UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

RECONNAISSANCE OF GROUND-WATER DEVELOPMENT IN THE FORT STOCKTON AREA, PECOS COUNTY, TEXAS

By

G. L. Audsley, Hydraulic Engineer
United States Geological Survey

Prepared for the Bureau of Reclamation,
United States Department of the Interior

September 1956

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INTRODUCTION

This report was prepared by the U. S. Geological Survey for the U. S. Bureau of Reclamation as part of the Bureau's overall investigation of the water resources of the Fort Stockton area. The investigation for the report was carried on from December 1955 to May 1956 and consisted of a reconnaissance of ground-water pumping in the Fort Stockton area and a determination of the effect of the pumping on water levels in the area. Information was gathered on five phases: (1) the quantity of water being pumped for irrigation from the Cretaceous formations in the Leon, Comanche, Six Shooter, and Coyanosa watersheds; (2) the effect of this pumping on artesian pressures; (3) the municipal supply of the city of Fort Stockton; (4) the quality of the ground water pumped from the post-Permian formations; and (5) the quantity and quality of water developed from the Rustler limestone of Permian age, and the possibility of future development of the Rustler. The Fort Stockton area, as used in this report, includes only the land south, southwest, and west of the city of Fort Stockton (fig. 1). Some additional data collected in the Comanche Creek watershed north of Fort Stockton are included with the tabular data in this report. The irrigated area in the Comanche Creek watershed directly south of Fort Stockton is included in the discussion of the Leon watershed, and the discussion of the Coyanosa watershed includes developments in the area of upper and middle Coyanosa Creek and the Hovey area.

Previous investigations in the Fort Stockton area include geologic mapping near Fort Stockton by Adkins (1927), an investigation of the ground-water resources of the area by Dennis and Lang (1941) and Lang (1942), and an inventory of wells and springs in the northern two-thirds of Pecos County by Dante (1947).

Lang (1942, p. 3) describes the geologic formations as follows:

> Lower Cretaceous rocks underlie all of Pecos County ... Where they are not exposed at the surface the rocks are usually mantled by a thin veneer of alluvial deposits. The basal sands of the Trinity group are the most widespread source of potable ground-water supplies in the Fort Stockton area. Beneath the basal Cretaceous sands are red beds of Triassic and Permian age, which usually carries highly mineralized waters in areas where they are several hundred feet below the surface.

Cavernous limestones of Cretaceous age overlie the Trinity group. Water from the Trinity group is believed to enter the limestones through fractures and solution caverns. Some wells obtain as much as 3,000 gallons per minute from

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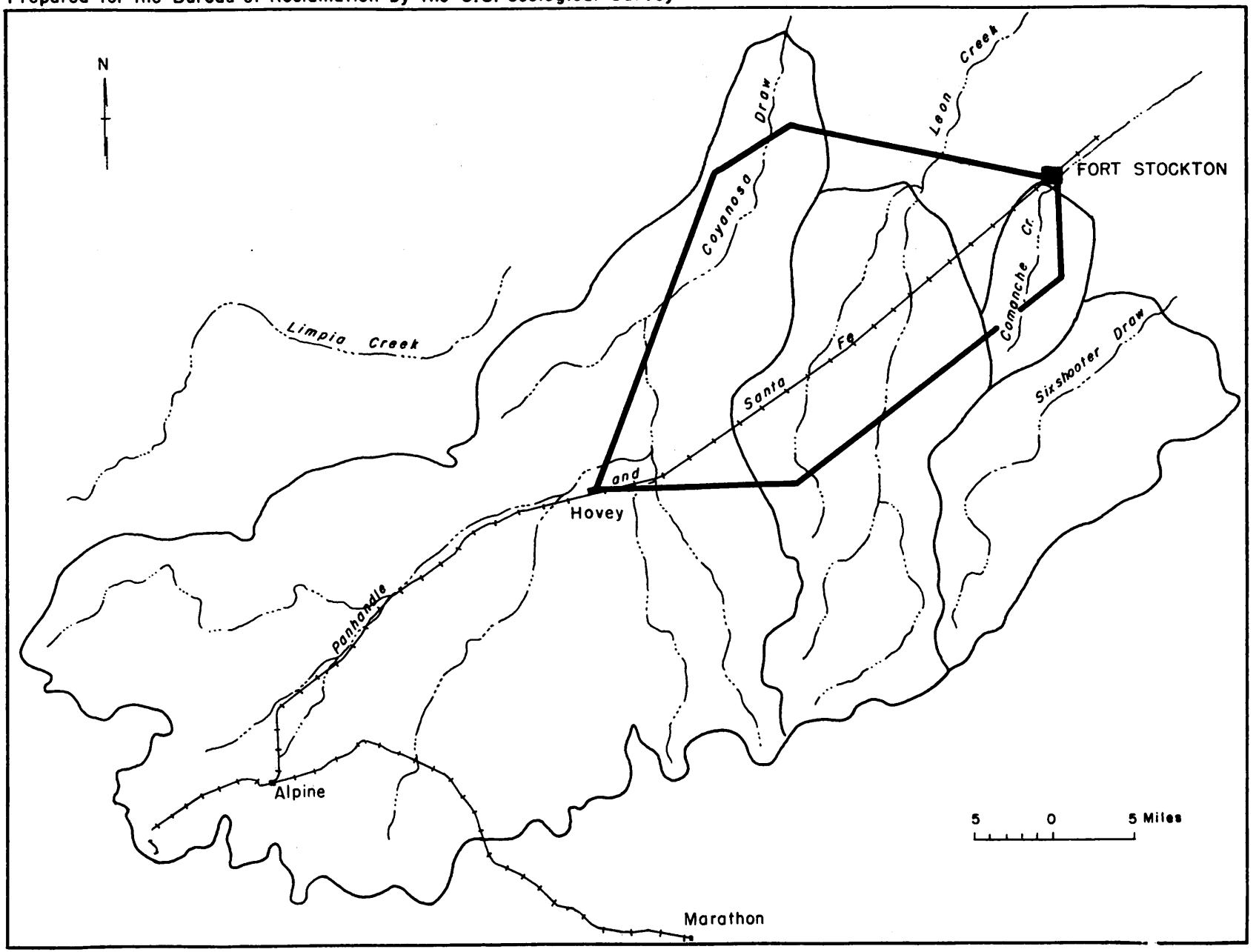

FIGURE 1.- Index map showing location of Fort Stockton area, Texas.

caverns in the limestone, which are reported to be as much as 8 feet across. Lang (1942, p. 3) says further:

> The direction of dip of the Cretaceous rocks in western Pecos County is easterly; in the vicinity of Twelve Mile Mesa, southwest of Fort Stockton, it is northeasterly; and around Sierra Madera, south of Fort Stockton, it is northerly. It thus appears that Fort Stockton is located in a scoop-like feature in the Cretaceous rocks with the open end of the scoop pointing approximately northeast. The catchment areas for the aquifers that serve the Fort Stockton area must be in western Pecos County, in the vicinities of Twelve Mile Mesa and Chancellor, and around Sierra Madera and perhaps in the extreme northern part of Brewster County, where the basal sandstones and the porous limestones crop out. By traveling in these directions from Fort Stockton one should find ground water of increasingly better quality as the areas of intake are approached.

Adkins (1927) says:

> The catchment area of the basal Cretaceous sands is located around the Sierra Madera (elevation about 3,800 feet), in an area south and southwest of Belding (elevation 3,200-3,300 feet), and in Reeves County north of the Herenshon well (elevations of around 3,200 feet). The total extent of this outcrop has not yet been measured, but is probably less than 50 square miles in this vicinity. From the two localities first named, the rocks dip north to northeast towards the Fort Stockton quadrangle, and from the Herenshon well, they dip in a general easterly direction.

PUMPAGE OF GROUND WATER

Records for 162 wells in the vicinity of Fort Stockton are listed in table 5 and the locations of the wells are shown on plate 1. Table 6 gives drillers' and some geologists' logs for some of the wells.

No water for irrigation is being withdrawn from the Six Shooter watershed in the Fort Stockton area. The total quantity of water being pumped from the Leon and Coyanosa watersheds was estimated from cotton acreages, well yields, rate of fuel consumption of pump engines, and total fuel consumption in 1955. Almost all the water pumped for irrigation in the Leon and Coyanosa watersheds was used for the irrigation of cotton. Hay or sorghum is planted to establish acreage allotments, but the quantity of water pumped for irrigation of hay and sorghum is negligible. Three farms were selected as representative of the two watersheds to determine the amount of water being pumped per acre of cotton.

In 1955 the only irrigated crop on farm A was cotton, which was irrigated from wells E-77 and E-78. The yields of both wells were measured, and the corresponding rates of consumption of natural gas by the engines were determined. The following calculations were made to determine the quantity of water pumped per unit of fuel consumed and the quantity of water pumped during 1955.

Well	Rate of fuel consumption (cubic feet per minute)	Measured yield (gpm)
E-77	15.8	1,980
E-78	17.5	2,280

E-77 $\dfrac{1{,}980 \ \frac{\text{gal}}{\text{min}}}{15.8 \ \frac{\text{ft}^3}{\text{min}}} = 125 \ \dfrac{\text{gal. of water}}{\text{ft}^3 \text{ nat. gas}}$

E-78 $\dfrac{2{,}280 \ \frac{\text{gal}}{\text{min}}}{17.5 \ \frac{\text{ft}^3}{\text{min}}} = 130 \ \dfrac{\text{gal. of water}}{\text{ft}^3 \text{ nat. gas}}$

Total natural gas consumption in 1955 for both wells, according to the meter, was 6,743,600 cubic feet. The wells used approximately the same amount of fuel so the average rate of the two wells may be used.

Average $\dfrac{125 + 130}{2} = 127 \ \dfrac{\text{gal. of water}}{\text{ft}^3 \text{ nat. gas}}$

$$\frac{6{,}743{,}600 \text{ ft}^3 \times 127 \ \frac{\text{gal}}{\text{ft}^3}}{325{,}851 \ \frac{\text{gal}}{\text{acre-feet}}} = 2{,}630 \text{ acre-feet of water pumped in 1955}$$

In 1955 Farm B irrigated 92 acres of cotton and 50 acres of hay from well E-76. It is estimated that 20 percent of the water was used to irrigate the hay.

Well	Rate of fuel consumption (cubic feet per minute)	Measured yield (gpm)
E-76	13.3	1,670

$$\frac{1{,}670 \ \frac{\text{gal}}{\text{min}}}{13.3 \ \frac{\text{ft}^3}{\text{min}}} = 125 \ \frac{\text{gal. of water}}{\text{ft}^3 \text{ nat. gas}}$$

Total natural gas consumption in 1955 on farm B was 2,692,300 cubic feet, according to the meter.

2,692,300 x .80 = 2,153,840 ft^3 of nat. gas used to pump water for cotton.

$$\frac{2{,}153{,}840 \text{ ft}^3 \times 125 \ \frac{\text{gal}}{\text{ft}^3}}{325{,}851 \ \frac{\text{gal}}{\text{acre-feet}}} = 830 \text{ acre-feet of water pumped in 1955.}$$

Farm C irrigated 130 acres of cotton in 1955 from well E-79. No other crop was irrigated.

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Farm C irrigated 130 acres of cotton in 1955 from well E-79. No other crop was irrigated.

Well	Rate of fuel consumption (cubic feet per minute)	Measured yield (gpm)
E-79	15.4	1,940

$$\frac{1{,}940 \frac{\text{gal}}{\text{min}}}{15.4 \frac{\text{ft}^3}{\text{min}}} = 126 \frac{\text{gal. of water}}{\text{ft}^3 \text{ of nat. gas}}$$

Total natural gas consumption in 1955 was 1,610,400 cubic-feet.

$$\frac{1{,}610{,}400 \text{ ft}^3 \times 126 \frac{\text{gal}}{\text{ft}^3}}{325{,}851 \frac{\text{gal}}{\text{acre-feet}}} = 620 \text{ acre-feet of water pumped in 1955.}$$

In summary,

Farm	Acres cotton	Water pumped (acre-feet)
A	397	2,630
B	92	830
C	130	620
Total	619	4,080

$$\frac{4{,}080 \text{ acre-feet of water}}{619 \text{ acres of cotton}} = \frac{6.6 \text{ acre-feet of water}}{\text{acre of cotton}}$$

According to the Agricultural Stabilization and Conservation Division of the United States Department of Agriculture, 3,114 acres of cotton was grown in the Leon watershed in 1955.

$$3{,}114 \text{ acres of cotton} \times 6.6 \frac{\text{acre-feet water}}{\text{acre of cotton}} = 20{,}600 \text{ acre-feet of water pumped.}$$

According to the Agricultural Stabilization and Conservation Division cotton allotments for the Leon watershed totaled 5,409 acres for 1956. Thus, considerably more water will be pumped in 1956.

In the Coyanosa watershed the cotton acreage for 1955 was 216. Using the factor of 6.6 acre-feet of water per acre irrigated.

216 x 6.6 = 1,425 acre-feet of water (estimated withdrawal in 1955).

The acreage allotment was increased to 833 acres for 1956, so the pumpage will be increased perhaps proportionately.

An irrigation area is developing near Hovey, about 35 miles southwest of Fort Stockton (fig. 2). Three wells (J-1, J-2, and J-3) have been constructed, but as yet no estimate of ground-water withdrawal for this area can be made.

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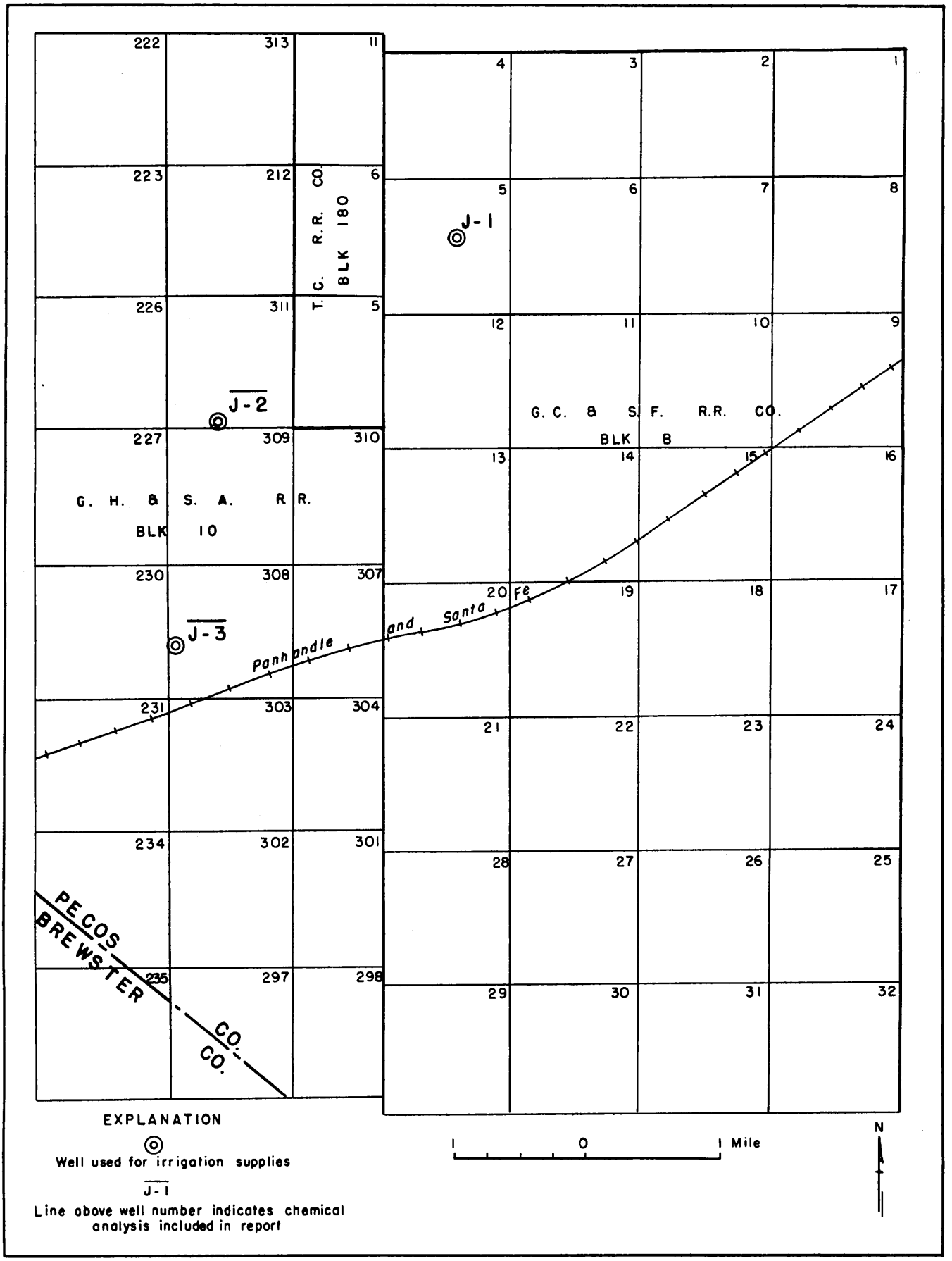

FIGURE 2. - Map showing wells in the Hovey area, Pecos County, Tex.

The figure of 6.6 acre-feet of water per acre irrigated is substantially higher than similar figures obtained elsewhere in Texas. Hood and Knowles (1952 p. 3) reported figures ranging from 2.7 acre-feet per acre in 1950 to 4.4 acre-feet per acre in 1940 in Reeves County; and Hughes and Magee (1956, p. 7) reported 1.48 acre-feet per acre in 1954 in the High Plains. The type of crop irrigated in Reeves County and the High Plains was essentially the same as in the Fort Stockton area.

The figure of 6.6 acre-feet of water per acre was obtained on the basis of measurements of yield versus fuel consumption made at the start of the irrigation season, and cotton acreages supplied by the Agricultural Stabilization and Conservation Division. The decline of artesian pressure during the irrigation season probably results in a decrease of yield per unit of fuel consumption, thus decreasing the amount of water pumped per acre irrigated below the computed figure. Other factors causing the high ratio of acre-feet of water pumped per acre of cotton irrigated are: In many places cotton rows are three-quarters of a mile to a mile long, and by the time minimum moisture penetration has been achieved at the lower end of the row, there is excessively deep moisture penetration at the upper end; much tail water is allowed to run down road ditches and across pastures; and most of the irrigation ditches are unlined and it is estimated that seepage losses run as high as 30 percent of the pumpage at some farms where fields are more than a mile from the well.

EFFECTS OF PUMPAGE ON ARTESIAN PRESSURES

Periodic water-level measurements have been made in wells in the Fort Stockton area since 1942 (table 7). The net change of artesian pressure in 10 wells for the period January 1952 to December 1955, which corresponds with the period of maximum pumping in the area, is shown in table 1. The average net decline in the 10 wells was 2.28 feet, and the maximum decline was 5.32 feet at well F-154.

The overall decline of artesian pressures shown by the off-season measurements is not to be confused with the large seasonal decline caused by pumping each summer in the Fort Stockton area. As water is withdrawn from a well, the artesian pressure drops, creating a hydraulic gradient which increases toward the well. The shape of the declining pressure surface resembles an inverted cone, and is called the cone of depression. The cone grows as pumping continues, and eventually the cones of individual wells may merge to form one large cone of depression around areas of concentrated pumping. Water-level records and reported pump settings suggest that such a cone of depression extends laterally for many miles in the Leon watershed, the point of greatest decline in pressure appearing to be near well E-91.

The average discharge of Comanche Springs and the precipitation at Fort Stockton are shown in figure 3. Although the correlation between spring discharge and precipitation is partly masked by the effects of pumping, the overall decline of discharge of the springs that started in 1947 can be correlated with the period of subnormal rainfall from 1947 through 1955.

