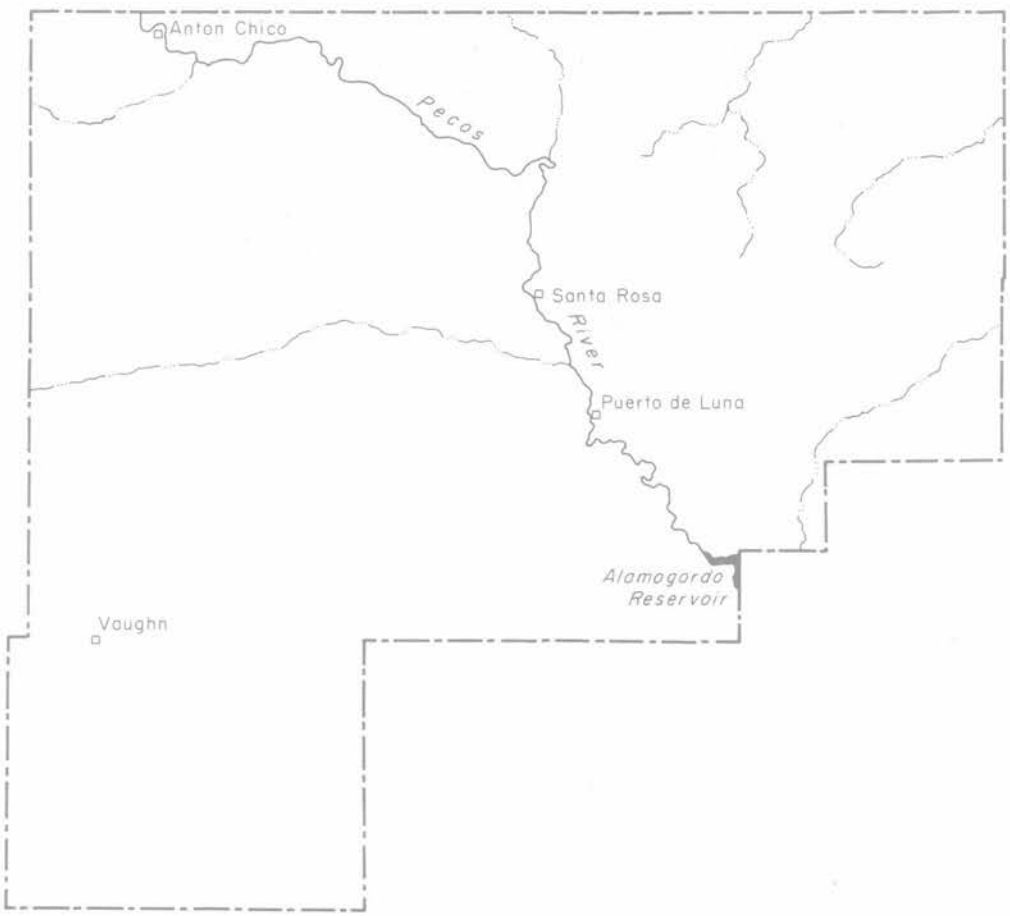
Water Resources of Guadalupe County, New Mexico



HYDROLOGIC REPORT 3 — 1973

New Mexico State Bureau of Mines and Mineral Resources

Water Resources of Guadalupe County, New Mexico

by George A. Dinwiddie and Alfred Clebsch, Jr.
Hydrologists, U.S. Geological Survey

Prepared in cooperation with the
United States Geological Survey, and the
New Mexico State Engineer Office

HYDROLOGIC REPORT 3 1973
New Mexico State Bureau of Mines and Mineral Resources

New Mexico State Bureau of Mines and Mineral Resources
Don H. Baker, Jr., *Director*

A Division of
New Mexico Institute of Mining and Technology
Stirling A. Colgate, *President*

Published by Authority of State of New Mexico, NMSA 1953 Sec. 63-1-4
Printed by University of New Mexico Printing Plant, February 1973

Available from New Mexico State Bureau of Mines, Socorro, NM 87801
Deposited in public libraries

