762-4772	1.660	4700	RD W/HH	4700	4880-4910	1.660	4850	Permanent	4850
	NO.4	4700-4710	1.660	4650	RD W/HH	4650	4814-4895	1.660	4750	Permanent	4750
CABOT ST. NEW MEX. "G"	NO.5	4710-4720	2.063	4650	RD W/HH	4650	4826-4910	2.063	4775	Permanent	4775
	NO.1	4733-4747	2.063	4700	RD W/HH	4700	4860-4946	2.063	4800	Permanent	4800
	NO.4	4774-4786	2.063	4725	RD W/HH	4725	4834-4949	2.063	4825	Permanent	4825
	NO.7	4726-4736	1.660	4675	RD W/HH	4675	4842-4851	1.660	4800	Permanent	4800
INMAN SUPERIOR-FED.	NO.2	4814-4820	1.660	4775	RD W/HH	4775	4934-5008	1.660	4900	Permanent	4900
SHELL STATE "PK"	NO.2	4870-4880	2.063	4825	RD W/HH	4825	5026-5054	2.063	4950	Permanent	4950
CACTUS PARKS	NO.1	4810-4820	2.375	4750	RD W/HH	4750	4932-5030	2.375	4875	Permanent	4875
SKELLY HOBBS "J" ST.	NO.1	4770-4785	2.063	4725	RD W/HH	4725	4898-5000	2.063	4850	Permanent	4850
GULF LEA STATE "IH"	NO.1	4782-4790	1.660	4750	RD W/HH	4750	4914-5000	1.660	4850	Permanent	4850
	NO.4	4819-4821	1.660	4775	RD W/HH	4775	4957-5050	1.660	4900	Permanent	4900
CACTUS GULF ST. "A"	NO.4	4775-4790	2.063	4725	RD W/HH	4725	4910-4993	2.063	4850	Permanent	4850
	NO.2	4746-4761	2.063	4700	RD W/HH	4700	4888-4962	2.063	4825	Permanent	4825
GULF LEA STATE "AP"	NO.3	4848-4850	1.660	4800	RD W/HH	4800	4927-5037	1.660	4900	Permanent	4900
	NO.1	4803-4805	1.660	4750	RD W/HH	4750	4947-5060	1.660	4900	Permanent	4900
CACTUS AZTEC ST.	NO.2	4790-4800	2.375	4750	RD W/HH	4750	4835-5030	2.375	4825	Permanent	4825
	NO.6	4714-4900	2.375	4700	RS Tension	4700	Commingled Injection w/Upper Interval in Open Hole.	2.375	4825	Permanent	4825
	NO.4	4784-4790	2.375	4750	RD W/HH	4750					
	NO.7	4767-4772	2.375	4700	RD W/HH	4700					
GULF LEA-STATE "AQ"	NO.2	4774-4776	1.660	4725	RD W/HH	4725	4924-5015	1.660	4850	Permanent	4850
	NO.4	4785-4787	1.660	4725	RD W/HH	4725	4929-5020	1.660	4850	Permanent	4850
	NO.5	4786-4788	1.660	4725	RD W/HH	4725	4884-5025	1.660	4825	Permanent	4825
	NO.7	4802-4804	1.660	4750	RD W/HH	4750	4949-5040	1.660	4875	Permanent	4875
	NO.1	4790-4806	2.063	4750	RD W/HH	4750	4898-5022	2.063	4850	Permanent	4850
GULF LEA ST. "BG"	NO.3	4737-4741	1.660	4700	RD W/HH	4700	4881-4975	1.660	4800	Permanent	4800
	NO.1	4773-4785	1.660	4725	RD W/HH	4725	4920-5010	1.660	4850	Permanent	4850
	NO.6	4767-4782	1.660	4700	RD W/HH	4700	4927-5020	1.660	4850	Permanent	4850
	NO.8	4750-4752	1.660	4700	RD W/HH	4700	4890-4962	1.660	4800	Permanent	4800
GULF LEA ST. "AR"	NO.4	4776-4778	1.660	4725	RD W/HH	4725	4876-4998	1.660	4825	Permanent	4825

RD W/HH -Retrievable Dual with Hydraulic Hold-down Similar to Baker Model "K"
RS Tension -Retrievable Single Tension Type Packer Similar to Baker Model "AB"
Permanent -Drillable Packer Similar to Baker Model "N" (Tubing Set)