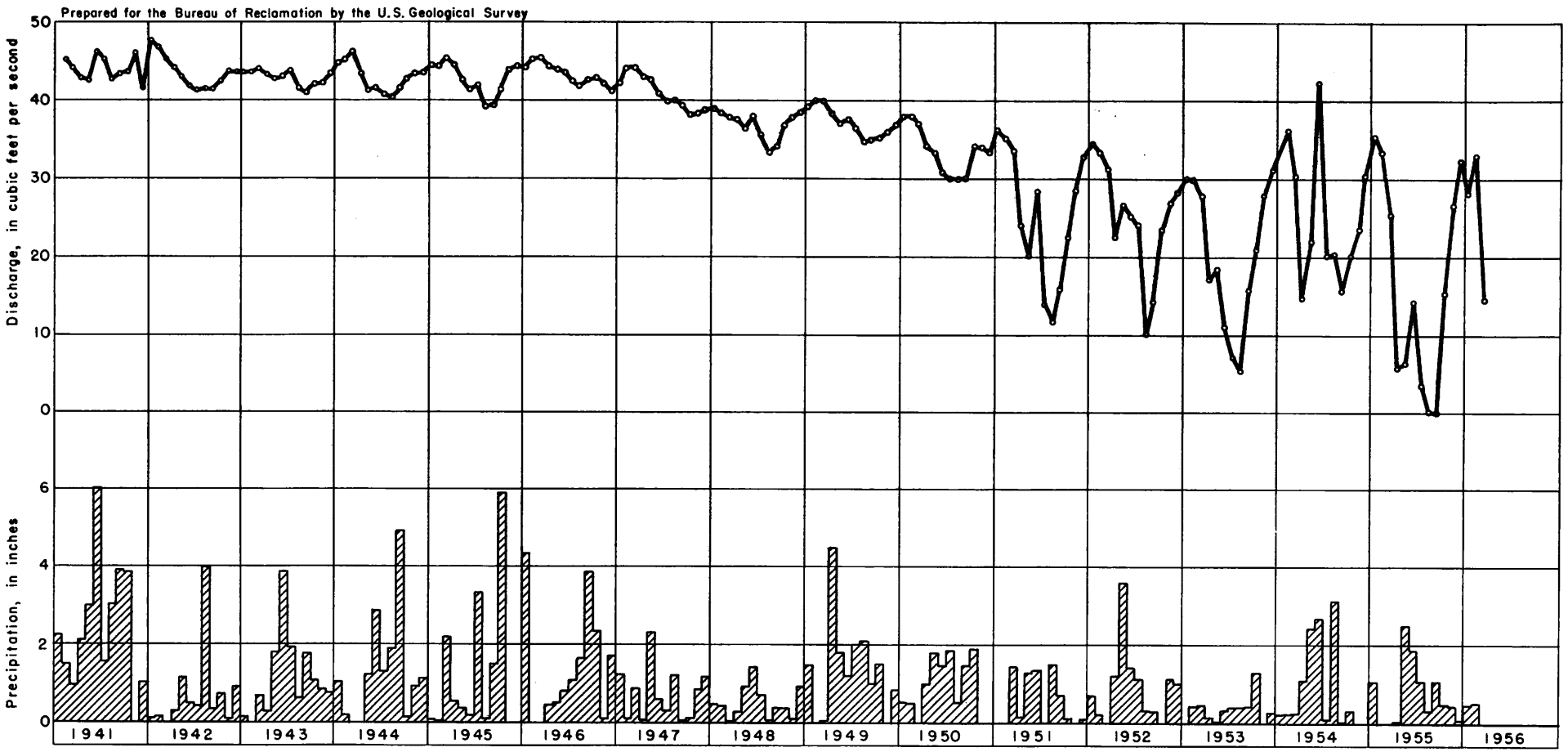

FIGURE 3.- Average monthly discharge of Comanche Springs and precipitation at Fort Stockton, Pecos County, Tex., 1941-56.

Table 1. - Decline of water levels from January 1952 to December 1955

Well number	Decline of water levels, in feet
E-69	- 3.45
E-73	- 2.43
E-91	- 2.30
F-57	- 1.80
F-130	- 1.52
F-132	- .03
F-149	- 5.18
F-153	- .78
F-154	- 5.32
F-156	- .01

Comparison of the discharge measurements from January 1951 to January 1956 indicates that the flow of the springs during each pumping season has declined since 1951, and in 1955 the flow actually ceased temporarily. At the close of each irrigation season, however, the discharge has increased steadily and the discharge of the springs prior to the start of each annual irrigation season has shown no significant decline during the period 1951-55.

The area of recharge for the aquifers supplying the Fort Stockton area has been described by Lang (1942, p. 3) as lying south and southwest of Fort Stockton. Heavy pumping in the Hovey area, therefore, possibly could affect artesian pressures in the Fort Stockton area.

WATER SUPPLY OF THE CITY OF FORT STOCKTON

In 1954 the city of Fort Stockton was operating four wells, F-52, F-53, F-54, and F-55, for the municipal water supply. Monthly pumpage for the period 1951-56 is shown in table 2. The wells, all located on one city block, range in depth from 172 to 203 feet and pump from caverns in the Cretaceous limestone. Prior to 1954, the static water level was about 52 feet, with a pumping level of 54 feet. Although, as shown in table 2, withdrawals remained relatively constant, by the summer of 1954 the pumping levels had declined to about 63 feet and by the summer of 1955 declined still further to 102 feet. The city was concerned also because the water was contaminated by sewage which moved readily through the fractured limestone, probably from sources such as cesspools.

Table 2.-Pumpage by city of Fort Stockton, 1951-55 (in thousands of gallons per month)

(Data from files of city of Fort Stockton)

	1951	1952	1953	1954	1955	1956
January	15,010	18,220	17,680	22,150	15,170	18,510
February	14,930	16,780	17,530	22,740	20,050	20,695
March	18,440	21,260	20,350	27,800	33,520	33,005
April	23,260	25,520	28,080	27,440	38,730	-
May	25,830	28,200	39,407	29,700	32,760	-
June	34,050	31,170	48,370	37,550	52,340	-
July	48,310	37,790	54,859	54,120	46,999	-
August	40,026	47,057	49,125	34,580	48,100	-
September	29,770	32,600	37,810	43,640	34,340	-
October	24,720	26,940	27,630	29,010	26,460	-
November	17,710	16,630	21,320	23,090	19,910	-
December	18,780	14,360	19,290	20,450	19,640	-
Total	310,836	316,527	381,351	372,270	388,019	-

Concern over the decling pumping levels and the contamination problem prompted the city of Fort Stockton to start an exploratory drilling program in late 1955 to test the basal Cretaceous sands for a new permanent water supply. Well F-137, located 50 feet east of the old wells, was drilled to 345 feet, and the water from the limestone was cased off.

A second well, F-136, located about 1 mile southwest of the old wells, was completed in April 1956 to a depth of 414 feet. This well was reported to yield 500 gallons per minute from the basal Cretaceous sands. The city of Fort Stockton plans to continue the exploratory drilling program until a maximum yield of 2,000 gallons per minute from the sands is obtained.

QUALITY OF WATER

Partial chemical analyses of water from 34 wells in the vicinity of Fort Stockton, and from Comanche Springs are given in table 8. The analyses were made in the laboratory of the U. S. Geological Survey at Austin, Tex.

Standards specified by the U. S. Public Health Service (1946) for water used on interstate carriers place the following limits on the concentration of the more important dissolved constituents:

	Parts per million
Iron and manganese (Fe, Mn)	0.3
Magnesium (Mg)	125
Chloride (Cl)	250
Fluoride (F)	1.5
Sulfate (SO_4)	250

Dissolved solids should not exceed 500 parts per million in water of good chemical quality. However, if such water is not available, a dissolved-solids content of 1,000 parts per million may be permitted.

Calcium and magnesium are the principal constituents causing hardness in water. Water having a hardness of less than 60 parts per million (ppm) is considered soft; 61 to 120 ppm, moderately hard; 121 to 200 ppm, hard; and more than 200 ppm, very hard.

A diagram for the classification of irrigation waters is given in figure 4, and table 3 gives the permissible limits of boron for several classes of irrigation waters.

Table 3.--Permissible limits of boron for several classes of irrigation waters (parts per million)
(From Wilcox, 1955, p. 11)

Boron class	Sensitive crops	Semitolerant crops	Tolerant crops
1	0.33	0.67	1.00
2	0.33 to .67	0.67 to 1.33	1.00 to 2.00
3	.67 to 1.00	1.33 to 2.00	2.00 to 3.00
4	1.00 to 1.25	2.00 to 2.50	3.00 to 3.75
5	1.25	2.50	3.75

The analyses indicate that most of the water from the Cretaceous formation in the Fort Stockton area have a high to very high salinity hazard, a low to a medium sodium hazard, and a very low boron content. Further interpretation of the relation of quality of water for irrigation use is beyond the scope of this report. The reader is referred to a report by the United States Salinity Laboratory Staff (1954) for comprehensive treatisment of the subject.

Table 4 gives the range in concentration and the mean of chemical constituents in water from irrigation wells in the Cretaceous rocks in the vicinity of Fort Stockton. The dissolved mineral content of the water is least in the Coyanosa watershed and greatest in the Comanche watershed north of Fort Stockton, thus indicating a progressive increase of mineral content down the dip of the water-bearing status.

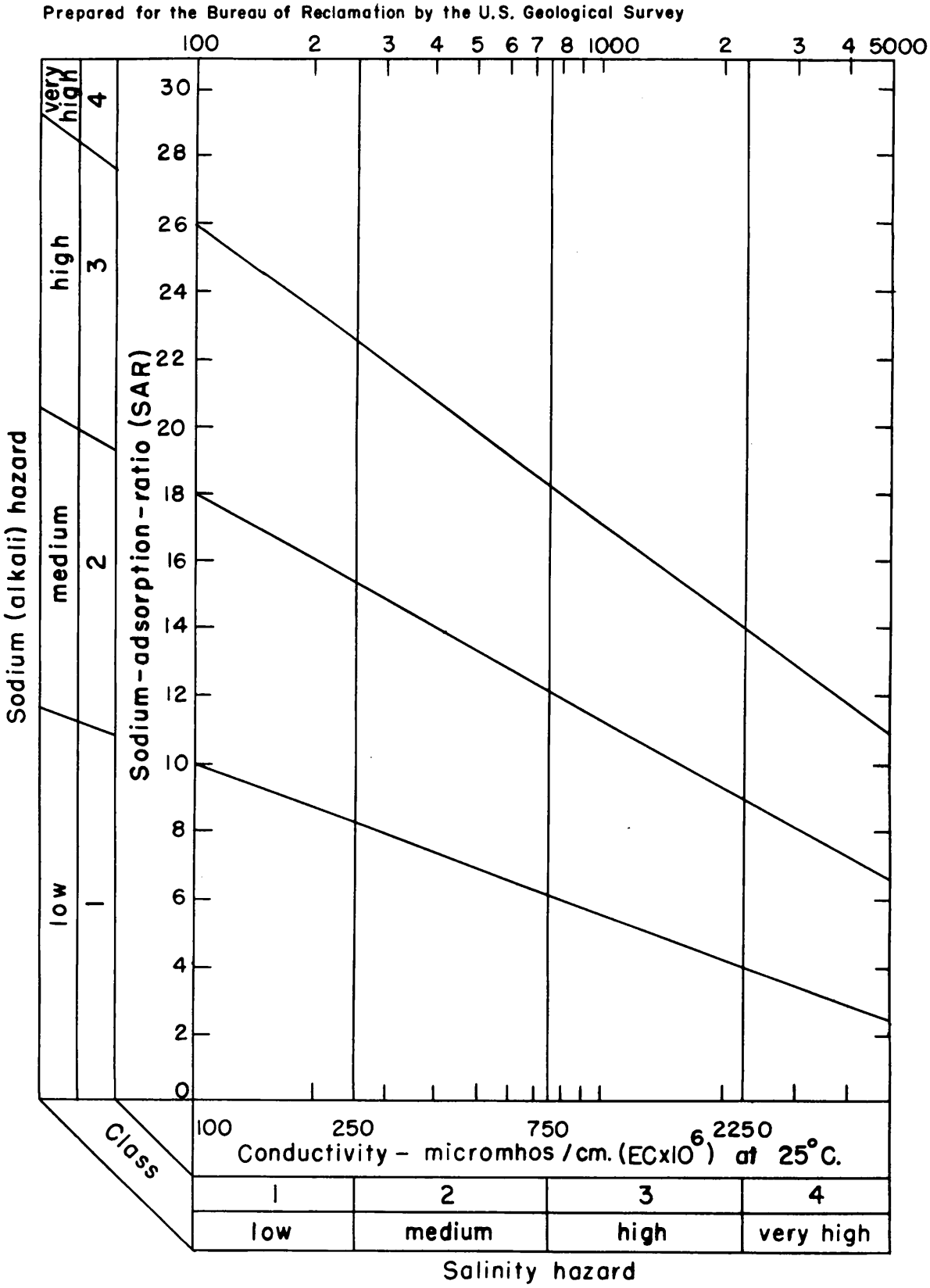

FIGURE 4.—Diagram for the classification of irrigation waters

(After United States Salinity Laboratory Staff, 1956, p.80)

Table 4.- Range in and mean concentration of chemical constituents in water from irrigation wells in the vicinity of Fort Stockton

(Constituents are in parts per million except specific conductance, and sodium-adsorption ratio)

	LEON WATERSHED				COYANOSA WATERSHED		COMANCHE WATERSHED	
	Rustler limestone (four wells)		Cretaceous formations (seven wells)		Cretaceous formations (two wells)		north of Fort Stockton Cretaceous formations (nine wells)	
	Range	Mean	Range	Mean	Range	Mean	Range	Mean
Calcium (Ca)	265 -- 530	397	136 - -148	141	94 - 102	98	161 - 416	263
Magnesium (Mg)	62 - 118	96	44 - 53	49	19 - 27	23	60 - 144	88
Sulfate (SO_4)	750 -1,470	1,170	259 - 444	384	143 - 177	160	500 -1,380	799
Chloride (Cl)	160 - 300	252	302 - 380	352	114 - 144	129	390 - 795	572
Boron (B)	.21 - .27	.24	.23 - .56	.32	.20 - .27	.24	.56 - .60	.57
Dissolved solids	1,730 -2,580	2,180	1,220 -1,420	1,360	604 - 710	657	1,560 -3,420	2,290
Total hardness as $CaCO_3$	916 -1,810	1,380	528 - 584	555	312 - 366	339	694 -1,630	1,020
Specific conductance (micromhos at 25°C)	2,430 -3,150	2,760	1,990 -2,250	2,180	994 -1,170	1,080	2,450 -4,730	3,350
Sodium-adsorption ratio (SAR)	1.1 - 3.1	2.0	4.2 - 5.3	4.8	2.1 - 2.4	2.25	4.2 - 6.7	5.4

GROUND WATER IN RUSTLER LIMESTONE

In the Fort Stockton area, with the exception of well F-62, all wells tapping the Rustler limestone flow (see table 5). Most of the wells were drilled as oil tests, and the drillers report that the water occurs in cavernous anhydrite and dolomite beds within the Rustler. There does not appear to be any continuity in depth or elevation of the caverns, and Dennis and Lang (1941, p. 87) state, "...Many of the wells in the Rustler obtained large flows of water. On the other hand a number of wells have penetrated the formation without finding water, and some wells yielded too little water for irrigation use." There is no certainty of obtaining large yields from the Rustler. The yield for well E-28 was measured at 675 gallons per minute on March 28, 1956, and the yields for wells E-30 and E-84 were estimated on March 28, 1956, at 600 and 1,500 gallons per minute, respectively. However, many wells yielding less than 300 gallons per minute have been abandoned.

The water in the Rustler contains large quantities of hydrogen sulfide and sulfate and generally is unfit for human consumption. (See table 4). Analyses of all the samples of water from the Rustler showed a very high salinity hazard, a low sodium hazard, and a very low boron content.

Wells in the Rustler north and northwest of Fort Stockton have higher yields than those south and southwest of Fort Stockton, but they yield more highly mineralized water.

Large-scale development of water supplies from the Rustler for irrigation projects does not appear feasible because: (1) yields are unpredictable, (2) the depth to the water-bearing horizons is between 1,000 and 2,000 feet, and (3) the quality of water may be unsuitable for certain crops and soils.

SUMMARY

Ground water in the Fort Stockton area is obtained from sand and limestone of Cretaceous age and the Rustler limestone of Permian age. The major use of water is for irrigation of cotton. The total amount of water pumped in the area in 1955 was calculated by using a factor of 6.6 acre-feet of water per acre of cotton irrigated which was computed from the total quantity of water withdrawn versus the net acreage of cotton harvested on three farms which were considered representative of the area. This factor is substantially higher than similar figures obtained elsewhere in Texas because, large quantities of water are lost by seepage and evaporation primarily because of the use of lengthy unlined irrigation ditches. The estimate may be in error also if the rates of pumping, which were measured near the start of the irrigation season, are substantially greater than the average for the year.

On the basis of data on cotton acreage issued by the Agricultural Stabilization and Conservation Division, approximately 20,600 acre-feet of water was pumped in 1955 from the Leon watershed. The pumpage for the average scheduled for 1956 will be much greater. Pumpage from the Coyanosa watershed in 1955 as computed is approximatey 1,435 acre feet. The pumpage for 1956 should be considerably greater because cotton acreage allotments are larger.

Periodic water-level measurements made during the winter months show that pumping in the Fort Stockton area from 1951 through 1955 has had very little

net effect on artesian pressures. During the summer, however, prolonged pumping creates a temporary area-wide cone of depression, resulting in the necessity of deeper pump settings at some wells and the temporary cessation of spring flow.

The public supply for the city of Fort Stockton prior to 1955 was obtained from four wells which ranged in depth from 175 to 203 feet and obtained water from the cavernous limestone of Cretaceous age. Concern over declining pumping levels resulted in an exploratory drilling program in 1955 to test the basal Cretaceous sands for a permanent water supply. Two successful wells, each yielding 500 gallons per minute, have been completed, and additional well construction is planned until a maximum supply of 2,000 gallons per minute is assured. The reported average monthly consumption of water in 1955 was 32,335,000 gallons, and no immediate large increase in water consumption is anticipated in the foreseeable future.

Water from wells in the Cretaceous formations in the Leon watershed is more highly mineralized than water from similar wells in the Coyanosa watershed. In general, however, the ground water in the Fort Stockton area is usable for irrigation and, except for the water from the Rustler, is usable for domestic supply.

Large-scale development of water supplies for irrigation and public supplies from the Rustler limestone does not appear feasible because of unpredictable yields, the great depth to water-bearing zones, and the poor quality of the water.

REFERENCES

ADKINS, W. S., 1927, The geology and mineral resources of the Fort Stockton quadrangle: Univ. Texas Bull. 2738, p. 89.

DANTE, J. H., 1947, Records of wells and springs in northern Pecos County: Texas Board Water Engineers, duplicated report.

DENNIS, P. E., and LANG, J. W., Pecos River Joint Investigation Vol. I, Water resources of the Pecos River Basin, Report B, Geology and ground water: Texas Board Water Engineers, duplicated report.

HOOD, J. W., and KNOWLES, D. B., 1952, Summary of ground-water development in the Pecos area, Reeves and Ward Counties, Texas: Texas Board Water Engineers Bull. 5202.

HUGHES, W. F., and MAGEE, A. C., 1956, Changes in investment and irrigation water costs, Texas High Plains, 1950-54: Texas Agri. Exper. Sta. Bull. 828.

LANG, J. W., 1942, Available supplies of ground water of low mineral content in vicinity of Fort Stockton, Tex.: U. S. Geol. Survey open-file report.

United States Public Health Service, 1946, Drinking-water standards: Public Health Repts., v. 61, no. 11, p. 371-384

United States Salinity Laboratory staff, 1954, Diagnosis and improvement of saline and alkali soils: U. S. Department Agriculture, Agr. Handbook 60.

WILCOX, L. V., 1955, Classification and use of irrigation waters: U. S. Dept. Agri. Circ. 969.

Table 5.- Records of wells and springs in the vicinity of Fort Stockton, Pecos County, Tex.
(All wells are drilled unless otherwise noted in the remarks column)

Method of lift: A, airlift; B, bucket; C, cylinder; Cf, centrifugal, E, electric; G, gasoline; H, hand; Ng, natural gas; T, turbine; W, windmill. Number indicates horsepower.

Use of water: D, domestic; Irr, irrigation; N, not used; P, public supply; RR, railroad; S, stock.