Price $4.00

Contents

Tables

Figures

Abstract

Guadalupe County consists of dissected highlands drained by the Pecos River and tributaries of the Canadian River. Karst topography is widespread in the western part of the county, and more than a third of the area has no exterior surface drainage. The climate is characterized by scant precipitation occurring mainly in summer, low relative humidity, and large daily fluctuations of temperature. Rock formations range in age from Permian to Holocene that dip eastward from the Pedernal positive element toward the Tucumcari basin. Ground water, the chief source of water supply, is obtained from consolidated sedimentary rocks ranging in age from Permian to Cretaceous, and from unconsolidated surficial deposits of Tertiary and Quaternary age. Aquifers in the consolidated sedimentary rocks commonly are beds of siltstone and sandstone that yield only small quantities (from less than 5 to about 10 gallons per minute); larger yields may be possible. The San Andres Limestone is capable of yielding several hundred gallons of water per minute to wells at places where the formation is saturated and where it consists of cavernous, fractured limestone; however, where consisting of shale, anhydrite, gypsum, and salt the San Andres yields little, if any, water to wells. Unconsolidated surficial deposits are often neither sufficiently thick nor extensive enough really to be good aquifers. The chemical quality of ground water ranges from fresh to moderately saline. In general, the water of best chemical quality is found nearest the areas of recharge. Solution and collapse have facilitated recharge to the San Andres Limestone and the Santa Rosa Sandstone. The direction of movement of ground water generally is down gradient toward the principal areas of discharge in the lowlands along the Pecos River. The Pecos is the only stream that supplies enough surface water for irrigation. Average discharge near Anton Chico was 103,500 acre-feet per year; near Puerto de Luna, 172,300 acre-feet per year. Obviously, discharging ground water makes a significant contribution to the stream flow. Between Anton Chico and the Colonias area, the Pecos loses water by infiltration and the streambed is frequently dry; however, the river gains water by spring discharge between Colonias and Santa Rosa. The chemical quality of the overland flow does not change significantly, but specific conductance, sulfate, and chloride content do increase significantly downstream from Colonias.