DIAGRAMMATIC SKETCH
Typical Dual Injection Well

West Pearl Queen Unit
Lea County, New Mexico



INJECTION WELL DETAIL
DUALS EQUIPPED WITH SINGLE TUBING STRING
WEST PEARL, QUEEN UNIT
LEA COUNTY, NEW MEXICO

INJECTION WELL	UNIT DESIGNATION	SIZE (INCHES)	SURFACE CASING			PRODUCTION CASING			ADDITIONAL CEMENTED INTERVALS #	INJECTION INTERVALS AND EQUIPMENT SETTING DEPTHS		
			DEPTH (FEET)	CEMENT (SACKS)	TOP CEMENT (FEET)	SIZE (INCHES)	DEPTH (FEET)	CEMENT (SACKS)	TOP CEMENT (FEET) *	GROSS PERFORATED AND/OR EQUIPMENT INTERVALS	APPROXIMATE TUBING AND PACKER DEPTH #	
HAMON ST. E-8182	NO. 3	28-4	327	300	Surface	4-1/2	4991	350	3423	4762-4772	4880-4910	4850
	NO. 4	28-6	326	300	Surface	4-1/2	4961	350	3393	4700-4710	4814-4895	4750
CABOT ST. NEW MEX. "G"	NO. 5	28-10	304	300	Surface	5-1/2	4931	200	3753	4710-4720	4826-4910	4775
	NO. 1	28-12	313	300	Surface	5-1/2	4904	300	3180	4733-4747	4860-4946	4800
	NO. 4	28-14	302	300	Surface	5-1/2	4919	200	3920	4774-4786	4854-4949	4825
	NO. 7	28-16	305	300	Surface	4-1/2	4932	200	4036	4726-4736	4842-4851	4800
INMAN SUPERIOR-FED.	NO. 2	29-2	328	265	Surface	4-1/2	5049	240	2980	4814-4820	4934-5008	4900
SHELL ST. "PK"	NO. 2	29-4	96	85	Surface	5-1/2	5145	200	3967	4870-4880	5026-5059	4950
CACTUS PARKS	NO. 1	29-6	100	80	Surface	7	4932	150	3061	4810-4820	4932-5030	4875
SKELLY HOBBS "J" ST.	NO. 1	29-8	88	80	Surface	5-1/4	4920	300	3153	4770-4785	4898-5000	4850
GULF LEA ST. "IH"	NO. 1	29-10	308	300	Surface	4-1/2	5009	2050	795	4782-4790	4914-5000	4850
	NO. 4	29-12	144	100	Surface	4-1/2	4974	250	4078	4819-4821	4957-5050	4900
CACTUS GULF ST.	NO. 4	29-14	100	50	Surface	5-1/2	4965	350	3026	4775-4790	4910-4993	4850
	NO. 2	29-16	90	80	Surface	5-1/2	4939	300	3277	4746-4761	4888-4962	4825
GULF LEA ST. "AP"	NO. 3	30-8	143	100	Surface	4-1/2	5075	250	3597	4848-4850	4927-5037	4900
	NO. 1	30-16	137	100	Surface	4-1/2	4981	250	4085	4803-4805	4947-5060	4900
CACTUS AZTEC ST.	NO. 2	31-2	107	100	Surface	7	4832	125	3273	4790-4800	4835-5030	4820
	NO. 6	31-6	108	90	Surface	7	4714	150	2843	4714-4900	NOT DUAL	4700
	NO. 4	31-8	102	100	Surface	7	4874	150	3003	4784-4790	4877-4930	4825
	NO. 7	31-10	105	100	Surface	5-1/2	4714	150	3300	4767-4772	4880-4997	4825
						Liner	4984	40	4144			
GULF LEA ST. "AQ"	NO. 2	32-2	108	60	Surface	4-1/2	4959	250	4063	4774-4776	4924-5015	4850
	NO. 4	32-4	101	100	Surface	4-1/2	4948	250	4052	4785-4787	4929-5020	4850
	NO. 5	32-6	130	100	Surface	4-1/2	4936	250	4040	4786-4788	4884-5025	4825
	NO. 7	32-8	145	100	Surface	4-1/2	4979	250	4081	4802-4804	4949-5040	4875
PHILLIPS NEW MEX. "C"	NO. 1	32-10	144	145	Surface	5-1/2	5060	300	3293	4790-4806	4898-5022	4850
GULF LEA ST. "BG"	NO. 3	33-2	327	300	Surface	4-1/2	4932	1850	465	4737-4741	4881-4975	4800
	NO. 1	33-4	349	300	Surface	4-1/2	4969	1800	415	4773-4785	4920-5010	4850
	NO. 6	33-6	146	100	Surface	4-1/2	4965	250	3487	4767-4782	4927-5020	4850
	NO. 8	33-8	141	100	Surface	4-1/2	5005	250	3527	4750-4752	4890-4962	4800
GULF LEA ST. "AR"	NO. 4	33-10	140	100	Surface	4-1/2	5011	250	3533	4776-4778	4876-4998	4825

* E - Estimated
Two-stage cementing tool set at lower depth and 50 sacks cement spotted at top of sale and anhydrite section.
§ 2-3/8" OD Tubing and retrievable tension type packer (Baker Model "AB" or equivalent).