Well	Owner	Driller	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water level		Method of lift	Use of water	Remarks
						Below land-surface datum (ft.)	Date of measurement			
*E-13	D. J. Sibley	Lawrence Ryan	1943	401	7	b/44.3 51.6	Nov. 23, 1946 Jan. 19, 1955	C,W	S	Observation well.
E-16	Southwestern Life Insurance Co.	Buell-Hagen	--	2,933	--	--	--	None	N	Oil test. Altitude of land surface 3,170 ft. See log.
E-18	Chandler Co.	Honolulu Oil & Refining Co. et al	1931	3,096	--	--	--	None	N	Oil test. Altitude of land surface 3,054 ft. See log.
*E-26	M. C. Slaton	-- Belding	1943	350	18	50.4 55.7 63.6	Nov. 30, 1946 Mar. 6, 1950 Jan. 5, 1956	T,Ng	Irr	Sand reported from 176 to 276 ft. Measured yield 2,930 gpm, Mar. 15, 1956. Temp. 79°F.
*E-28	Clayton Williams	Humble Oil & Refining Co.	1937	1,373	8¼	+ +	Apr. 3, 1944 Mar. 28, 1956	Flows	Irr	Water reported from Rustler formation at 1,373 ft. Measured yield 675 gpm, Mar. 28, 1956. Temp. 89°F.
*E-29	do	Claude Garrett	1946	446	12½	66.3	Dec. 17, 1946	T,Ng	Irr	Cased to 280 ft. Measured yield 1,474 gpm, Mar. 28, 1956. Temp. 78°F.
*E-30	Chandler Co.	Schkade & Reynolds	1940	1,756	8	+ +	Apr. 11, 1946 Apr. 4, 1956	Flows	Irr	Reported yield 600 gpm, Temp. 85°F. See log.
*E-31	Mrs. C. L. Thompson	Humble Oil & Refining Co.	--	3,575	--	+	Apr. 3, 1946	Flows	--	Temp. 84°F. See log.
*E-32	George Baker	--	--	220	8	168.8 170.9 173.6 175.8	June 16, 1947 June 25, 1950 Dec. 3, 1954 Jan. 7, 1956	C,W	S	
*E-33	do	--	Old	200	8	84.2 99.7 99.4 100.3	June 16, 1947 Dec. 3, 1954 Jan. 20, 1955 Apr. 12, 1956	C,W	S	Temp. 69°F.
E-51	-- Harrison	Pure Oil Co.	--	5,000	--	--	--	None	N	Oil test. Altitude of land surface 3,494 ft. See log.
E-56	-- Alvis	Pennsylvanian Oil Co.	1931	3,925	--	--	--	None	N	Oil test. Altitude of land surface 3,493 ft. See log.
E-61	A. J. Sitten, Sr.	--	--	--	16	48.1	Jan. 7, 1956	T,B	Irr	
E-62	Raymond Tyler	Richardson Bros.	--	429	16	49.5	do	T,B	Irr	Cased to 365 ft. Measured yield 1,113 gpm, Apr. 2, 1956. Temp. 72°F.

a/ Reported by owner or driller.
b/ See table of water level measurements.
+ See table of chemical analyses.

Table 5.- Records of wells and springs in the vicinity of Fort Stockton, Pecos County--Continued

Well	Owner	Driller	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water level		Method of lift	Use of water	Remarks
						Below land-surface datum (ft.)	Date of measurement			
E-63	Raymond Tyler	-- Landcaster	1956	630	20, 16	62.3	Feb. 20, 1956	T,Ng	Irr	Cased to 400 ft. Reported water from yellow sand from 477 to 490 ft. Temp. 72°F.
E-64	do	Henry Parker	1955	641	16	58.5	do	T,B	Irr	Cased to 420 ft. Temp. 72°F. See log.
E-65	do	-- Landcaster	--	570	16	67.1	do	T,B	Irr	Cased to 420 ft. Temp. 72°F.
*E-66	do	Henry Parker	--	630	16	76.1	do	T,B	Irr	Cased to 420 ft. Temp. 71°F.
*E-67	Harlan Black	--	1955	600	14	90.1	Jan. 7, 1956	T,B	Irr	Cased to bottom. Measured yield 721 gpm, Apr. 2, 1956. Temp. 70°F.
E-68	Lillian Rudicil	The Texas Co.	--	3,122	--	--	--	None	N	Oil test. See log.
E-69	Chandler Co.	--	--	285	18, 15	b/9.2 12.7	Jan. 25, 1952 Dec. 7, 1955	T,Ng	Irr	Cased to 285 ft. Observation well.
E-70	do	--	--	83	18	10.1	Dec. 7, 1955	T,Ng	Irr	Cased to 80 ft. Measured yield 2,745 gpm, Mar. 30, 1956.
E-71	do	--	--	243	18	6.1 7.5 9.1	Jan. 20, 1955 Feb. 9, 1955 Dec. 7, 1955	T,Ng	Irr	Cased to 243 ft.
E-72	do	--	--	60	16	b/15.0 12.5	Dec. 8, 1952 Dec. 7, 1955	T,E	Irr	Cased to 60 ft. Observation well.
E-73	do	--	--	105	16	b/8.6 11.0	Jan. 25, 1952 Dec. 7, 1955	T,B	Irr	Cased to 100 ft. Observation well.
E-74	do	--	--	290	10	62.1 67.2	Apr. 12, 1956 May 3, 1956	None	N	Observation well.
E-75	do	--	--	1,600	--	--	--	None	N	Oil test. Webb Fee well 1. See log.
E-76	Carl Cocheran	R. A. Cleveland	1950	160	15	51.0 57.8	Apr. 12, 1950 Jan. 5, 1956	T,Ng	Irr	Measured yield 1,658 gpm, Apr. 11, 1956. See log.
E-77	M. C. Slaton	do	1950	175	16	54.4	Dec. 28, 1955	T,Ng	Irr	Cased to 150 ft. Measured yield 2,025 gpm, Apr. 11, 1956. Temp. 79°F. See log.
E-78	do	--	1955	150	16	61.9	Jan. 5, 1956	T,Ng	Irr	Cased to 135 ft. Measured yield 2,278 gpm, Mar. 28, 1956.
E-79	Bill Sage	-- McMahon	1950	165	12½	58.6 66.1	Apr. 1, 1950 Jan. 5, 1956	T,Ng	Irr	Cased to 77½ ft. Measured yield 1,940 gpm, Mar. 29, 1956. Temp. 80°F. See log.
E-80	McKinney & Ivey	Bill Tipton	1950	190	16	63.9 64.8	Nov. 30, 1951 Dec. 28, 1955	T,Ng	Irr	Cased to 140 ft. Measured yield 1,017 gpm, Mar. 30, 1956. See log.
E-81	do	do	1951	200	16	72.6	Dec. 28, 1955	T,Ng	Irr	Cased to 140 ft. Measured yield 1,456 gpm, Mar. 30, 1956.

Table 5.- Records of wells and springs in the vicinity of Fort Stockton, Pecos County--Continued

Well	Owner	Driller	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
E-82	McKinney & Ivey	Bill Tipton	1951	200	16	72.2	Dec. 28, 1955	T,Ng	Irr	Cased to 140 ft. Measured yield 1,330 gpm, Apr. 11, 1956. Temp. 77°F.
E-83	do	do	1951	170	16	71.8	do	T,Ng	Irr	Cased to 140 ft.
*E-84	Chandler Co.	Joe Cannon	1952	1,812	16, 12¾	+	Apr. 4, 1956	Flows	Irr	Well acidized when completed. Casing set to 1,620 ft. Temp. 86°F. See log.
E-85	Mrs. C. L. Thompson	Humble Oil & Refining Co.	--	429	--	--	--	None	N	Oil test. See log.
E-86	L. C. Holliday	E. James	1955	192	16	79.8	Dec. 28, 1955	T,B	Irr	Cased to 160 ft. Measured yield 1,775 gpm, Mar. 28, 1956.
E-87	Clayton Williams	--	--	--	--	71.3	do	T,Ng	Irr	Measured yield 1,070 gpm, Mar. 28, 1956.
E-88	do	--	--	--	--	72.5	do	T,Ng	Irr	Measured yield 618 gpm, Mar. 28, 1956.
E-89	Wesley Whitman	--	1955	192	20	b/77.3 109.1	Jan. 5, 1956 Apr. 10, 1956	T,Ng	Irr	Reported well can produce 600 gpm. Observation well.
E-90	do	E. J. McMillan	1956	308	16	141.8	Apr. 10, 1956	T,Ng	Irr	Cased to 120 ft. See log.
E-91	The University of Texas	--	1946	208	--	99.6 101.9 145.1 151.0	Nov. 30, 1951 Dec. 19, 1955 Apr. 10, 1956 May 5, 1956	C,W	S	Cased to 145 ft. Sand at 208 ft. Temp. 79°F.
*E-92	S. C. Park	Richardson Bros.	1955	210	16	98.7	Dec. 19, 1955	T,B	Irr	Cased to 30 ft. Measured yield 885 gpm, Mar. 29, 1956. Temp. 77°F. See log.
E-93	Bill Tripp	Joe Gray	1956	327	16	a/110	Apr. 1956	T,Ng	Irr	Cased to bottom.
E-94	D. C. McAteer	do	1956	308	16	a/115	Apr. 1956	T,Ng	Irr	Cased to 300 ft.
E-95	Chandler Co.	do	1955	260	16	97.9	Jan. 3, 1956	T,B	Irr	Cased to bottom. Measured yield 1,676 gpm, Mar. 31, 1956.
E-96	do	Leonard Wilson	1955	280	16	104.9	do	T,B	Irr	Cased to bottom. Measured yield 1,415 gpm, Mar. 31, 1956.
E-97	do	do	1955	270	16	108.9	do	T,B	Irr	Cased to bottom. Measured yield 1,784 gpm, Mar. 31, 1956.
E-98	do	Joe Gray	1955	270	16	108.2	do	T,B	Irr	Cased to bottom. Measured yield 885 gpm, Apr. 4, 1956. Temp. 76°F.
E-99	do	--	1955	224	16	136.0 140.2 148.4	Apr. 3, 1956 Apr. 10, 1956 May 3, 1956	None	N	Abandoned because of crooked hole.
E-100	McKinney & Ivey	A. N. Yocke	1956	--	--	140.2 143.0	Dec. 16, 1955 Mar. 21, 1956	T,Ng	Irr	Well deepened in 1956. Measured yield 921 gpm, Apr. 11, 1956.

Table 5.- Records of wells and springs in the vicinity of Fort Stockton, Pecos County--Continued

Well	Owner	Driller	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water level		Method of lift	Use of water	Remarks
						Below land-surface datum (ft.)	Date of measurement			
E-101	Ralph Merkle	--	1956	--	--	--	--	T,Ng	Irr	
E-102	do	--	1956	--	--	--	--	T,Ng	Irr	
E-103	do	--	--	--	--	160.6 166.5 169.2	Jan. 5, 1956 Apr. 3, 1956 Apr. 10, 1956	T,B	Irr	Reported weak well.
E-104	Chandler Co.	Leonard Wilson	1955	430	16	149.5	Jan. 3, 1956	T,B	Irr	Cased to bottom. Measured yield 903 gpm, Mar. 31, 1956.
E-105	do	Joe Gray	1955	270	16	133.3	do	T,B	Irr	Cased to 170 ft. Measured yield 1,258 gpm, Apr. 3, 1956. Temp. 75°F.
E-106	do	Leonard Wilson	1955	270	16	129.4	do	T,B	Irr	Cased to bottom. Measured yield 910 gpm, Mar. 31, 1956.
E-107	do	Joe Gray	1955	270	20	111.0 125.6	Jan. 3, 1956 Apr. 3, 1956	None	N	Cased to bottom. Well will not be used in 1956.
E-108	Bill Williams	A. N. Yocke	1955	290	16	127.2 143.0	Dec. 20, 1955 Apr. 10, 1956	T,B	Irr	Cased to 260 ft. Temp. 82°F.
E-109	--	--	--	--	--	125.3 140.6	Dec. 20, 1955 Apr. 10, 1956	C,W	S	
E-110	L. P. Williams	J. T. Coats	1956	590	--	--	--	T,B	Irr	Reported to yield 1,500 gpm. Sand and limestone reported to 590 ft.
E-111	do	do	1955	385	16	155.1	Dec. 20, 1955	T,B	Irr	Cased to bottom. Measured yield 1,064 gpm, Mar. 30, 1956. See log.
*E-112	do	do	1955	372	16	156.9	do	T,B	Irr	Cased to 44 ft. Measured yield 1,690 gpm, Apr. 11, 1956. Temp. 81°F. See log.
E-113	do	do	1955	260	16	--	--	None	N	Insufficient water; will be deepened in 1956.
E-114	Douglas Fugate	A. N. Yocke	1956	329	16	171.2 186.8 188.8	Feb. 20, 1956 Apr. 3, 1956 Apr. 10, 1956	T,Ng	Irr	Cased to 254 ft.
E-115	Chandler Co.	Leonard Wilson	1955	330	16	173.0	Dec. 29, 1955	T,B	Irr	Measured yield 1,022 gpm, Apr. 11, 1956.
E-116	A. F. Buchanan	Bill Gibbs, Jr.	1955	365	16	--	--	T,B	Irr	Cased to bottom. Measured yield 3,080 gpm, Mar. 30, 1956.
E-117	do	Don Kimbrough	1955	303	18	211.8 233.4	Feb. 20, 1956 Apr. 10, 1956	T,Ng	Irr	
E-118	do	Barbee Drilling Co.	1956	315	16	220.4 225.3	Mar. 31, 1956 Apr. 10, 1956	T,Ng	Irr	Cased to 277 ft.
E-119	do	do	1956	598	--	a/253	Mar. 1956	T,B	Irr	Weak supply of water. Reported sulfur water smell.

Table 5.- Records of wells and springs in the vicinity of Fort Stockton, Pecos County--Continued

Well	Owner	Driller	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water level		Method of lift	Use of water	Remarks
						Below land-surface datum (ft.)	Date of measurement			
E-120	L. P. Williams	J. T. Coats	1955	597	--	--	--	None	N	Insufficient supply. Reported fresh water at 547 ft. See log.
E-121	A. F. Buchanan	--	--	--	--	--	--	None	N	Well being drilled April 1956 by rotary rig.
*F-4	Ernest Riggs	Bishop Smith	1946	334	16	38.9 44.4	Dec. 3, 1946 Aug. 1948	T,B	Irr	Cased to 107 ft. Water has bad taste. Temp. 65°F. See log.
F-7	do	Earl Holloway	1947	360	18	b/14.2 12.7	June 6, 1947 Dec. 6, 1955	None	N	Observation well.
*F-13	T. W. Hillin	Carmine Drilling Co.	1947	515	16	23.0	Apr. 10, 1947	T,Ng	Irr	Cased to 120 ft. Altitude of land surface 2,882 ft. Temp. 71°F. See log.
F-20	E. A. Robertson	--	1946	217	16	17.7	Oct. 18, 1946	T,Ng	Irr	Altitude of land surface 2,861 ft.
*F-22	Charles Stone	Ed Jones	1945	250	10	14.4 13.6	Oct. 18, 1946 Mar. 6, 1948	T,Ng	Irr	See log.
*F-26	Harrison Dyche	Carmine Drilling Co.	1947	260	14	38.5 39.9 62.0	Apr. 14, 1947 Mar. 14, 1950 Apr. 4, 1956	T,E	Irr	Cased to 240 ft.
F-46	Roots Estate	-- Anderson	1933	1,416	10, 8¼	--	--	None	N	Oil test. See log.
F-52	City of Fort Stockton	--	1927	175	6	51.4 49.4 50.8	Oct. 21, 1946 Aug. 11, 1949 Dec. 13, 1949	T,E	P	Cased to 160 ft. Reported yield 450 gpm in January 1956.
*F-53	do	Art Powell	1938	193	13	--	--	T,E	P	Cased to 161 ft. Reported yield 1,425 gpm in January 1956. Temp. 77°F.
F-54	do	R. A. Cleveland	1946	203	12	51.8 51.6	Oct. 21, 1946 Aug. 10, 1949	T,E	P	Cased to 161 ft. Reported yield 1,200 gpm in January 1956.
F-55	do	--	--	190	--	--	--	T,E	P	Reported yield 500 gpm in January 1956. Temp. 77°F.
*F-57	M. R. Gonzales	R. A. Cleveland	1945	235	8	b/29.8 35.1	Apr. 10, 1947 Dec. 6, 1955	T,Ng	Irr	Cased to 46 ft. Altitude of land surface 2,972 ft. Observation well. Temp. 74°F.
*F-58	Pecos County Water Control & Improvement District No. 1	--	--	Spring	--	--	--	Flows	--	Comanche Springs. See table 8.
*F-62	Page Carson	-- Shoemaker	1947	1,547	6	+ 3.6	June 23, 1947 Apr. 9, 1956	T,G	S	Cased to 1,305 ft. Temp. 82°F. See log.
*F-63	Lem Smith	C. L. Garrett	1943	350	16, 10	b/97.4 87.2	Oct. 30, 1946 Jan. 19, 1955	T,B	Irr	Cased to 245 ft. Observation well. Temp. 75°F.

Table 5.- Records of wells and springs in the vicinity of Fort Stockton, Pecos County--Continued

Well	Owner	Driller	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water level		Method of lift	Use of water	Remarks
						Below land-surface datum (ft.)	Date of measurement			
F-65	The University of Texas	Jamison & Pollard	1942	2,968	12¼, 8¼	--	--	None	N	Oil test. Reported altitude of land surface 3,087 ft. See log.
F-68	Chandler Co.	Lockhart & Co.	--	3,306	--	--	--	None	N	Oil test. Altitude of land surface 2,977 ft. See log.
F-71	McKinney & Ivey	--	1915	176	6	b/118.2 168.4	June 15, 1942 Apr. 3, 1956	None	N	Observation well. Temp. 76°F.
F-75	Dow Puckett	Helmerich & Payne	1938	3,502	--	--	--	None	N	Oil test. Reported altitude of land surface 3,185 ft. See log.
*F-101	Ernest Riggs	Paul Tees	1952	1,435	8	+	Apr. 7, 1956	Flows	N	Reported yield 350 gpm. To be acidized and used for irrigation if yield increases. Cased to 1,400 ft. Temp. 75°F.
*F-102	Mrs. B. Downs	The Texas Co.	1947	2,997	10¾	+ +	Jan. 5, 1948 Apr. 7, 1956	Flows	N	Casing: 10¾-in. to 445 ft, 7-in. to 2,860 ft. Oil test. Reported altitude of land surface 2,331 ft. Reported yield 1,700 to 2,000 gpm. Temp. 76°F. See log.
F-103	Lester Griffith	Lawrence Ryan	1950	240	12	--	--	T,Ng	Irr	Cased to 25 ft. Reported 400-gpm well.
F-104	C. E. Oswalt	Luther Gray	1955	225	12	32.6	Apr. 4, 1956	T,Ng	Irr	Cased to 192 ft.
F-105	Elbert Boatman	Roy Johnson	1954	492	12½	--	--	T,Ng	Irr	Cased to 145 ft.
F-106	T. W. Hillin	J. E. Dye	1940	250	10	14.8	Apr. 3, 1949	C,W	S	Turbine pump removed in 1955. Temp. 67°F.
F-107	C. A. Criswell	R. A. Cleveland	1953	300	10	45.0	Apr. 4, 1956	T,Ng	Irr	Cased to 175 ft.
F-108	C. M. Dees	do	1951	160	16	--	--	T,Ng	Irr	Cased to 101 ft.
F-109	E. Sullivan	Gulf Oil Corp.	1954	630	14	--	--	T,Ng	Irr	Cased to 14 ft. Drilled as oil test. Reamed to 300 ft. See log.
F-110	Clyde Wilson	C. Stone	1950	158	--	23.0 39.2	Mar. 19, 1951 Apr. 5, 1956	T,Ng	Irr	
F-111	H. E. Taylor	R. A. Cleveland	1955	200	12	a/43.0	Jan. 1956	T,Ng	Irr	Cased to 10 ft. See log.
*F-112	Clyde Wilson	Bishop Smith	1948	215	12	23.1	Nov. 23, 1949	T,Ng	Irr	Cased to 10 ft.
F-113	E. A. Robertson	do	1948	200	14	37.6	Apr. 6, 1956	T,Ng	Irr	Cased to 15 ft.
F-114	Charles Stone	John Lancaster	1942	220	8	19.0 a/45.0	June 15, 1949 Apr. 1956	T,Ng	Irr	
F-115	do	P. Weddle	1952	234	12	--	--	T,Ng	Irr	Cased to 180 ft.