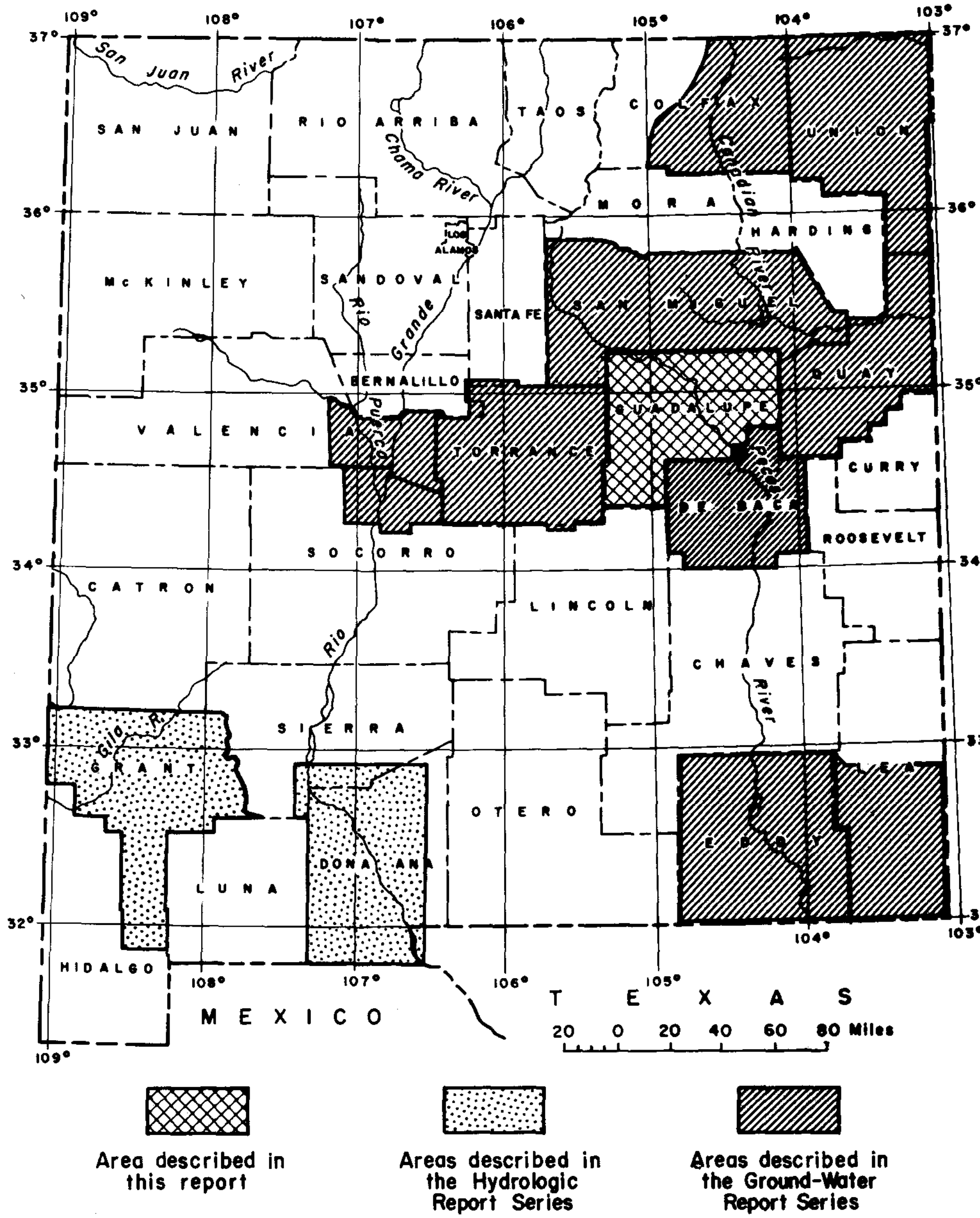


Figure 1–Areas described in water resources reports published by the New Mexico State Bureau Mines and Mineral Resources in cooperation with the U.S. Geological Survey and the New Mexico State Engineer.

Introduction

PURPOSE AND SCOPE

This report describes the availability and quality of water in Guadalupe County, in east-central New Mexico. It is one of a series of county hydrologic investigations describing the occurrence and availability of water for municipal, industrial, domestic, stock, and agricultural use. A study of this type is particularly pertinent to Guadalupe County where most of the presently developed supplies of water are meager, where much of the water is of poor chemical quality, and where municipal water supplies for the larger towns are inadequate. Information in this report can be used advantageously to indicate the general areas in which ground water may be obtained, and the yields that might be expected from these water - bearing formations. Thus, in planning for future development, the most promising areas for intensive study and test drilling are indicated.

Fieldwork for the project was done from July 1954 to January 1956 by Alfred Clebsch, Jr. , of the U. S. Geological Survey. It consisted of geologic mapping; collecting data about wells; measuring depth to water in wells; making river gain-and-loss measurements; and collecting samples of water from wells, springs, spring-fed lakes, and streams for chemical analysis. These data then were organized and compiled in the tables and illustrations that accompany this report. No attempt has been made to update the information, but chemical analyses and stream flow measurements made after completion of fieldwork have been included. The text of the report consists of explanatory material to accompany the tables and illustrations, and includes a section describing lithology, stratigraphy, and water-bearing characteristics of the rock formations; a section on movement of ground water; a small section on the effect of solution cavities on the movement of ground water; a section on surface water; and a section on ground water-surface water interflow relationships. Discussion of geology is limited to that which is pertinent to the hydrologic system of the county.

PREVIOUS INVESTIGATIONS

Previous investigations in Guadalupe County were concerned mostly with geology and mineral resources as oil, gas, asphalt, and copper. However, the report from the Pecos River Joint Investigation compiled by the U. S. National Resources Planning Board (1942) presents some historical and basic data concerning the water resources in the Pecos River basin. Guadalupe County is in the upper basin, that part of the Pecos River basin above Alamogordo Reservoir.

WELL-NUMBERING SYSTEM

All wells and springs referred to in this report are identified by location numbers used by the U. S. Geological Survey and by the New Mexico State Engineer for numbering water wells in New Mexico. The location number is a description of the geographic location of the well or spring, based on the system of public land surveys. The number indicates the location of the well or spring to the nearest 10-acre tract, wherever feasible. The location number consists of a series of numbers corresponding to the township, range, section, and tract within a section, in that order, as illustrated in fig. 2. If a well or spring has not been located closely enough to be placed within a particular section or tract, a zero is used for that part of the number.

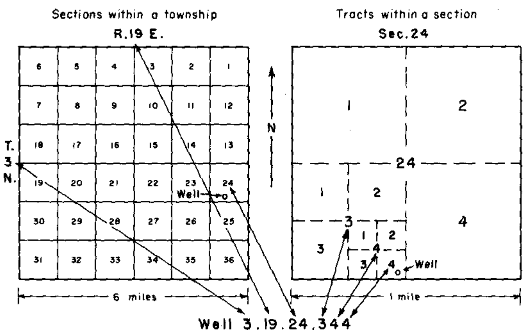


Figure 2—Well-numbering system.