DATA FOR
PROPOSED WEST PEARL QUEEN UNIT
OIL CONSERVATION COMMISSION HEARING
CASE NUMBER 3066

I. GENERAL

Operator Gulf Oil Corporation Date June 10, 1964
Project West Pearl Queen Unit Waterflood
Number of Wells 63 Unit and Project Area 2,520 Acres
Location Township 19 South, Range 35 East, Lea County, New Mexico,
approximately 20 miles southwest of Hobbs.
Pool Pearl Queen Reservoir Queen
Other Waterflood Projects in Pool East Pearl Queen Unit Project,
operated by Shell Oil Company.

II. RESERVOIR INFORMATION, PROJECT AREA

A. Geology

1. Reservoir Depth Approximately 4,900 feet
2. Productive Zones Series of sandstone stringers within a 200-
foot gross interval of the Queen formation. (Exhibits No. 4 and
6)
3. Maximum Net Pay Per Zone 8 to 14 feet
4. Stratigraphy Gray, fine-grained, dolomitic and anhydritic
sandstone rocks rhythmically interbedded with gray to tan, dense
anhydritic and shaly dolomite rocks.
5. Structure Northeast-southwest trending monoclinal nose plunging
to the southwest at 50 feet per mile. (Exhibit No. 5)
6. Reservoir Limits Oil-water contact defines down-dip productive
limit and porosity and permeability deterioration defines up-dip
productive limit of each productive zone.

B. Rock and Fluid Properties

1. Average Porosity 16.7% Range 10-22.8%

2. Average Permeability 22.8 md. Range 1-244 md.
3. Original Reservoir Pressure 1776 psi ✓
4. Bubble Point Pressure 1400 psi ✓
5. Reservoir Temperature 100° F. ✓
6. Formation Volume Factor 1.176 @ original conditions ✓
7. Oil Gravity 35° API ✓

III. OPERATIONS

A. Primary (Exhibit No. 2)

1. Date of First Completion January 1, 1958
2. Total Number Wells Drilled 63, including 4 dry holes in
the Queen formation.
3. Cumulative Production, 4-1-64 2,198,858 barrels ✓
4. Average Daily Oil Production Per Well, March, 1964 9 barrels
5. Drive Mechanism Solution-gas, or depletion type
6. State of Depletion Late. Reservoir is approximately 80%
depleted of primary oil reserves.
7. Estimated Oil Recovery Through Primary Operations 2,686,000 ✓
barrels, or 11.8% of original oil-in-place.

B. Waterflood

1. Pattern 80-acre five-spot (Exhibit No. 1)
2. Number of Injection Wells 30
3. Estimated Initial Injection Rate 500 barrels per day per well
4. Estimated Injection Pressures Initially 1500 to 2000 psi
increasing to a maximum of 2500 psi during life of flood.

5. Plan of Injection The uppermost pay, Zone I, will be isolated from the lower zones through use of packers. Water will then be dually injected in all but one injection well either through two strings of coated tubing (Exhibits 8 and 9) or simultaneously down tubing and the tubing-casing annulus (Exhibits 10 and 11).
6. Source of Injection Water Shallow Ogallala wells located in Section 3-19S-36E, approximately 6 miles east of the project area. Water will be shared with East Pearl Queen Unit.
7. Type of Water Fresh. Produced formation water will be mixed with Ogallala water and injected into reservoir during latter stages of project.
8. Treatment of Water None is initially anticipated if injection is down dual strings of coated tubing; however, if injection is down uncoated tubing and the tubing-casing annulus, the Ogallala water will be treated to reduce oxygen content to 0.20 ppm. When recycled water is used additional corrosion treatment of the water will be initiated if necessary (See Exhibits 12 and 13).

IV. ANTICIPATED RESULTS OF WATERFLOOD PROJECT

- A. Secondary Recovery, Per Cent of Primary 150%
- B. Additional Oil Recovery 4,029,000 barrels
- C. Increase in Life of Unit Wells 6 years

V. SUMMARY AND RECOMMENDATIONS

- A. The Pearl Queen Pool produces by solution-gas-drive and as a result it is estimated that only 11.8% of the original oil-in-place beneath the West Pearl Queen Unit will be recovered through primary operations. Large amounts of oil will remain unrecovered unless a secondary recovery project is installed to increase recovery.
- B. This portion of the Pearl Queen Pool is 80% depleted and the average daily oil production per well is only 9 barrels.
- C. Engineering and geological studies indicate the Queen reservoir under the project area can be successfully waterflooded, thus increasing the life and ultimate recovery per well in the West Pearl Queen Unit.
- D. Therefore, Gulf, in association with the other operators, concludes that unitization of the 63 wells and 2,520 acres outlined in Exhibit No. 1 for the purpose of waterflooding the Queen formation is in the best interest of conservation and prevention of waste.
- E. Gulf, as West Pearl Queen Unit Operator, respectfully requests that the Oil Conservation Commission approve the proposed waterflood project and grant a Unit oil allowable for the 59 producing wells in the waterflood area as provided in Rule 701 (E), Subparagraph 3 of the Commission Rules and Regulations.