Table 5.- Records of wells and springs in the vicinity of Fort Stockton, Pecos County--Continued

Well	Owner	Driller	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water level		Method of lift	Use of water	Remarks
						Below land-surface datum (ft.)	Date of measurement			
F-116	M. E. Fincher	R. A. Cleveland	1954	270	14	--	--	T,Ng	Irr	Cased to 10 ft.
F-117	do	-- Taylor	1951	270	14	--	--	T,Ng	Irr	Do.
F-118	do	do	1952	270	14	--	--	T,Ng	Irr	Do.
*F-119	Lee O. White	Lee O. White	1951	1,800	7	+	Apr 6, 1956	Flows	Irr	Plugged back to 1,480 ft. Reported flowing on Apr. 6, 1956 at 150 gpm. Temp. 75°F.
F-120	Mrs. E. Nevans	P. Weddle	1951	300	14	--	--	T,Ng	Irr	Cased to 10 ft.
F-121	C. E. Barker	J. Parker	1955	310	18	--	--	T,Ng	Irr	Cased to 12 ft.
F-122	Wm. Hoefs	do	1955	300	16	--	--	T,Ng	Irr	Cased to 20 ft.
F-123	do	do	1955	300	16	--	--	T,Ng	Irr	Do.
*F-124	C. E. McIntyre	--	1953	386	16	--	--	T,Ng	Irr	
F-125	L. D. Guthrie	R. A. Cleveland	1952	225	--	--	--	T,Ng	Irr	Weak supply.
F-126	V. E. Danielson	do	1954	240	16	--	--	T,Ng	Irr	Cased to 21 ft.
F-127	O. W. Adams	do	1950	300	16	56.3	Dec. 12, 1951	T,Ng	Irr	Cased to 18 ft.
*F-128	do	do	1947	300	--	26.5	May 18, 1949	T,Ng	Irr	Temp. 68°F.
F-129	D. V. Rowles	E. James	1951	300	18	--	--	T,Ng	Irr	Cased to 15 ft.
F-130	Mrs. B. F. Webb	--	1944	220	7	b/41.4 55.3	Mar. 15, 1950 Dec. 7, 1955	C,W	D,S	Cased to 108 ft. Observation well.
F-131	--	Quinby Oil Co.	1922	3,333	--	--	--	None	N	Oil test. No. 1 Townsite. Altitude of land surface 2,956 ft. See log.
F-132	The Texas Co.	--	1947	240	5½	b/103.0 102.7	June 28, 1949 Dec. 6, 1955	None	N	Cased to 185 ft. Altitude of land surface 3,035 ft. Observation well.
F-133	C. W. Williams	E. R. Minshall	--	3,005	10, 6 3/8	--	--	None	N	Oil test. No. 1 Banker. Altitude of land surface 3,090 ft. See log.
F-134	do	--	--	3,278	--	--	--	None	N	Oil test. Reported altitude of land surface 3,205 ft. See log.
F-135	do	--	1938	2,984	--	--	--	None	N	Oil test. See log.
F-136	City of Fort Stockton	P. Jones	1956	414	18	--	--	--	P	Cased to 190 ft. Well to be pumped in May 1956 See log.

Table 5.- Records of wells and springs in the vicinity of Fort Stockton, Pecos County--Continued

Well	Owner	Driller	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water level		Method of lift	Use of water	Remarks
						Below land-surface datum (ft.)	Date of measurement			
F-137	City of Fort Stockton	P. Jones	1955	345	16, 10	a/60.0	Jan. 1956	T,E	P	Cased to 340 ft. See log.
F-138	State Highway Department	Rex Hood	1931	220	5	b/54.3 51.9	Oct. 5, 1949 Dec. 7, 1955	None	N	Cased to 220 ft. Observation well.
F-139	N. M. Mitchell	P. Weddle	1951	310	14	35.3	Mar. 22, 1951	T,E	Irr	Cased to 30 ft. See log.
*F-140	do	Lister & Hollis	1948	255	12	--	--	T,E	Irr	Cased to 145 ft. Altitude of land surface 2,923 ft. Temp. 68°F.
F-141	do	P. Weddle	1952	300	15	--	--	T,E	Irr	Cased to 20 ft. Temp. 65°F.
F-142	Francis Sheen	R. A. Cleveland	1951	200	--	64.7	Nov. 26, 1951	T,Ng	Irr	
*F-143	B. E. Mitchell	E. James	1948	255	16	15.6	Apr. 21, 1949	T,Ng	Irr	Cased to 105 ft. Altitude of land surface 2,907 ft.
*F-144	J. S. Oates	do	1948	259	16	27.0	Sept. 23, 1948	T,Ng	Irr	Cased to 100 ft. Temp. 69°F. See log.
F-145	do	R. A. Cleveland	1955	160	12	a/85.0	Apr. 1956	T,Ng	Irr	Cased to 120 ft.
F-146	L. H. Whitacre	do	1956	280	12	a/60	Apr. 1956	T,Ng	Irr	Cased to bottom.
F-147	Jones Taylor	do	1955	420	16	a/50	Apr. 1956	T,Ng	Irr	Cased to 20 ft.
F-148	do	--	1953	300	14	--	--	T,Ng	Irr	Cased to 15 ft.
F-149	Burney Ligon	Rex Road	1932	289	5	b/83.4 94.3	June 11, 1950 Dec. 5, 1955	C,W	S	Cased to 173 ft. Observation well.
F-150	--	--	--	3,260	--	--	--	None	N	Oil test. Smith No. 1. Altitude of land surface 2,978 ft. See log.
F-151	Burney Ligon	--	1950	250	12	--	--	T,Ng	Irr	Cased to 10 ft.
F-152	do	E. James	1947	142	8	--	--	T,Ng	Irr	Cased to 100 ft. Altitude of land surface 2,934 ft. See log.
F-153	B. Hilger	--	1940	63	--	b/51.3 62.6	June 21, 1949 Dec. 7, 1955	C,W	S	Observation well.
F-154	City of Fort Stockton	--	1940	227	--	b/117.0 127.8	Jan. 17, 1950 Dec. 7, 1955	C,-	Irr	Cemetery well. Observation well. Temp. 70°F.
F-155	--	--	--	2,504	--	--	--	None	N	Oil test. Williams-Shumaker well. See log.
F-156	M. R. Gonzales	R. A. Cleveland	1949	240	15	b/41.2 43.6	Mar. 21, 1949 Dec. 6, 1955	None	N	Insufficient supply. Observation well. See log.

Table 5.- Records of wells and springs in the vicinity of Fort Stockton, Pecos County--Continued

Well	Owner	Driller	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water level		Method of lift	Use of water	Remarks
						Below land-surface datum (ft.)	Date of measurement			
F-157	Page Carson	P. Jones	1954	210	16	--	--	T,B	Irr	Insufficient supply.
F-158	S. C. Park	Richardson Bros.	1955	210	16	91.4	Dec. 19, 1955	T,B	Irr	Cased to 30 ft. Measured yield 1,030 gpm on Mar. 29, 1956. Temp. 76°F. See log.
F-159	do	A. N. Yocke	1955	200	16	--	--	T,B	Irr	Cased to 160 ft. Temp. 77°F. See log.
F-160	H. S. Whittenburg	Joe Gray	1955	401	8	--	--	None	N	Abandoned. Insufficient supply. See log.
F-161	do	--	1952	342	14½	b/99.7 96.9	Dec. 8, 1952 May 4, 1956	None	N	Cased to 120 ft. Observation well.
F-162	McKinney & Ivey	--	--	--	--	109.7 134.1	Dec. 16, 1955 Mar. 21, 1956	T,B	Irr	
F-163	do	--	--	--	--	112.4	Dec. 16, 1955	T,B	Irr	Measured yield 1,166 gpm, Mar. 29, 1956.
F-164	do	--	--	--	--	143.1 154.9	Dec. 16, 1955 Mar. 21, 1956	T,B	Irr	
F-165	do	A. N. Yocke	1956	--	16	--	--	T,Ng	Irr	
F-166	do	--	--	--	--	--	--	T,B	Irr	Measured yield 744 gpm, Mar. 29, 1956. Temp. 75°F.
*F-167	A. F. Buchanan	Henry Parker	1955	363	16	158.5	Dec. 15, 1955	T,B	Irr	Cased to 280 ft. Measured yield 1,171 gpm, Mar. 30, 1956. Temp. 69°F.
J-1	Elsinore Cattle Co.	Aldrich & Stroud	1956	698	--	a/240.0	Apr. 1956	T,B	Irr	Reported water in brown sand from 605 to 698 ft.
*J-2	Graef Bros.	E. James	1955	450	--	a/289	Dec. 1955	T,B	Irr	Cased to 400 ft. Temp. 77°F. See log.
*J-3	Dave McGill	Royce Hammline	1956	201	--	--	--	None	--	Reported to yield 950 gpm with pumping level at 35.1 ft. Reported 421 ft of alluvium. Water sample taken at a depth of 201 ft. Temp. 71°F. See log.

a/ Reported by owner or driller.

b/ See table of water level measurements.

* See table of chemical analyses.

Table 6.--Drillers' logs of wells in the vicinity of Fort Stockton, Pecos County County, Tex.

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well E-16--partial log					
Owner: Southwestern Life Insurance Co. Driller: Buell-Hagen.					
Lime, white, hard	70	70	Anhydrite and shale, light	33	1,658
Gumbo, dark	20	90	Shale	17	1,675
Limestone	50	140	Rock, red	10	1,685
Gumbo	70	210	Sand, water	20	1,705
Sand, water	5	215	Anhydrite	5	1,710
Shale	35	250	Sand, water	55	1,765
Sand, water	10	260	Shale, light	20	1,785
Gumbo	15	275	Sand, shale, light	30	1,815
Sand, hole full of water	10	285	Shale, light	10	1,825
Limestone	35	320	Anhydrite	15	1,840
Shale	30	350	Shale	5	1,845
Limestone	20	370	Anhydrite	35	1,880
Sand	10	380	Shale	5	1,885
Shale	10	390	Anhydrite	45	1,930
Sand and pyrite	5	395	Salt	5	1,935
Sand, hole full of water	77	472	Shale, light and anhydrite	80	2,015
Shale	18	490	Shale	10	2,025
Sand	50	540	Anhydrite	20	2,045
Shale	10	550	Shale, light	60	2,105
Sand	5	555	Anhydrite	45	2,150
Shale	27	582	Shale, light	135	2,285
Shale, light	13	595	Shale, light and anhydrite	35	2,320
Shale	18	613	Sand, show of gas 2,325 feet, and oil at 2,335 feet	20	2,340
Shale, light	7	620	Shale, light and anhydrite	35	2,375
Sand, red	10	630	Anhydrite	155	2,530
Sand and lime	40	670	Shale, light and anhydrite	25	2,555
Sand	10	680	Anhydrite	165	2,720
Shale	40	720	Shale, light oil show	70	2,790
Mud, red	35	755	Sand, sulfur water at 2,795	25	2,815
Shale, hole full of water	30	785	Shale, light	5	2,820
Shale, red	290	1,075	Lime, hole full of sulfur water	15	2,835
Shale	15	1,090	Sand, hole full of sulfur water	10	2,845
Shale, red	10	1,100			
Shale	10	1,110			
Shale, red	15	1,125			
Sand, red	15	1,140			
Sand, (Sulfur gas)	40	1,180			
Rock, red, (Sulfur gas)	295	1,475			
Anhydrite	75	1,550			
Sand, hole full of water	5	1,555			
Sand and limestone	35	1,590			
Shale, light	35	1,625			

(continued on next page)

Table 6.--Drillers' logs of wells in the vicinity of Fort Stockton, Pecos County--continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well E-16--partial log--continued					
Lime	10	2,855	Lime	12	2,907
Sand, hole full of water	5	2,860	Total depth		2,933
Lime	30	2,890			
Lime, broken, sulfur water	5	2,895			
Well E-18					
Owner: Chandler Co. Driller: Honolulu Oil & Refining Co., et. al.					
Lime	52	52	Lime, sandy	10	635
Shale, blue	133	185	Shale, red sandy	5	640
Gravel	5	190	Redbeds, sandy	25	665
Shale, blue	10	200	Shale, light	25	690
Lime, water	10	210	Shale, red	55	745
Shale	10	220	Sand, gray	7	752
Lime	15	235	Shale, red	26	778
Shale	20	255	Shale, gray sandy	2	780
Shale, blue	20	275	Shale, sandy red	40	820
Shale, white sandy	35	310	Shale, red	21	841
Sand, yellow, water	45	355	Mud, red	14	855
Sand, white	30	385	Redbeds	10	865
Shale	5	390	Shale, red sandy	40	905
Sand, shells	20	410	Shale, red	55	960
Sand, yellow	40	450	Redbeds	60	1,020
Sand, lighter yellow	5	455	Shale, red	110	1,130
Shale	10	465	Sand, red	10	1,140
Shale, blue	5	470	Shale, red sandy hard	40	1,180
Rock, red	4	474	Shale, red	125	1,305
Shale, red	13	487	Shale, blue	70	1,375
Shell, lime	2	489	Anhydrite, sand and gypsum	49	1,424
Shale, white	11	500	Shale, red	11	1,435
Shale, blue	4	504	Anhydrite	47	1,482
Shell, lime	4	508	Lime, sandy, sulfur water	50	1,532
Shale, white	7	515	Lime, gray sandy	35	1,567
Shale, light	27	542	Lime, gray, hard	25	1,592
Sand	23	565	Lime, gray	3	1,595
Shale, red (sandy)	7	572	Shale, blue	12	1,607
Sand (shaley)	13	585	Shale, red	4	1,611
Rock, red	40	625			

(continued on next page)

Table 6.--Drillers' logs of wells in the vicinity of Fort Stockton, Pecos County--continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well E-18--continued					
Lime	9	1,620	Lime and anhydrite	18	2,641
Gypsum, rock	17	1,637	Anhydrite	11	2,652
Lime, sandy	3	1,640	Lime, brown	18	2,670
Sand, soft	13	1,653	Lime and anhydrite	10	2,680
Lime and anhydrite	5	1,658	Lime	12	2,692
Lime and anhydrite, hard	33	1,691	Anhydrite	7	2,699
Sand, water	8	1,699	Lime, brown	8	2,707
Sand, hard	6	1,705	Lime and anhydrite	33	2,740
Lime, hard gray sandy	52	1,757	Lime, brown	48	2,788
Lime, gray	8	1,765	Lime, gray	11	2,799
Shale and anhydrite	13	1,778	Lime, brown, oil showing	7	2,806
Anhydrite	12	1,790	Lime, gray	19	2,825
Lime, brown	10	1,800	Lime, brown	6	2,831
Anhydrite	58	1,858	Lime, gray	3	2,834
Lime, brown	8	1,866	Lime, brown	36	2,870
Gypsum	9	1,875	Lime, gray	4	2,874
Lime and anhydrite	5	1,880	Lime, brown	25	2,899
Anhydrite	40	1,920	Lime, gray	17	2,916
Lime and anhydrite	8	1,928	Lime, gray light	7	2,923
Anhydrite, gas at 2,005 feet	297	2,225	Lime, gray	15	2,938
Lime and anhydrite	12	2,237	Lime, brown	6	2,944
Anhydrite	86	2,323	Lime, gray	17	2,961
Lime, brown	9	2,332	Lime, brown	21	2,982
Anhydrite	250	2,582	Lime, gray	55	3,037
Lime, brown	21	2,603	Lime, sandy	12	3,049
Anhydrite	20	2,623	Lime, gray	47	3,096
Well E-30					
Owner: Chandler Co. Driller: Schkade and Reynolds.					
Clay	40	40	Lime, broken yellow	49	299
Gumbo and shale	40	80	Shale, yellow	11	310
Gumbo	10	90	Lime	4	314
Clay	50	140	Shale, blue	40	354
Caliche, water	97	237	Lime, hard	3	357
Gumbo	6	243	Shale and lime shells	5	362
Clay	7	250	Shale, blue	8	370

(continued on next page)

Table 6.--Drillers' logs of wells in the vicinity of Fort Stockton, Pecos County--continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well E-30--continued					
Lime	5	375	Shale, sandy and yellow shells	9	760
Shale	2	377	Sand, hard	10	770
Lime	5	382	Shale, yellow sandy and shells	10	780
Shale, black	8	390	Sand, red and shells	13	793
Lime and shale	20	410	Shale, red	37	830
Lime	10	420	Shale, gray	67	897
Shale, blue	12	432	Lime, sandy	13	910
Lime	2	434	Rock, red	10	920
Shale, blue	18	452	Shale, red	5	925
Shale and lime shells	8	460	Shale, sandy	10	935
Lime, blue	3	463	Rock, red	7	942
Shale, yellow	2	465	Sand, hard	18	960
Lime	10	475	Shale, gray sandy	32	992
Lime, broken	10	485	Sand, hard	6	998
Lime, yellow hard	19	504	Shale, sandy	9	1,007
Lime, gray	11	515	Rock, red	12	1,019
Lime, blue	6	521	Shale, red sandy	44	1,063
Shale, yellow	12	533	Rock, red	14	1,077
Lime, yellow	8	541	Shale, red sandy	16	1,093
Lime, blue	3	544	Rock, red	5	1,098
Lime, gray	2	546	Shale, sandy	12	1,110
Lime, yellow	1	547	Rock, red	6	1,116
Lime, gray	2	549	Redbeds	8	1,124
Lime, gray sandy	5	554	Sand, hard	7	1,131
Lime, yellow	25	579	Shale, red	18	1,149
Sand, water	6	585	Redbeds	72	1,221
Sand, water and shells	35	620	Rock, red	54	1,275
Shell, sand and shale	10	630	Shale, blue	20	1,295
Sand, hard	45	675	Shale, sandy blue	11	1,306
Lime, blue sandy	5	680	Shale, blue	32	1,338
Sand, hard	6	686	Shale, black	1	1,339
Shale, sticky	2	688	Sand, hard	1	1,340
Sand, hard	7	695	Rock, red	2	1,342
Sand, hard and shale	8	703	Sand, hard and shale	8	1,350
Rock, red	7	710	Shale, broken	30	1,380
Sand, hard	8	718	Shale, blue and shells	10	1,390
Rock, red	8	726	Shale, blue	40	1,430
Sand, hard	4	730	Shale, sticky	2	1,432
Rock, red	10	740	Shale, blue and shells	4	1,436
Sand, hard	8	748			
Lime, gray	3	751			

(continued on next page)

Table 6.--Drillers' logs of wells in the vicinity of Fort Stockton, Pecos County--continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well E-30--continued					
Sand, hard and gypsum	5	1,441	Sand, medium soft	10	1,580
Shale, broken sandy and shells	21	1,462	Lime, broken and red rock	15	1,595
Shale, hard sand and shells	6	1,468	Shale, blue, sticky	67	1,662
Shale, sandy	14	1,482	Lime, broken and gypsum	6	1,668
Shale, blue	10	1,492	Shale, blue and lime shells	27	1,695
Lime, sandy and shells	18	1,510	Sand, hard and broken lime	32	1,727
Lime, broken	2	1,512	Sand, hard and lime	24	1,751
Rock, red	4	1,516	Lime	5	1,756
Shale, hard sand and shells	12	1,528	(Sulfur water 1,680 to 1,756 feet)		
Sand, hard and shell	4	1,532			
Lime, broken	14	1,546			
Sand, hard and lime	7	1,553			
Shale and shells	17	1,570			
Well E-31					
Owner: Mrs. C. L. Thompson. Driller: Humble Oil & Refining Co.					
Soil	5	5	Shale, brown	10	415
Clay and lime shells	20	25	Shale, gray	28	443
Clay, yellow	30	55	Rock, red	17	460
Lime, blue	10	65	Shale, blue and shells	10	470
Mud, blue	10	75	Redbeds	30	500
Lime, white	5	80	Shale, blue	20	520
Crevice	4	84	Sand, red shale	5	525
Mud	26	110	Shale, sandy	10	535
Lime	5	115	Redbeds, broken	25	560
Lime, blue	15	130	Redbeds	10	570
Lime	25	155	Shale, blue	25	595
Clay, yellow	5	160	Redbeds, sandy	30	625
Sand, water	15	175	Redbeds	25	650
Lime	10	185	Sand, red	10	660
Sand	68	253	Redbeds, sandy	36	696
Redbeds	24	277	Redbeds and lime shells	29	725
Lime, brown and anhydrite	13	290	Redbeds	73	798
Redbeds	30	320	Anhydrite	17	815
Shale, red, and shells	22	342	Anhydrite, broken	170	985
Shale, gray	63	405	Anhydrite	182	1,167

(continued on next page)

Table 6.- Drillers' logs of wells in the vicinity of Fort Stockton, Pecos County--continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well E-31--continued					
Redbeds	13	1,180	Shale, red	10	1,790
Anhydrite	60	1,240	Anhydrite, white	195	1,985
Redbeds	10	1,250	Lime, gray	35	2,020
Lime, gray and anhydrite	25	1,275	Anhydrite and lime, show of oil and gas	40	2,060
Lime	5	1,280	Lime, gray	40	2,100
Sand, fresh water	3	1,283	Anhydrite and lime	160	2,260
Lime, gray, water	20	1,303	Anhydrite, white small oil show	10	2,270
Lime, gray	82	1,385	Lime, brown	30	2,300
Shale	5	1,390	Lime, brown and anhydrite	35	2,335
Lime, gray	100	1,490	Lime and anhydrite,oil and gas	38	2,373
Lime, brown	10	1,500	Anhydrite, white	302	2,675
Lime, gray	35	1,535	Lime and anhydrite	35	2,710
Shale and anhydrite	10	1,545	Sand, hard	15	2,725
Lime, gray	50	1,595	Lime and anhydrite	8	2,733
Lime and anhydrite	3	1,598	Anhydrite	842	3,575
Lime, gray	30	1,628			
Lime and anhydrite	57	1,685			
Anhydrite	15	1,700			
Anhydrite and some lime	80	1,780			
Well E-51					
Owner: -- Harrison. Driller: Pure Oil Co.					
Limestone	130	130	Lime, brown and gray, some sand and red and gray shale, water 840-842 feet	350	1,140
Lime, white and yellow, and shale	20	150	Shale, sandy, gray and brown lime and gypsum	8	1,148
Limestone, gray and white, sand and sandy shale	15	165	Anhydrite and gypsum, sulfur water 1,275 feet	257	1,405
Shale, red, sandy	200	365	Lime and anhydrite, sulfur water 3,262-3,264 feet	2,860	4,265
Shale, red, anhydrite and gypsum	210	575	Shale, black and shaly black lime	735	5,000
Shale, red, sandy and gray sand	5	580			
Anhydrite and red shale	100	680			
Anhydrite and gypsum	35	715			
Anhydrite, white and gray	20	735			
Limestone, anhydrite, and thin beds of red, sandy shale	55	790			
Well E-56, partial log					
Owner: -- Alvis. Driller: Pennsylvania Oil Co.					
Lime	120	120	Lime, shells, and shale, yellow	40	270
Lime, gray	10	130	Lime, hard	30	300
Shale, blue	30	160	Lime	30	330
Shells, dark, and lime	70	230			