In the northern part of Guadalupe County large blocks of grant land have not been sectionalized. To locate wells within these grants, by the numbering system described, section lines were projected from the sectionalized parts of the county. The projected lines are shown as dashes on maps accompanying this report.

GENERAL FEATURES OF AREA

Guadalupe County is in the Great Plains physiographic province (Fenneman, 1931, p. 274) and in the Trans-Pecos Paleozoic ground-water province (Meinzer, 1923, p. 313). The topography is characterized by broad, sloping plains deeply dissected in places. The altitude of the land surface is about 6,000 ft. along the west side of the county, and about 5,000 ft. along the east. The Pecos River transects the county from the northwest corner, at an altitude of about 5,300 ft., southeastward to Alamogordo Reservoir at an altitude of about 4,200 ft. Large expanses in the northwestern part of the county are characterized by karst topography, and more than 40 percent of the county drains into closed depressions. The areas of interior drainage are mostly west of the Pecos, but a closed basin of about 35 square miles is in the upland east of Santa Rosa (fig. 5).

Climate in Guadalupe County is typical of the plains of eastern New Mexico. Most of the precipitation occurs as summer showers and thunderstorms; precipitation during the winter generally is much less than during the summer. The effects of extreme temperatures are moderated by the persistent dryness of the atmosphere; the frost-free period generally is from early May to late October. Although there is some wind throughout the year, most of the high-velocity wind is in March, April, and May. The average annual evaporation measured at Alamogordo Dam is about 109 inches, most of which takes place during the summer. Table 1 presents general climatological data collected at weather stations in or near the county.

Native vegetation consists mainly of grasses throughout most of the county. Woodlands are found along the northern edge of the county and along the Pecos River, and consist of pinon, juniper, oak, cottonwood, salt cedar, and willow. Higher altitude, forest-type trees as pine, spruce, and fir do not occur naturally.

According to the U. S. Department of Commerce (1971), the population of Guadalupe County in 1970 was 4,969, about 0.5 percent of the population of the state. The land area of the county is 2, 999 square miles, about 2.5 percent of the land area of the state. Thus, the county has less than 2 persons per square mile and is one of the least densely populated counties in the state. About 67 percent of the total population was in the towns of Santa Rosa and Vaughn; the remaining 33 percent was in small communities and rural areas. Population of the county decreased by 11.4 percent during the period 1960 to 1970, mostly in the small communities and rural areas.

The economy is based chiefly on agriculture and ranching. About 4, 820 acres of cropland were irrigated in 1965; this is an increase from the approximately 3,000 acres that reportedly were irrigated in 1898 (U.S. National Resources Planning Board, 1942, p. 136). The principal crops grown in 1965 were alfalfa, corn, and grain sorghum. Most of the irrigated land is along the Pecos River near Anton Chico; some is near Puerto de Luna. Most of the land is irrigated with water diverted from the Pecos River. However, in the middle 1950's ground water from wells was used near Colonias, at the River Ranch near river mile 277 (fig. 4 in pocket), along the Rio Agua Negra in sec. 33, T. 8 N. , R. 21 E. , and on a small scale at a few upland localities. Dry farming is almost nonexistent. The advent of the

Table 1 --Climatological data in 1964 for stations in or near Guadalupe County, New Mexico

Data from U.S. Department of Commerce (1965)