(continued on next page)

Table 6.--Drillers' logs of wells in the vicinity of Fort Stockton, Pecos County--continued

	Thickness (feet)	Depth (feet)
Well E-56--continued		
Mud, yellow	10	340
Sand, yellow, little water at 350 feet	40	380
Lime, gray, sandy	30	410
Lime	10	420
Sand, hard, sharp	15	435
Sand, water	20	455
Shale, gray	10	465
Redbeds	25	490
Lime, gray	10	500
Sand, water	10	510
Shale, red	5	515
Sand, red, hole full of water	5	520
Lime, brown, sandy	20	540
Rock, gypsum	20	560
Shale, gray	20	580
Rock, red	10	590
Shale, gray	260	850
Rock, gypsum	5	855
Lime and shale, a little gas	5	860
Lime, hard	15	875
Lime, gray, gypsum and shale	30	905
Lime, gray, show of gas	5	910
Lime, gray	15	925
Shale, blue	35	960
Shale, red	115	1,075
Shale, red, sandy	70	1,145
Shale, red	87	1,232
Shale, red, sandy	63	1,295
Shale, sandy, blue	100	1,395
Sand, water	70	1,465
Sand, water	5	1,470
Lime, dark, hard	25	1,495
Lime, hard	50	1,545
Lime, gray	140	1,685
Lime, brown	65	1,750
Shale, brown, and lime	15	1,765
Shale, blue	7	1,772
Shale and lime	8	1,780
Lime	70	1,850
Lime and shale	12	1,862
Lime	48	1,910
Lime, soft	40	1,950
Lime and anhydrite	5	1,955
Lime	50	2,005
Lime, sandy, sand, water	30	2,035
Lime	378	2,413
Sand	11	2,424
Lime and shale	12	2,436
Shale, blue	4	2,440
Sand, gray	25	2,465
Lime and anhydrite	15	2,480
Lime	15	2,495
Shale, lime, and sand	16	2,511
Shale, sandy	10	2,521
Lime, gray	75	2,596
Lime, dark gray	49	2,645
Lime, soft gray, sandy, water	5	2,650
Lime, gray	227	2,877
Shale, black	13	2,890
Sand, water	16	2,906
Lime, gray	24	2,930
Lime, sandy, gray	6	2,936
Sand, water	20	2,956
Lime and shale	37	2,993
Lime, gray	33	3,026
Lime	26	3,052
Lime, white	93	3,145
Lime, gray	101	3,246
Anhydrite	10	3,256
Anhydrite and lime	10	3,266
Lime	177	3,443
Lime, very fine	3	3,446
Lime	14	3,460
Lime, very hard	14	3,474
Lime, gray and hard	11	3,485
Lime	20	3,505
Lime, brown	35	3,540
Lime	20	3,560
Lime, darker	25	3,585
Lime, show of oil and gas	12	3,597
Total depth		3,925

Table 6.--Drillers' logs of wells in the vicinity of Fort Stockton, Pecos County--continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well E-64					
Owner: Raymond Tyler. Driller: Henry Parker.					
Soil and caliche, lime shells	90	90	Sand, yellow, water	7	484
Lime, yellow	61	151	Lime, sandy, hard	12	496
Crevice, water (water exhausted)	4	155	Conglomerate	3	499
Lime, yellow	100	255	Shale, blue (water level 102 ft)	8	507
Lime, yellow, water estimated at 150 gpm	2	257	Lime, blue	18	525
Shale, dark gray	16	273	Sand, hard	13	538
Lime, shaley, yellow	30	303	Sand, soft	12	550
Shale, gray	63	366	Shale, white	8	558
Shale, gray, and lime shells	9	375	Sand, soft	5	563
Gumbo, gray	13	388	Shale, white	14	577
Lime, shaley, gray	7	395	Sand, soft	24	601
Gumbo, dark gray	24	419	Shale, white	9	610
Lime shells, gray and shale	11	430	Sand, medium, white	16	626
Conglomerate, hard	23	453	Shale, white	6	632
Lime, gray	24	477	Sand, hard	4	636
			Shale, blue	5	641
Well E-68--partial log					
Owner: Lillian Rudicil. Driller: The Texas Co.					
Fredericksburg limestone and little sandstone	250	250	Dolomite, little anhydrite and sandstone	250	1,700
Top of Trinity sandstone, clear, coarse to very coarse	110	360	Anhydrite with little dolomite and sandstone scattered	720	2,420
Top of Triassic, sandstone fine, red, micaceous with little red shale	270	630	Dolomite with anhydrite decreasing steadily from 75-10 percent	130	2,550
Top of Permian, sandstone, fine, red with small amount scattered red shale and gypsum	720	1,350	Top Yates by spls		2,550
Top of Rustler, anhydrite	60	1,410	Total depth		3,122
Sandstone, gray, white fine; 75-10 percent anhydrite decreasing from 1410-1450 ft.	40	1,450			

Table 6.--Drillers' logs of wells in the vicinity of Fort Stockton, Pecos County--continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well E-75					
Owner: Chandler Co. Driller: --.					
Soil	3	3	Shale, broken green and redbeds	5	640
Caliche	17	20	Redbeds	10	650
Shale, blue	91	111	Sand, red	11	661
Lime, gray	70	181	Sand, gray	14	675
Sand, gray	5	186	Redbeds	263	938
Sand, yellow	97	283	Sand, gravel and redbeds	22	960
Sand, gray	14	297	Sand, red broken	142	1,102
Sand, gray and green shale	9	306	Redbeds, green shale and anhydrite and gypsum	84	1,186
Shale, red	14	320	Sand, gray	4	1,190
Shale, brown sandy	18	338	Shale, blue	50	1,240
Shale, pink	1	339	Shale, gray	20	1,260
Shale, red	11	350	Sand, gray	19	1,279
Sand, gray	12	362	Lime, gray	7	1,286
Shale, pink	47	409	Shale, blue	27	1,313
Shale, gray	14	423	Anhydrite	3	1,316
Shale, pink	7	430	Shale, blue and anhydrite	112	1,428
Shale, gray	19	449	Lime, brown	12	1,440
Redbeds	20	469	Lime, sandy	2	1,442
Lime, gray	17	486	Lime	15	1,457
Shale, gray	2	488	Lime, sandy	63	1,520
Shale, brown	6	494	Lime, brown	6	1,526
Sand, brown	11	505	Lime, gray	16	1,542
Shale, broken blue	3	508	Redbeds	2	1,544
Redbeds	13	521	Lime, gray and water sand	13	1,557
Sand, red	16	537	Lime, gray	6	1,563
Shale, broken gray and red sand	11	548	Sand, broken gray, blue shale, redbeds	7	1,570
Sand, red	19	567	Lime, gray	30	1,600
Sand, red broken and gypsum	3	570			
Sand, red	35	605			
Shale, green	5	610			
Redbed	25	635			

Table 6.--Drillers' logs of wells in the vicinity of Fort Stockton, Pecos County--continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well E-76					
Owner: Carl Cocheran. Driller: R. A. Cleveland.					
Soil	5	5	Crevice, water rose to within 56 feet of surface	3	133
Caliche	25	30	Lime, hard	2	135
Gravel and caliche	12	42	Crevice	6	141
Clay with shell lime	13	55	Lime, shell, fossils	1	142
Brown, light to tan, yellow green	5	60	Crevice	6	148
Lime, very hard	6	66	Lime (no returns)	2	150
Shale, blue	39	105	Crevice	10	160
Lime, shell and shale	13	118			
Lime, hard gray	12	130			
Well E-77					
Owner: M. C. Slaton. Driller: R. A. Cleveland.					
Soil	4	4	Unknown	8	155
Caliche	14	18	Lime and shale, soft	14	169
Gravel, water at 43 feet	27	45	Crevice, water level dropped from 40 to 52 feet of surface	5	174
Lime, white, increase in water	3	48	Lime	1	175
Clay, yellow, soft	15	63			
Mud, brown	9	72			
Shale, blue	43	115			
Lime, hard, blue, shale streaks	32	147			
Well E-79					
Owner: Bill Sage. Driller: -- McMahon.					
Soil	5	5	Shale, blue	31	92
Shale, yellow or mud	25	30	Lime, gray	6	98
Gravel	5	35	Shale, blue	4	102
Shale, yellow	20	55	Lime, gray, water at 128-134 feet	53	155
No record	3	58	Lime, yellow	10	165
Lime, shell, blue	3	61			

Table 6.--Drillers' logs of wells in the vicinity of Fort Stockton, Pecos County--continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well E-80					
Owner: McKinney & Ivey. Driller: Bill Tipton.					
Soil	3	3	Crevice, water	1	159
Caliche	3	6	Formation, soft	1	160
Rock, white yellow	6	12	Rock, yellow	10	170
Clay, yellow	62	74	Lime, gray	18	188
Shale, blue	8	82	Shale, blue	2	190
Limestone, gray	8	90	Water level 67 feet below surface		
Shale, blue	39	129			
Limestone, gray	29	158			
Well E-84					
Owner: Chandler Co. Driller: Joe Cannon.					
Clay and shale	56	56	Redbed and shale	98	1,128
Shale and shells	86	142	Sand, hard	66	1,194
Sand and gravel	194	336	Red rock	106	1,300
Shale and lime shells	294	630	Shells	128	1,428
Shale	74	704	Sand, hard	52	1,480
Sand, hard	46	750	Shale and shells	48	1,528
Sand and shells	64	814	Lime	102	1,630
Redbed and rock	72	886	Lime, broken with streaks of redbed	52	1,682
Shale and broken lime	59	945	Lime (3 ft cavity at 1804 ft). Strong water	130	1,812
Redbed	37	982			
Redbed and hard lime shells	48	1,030			
Well E-85					
Owner: Mrs. C. L. Thompson. Driller: Humble Oil & Refining Co.					
Soil	15	15	Limestone, cream, yellow, and gray	20	100
Clay, yellow	30	45	Limestone, gray and yellow with a trace of chert	10	110
Sand, hard	20	65	Limestone, earthy, gray	8	118
Limestone, cream to yellow	10	75			
Limestone, yellow and gray marly	5	80			

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Table 6.--Drillers' logs of wells in the vicinity of Fort Stockton, Pecos County--continued

	Thickness (feet)	Depth (feet)
Well E-85--continued		
Limestone, earthy, gray, 80 percent and gray clay 20 percent	47	165
Limestone, gray 60 percent and dark gray clay 40 percent	10	175
Limestone, gray 60 percent dark gray shale 20 percent and dark gray clay, 20 percent	10	185
Limestone, yellow	10	195
Limestone, cream to light gray	30	225
Dolomite, cream to earthy gray	10	235
Dolomite, cream to earthy gray 80 percent and clay, 20 percent	5	240
Limestone, cream to earthy gray	3	243
Limestone, light gray	12	255
Clay, dark gray	20	275
Limestone gray, 80 percent and dark gray clay, 20 percent	5	280
Limestone, gray, 70 percent and dark gray clay, 30 percent	5	285
Clay, dark gray	25	310
Clay, dark gray, silty	10	320
Limestone, gray, shaley	10	330
Limestone, gray, 40 percent and gray sandstone 30 percent, and gray shale 30 percent	30	360
Clay, gray 80 percent and gray limestone 20 percent	5	365
Limestone, gray 80 percent and gray shale, 20 percent	22	387
Limestone, gray and yellow	5	392
Limestone, yellow, 80 percent, and black shale, 20 percent	8	400
Limestone, yellow	3	403
Limestone, yellow and gray	7	410
Limestone, yellow, 70 percent and black shale, 30 percent	5	415
Limestone, yellow	6	421
Limestone, cream and yellow	4	425
Limestone, grayish cream to yellow	4	429

Table 6.--Drillers' logs of wells in the vicinity of Fort Stockton, Pecos County--continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well E-90					
Owner: Wesley Whitman. Driller: E. J. McMillan.					
Soil	5	5	Shale, black	4	224
Caliche and gravel	70	75	Sand and sandy lime	6	230
Shale, black	15	90	Shale, black and white lime	9	239
Lime	24	114	Sand and lime	4	243
Crevice, lost drilling water	4	118	Shale, sandy, black	4	247
Lime, gray	24	142	Sand and lime	8	255
Lime, white	44	186	Sand	21	276
Shale, sandy, yellow	2	188	Lime and blue shale	7	283
Crevice, water	5	193	Lime, sandy	3	286
Lime, sandy	12	205	Shale, black	22	308
Lime, fractured and gravel	15	220			
Well E-92					
Owner: S. C. Park. Driller: Richardson Bros.					
Soil	6	6	Lime, yellow and clear gravel	5	185
Caliche	6	12	Lime, yellow, water	10	195
Lime, hard, yellow	38	50	Lime, gray and yellow gravel	10	205
Shale, blue	91	141	Lime, gray and blue shale with breaks	5	210
Lime, blue and gravel	9	150			
Lime, hard, gray	20	170			
Lime, hard, yellow	10	180			
Well E-111					
Owner: L. P. Williams. Driller: J. T. Coats.					
Soil	6	6	Shale, black	11	110
Gravel	12	18	Shale, yellow and sand	17	127
Lime, yellow	3	21	Lime, yellow	29	156
Shale, yellow	27	48	Shale, yellow	4	160
Shale, gray	51	99	Shale, blue	38	198

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Table 6.--Drillers' logs of wells in the vicinity of Fort Stockton, Pecos County--continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well E-111--continued					
Lime, white	8	206	Lime	26	321
Shale, blue	14	220	Shale, blue	24	345
Shale, black	63	283	Shale, black	8	353
Shale, blue	9	292	Lime, yellow	29	382
Sand, water	3	295	Shale, black	3	385
Well E-112					
Owner: L. P. Williams. Driller: J. T. Coats.					
Soil	3	3	Lime, hard	77	355
Caliche	27	30	Lime, yellow and yellow sand	15	370
Shale, yellow	85	115	Sand, yellow and yellow gravel	2	372
Shale, black	143	258			
Sand and gravel, water	20	278			
Well E-120					
Owner: L. P. Williams. Driller: J. T. Coats.					
Soil	4	4	Sand, gray, good water	20	567
Caliche	26	30	Shale, blue	3	570
Lime, white	35	65	Sand, gray, yellow and gray gravel, yellow; yellow, water	27	597
Lime, yellow	15	80			
Lime, white	25	105			
Lime, yellow	64	169			
Lime, blue, yellow white	378	547			
Well F-4					
Owner: Ernest Riggs. Driller: Bishop Smith.					
Soil	30	30	Lime	3	115
Caliche	54	84	Shale, black	23	138
Shale, black	28	112	Lime	4	142

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Table 6.--Drillers' logs of wells in the vicinity of Fort Stockton, Pecos County--continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well F-4--continued					
Shale	5	147	Lime, white	20	196
Lime	7	154	Lime, blue	46	242
Shale	7	161	Sand and lime	92	334
Lime	2	163	(Water at 65, 165, 225, and 234 feet).		
Crevice or sand	13	176			
Well F-13					
Owner: T. W. Hillin. Driller: Carmine Drilling Co.					
Soil	6	6	Sand, light, very fine-grained	51	351
Caliche	18	24	Sand, blue, fine-grained	8	359
Gypsum, water	4	28	Sandstone, gray	6	365
Clay, yellow, and asphalt	52	80	Sand, very fine-grained	5	370
Clay, blue	14	94	Clay, blue	6	376
Clay, light blue, heaving	16	110	Sand, water	26	402
Asphalt	35	145	Clay,blue	18	420
Lime, gray	80	225	Sand, fine-grained	60	480
Sand, fine-grained	15	240	Gravel, water	20	500
Sand, brown	18	258	Clay, blue	8	508
Shale,blue, sticky	7	265	Redbeds	7	515
Sand, streaks, and clay, water	35	300			
Well F-22					
Owner: Charles Stone. Driller: Ed Jones.					
Lime, hard, and caliche	15	15	Clay, yellow	5	115
Lime, soft gray, water	25	40	Gravel, shells, blue, shale	32	147
Shale, brown	20	60	No record	3	150
Gravel, water	10	70	Shale, blue, and caliche	50	200
Gravel, pink, brownish-yellow	30	100	Sand, white, blue when wet	50	250
Lime, hard, blue	10	110			

Table 6.--Drillers' logs of wells in the vicinity of Fort Stockton, Pecos County--continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well F-46					
Owner: Roots Estate. Driller: -- Anderson.					
Soil	3	3	Redbeds	25	615
Caliche	27	30	Redbeds, hard	55	670
Clay, yellow	30	60	Redbeds, soft	10	680
Lime	125	185	Sand, hard, red	10	690
Redbeds	16	201	Redbeds, soft	15	705
Sand	49	250	Shale, soft, red	45	750
Lime, light brown	10	260	Sand, water	15	765
Sand, water	31	291	Redbeds, soft	258	1,023
Mud, gray	5	296	Sand, red	17	1,040
Sand, water	7	303	Rock, red	10	1,050
Redbeds and lime shells	20	323	Redbeds	40	1,090
Lime, gray	77	400	Rock, red	223	1,313
Lime, gray	43	443	Sand and lime breaks	17	1,330
Shale, blue caving	27	470	Shale, blue, sandy	3	1,333
Lime and sand, hard, gray	10	480	Lime, hole full of water	6	1,339
Rock, red, and sand, hard	65	545	Lime	41	1,380
Sand, red, hard	10	555	Lime, sandy, sulfur water	7	1,387
Redbeds and rock, red	25	580	Gypsum	6	1,393
Shale, gray	3	583	Shale, broken, sandy	23	1,416
Sand, hard, gray	7	590			
Well F-62					
Owner: Page Carson. Driller: -- Shoemaker.					
Caliche	20	20	No record	137	317
Lime, yellow, crevice at 23 feet	8	28	Redbeds	6	323
Lime, gray, hard, water	28	56	Lime, gray	11	334
Lime, blue	9	65	Redbeds	7	341
Lime, gray, water	38	103	Lime, gray	7	348
Lime, blue	2	105	Shale, gray	17	365
Sand, rock, yellow	21	126	Shale, red	4	369
Sand, gray, water	9	135	Shale, gray	19	388
Shale, blue	2	137	Shale, blue	23	411
Sand, water rose to 80 feet of surface	43	180	Shale, gray	23	434
			Redbeds	27	461
			Shale, gray	4	465

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Table 6.--Drillers' logs of wells in the vicinity of Fort Stockton, Pecos County--continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well F-62--continued					
Shale, red	6	471	Redbeds	88	1,202
Lime	8	479	Rock, red	30	1,232
Shale, red	31	510	Rock, red and shale	23	1,255
Rock, red	7	517	Lime	4	1,259
Lime, brown	8	525	Rock, red	19	1,278
Shale, red	30	555	Lime	18	1,296
Redbeds	47	602	Gyp	5	1,301
Sand, brown	7	609	Shale, blue	11	1,312
Rock, red	33	642	Redbeds, water rose to 36 feet of surface	13	1,325
Redbeds	21	663	Lime, gray	11	1,336
Sand, brown	7	670	Sand, water	2	1,338
Redbeds	15	685	Lime	57	1,395
Lime, brown	12	697	Lime, sandy	5	1,400
Shale, red	24	721	Shale, blue	2	1,402
Redbeds	52	773	Lime	2	1,404
Lime, yellow	3	776	Shale and gyp	1	1,405
Redbeds	54	830	Lime	6	1,411
Rock, red	40	870	Lime, and gyp	6	1,417
Redbeds	15	885	Shale, blue	17	1,434
Rock, red	36	921	Lime, gray	62	1,496
Redbeds	75	996	Sand, red	14	1,510
Rock, red	20	1,016	Lime	37	1,547
Shale, red	27	1,043			
Rock, red	71	1,114			
Well F-65					
Owner: The University of Texas. Driller: Jamison & Pollard.					
Limestone, hard, white	48	48	Limestone, sandy, and shale, blue	5	120
Shale, blue	12	60	Limestone, sandy	4	124
Shale, blue, and limestone, white	12	72	Limestone, hard, gray, fossiliferous blue shale	4	128
Shale, blue, rotten in lower 8 feet	26	98	Limestone, gray and tan	14	142
Shale, blue, thin beds of limestone	17	115			

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Table 6.--Drillers' logs of wells in the vicinity of Fort Stockton, Pecos County--continued

	Thickness (feet)	Depth (feet)
Well F-65--continued		
Shale, blue and limestone, hard, gray	5	147
Shale, blue	8	155
Limestone, sandy, gray	5	160
Limestone, hard, gray, and white; 180-190 feet fossiliferous	25	185
Shale, blue and gray, limestone, hard, gray	5	190
Limestone, hard, gray, and tan, fossiliferous	17	207
Limestone, hard, gray and tan with calcite veins	18	225
Limestone, hard, yellow and gray	29	254
Limestone, and shale, blue	9	263
Limestone, gray and yellow	2	265
Limestone, sandy gray, trace of pyrite	7	272
Limestone, sandy, gray, and shale, white	8	280
Sand, coarse-grained, gray, water	10	290
Sand, coarse-grained, white, water	5	295
Limestone, medium-grained, hard, white, and sand, white, abundance of pyrite	10	305
Sand, coarse-grained, white water	25	330
Sand, coarse-grained, white, blue shale breaks	15	345
Sand, coarse-grained, white, shale, blue, and limestone, yellow	17	362
Sand, coarse-grained, white	20	382
Sand, fine-grained, red, some blue and red shale	18	400
Sand, coarse-grained, red	5	405
Sand, coarse-grained, red, some limestone, white	3	408
Sand, very coarse-grained, red, water	2	410
Sand, coarse-grained, red and hard, white, limestone	8	418
Limestone, hard, white	30	448
Limestone, white	17	465
Limestone, white, and shale white	10	475
Sand, very coarse-grained transparent to red	20	495
Sand, coarse-grained, hard; limestone, tan to white	15	510
Shale, sandy, mostly purple, and interbedded silty red sand	60	570
Sand, red, very fine to coarse-grained, with some thin beds of gray to red shale	15	585
Shale, red and gray, sandy, and sand	33	618
Sand, coarse-grained, red and gray (caves badly)	17	635
Shale, gray and red, sandy	15	650
Shale, red and gray, sandy	59	709
No record	11	720
Shale, red, sandy	40	760
Shale, red, sandy with trace of gypsum	5	765
Shale, red, sandy, medium grained	30	795

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Table 6.--Drillers' logs of wells in the vicinity of Fort Stockton, Pecos County--continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well F-65--continued					
Sand, red, coarse-grained ---	5	800	Anhydrite, white, dark dolomite ----------	15	1,425
Shale and sand, sandy, fine to coarse grained ---------	40	840	Anhydrite, white, hard, trace of dolomite ----	9	1,434
Shale, gray to red, sandy --	35	875	Shale, red ----------	11	1,445
Sand, fine-grained, red, red sandy shale and green sandy shale ----------	45	920	Limestone, hard to medium, white ----------	15	1,460
Shale, red, trace of white gypsum ----------	5	925	Limestone, medium to hard, light-tan ------	8	1,468
Sand, fine-grained, red sandy shale, trace of gypsum ---	45	970	Water rose to within 200 feet of top of hole at 1,450 feet.		
Shale, sandy, red, trace of gypsum ----------	10	980	Dolomite, porous, light to dark tan ----------	55	1,523
Sand, fine-grained, red, and sandy, red shale with thin beds of gypsum ----------	95	1,075	Dolomite, dark tan, shale, red ----------	7	1,530
Shale, sandy, red, thin beds of gypsum ----------	39	1,114	Shale, red and white, tan dolomite, and white anhydrite ----------	18	1,548
Shale, sandy, red, trace of gypsum ----------	11	1,125	Shale, red ----------	7	1,555
Shale, red ----------	15	1,140	Dolomite, dark tan, hard	13	1,568
Shale, red, sandy, trace of greenish-gray sand--------	30	1,170	Limestone, and sand, gray and dark ----------	4	1,572
Shale, sandy, red, trace of gypsum ----------	5	1,175	Sand and dolomite, gray and white ----------	8	1,580
Shale, sandy, red, trace of white gypsum and green sand ----------	25	1,200	Sand and sandy limestone, gray to tan ----------	20	1,600
Sand, red, silty, and sandy shale ----------	60	1,260	Limestone, hard, dense -	12	1,612
Shale, red, sandy ---------	10	1,270	Limestone, porous, tan	3	1,615
Shale, sandy, gray --------	15	1,285	Limestone, alternating beds of dense and porous ----------	20	1,635
Shale, red, sandy, white, gypsum ----------	30	1,315	Dolomite, tan, and gray, sand, water ----------	10	1,645
Shale, sandy, red ---------	20	1,335	Sand, coarse-grained, gray some dolomite, and red shale --------	20	1,665
Shale, gray and red, sandy	18	1,353	Dolomite, hard, coarse-grained, red sand, red and white shale ------	5	1,670
Shale, sandy, red ---------	29	1,382	Dolomite, tan, hard ----	5	1,675
Shale, sandy, red, white anhydrite, and gray sand	8	1,390			
Anhydrite, white, trace of dolomite, white ---------	20	1,410			

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Table 6.--Drillers' logs of wells in the vicinity of Fort Stockton, Pecos County--continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well F-65--continued					
Dolomite, tan, hard, fine-grained sand, and red shale	9	1,684	No record (Top "salt" 2,220 feet)	417	2,220
Anhydrite, white, white shale and dolomite	8	1,692	No record (Top sand 2,795 feet)	575	2,795
Anhydrite, white	8	1,700	No record (700 feet of sulfur water in 2 hours)	173	2,968
Anhydrite, tan and white	15	1,715			
Anhydrite, white	88	1,803			
Well F-68					
Owner: Chandler Co. Driller: Lockhart & Co.					
Surface	10	10	Shale, red and gray, sandy	68	693
Lime, broken, sandy	27	37	Rock, red	74	767
Lime, brown, and gravel	13	50	Shale, blue	3	770
Lime, gray, sandy	20	70	Sand, red	15	785
Slate, brown	10	80	Rock, red	46	831
Shells, sandy	15	95	Lime and shale	6	837
Lime, broken	40	135	Rock, red	8	845
Shale, gray	5	140	Lime	3	848
Gumbo	20	160	Rock, red, and sand	257	1,105
Slate, black	47	207	Rock, red with some gypsum	215	1,320
Lime	18	225	Shells, lime	3	1,323
Slate and lime shells	33	258	Shale, red	72	1,395
Shale, gray	22	280	Anhydrite	13	1,408
Sand, water	10	290	Rock, red	7	1,415
Lime, gray	57	347	Anhydrite	53	1,468
Sand, water	113	460	Sand, soft, brown	22	1,490
Shale, gray	3	463	Lime, brown	5	1,495
Sand	7	470	Sulfur water 1,490-95 feet		
Rock, red	3	473	Lime, gray	115	1,610
Sand, red	23	496	Rock, red	5	1,615
Lime, sandy	9	505	Shale, blue	5	1,620
Rock, red	15	520	Gypsum	45	1,665
Lime, brown	10	530	Lime, hard	20	1,685
Sand, hard, sharp	35	565	Lime, gray	15	1,700
Rock, red	10	575			
Lime, sandy	50	625			

(continued on next page)

Table 6.- Drillers' logs of wells in the vicinity of Fort Stockton, Pecos County--continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well F-68--continued					
Sand, brown	10	1,710	Anhydrite	7	2,712
Lime, gray	20	1,730	Anhydrite and lime	17	2,729
Anhydrite and lime	10	1,740	Lime, brown, small	13	2,742
Lime	11	1,751	Lime, brown	11	2,753
Lime and anhydrite	7	1,758	Lime, dark brown	12	2,765
Shale, blue	7	1,765	Lime, brown	47	2,812
Lime, gray	17	1,782	Shale, brown	13	2,825
Lime and anhydrite	8	1,790	Lime, brown, and shale	21	2,846
Lime, gray	10	1,800	Lime, gray	17	2,863
Anhydrite	377	2,177	Lime, brown	109	2,972
Lime and anhydrite	8	2,185	Shale, gray	11	2,983
Anhydrite, gypsum, water	89	2,274	Sand, brown	36	3,019
Lime, gray	56	2,330	Lime, gray	31	3,050
Anhydrite	6	2,336	Sand	30	3,080
Lime, brown	24	2,360	Shale, red, sandy	20	3,100
Lime and shale, blue	17	2,377	Lime, gray, small	45	3,145
Lime and slate	33	2,410	Lime, brown	6	3,151
Gypsum and slate	60	2,470	Lime, gray,sandy,soft	12	3,163
Shale, blue	24	2,494	Lime, broken and shale	21	3,184
Anhydrite	9	2,503	Lime, gray	31	3,215
Lime	6	2,509	Lime, gray, sandy	10	3,225
Lime and anhydrite	38	2,547	Shale, dark, sandy	5	3,230
Anhydrite	87	2,634	Shale, black	4	3,234
Lime, gray	13	2,647	Lime, brown	20	3,254
Anhydrite	10	2,657	Lime, white	16	3,270
Anhydrite and lime, gray	2	2,659	Lime,dark,and shale	5	3,275
Lime, gray	7	2,666	Lime, hard, white	25	3,300
Lime, hard, gray	5	2,671	Lime, soft, white	6	3,306
Lime, gray	34	2,705			
Well F-75					
Owner: Dow Puckett. Driller: Helmerich & Payne.					
Caliche	24	24	Lime and shale	42	1,195
Clay, yellow	51	75	Rock,red, and shells	15	1,210
Sand, white	135	210	Anhydrite	2	1,212
Sand	10	220	Anhydrite and lime	148	1,360
Clay, yellow	20	240	Anhydrite	890	2,250
Sand	30	270	Anhydrite and lime	157	2,407
Lime and sand	108	378	Lime and anhydrite	95	2,502
Shale, brown	72	450	Lime	105	2,607
Sand	10	460	Lime and sand	52	2,659
Rock, red	660	1,120	Lime, sandy	52	2,711
Shale	13	1,133	Lime and sand	201	2,912
Sand	20	1,153	Lime	590	3,502
Well F-102					
Owner: Mrs. B. Downs. Driller: The Texas Co.					
Surface clay	70	70	Redbeds and anhydrite (encountered sulfur at 1,600 feet)	153	1,725
Shale and shells	380	450	Limestone	95	1,820
Sand and redbeds	250	700	Anhydrite and limestone	502	2,322
Redbeds	780	1,480	Anhydrite and salt	176	2,498
Anhydrite and blue shale	10	1,490	Limestone	79	2,577
Redbeds and blue shale	50	1,540			
Anhydrite and blue shale	32	1,572			

(continued on next page)

Table 6.--Drillers' logs of wells in the vicinity of Fort Stockton, Pecos County--continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well F-102--continued					
Anhydrite and limestone	81	2,658	Limestone	33	2,936
Limestone	101	2,759	Limestone and sand	16	2,952
Anhydrite and limestone	51	2,810	Sand	9	2,961
Limestone and sand	40	2,850	Sand and dolomite	4	2,965
Limestone	45	2,895	Shale, sandy	32	2,997
Limestone, sandy	8	2,903			
Well F-109					
Owner: E. Sullivan. Driller: Gulf Oil Corp.					
Limestone, light buff, hard, fine-grained, crystalline-	70	70	Limestone, gray, fine-grained, crystalline and little gray sand. Top sand at 345 feet -	90	400
Shale, dark gray, silty, earthy, calcareous and light gray fine-grained crystalline limestone	30	100	Sand, gray, medium-grained, slightly calcareous, water at 440 feet	130	530
Shale, gray, silty, earthy calcareous	120	220	Sand, gray, fine-grained silty	70	600
Limestone, gray, fine to medium, grained, crystalline	40	260	Sand, medium-coarse grained, pyrite present, some gray-green shale	30	630
Limestone, light tan to buff, hard, fine-grained crystalline	50	310			
Well F-111					
Owner: H. E. Taylor. Driller: R. A. Cleveland.					
Top soil	2	2	Sand, gray	9	140
Lime, broken	5	7	Sand, yellow, porous	9	149
Lime, white, hard	14	21	Lime, hard	2	151
Caliche, hard	24	45	Sand, white, water	2	153
Gravel, water	15	60	Sand, white	3	156
Clay, light yellow	12	72	Rock, shell, purple and gray	3	159
Lime, yellow	11	83	Shale	9	168
Clay, yellow	8	91	Lime, yellow and fine red sand	5	173
Lime, hard	16	107	Gravel, and shell rock	12	185
Lime, brown and yellow, broken	14	121	Sand (salt and pepper) -	15	200
Lime, gray, sandy	10	131			

Table 6.--Drillers' logs of wells in the vicinity of Fort Stockton, Pecos County--continued

	Thickness (feet)	Depth (feet)
Well F-131		
Owner: --- Driller: Quinby Oil Co.		
Lime, white	40	40
Gumbo, yellow	40	80
Sand, water	20	100
Shale, blue, lime, shells	20	120
Shale, blue	25	145
Lime, gray, water level 68	5	150
Lime, gray	51	201
Lime, white, very hard	5	206
Lime, white	2	208
Shale, blue	2	210
Lime, white	27	237
Lime, white, hard	4	241
Lime, gray, hard	18	259
Shale, blue, sandy	10	269
Lime, sandy	9	278
Sand	5	283
Lime, sandy	7	290
Lime, white, sandy	36	326
Sand	23	349
Lime, white, caving	5	354
Lime, white, shells, hard	2	356
Sand, white, water	2	358
Lime, white, shells, hard	17	375
Rock, red	7	382
Redbeds	3	385
Rock, red	10	395
Lime, gray, shells and shale	19	414
Lime, white, caving	19	433
Lime, white, shells and shale, caving	21	454
Sand, red	12	466
Lime, white, shell	3	469
Sand, red caving	2	471
Lime, gray, caving	21	492
Shale, red	3	495
Shale, light gray, sandy, carrying water	75	570
Shale, red, sandy	6	576
Sand, red, water	11	587
Redbeds	10	597
Sand, red, water	3	600
Sand, redbeds, caving	16	616
Redbeds, caving	26	642
Redbeds	11	653
Lime, gray, hard	5	658
Rock, red	1	659
Redbeds	19	678
Rock, red	33	711
Shut-down Nov. 1925, Apr. 13, 1926 rigged up and cleaned out, water level 75 feet, caving 60 feet.		
Redbeds	64	775
Lime, and shells	5	780
Redbeds, hard	4	784
Redbeds	42	826
Rock, red	21	847
Redbeds	23	870
Rock, red	15	885
Sand, red, hard	5	890
Sand and shell, red, very hard	8	898
Redbeds	7	905
Redbeds and gypsum	10	915
Redbeds	21	936
Redbeds	4	940
Sand, red, hard	10	950
Rock, red	8	958
Redbeds	27	985
Mud, blue	5	990
Redbeds	17	1,007
Redbeds, sandy	23	1,030
Redbeds	23	1,053
Sand rock, red, very hard	17	1,070
Sand, red, hard	103	1,173
Redbeds, very slight oil show 1,228 feet. Hole reduced 1,228 feet	55	1,228

(continued on next page)

Table 6.--Drillers' logs of wells in the vicinity of Fort Stockton, Pecos County--continued

	Thickness (feet)	Depth (feet)
Well F-131--continued		
Redbeds, bailed water down to 600 feet	37	1,265
Redbeds	5	1,270
Redbeds and sand, hard	15	1,285
Gyp, white	5	1,290
Sand, red	4	1,294
Redbeds	16	1,310
Lime, white, and gyp	34	1,344
Gyp, white, sandy	11	1,355
Sand, water	10	1,365
Sand, white, water hard -- May 2, water was soft and fresh at first, but with hole remaining at 1,372 feet it gradually gained in sulfur and in 24 hours was quite strong. Water struck between 1,365-1,380 feet, came to top of casing, and began to run over. Volume measured at 1,372 feet was 307 barrels per day. May 3, at depth of 1,376 feet, flow was same as May 4, when depth was 1,387 and flow 1,077. Temperature of water at latter depth was 79.8.	7	1,372
Gyp, white, soft	4	1,376
Gyp, white, soft	11	1,387
Lime, white, shell, very hard. Underreamed and set 10 inch	8	1,395
Sand, white, water	9	1,404
Sand, brown and lime	4	1,408
Sulfur, increase in water	4	1,412
Shell, hard	6	1,418
Sulfur, more water	2	1,420
Shell, hard	5	1,425
Sand, gray	5	1,430
Sand, pink	5	1,435
Shell, white, hard	5	1,440
Shell, hard	5	1,445
Sand, water	3	1,448
Lime, gray, hard	6	1,454
Lime, gray, soft	2	1,456
Lime, gray, shell, hard	9	1,465
Lime, gray, very hard	3	1,468
Lime, gray	8	1,476
Sand, white, water	2	1,478
Lime, white, hard, bailed water down 300 May 14	14	1,492
Lime, white, hard, pipe reset 1,504 feet, 7-inch water not shut off	12	1,504
Lime, gray, hard, water 1,504-1,509, put mud in hole	2	1,506
Sand, gray, water, soft	3	1,509
Sand, gray, slightly hard	6	1,515
Sand, limey, hard	5	1,520
Lime, brown, sandy	22	1,542
Lime, gray, hard	5	1,547
Sand, red, reduced hole, lowered pipe to bottom hole appeared dry -- Bailed water down 200 feet.	9	1,556
Lime, gray	2	1,558
Redbeds	3	1,561
Lime, brown	4	1,565
Lime and gyp, reddish	15	1,580
Shale, blue, soft	5	1,585
Shale, blue, hard	10	1,595
Lime, gray	5	1,600
Lime, gray, shale, and slate	20	1,620
Lime, gray, and gyp	20	1,640
Lime and gyp	39	1,679
Lime, gray and gyp	37	1,716
Permian, gray	29	1,745
Lime, gray and gyp	74	1,819
Lime, gray, and gyp hard	26	1,845

(continued on next page)

Table 6.--Drillers' logs of wells in the vicinity of Fort Stockton, Pecos County--continued

	Thickness (feet)	Depth (feet)
Well F-131--continued		
Lime, gray	65	1,910
Permian, blue, hard	31	1,941
Lime, gray	19	1,960
Lime, blue	42	2,002
Lime, blue, samples show some salt crystals water between 2,002-12 IBl in three hours	33	2,035
Salt, blue, and lime shell	25	2,060
Lime, hard	12	2,072
Sand, gray, hard	2	2,074
Lime, blue, and salt, broken formation	51	2,125
Shells, gray, salt	45	2,170
Lime and salt, white	30	2,200
Salt, gray	20	2,220
Lime, gray	4	2,224
Lime, blue and salt	16	2,240
Salt, blue and lime	35	2,275
Lime, white, hard	15	2,290
Lime, blue	10	2,300
Lime, gray, hard	30	2,330
Lime, gray	57	2,387
Lime, gray, hard	8	2,395
Lime, shells, gray and blue	29	2,424
Lime, gray, hard	18	2,442
Lime, gray	56	2,498
Lime, blue, 40 hour shutdown hole made 8½, bails water. Reduced hole 2,525 feet to 8-inch	20	2,518
Lime, gray	37	2,555
Lime, gray, hard	13	2,568
Lime, blue, hard	17	2,585
Lime, gray	7	2,592
Lime, gray, hard	13	2,605
Lime, brown, hard	8	2,613
Dolomite, gray, hard	12	2,625
Lime, gray, hard	11	2,636
Lime, gray	42	2,678
Lime, gray, very hard	18	2,696
Lime, gray	9	2,705
Lime, brown	17	2,722
Lime, red and black, and gyp	28	2,750
Lime, brown and gray, and gyp	32	2,782
Lime, brown and gyp	55	2,837
Lime, white, very hard	17	2,854
Lime, brown, hard	18	2,872
Lime, gray, shell	13	2,885
Lime, gray, shell softer	5	2,890
Lime, gray	20	2,910
Lime, white, hard	17	2,927
Lime, white, very hard	5	2,932
Dolomite, gray	1	2,933
Dolomite, gray	7	2,940
Lime, blue	36	2,976
Lime, gray	40	3,016
Lime, shell, gray	5	4,031
Lime, blue	14	3,035
Lime, shell, gray and blue	25	3,060
Lime, gray, appears to be a little more water, 3 bailers of water in 4 hours	9	3,069
Gas, strong odor	15	3,084
Sand, red	6	3,092
Lime, gray	56	3,148
Lime, white	1	3,149
Lime, gray	21	3,170
Sand, red	10	3,180
Slate and lime shells, gray	20	3,200
Lime, gray, took water samples	10	3,210
Lime, gray, bailed 28 bailers of water	5	3,215
Lime, gray, bailed 19 bailers of water	5	3,220