Climatological normals based on the period 1931-60

Average temperatures and normal average temperatures, in °F

Station	January		February		March		April		May		June		July		August		September		October		November		December	
	Temp.	Normal	Temp.	Normal	Temp.	Normal	Temp.	Normal	Temp.	Normal	Temp.	Normal	Temp.	Normal	Temp.	Normal	Temp.	Normal	Temp.	Normal	Temp.	Normal	Temp.	Normal
Alamogordo Dam	37.4	-	35.1	-	46.5	-	56.5	-	67.4	-	76.1		80.3	-	78.2	-	70.6	-	61.6	-	48.5	-	41.5	-
Dilia	34.7	-	-	-	-	-	-	-	-	-	-	-	-	-	75.0	-	67.3	-	58.1	-	46.8	-	36.4	-
Santa Rosa	38.0	38.5	34.8	42.3	45.4	47.9	55.3	56.8	66.8	68.4	74.4	74.4	79.9	77.3	78.7	76.1	70.4	69.2	61.6	58.5	48.3	46.4	40.8	40.5
Santa Rosa 12 SE	34.5	-	33.6	-	44.4	-	55.3	-	66.3	-	74.5	-	80.1	-	77.7	-	70.0	-	61.1	-	48.3	-	41.0	-
Vaughn	30.5	-	26.7	-	38.2	-	49.4	-	58.6	-	68.9	-	74.9	-	72.6	-	64.5	-	58.2	-	43.2	-	35.7	-

Total precipitation and normal precipitation, in inches

Station	January		February		March		April		May		June		July		August		September		October		November		December	
	Prec.	Normal	Prec.	Normal	Prec.	Normal	Prec.	Normal	Prec.	Normal	Prec.	Normal	Prec.	Normal	Prec.	Normal	Prec.	Normal	Prec.	Normal	Prec.	Normal	Prec.	Normal
Alamogordo Dam	0.04	-	0.26	-	0.08	-	Trace	-	0.06	-	0.18	-	1.72	-	1.50	-	1.62	-	0.00	-	0.51	-	0.13	-
Dilia	est. .19	-	-	-	-	-	-	-	-	-	-	-	-	-	.37	-	2.34	-	Trace	-	.44	-	.05	-
Santa Rosa	.07	0.43	1.54	0.42	.39	0.63	0.48	0.72	1.67	1.77	.46	1.36	.27	2.47	1.25	2.47	.83	1.63	.00	1.17	.31	0.34	.13	0.51
Santa Rosa 12 SE	Trace	-	est. 2.14	-	.26	-	.09	-	.47	-	.69	-	.42	-	.91	-	1.56	-	Trace	-	.38	-	.10	-
Vaughn	.15	-	est. 2.89	-	1.83	-	.10	-	2.93	-	Trace	-	.82	-	.22	-	2.19	-	.00	-	.45	-	.03	-

railroad to Guadalupe County about 1900 encouraged ranching, and the amount of livestock in 1965 was estimated at 40,000 sheep and 36,000 cattle; thus, ranching has emerged through the years as the leading occupation.

Mining is of minor consequence but is of general interest. The Pastura district, about 17 miles southwest of Santa Rosa, has intermittently produced copper ore (mainly chalcocite, azurite, malachite, and tenorite) since about 1925 (Roswell Geological Society, 1956, p. 7). About 300 tons of ore per day were shipped to El Paso in 1954 (Anderson, 1957, p. 81). Small amounts of silver also have been produced from the Pastura mining district. Asphalt was quarried as asphaltic sandstone near Santa Rosa from 1930 to 1939, during which time about 153,000 tons were produced and used for surfacing streets and roads (Roswell Geological Society, 1956, p. 11).

Table 2 --Generalized stratigraphic section and water-bearing characteristics of geologic units in Guadalupe County, New Mexico