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Table 6.--Drillers' logs of wells in the vicinity of Fort Stockton, Pecos County--continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well F-131--continued					
Lime, white	3	3,223	Sand, white, water	14	3,308
Lime, shell, gray	22	3,245	Sand, gray, coarse-grained	4	3,312
Lime, gray and sand	15	3,260	Sand, gray, dark and finer	6	3,318
Lime, black	5	3,265	No record	2	3,320
Sand, white	2	3,267	Reset 6¼-inch casing 3,307 feet. Muddied hole behind casings	7	3,327
Ore slion	3	3,270	Sand, gray, hard	2	3,329
Lime, black, water	6	3,276	Sand, hard	2	3,331
Lime, black, water, little sulfur in water, no salt	3	3,279	Sand, gray, hard	2	3,333
Lime, black	9	3,288			
Lime, black, getting harder	4	3,292			
No sample, softer formation	2	3,294			
Well F-133					
Owner: C. W. Williams. Driller: E. R. Minshall, et al.					
Lime	30	30	Shale, red, sandy	25	680
Lime and shale	5	35	Sand	4	684
Shale, blue	52	87	Sand, gray	5	689
Lime	24	111	Rock, red	6	695
Lime and shale	29	140	Rock, red, sandy	6	701
Shale, blue	145	285	Lime, sandy	8	709
Lime	36	321	Rock, red and sand	21	730
Sand, hole full of water	4	325	Sand, red	25	755
Sand	30	355	Sand, hole full of water	10	765
Lime	10	365	Rock, red, sandy	25	790
Sand, water	25	390	Sand, red	20	810
Shale, gray, sandy	15	405	Rock, red	45	855
Sand and shale	35	440	Lime,	5	860
Rock, red	70	510	Rock, red	5	865
Anhydrite	25	535	Redbeds	140	1,005
Sand	28	563	Sand, red	5	1,010
Rock, red	7	570	Rock, red and sand, red	250	1,260
Rock, red, and sand	5	575	Rock, red	40	1,300
Sand	30	605	Sand	7	1,307
Lime, sandy	5	610	Rock, red	189	1,496
Sand	35	645	Gypsum and anhydrite	4	1,500
Redbeds	10	655	Anhydrite	45	1,545

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Table 6.--Drillers' logs of wells in the vicinity of Fort Stockton, Pecos County--continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well F-133--continued					
Lime, gray	5	1,550	Anhydrite	16	2,538
Lime, brown, hole full of sulfur water	15	1,565	Dolomite	13	2,551
Sand, gray	5	1,570	Anhydrite	39	2,590
Lime, gray	5	1,575	Lime, brown	6	2,596
Lime, white	20	1,595	Anhydrite	10	2,606
Lime	5	1,600	Lime and anhydrite	7	2,613
Shale	50	1,650	Lime, brown	9	2,622
Lime	7	1,657	Anhydrite	26	2,648
Shale	10	1,667	Lime	22	2,670
Lime	83	1,750	Lime, brown	59	2,729
Sand	3	1,753	Lime, black	21	2,750
Rock, red, sandy	27	1,780	Shale, gray	4	2,754
Lime, sand and rock, red	10	1,790	Lime, gray	10	2,764
Gypsum and rock, red	10	1,800	Lime, brown	22	2,786
Anhydrite and shale	5	1,805	Lime,	6	2,792
Anhydrite	277	2,082	Lime, gray	6	2,798
Lime, gray	13	2,095	Lime, brown	5	2,803
Anhydrite	190	2,285	Anhydrite	3	2,806
Salt	20	2,305	Lime, gray	9	2,815
Gypsum, anhydrite, and salt	11	2,316	Lime and sand	12	2,827
Anhydrite	49	2,365	Lime	99	2,926
Salt	81	2,446	Shale, black and blue	24	2,950
Anhydrite	44	2,490	Lime, broken	10	2,960
Lime	18	2,508	Lime	20	2,980
Dolomite and lime	8	2,516	Rock, red	10	2,990
Lime, brown	6	2,522	Sand, gray	15	3,005
Well F-134					
Owner: C. W. Williams.					
Caliche and lime	105	105	Lime, broken, and shale	10	300
Lime	20	125	Lime	37	337
Shale, blue	15	140	Sand, water at 344 feet	43	380
Lime	45	185	Lime, sandy	35	415
Shale, blue	20	200	Shale,	10	425
Lime	10	210	Sand	14	439
Shale, blue	15	225	Shale	58	497
Lime	5	230	Sand	13	510
Shale, blue	60	290	Shale, blue	8	518

(continued on next page)

Table 6.--Drillers' logs of wells in the vicinity of Fort Stockton, Pecos County--continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well F-134--continued					
Sand, white	10	528	Lime	21	2,756
Redbeds	12	540	Anhydrite	10	2,766
Sand, white	10	550	Shale	4	2,770
Redbeds	25	575	Lime and anhydrite	4	2,774
Lime	10	585	Lime, gray	17	2,791
Rock, red	35	620	Lime, brown	20	2,811
Sand	10	630	Lime, gray	108	2,919
Rock, red	160	760	Sand, coarse-grained	47	2,966
Sand	5	765	Lime, brown, sandy	5	2,971
Rock, red	272	1,037	Sand	14	2,985
Rock, red	470	1,507	Lime, gray	9	2,994
Anhydrite	53	1,560	Sand	31	3,025
Lime, brown	40	1,600	Rock, red	30	3,055
Lime, gray	316	1,916	Lime	28	3,083
Anhydrite	84	2,000	Sand, gray, water	8	3,091
Anhydrite and gypsum	32	2,032	Lime, sandy	9	3,100
Lime and anhydrite, smell of gas	108	2,140	Sand and rock, red	10	3,110
Anhydrite, sulfur water at 2,143 feet	140	2,280	Sand	14	3,124
Salt and anhydrite	11	2,291	Lime, gray, hard	9	3,133
Anhydrite and lime	47	2,338	Lime, gray, sandy	7	3,140
Salt	50	2,388	Lime, brown, sandy	10	3,150
Anhydrite and gypsum	7	2,395	Lime, gray	16	3,166
Salt	55	2,450	Lime, brown	9	3,175
Anhydrite	182	2,632	Lime, hard, gray	15	3,190
Lime	22	2,654	Lime, sandy	14	3,204
Anhydrite	10	2,664	Lime, white	11	3,215
Lime, brown	28	2,692	Lime, sandy	7	3,222
Lime, gray	18	2,710	Redbeds	11	3,233
Lime, brown and anhydrite	25	2,735	Rock, red	13	3,246
			Lime and rock, red	12	3,258
			Sand, sulfur water	20	3,278

Table 6.--Drillers' logs of wells in the vicinity of Fort Stockton, Pecos County--continued

Well F-135

Owner: C. W. Williams. Driller: --.

	Thickness (feet)	Depth (feet)
Lime	90	90
Shale, blue	1	91
Lime, shale	89	180
Lime, shale breaks	110	290
Shale, blue	30	320
Lime, and shale	20	340
Lime, water	10	350
Lime	70	420
Lime, blue, hard	4	424
Sand, water	31	455
Sand and shale	25	480
No record	15	495
Sand, water	9	504
Shale, sandy	21	525
Lime, blue	10	535
Shale, sandy	15	550
Shale and lime shells	15	565
Lime, broken	15	580
Lime	28	608
Lime, broken	10	618
Rock, red	40	658
Lime, hard	7	665
Rock, red	17	682
Shale, gray, sandy	8	690
Shale, red	30	720
Rock, red	10	730
Sand, water	35	765
Shale, red, sandy	15	780
Shale, red	25	805
Rock, red	27	832
Lime, anhydrite	6	838
Rock, red, and shale	75	913
Shale, red, shells	32	945
Rock, red, and shale	551	1,496
Shale, red, sandy	14	1,510
Anhydrite, shells and sand	8	1,518
Shale, red	17	1,535
Anhydrite, water	45	1,580
Sand, water, hole full of water	3	1,583
Lime, gray	17	1,600
Sand, water	4	1,604
Sand, white	3	1,607
Lime, gray	26	1,633
Lime, brown	14	1,647
Lime, gray	13	1,660
Gypsum, anhydrite, and lime	5	1,665
Lime, gray	10	1,675
Lime, brown	5	1,680
Lime, gray, red streaks	46	1,726
Lime, blue	31	1,757
Lime	20	1,777
Lime, broken, rock, red	4	1,781
Water	4	1,785
Lime, hard	9	1,794
Lime, broken, rock, red	5	1,799
Anhydrite	20	1,819
Lime, gray	25	1,844
Lime, gray	5	1,849
Anhydrite	50	1,899
Lime and anhydrite	9	1,908
Anhydrite, show of gas	78	1,986
Anhydrite	36	2,022
Lime, gray	11	2,033
Anhydrite	57	2,090
Lime, sandy	16	2,106
Anhydrite	33	2,139
Dolomite	11	2,150
Anhydrite and lime	24	2,174
Anhydrite and shells	14	2,188
Anhydrite, black sulfur water	55	2,243
Anhydrite	27	2,270
Dolomite	13	2,283
Anhydrite and salt	29	2,312
Lime and anhydrite	23	2,335
Salt	68	2,403
Anhydrite and gypsum	23	2,426
Anhydrite and lime	11	2,437

(continued on next page)

Table 6.--Drillers' logs of wells in the vicinity of Fort Stockton, Pecos County--continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well F-135--continued					
Dolomite	8	2,445	Lime, gray	28	2,819
Anhydrite	84	2,529	Sand, gas	9	2,828
Anhydrite and lime, brown	8	2,537	Shale and sand	8	2,836
Lime	8	2,545	Sand, gas	4	2,840
Anhydrite	6	2,561	Sand and shale	5	2,845
Lime, brown	6	2,567	Sand, gas	5	2,850
Anhydrite	13	2,570	Lime and sand	52	2,902
Lime, gray	13	2,583	Lime, sand increases	7	2,909
Gypsum	7	2,590	Lime, sandy	18	2,927
Anhydrite	10	2,600	Shale, sandy	8	2,935
Lime, brown	12	2,612	Sand, gas	5	2,940
Lime and anhydrite	10	2,622	Lime, gray	10	2,950
Lime, brown	70	2,692	Shale, gas	4	2,954
Lime, show of gas	3	2,695	Lime, gray, sandy	10	2,964
Lime	42	2,737	Lime, gray	4	2,968
Lime, dark gray	17	2,754	Sand, gray	12	2,980
Lime, gray	10	2,764	Sand, gray	3	2,983
Lime, brown	27	2,791	Sand, sulfur water	1	2,984
Well F-136					
Owner: City of Fort Stockton. Driller: P. Jones.					
Soil	3	3	Shale, sandy	4	366
Caliche	62	65	Sand	9	375
Shale, blue	70	135	Shale, sandy	15	390
Lime, shaley	45	180	Sand	23	413
Lime	106	286	Redbed	1	414
Sand	76	362			

Table 6.--Drillers' logs of wells in the vicinity of Fort Stockton, Pecos County--continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well F-137					
Owner: City of Fort Stockton. Driller: P. Jones.					
Caliche and lime shells, water at 17 feet	14	14	Lime, gray, hard	76	260
Shale, blue and lime shale	26	40	Sand, yellow	5	265
Shale, blue, sticky	58	98	Sand rock, white	25	290
Lime, gray, layers of slate and shale	74	172	Shale	4	294
Lime, yellow with shells, plenty of water, probably small crevice	12	184	Lime, sandy, hard	9	303
			Shale, white, sticky	12	315
			Sand rock, soft	12	327
			Sand, white	12	339
			Shale, white, blue oily	6	345
Well F-139					
Owner: N. M. Mitchell. Driller: P. Weddle.					
Soil	15	15	Sand, water rose fast	7	115
Caliche, and gravel	10	25	Lime, gray	75	190
Gumbo, yellow, seep water	10	35	Sand	17	207
Lime, yellow, hard	5	50	Shale, pink	3	210
Shale, hard	15	55	Sand, water	37	247
Shale, soft	35	90	Sandstone	3	250
Lime, gray, hard	15	105	Shale	25	275
Gravel, water rose some	3	108	Redbeds	35	310
Well F-144					
Owner: J. S. Oates. Driller: E. James.					
Soil	10	10	Clay, yellow, gravel	13	107
Clay and gravel	18	28	Limestone, hard, grayish-blue	41	148
Gravel, water	2	30	Clay, yellow	12	160
Lime shell	2	32	Sand, yellow	30	190
Clay, white, water	18	50	Shale, pink	14	204
Limestone, hard	2	52	Sand, gravel, black, water	12	216
Clay and limestone, gravel	11	63	Shale	19	235
Clay, white	10	73	Sand, white, water	24	259
Shale, pink	13	86			
Gravel, yellow, water	8	94			

Table 6.--Drillers' logs of wells in the vicinity of Fort Stockton, Pecos County--continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well F-150					
Owner: --. Driller: --.					
Limestone, medium dark, fine-grained, crystalline	160	160	Top Rustler	10	1,330
Sand, white and yellow, fine-grained	10	170	Dolomite	170	1,500
Limestone, sand, and gray shale	40	210	Anhydrite	200	1,700
Sand and limey sand	50	260	Anhydrite with little sand and gray and red shale	40	1,740
Sand, limestone, and gray shale	30	290	Anhydrite	90	1,830
Limestone, light gray and brown	70	360	Anhydrite with little sand and red-green and gray shale	190	2,020
Limestone, with increasing amount of sand	50	410	Anhydrite	200	2,220
Sand and gravelly sand	80	490	Top Tansill, dolomite and anhydrite	180	2,400
Shale, bluish-gray	20	510	Dolomite and little sand and gray shale	120	2,520
Sand, red, silty, fine-grained	40	550	Top Yates		2,520
Sand, silty with red and green shale	770	1,320	No record	740	3,260
Well F-152					
Owner: Burney Ligon. Driller: E. James.					
Soil and clay	8	8	Gravel and shale	65	110
Lime	12	20	Lime	32	142
Caliche	25	45			
Well F-155					
Owner: --. Driller: --.					
Lime, yellow	20	20	Shale, blue	5	55
Shale, blue	20	40	Lime, yellow	5	60
Lime, white	10	50	Lime, brown, water	5	65

(continued on next page)

Table 6.--Drillers' logs of wells in the vicinity of Fort Stockton, Pecos County--continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well F-155--continued					
Lime, brown	5	70	Lime	21	1,366
Shale, blue and lime	15	85	Sand, water	14	1,380
Clay, blue	15	100	Lime	19	1,399
Lime, sandy	10	110	Lime, white	14	1,413
Sand, white, water	15	125	Sand, water, flowing	12	1,425
Sand, white	35	160	Lime, gray, hard, sandy	5	1,430
Sand, yellow	20	180	Lime, white, hard, sandy	9	1,439
Shale, gray, sandy	20	200	Lime	18	1,457
Lime, brown	10	210	Sand, water second flow, bad water	12	1,469
Rock, red	10	220	Lime, gray, hard	14	1,483
Lime, brown	20	240	Lime	12	1,495
Lime, brown and white	5	245	Sand, dry	11	1,506
Lime, yellow	5	250	Lime	12	1,518
Lime, yellow, fine	15	265	Anhydrite	32	1,550
Lime, brown	10	275	Shale, blue	12	1,562
Lime, white	20	295	Anhydrite	10	1,572
Shale, blue	5	300	Anhydrite, sandy	8	1,580
Shale, brown, sandy	15	315	Anhydrite	327	1,907
Lime, brown	20	335	Shale, blue, sandy	11	1,918
Shale, brown	20	355	Anhydrite	85	2,003
Shale, blue	35	390	Sand, water	5	2,008
Sand, red and white, water will not bail down	10	400	Anhydrite	98	2,106
Redbed	35	435	Lime	13	2,119
Lime, brown	15	450	Lime, white, harder	10	2,129
Rock, red, some sand	5	455	Anhydrite	15	2,144
Rock, red	185	640	Lime	8	2,152
Rock, red, white sand, 12 B.W.P.H.	5	645	Anhydrite	6	2,158
Rock, red	57	702	Shale, blue	34	2,192
Redbed	425	1,127	Anhydrite	100	2,292
Rock, red sandy	102	1,229	Lime, gray	66	2,358
Shale, blue	26	1,255	Anhydrite	36	2,394
Lime, white	13	1,268	Lime	5	2,399
Lime	8	1,276	Anhydrite	17	2,416
Shale, blue	12	1,288	Lime	18	2,434
Lime, white, sandy	13	1,301	Anhydrite	3	2,437
Sand, water	30	1,331	Shale, blue, gas show	4	2,441
Lime	1	1,332	Lime, hard	2	2,443
Lime, black	13	1,345	Anhydrite	2	2,445
			Anhydrite, bottom hole	59	2,504

Table 6.- Drillers' logs of wells in the vicinity of Fort Stockton, Pecos County--continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well F-156					
Owner: M. R. Gonzales. Driller: R. A. Cleveland.					
Adobe, dirt and clay -----	5	5	Crevice ----------	4	49
Lime, soft, chalk --------	7	12	No record ---------	39	88
Caliche -----------------	6	18	Sand, gray, water -	22	110
Lime, hard --------------	27	45	Redbeds and lime --	130	240
Well F-158					
Owner: S. C. Park. Driller: Richardson Bros.					
Soil -------------------	6	6	Shale, blue and lime	19	190
Caliche and clay -------	9	15	Lime, yellow -------	11	201
Gravel, sandy ----------	6	21	Crevice ----------	8	209
Lime, white ------------	42	63	Lime, hard ---------	1	210
Shale, blue ------------	108	171			
Well F-159					
Owner: S. C. Park. Driller: A. N. Yocke.					
Soil -------------------	6	6	Shale, blue and lime	19	170
Caliche and clay ------	9	15	Lime, yellow --------	19	189
Sand and gravel -------	6	21	Crevice, water ------	6	195
Lime, white -----------	42	63	Lime, hard ----------	5	200
Shale, blue -----------	88	151			

Table 6.- Drillers' logs of wells in the vicinity of Fort Stockton, Pecos County--continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well F-160					
Owner: H. S. Whittenburg. Driller: Joe Gray.					
Soil	8	8	Lime, shells	5	256
Shale, sandy	17	25	Sand, gray	6	262
Gravel	15	40	Sand, yellow and shale, gray	31	293
Caliche and shale, limey	35	75	Sand, gray and shale, gray, possibly some water at 300-309	41	334
Lime, shells, blue	10	85	Sand, yellow	14	348
Sand, little water	5	90	Sand, soft, gray, possibly water	17	365
Shale, blue	15	105	Sand, hard, gray	7	372
Lime, blue	93	198	Lime, brown	29	401
Crevice (water cleared up, no returns no cuttings)	12	210			
Lime, gray	6	216			
Sand	35	251			
Well J-2					
Owner: Graef Bros. Driller: E. James.					
Gravel, surface	8	8	No returns on cuttings, lots of water, believe four strata of water, also four thin beds of limestone	55	450
Conglomerate	117	125	Bottomed in yellow clay and gravel. Water standing at 290 feet from surface.		
Gravel and clay	25	150			
Lime, hard, white	20	170			
Gravel and clay	80	250			
Lime, hard	30	280			
Gravel of limestone	10	290			
Gravel and clay	80	370			
Lime, hard	25	395			
Well J-3					
Owner: Dave McGill. Driller: Royce Hemmline.					
Soil	7	7	Clay, buff, arenaceous 75 percent and gravel, coarse to fine, of limestone and chert	29	135
Clay, reddish buff, slightly sandy	18	25	Sand, subrounded, angular, of limestone and chert	5	140
Gravel, limestone, subround angular, 60 percent and sand, quartz and limestone, subrounded grains, 40 percent	5	30	Sand of limestone and trachyte, subrounded to angular grains, 80 percent and gravel, limestone and trachyte pebbles, subrounded, 20 percent	7	147
Sand, fine to coarse-grained subrounded, 60 percent and gravel, limestone and igneous fragments, subrounded, 40 percent	76	106			

(Continued on next page)

Table 6.--Drillers' logs of wells in the vicinity of Fort Stockton, Pecos County--continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well J-3--continued					
Gravel, trachyitic, syenitic, little limestone, sub-rounded 90 percent and sand of same materials, 10 percent	23	170	Gravel, and sand, igneous, sub-rounded	5	183
Clay, pinkish buff, 50 percent and gravel of igneous origin 50 percent	8	178	Clay, pinkish buff, slightly arenaceous	8	191
			Sand and gravel of igneous origin, sub-rounded	10	201

Table 7.- Water levels in the vicinity of Fort Stockton, Pecos County, Texas

(Water levels in feet below land-surface datum)

Date	Water level	Date	Water level	Date	Water level
Well E-13					
Owner: D. J. Sibley.					
Nov. 23, 1946	44.3	Dec. 6, 1952	52.91	Jan. 19, 1955	51.64
Jan. 25, 1952	55.68	Dec. 2, 1954	54.26		
Well E-69					
Owner: Chandler Co.					
Jan. 25, 1952	9.22	Dec. 3, 1954	15.82	Feb. 9, 1955	10.55
Dec. 8	16.19	Jan. 20, 1955	18.98	Dec. 7	12.67
Well E-72					
Owner: Chandler Co.					
Dec. 8, 1952	14.96	Dec. 3, 1954	16.32	Feb. 9, 1955	11.09
Dec. 5, 1953	15.89	Jan. 22, 1955	9.53	Dec. 7	12.52
Well E-73					
Owner: Chandler Co.					
Jan. 25, 1952	8.61	Dec. 3, 1954	15.78	Feb. 9, 1955	10.30
Dec. 5, 1953	15.18	Jan. 20, 1955	8.81	Dec. 7	11.04
Well E-89					
Owner: Wesley Whitman.					
Jan. 3, 1956	77.3	Apr. 3, 1956	100.1	May 5, 1956	109.1
Mar. 21	83.1	Apr. 10	102.6		

Table 7.- Water levels in the vicinity of Fort Stockton, Pecos County--Continued

Date	Water level	Date	Water level	Date	Water level
Well F-7					
Owner: Ernest Riggs.					
June 6, 1947	14.2	Dec. 6, 1952	16.78	Jan. 19, 1955	14.21
July 8, 1948	16.5	Dec. 5, 1953	20.10	Dec. 6	12.65
Nov. 30, 1951	16.56	Dec. 2, 1954	19.24		
Well F-57					
Owner: M. R. Gonzales.					
Apr. 10, 1947	29.8	Jan. 25, 1952	33.25	Jan. 19, 1955	32.59
Apr. 28, 1950	34.0	Dec. 8	37.00	Dec. 6	35.05
Mar. 26, 1951	35.6	Dec. 5, 1953	35.04		
Nov. 28	36.60	Dec. 3, 1954	37.08		
Well F-63					
Owner: Lem Smith.					
Oct. 20, 1946	97.4	Jan. 25, 1952	88.32	Jan. 19, 1955	87.18
Dec. 30, 1950	89.5	Dec. 8	94.70		
Nov. 29, 1951	91.88	Dec. 5, 1953	93.11		
Well F-71					
Owner: McKinney & Ivey.					
June 15, 1942	118.2	July 15, 1948	122.7	Dec. 16, 1955	124.2
Nov. 19, 1946	116.0	June 23, 1949	119.5	Apr. 3, 1956	168.4
Well F-130					
Owner: Mrs. B. F. Webb.					
Mar. 15, 1950	41.4	Jan. 25, 1952	53.73	Dec. 2, 1954	55.62
May 30	43.2	Dec. 6	55.11	Dec. 7, 1955	55.25
Nov. 28, 1951	56.46	Dec. 5, 1953	56.91		

Table 7.- Water levels in the vicinity of Fort Stockton, Pecos County--Continued

Date	Water level	Date	Water level	Date	Water level
Well F-132					
Owner: The Texas Co.					
June 28, 1949	103.0	Jan. 25, 1952	102.63	Dec. 2, 1954	104.08
May 29, 1950	103.0	Dec. 6	103.78	Dec. 6, 1955	102.66
Nov. 28, 1951	104.80	Dec. 5, 1953	103.27		
Well F-138					
Owner: State Highway Department.					
Nov. 27, 1951	60.90	Dec. 7, 1953	70.14	Feb. 10, 1955	51.03
Jan. 25, 1952	58.92	Dec. 2, 1954	60.02	Dec. 7	51.89
Dec. 8	68.93	Jan. 20, 1955	47.81		
Well F-149					
Owner: Burney Ligon.					
June 11, 1950	83.4	Dec. 8, 1952	91.07	Dec. 1, 1954	91.38
Jan. 26, 1952	89.07	Dec. 5, 1953	93.87	Dec. 5, 1955	94.25
Well F-153					
Owner: B. Hilger.					
June 21, 1949	51.3	Jan. 25, 1952	61.85	Dec. 2, 1954	61.06
Oct. 4	50.4	Dec. 6	62.19	Jan. 19, 1955	60.53
Nov. 27, 1951	62.25	Dec. 5, 1953	61.62	Dec. 7	62.63
Well F-154					
Owner: City of Fort Stockton.					
Jan. 17, 1950	117.0	Dec. 6, 1952	126.33	Dec. 7, 1955	127.81
Nov. 28, 1951	127.33	Dec. 5, 1953	129.03		
Jan. 25, 1952	122.49	Dec. 3, 1954	126.16		

Table 7.- Water levels in the vicinity of Fort Stockton, Pecos County--Continued

Date	Water level	Date	Water level	Date	Water level
Well F-156					
Owner: M. R. Gonzales.					
Mar. 21, 1949	41.2	Jan. 25, 1952	43.61	Jan. 19, 1955	40.76
Jan. 1, 1951	42.6	Dec. 8	45.60	Dec. 6	43.62
Mar. 19	42.2	Dec. 5, 1953	45.14		
Nov. 28	45.85	Dec. 3, 1954	45.24		
Well F-161					
Owner: H. S. Whittenburg.					
Dec. 8, 1952	99.67	Jan. 19, 1955	95.39	Apr. 3, 1956	82.99
Dec. 5, 1953	98.97	Dec. 6	69.02	Apr. 10	87.31
Dec. 3, 1954	99.78	Dec. 19	68.86	May 4	96.9

Table 8.- Analyses of water from wells and springs in the vicinity of Fort Stockton, Pecos County, Tex.
(Results are in parts per million, except specific conductance, pH, and percent sodium)

Well	Owner	Depth of well (ft.)	Date of collection	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium and potassium ($Na + K$)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Nitrate (NO_3)	Boron (B)	Dissolved solids	Hardness as $CaCO_3$	Percent sodium	Sodium-adsorption ratio (SAR)	Specific conductance (micromhos at 25°C)	pH
E-13	D. J. Sibley	401	Nov. 23, 1946	-	158	45	178	270	310	300	0.5	-	1,120	580	-	-	-	-
E-26	M. C. Slaton	350	Mar. 28, 1949	22	135	54	283	271	405	375	2.5	0.11	1,410	559	52	-	2,230	-
E-26	do	350	Mar. 6, 1956	24	141	52	276 13	267	411	375	1.4	.33	1,420	566	51	5.1	2,220	7.5
E-28	Clayton Williams	1,373	Apr. 3, 1944	-	342	83	194	252	959	292	0	.26	1,990	1,200	26	-	-	-
E-28	do	1,373	Mar. 28, 1949	17	295	76	217	213	874	308	2.2	-	1,890	1,050	31	-	2,580	-
E-28	do	1,373	Mar. 6, 1956	20	265	62	214 9.2	225	750	300	.4	.27	1,730	916	33	3.1	2,430	7.1
E-29	do	446	Jan. 30, 1947	-	156	52	250	280	413	345	.8	-	1,350	604	47	-	2,090	-
E-29	do	446	Mar. 28, 1949	21	133	53	268	272	395	352	2.2	.20	1,360	550	51	-	2,120	-
E-29	do	446	Mar. 6, 1956	23	148	52	264 12	268	417	362	1.7	.33	1,410	584	49	4.7	2,200	7.8
E-30	Chandler Co.	1,756	Apr. 11, 1946	-	504	115	133	154	1,480	250	.5	-	2,560	1,730	14	-	-	-
E-30	do	1,756	Oct. 15, 1947	-	530	118	109	172	1,470	265	.5	-	2,580	1,810	12	-	3,150	-
*E-31	Mrs. C.L.Thompson	3,575	Apr. 1, 1932	17	388	103	88	174	1,230	105	.5	-	2,020	1,392	11	-	-	-
E-31	do	3,575	Apr. 3, 1944	-	478	116	115	202	1,470	160	.0	-	2,440	1,670	13	-	-	-
E-32	George Baker	220	May 5, 1947	-	104	23	86	245	149	127	6.7	-	680	354	35	-	1,090	-
E-33	do	200	do	-	360	106	371	277	1,070	525	7.5	-	2,640	1,330	38	-	3,670	-
*E-66	Raymond Tyler	630	Jan. 19, 1956	22	102	27	104 6.4	252	177	144	1.8	.27	710	366	38	2.4	1,170	7.4
E-67	Harlan Black	600	Apr. 2, 1956	22	94	19	84 6.0	244	143	114	2.1	.20	604	312	36	2.1	994	-
E-84	Chandler Co.	1,812	Apr. 7, 1956	18	314	87	195 9.2	192	984	282	.2	.21	1,980	1,140	27	2.5	2,690	7.3
E-92	S. C. Park	210	Mar. 21, 1956	22	144	46	266 0	268	385	360	1.0	.23	1,360	548	51	4.9	2,200	7.6
*E-112	L. P. Williams	372	Mar. 20, 1956	22	136	47	278 0	264	383	380	.0	.23	1,380	532	53	5.3	2,250	7.6
F-4	Ernest Riggs	334	Dec. 9, 1946	-	243	155	651	200	1,270	825	12	-	3,250	1,240	-	-	3,280	-
F-4	do	334	May 27, 1948	36	148	102	416	70	782	580	5.6	-	2,100	789	53	-	3,280	-
F-4	do	334	Apr. 7, 1956	19	284	144	560 20	279	968	910	11	-	3,050	1,300	48	6.8	4,570	7.7
F-13	T. W. Hillin	515	Mar. --, 1947	-	206	60	267	274	543	390	1.5	-	1,600	760	-	-	2,450	-
F-13	do	515	Apr. 2, 1949	16	208	62	301	254	614	408	5.9	-	1,740	774	46	-	2,640	-
F-22	Charles Stone	250	Oct. 28, 1946	-	352	94	777	306	1,020	795	25	-	3,210	765	-	-	5,240	-
F-26	Harrison Dyche	260	Apr. 16, 1947	-	416	144	537	308	1,380	780	10	-	3,420	1,630	-	-	-	-
F-53	City of Fort Stockton	193	Oct. 21, 1946	16	156	52	260	276	427	350	.4	-	1,420	604	44	-	2,180	7.0
F-57	M. R. Gonzales	235	Aug. 27, 1949	21	140	53	278	252	444	355	2.5	-	1,410	568	52	-	2,250	7.7
F-58	Pecos County Water Control & Improvement District No.1	Spring	Apr. 7, 1932	-	138	54	269	271	393	358	.83	-	1,368	566	50	-	-	-
F-58	do	Spring	Aug. 28, 1939	-	142	51	-	-	395	364	-	-	-	-	-	-	2,230	-

* Well E-31, Iron (Fe) 0.29.
* Well E-66, Iron (Fe), 0.16; Manganese (Mn), 0.00; Fluoride (F), 1.1; Phosphate (PO_4), 0.01.
* Well E-112, Iron (Fe), 1.9.

Table 8.- Analyses of water from wells and springs in the vicinity of Fort Stockton, Pecos County--Continued

Well	Owner	Depth of well (ft.)	Date of collection	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium and potassium (Na + K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Nitrate (NO_3)	Boron (B)	Dissolved solids	Hardness as $CaCO_3$	Percent sodium	Sodium-adsorption ratio (SAR)	Specific conductance (micromhos at 25°C)	pH
F-58	Pecos County Water Control & Improvement District No.1	Spring	Dec. 20, 1939	-	124	62	220	173	380	358	-	-	1,230	-	-	-	2,180	-
F-58	do	Spring	May 5, 1940	-	-	-	-	-	-	358	-	-	-	-	46	-	2,280	-
F-58	do	Spring	June 28, 1940	-	140	55	200	122	391	356	1.0	-	1,200	-	43	-	2,250	-
F-58	do	Spring	Aug. 23, 1940	-	109	54	262	180	386	364	2.0	-	1,270	494	54	-	2,180	-
F-58	do	Spring	Sept. 3, 1940	-	131	52	252	227	387	354	1.2	-	1,290	-	50	-	2,200	-
F-58	do	Spring	Feb. 1, 1941	22	140	50	273	273	386	348	.50	-	1,360	555	51	-	2,140	-
F-58	do	Spring	Apr. 15, 1941	-	129	52	255	228	383	358	0	-	1,290	536	51	-	2,110	-
F-58	do	Spring	June 1, 1941	-	142	50	261	273	394	350	-	-	1,330	560	50	-	-	-
F-58	do	Spring	Oct. 9, 1946	-	125	53	261	188	429	382	0	-	1,310	530	52	-	2,170	-
F-58	do	Spring	Oct. 14, 1947	-	132	54	261	238	402	358	1.0	-	1,330	552	51	-	2,220	-
F-58	do	Spring	Aug. 5, 1949	-	-	-	-	-	-	355	-	-	-	-	-	-	2,240	-
F-58	do	Spring	Oct. 3, 1949	-	-	-	-	267	-	352	-	-	-	-	-	-	-	7.4
F-58	do	Spring	Aug. 6, 1949	24	128	52	268	264	377	360	0	-	1,320	534	52	-	2,230	8.1
F-58	do	Spring	Jan. 28, 1950	22	136	58	246	243	389	360	.8	-	1,330	578	48	-	2,130	8.1
F-58	do	Spring	May 11, 1950	-	-	-	-	-	394	352	-	-	-	-	-	-	2,220	-
F-62	Page Carson	1,547	June 6, 1947	-	448	205	319	175	2,180	172	-	-	3,410	1,960	-	-	-	-
F-62	do	1,547	June 11, 1947	-	598	205	138	175	2,180	158	.0	-	3,370	2,340	11	-	-	-
F-62	do	1,547	Feb. 6, 1950	15	598	195	157	185	2,170	159	.0	-	3,380	2,290	13	-	3,690	7.7
F-62	do	1,547	Apr. 9, 1956	14	573	192	164	180	2,110	165	.0	-	3,310	2,220	14	1.5	3,620	8.0
F-63	Lem Smith	350	Nov. 30, 1946	-	100	52	250	142	384	348	2.0	-	1,210	464	54	-	2,130	-
F-63	do	350	Mar. 1, 1950	22	140	51	245	267	392	332	.0	0.56	1,310	559	49	-	2,160	7.4
F-101	Ernest Riggs	1,435	Apr. 7, 1956	16	584	198	146	199	2,150	132	.0	.21	3,320	2,270	12	1.3	3,580	7.4
F-102	Mrs. B. Downs	2,997	Jan. 5, 1948	-	588	225	117	88	2,160	230	1.0	-	3,360	2,390	9.6	-	-	-
F-102	do	2,997	Apr. 7, 1956	24	638	199	143	206	2,170	208	.3	-	3,480	2,410	11	1.3	3,850	7.7
F-112	Clyde Wilson	215	June 30, 1949	23	238	77	376	340	687	520	1.5	-	2,090	910	47	-	-	-
F-119	Lee O. White	1,800	Apr. 6, 1956	15	599	230	225	160	2,410	205	.0	-	3,760	2,440	17	2.0	4,110	7.1
F-124	C. E. McIntyre	386	Apr. 2, 1956	32	376	97	506 17	307	1,060	790	13	.56	3,040	1,340	45	6.0	4,340	7.0
F-128	O. W. Adams	300	Oct. 3, 1949	32	248	101	393	296	823	555	8.2	-	2,310	1,030	45	-	3,450	7.9
F-140	N. M. Mitchell	255	Nov. 17, 1950	15	161	74	276	262	507	400	.2	-	1,560	706	46	-	2,580	7.6
F-143	B. E. Mitchell	255	July 24, 1948	28	200	20	377	300	668	500	2.2	-	2,000	828	50	-	3,100	-
F-144	J. S. Oates	259	July 16, 1949	24	166	68	301	290	500	418	3.2	-	1,620	694	48	-	2,850	7.3
F-167	A. F. Buchanan	363	Mar. 21, 1956	21	139	44	222 0	277	259	302	.2	.24	1,220	528	48	4.2	1,990	7.6
J-2	Graef Bros.	450	Mar. 5, 1956	34	90	23	130 7.8	250	191	148	1.1	.17	748	319	46	3.2	1,180	7.5
J-3	Dave McGill	201	do	44	58	5.3	26 3.7	218	20	16	6.0	.11	286	166	25	.9	441	7.5

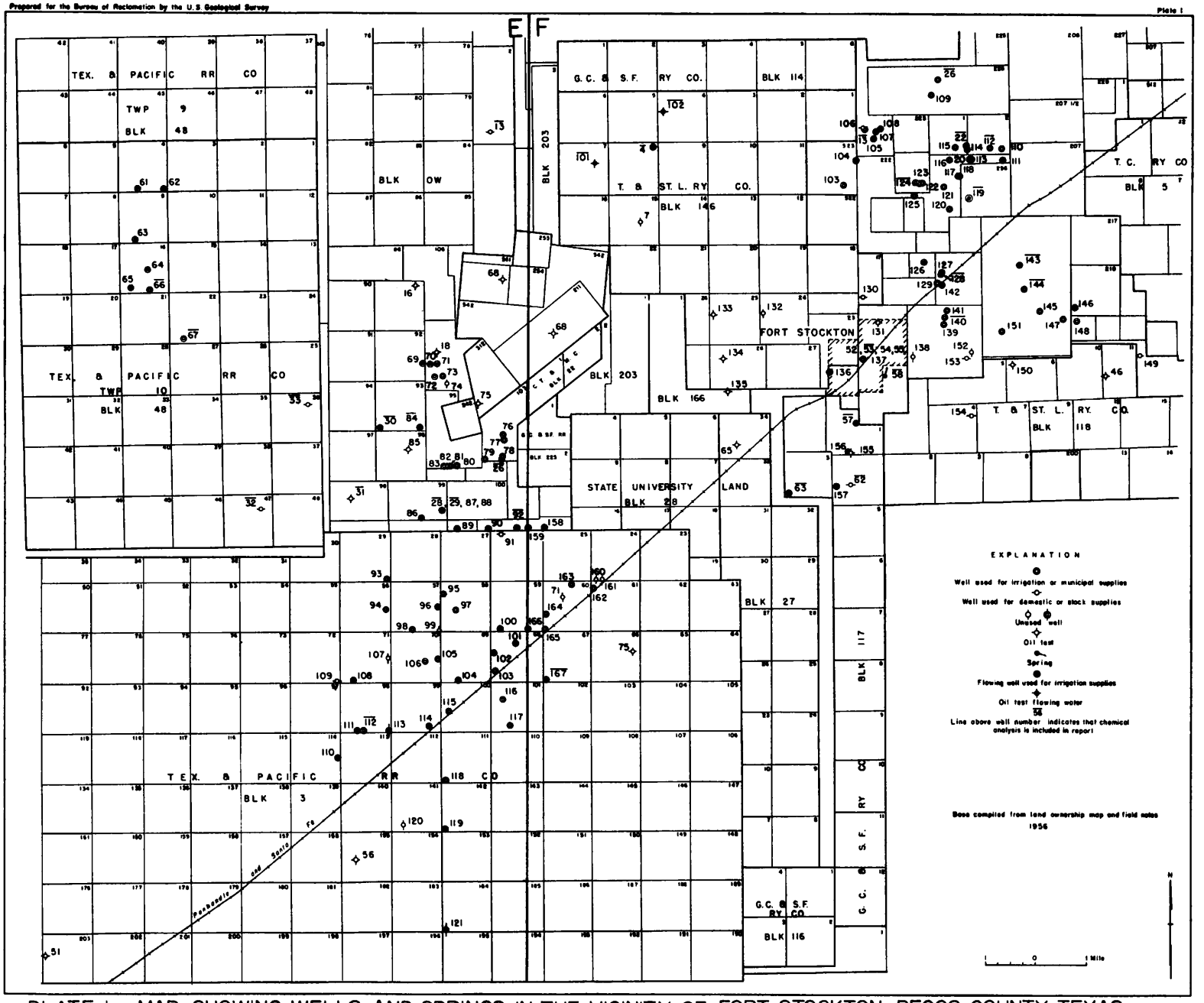

PLATE I. – MAP SHOWING WELLS AND SPRINGS IN THE VICINITY OF FORT STOCKTON, PECOS COUNTY, TEXAS.