System	Series	Formation	Estimated thickness (feet)	Character	Water-bearing characteristics
Quaternary	Holocene and Pleistocene	Alluvium	From 0 to at least 60	Fluvial deposits of gravel, sand and silt in valleys of the Pecos River and its tributaries and of tributaries to the Canadian River; sand, silt, and clay in closed depressions.	Not used extensively, but yields as much as 3 gpm to a few stock wells.
			From 0 to at least 160	Terrace and pediment deposits that are mostly sand and gravel capped by caliche.	Yields as much as 3 gpm to domestic and stock wells.
Quaternary or Tertiary	Pleistocene or Pliocene	Upland deposits	From 0 to about 100	Surficial deposits that are mostly sand and gravel capped by caliche.	Generally yields small amounts of water to a few domestic and stock wells. Well 8.26.7.222 (table 4) indicates that larger yields might be possible locally.
Tertiary	Pliocene	Ogallala Formation	From 0 to about 100	Poorly sorted sand and gravel that is cemented with calcium carbonate and capped by caliche.	Yields small amounts of water to a few domestic and stock wells.
Cretaceous	Lower Cretaceous	Mesa Rica Sandstone and Tucumcari Shale	From 70 to about 140	Buff to gray, massive, cross-bedded, well-cemented, cliff-forming sandstone and underlying buff to gray shale.	Not tapped by wells, but spring 9.26.24.420 (table 5) flows 0.5 gpm.
Jurassic	Upper Jurassic	Morrison Formation, Bell Ranch Formation, and Entrada Sandstone	About 300	Variegated shale and siltstone and gray to buff sandstone; light-gray sandstone, brownish-red siltstone, and dark-gray limestone; and pink massive sandstone.	Two wells tap the Entrada Sandstone near the east edge of the county (table 4), but the yields are not known. Well 9.26.31.332 is reported to be weak, probably less than 5 gpm.
Triassic	Upper Triassic	Chinle Formation (and locally the Redonda Formation)	About 800	Red, brown, and purple shale and siltstone. Contains beds of sandstone and some thin lenses of limestone conglomerate.	Yields as much as 5 gpm to many stock wells east of the Pecos River; however, well 10.25.26.242 (table 4) reportedly produces 50 gpm.
		Santa Rosa Sandstone	250-350	Red and gray shale and red, brown, and tan, massive to crossbedded sandstone	Yields as much as 5 gpm to many domestic and stock wells. Reported to yield as much as 150 gpm to wells near the Pecos River near Santa Rosa. Water is obtained from beds of sandstone.
Permian		Bernal Formation	50-250	Orange-red to gray siltstone and shale, fine-grained sandstone, dolomite, and gypsum.	Yields as much as 5 gpm to many stock wells. Well 7.20.35.144 (table 4) reportedly produces 90 gpm.
		San Andres Limestone	40-500	Gray limestone, dolomite, gypsum, anhydrite, and possibly some salt. The limestone is cavernous and fractured at some places.	Yields adequate quantities of water to stock, irrigation, domestic, and public-supply wells where fractured or cavernous limestone is tapped. Spring 8.21.1.333 (Blue hole) reportedly flows at 3,000 gpm (table 4).
		Glorieta Sandstone	200-500	Light-gray, buff to tan, medium-to coarse-grained, massive to bedded sandstone.	Yields as much as 10 gpm to stock and domestic wells.
		Yeso Formation	700-1,700	Orange, orange-red to gray, silty sandstone and shale. Contains some salt, anhydrite, gypsum, and dolomite	Yields as much as 5 gpm to stock and domestic wells in the western part of the county.

Geologic formations and their water-bearing properties

Geologic formations determine the storage, movement, and quality of water underground. Coarse, well-sorted, unconsolidated sediments, permeable sandstone, and fractured or cavernous rocks store and transmit water readily. Fine, poorly sorted, unconsolidated sediments and dense, un fractured, consolidated rocks generally do not transmit much water. Faults, facies changes, and structural attitudes in the geologic formations containing ground water affect the availability of the water. The mineral content of the rocks and the extent of groundwater circulation through them affect the chemical quality of the water. To explain the availability of ground water and the relationship between ground water and surface water, the general geology of Guadalupe County is summarized below.

Guadalupe County is immediately west of the Tucumcari basin (Krisle, J. E., 1959, p. 1), a structural depression in western Quay County, and is generally east of the Pedernal positive element (Roswell Geological Society; 1952, p. 31) in eastern Torrance County. The regional dip of beds in Guadalupe County is eastward to southeastward at low angles (about 1 to 2 degrees); however, local folds, collapse structures, and small domes influence the dips locally. The inset map on fig. 3 (geologic map in pocket) shows the general configuration of the present top of the Glorieta Sandstone (Permian). The contours indicate that a trough plunges eastward across the county toward the Tucumcari basin.

Processes of solution and collapse have affected both topography and hydrology. Solution has been active on beds of limestone and gypsum of Permian age, and a karst topography has developed in western Guadalupe County (Clebsch, 1958). The effect of collapse features on hydrology is discussed elsewhere in this report.

Rocks that range in age from Permian to Holocene crop out in the county; their distribution is shown in fig. 3. The Yeso Formation (Permian) does not crop out in the county but is discussed because this formation yields water to some wells in the area. The general stratigraphic succession and water-bearing properties of the formations tapped by wells are summarized in table 2; and general lithologic descriptions of strata penetrated by selected wells are given in table 3 (Appendix). The formations described below are in chronological order from oldest to youngest.

PERMIAN

YESO FORMATION

The Yeso Formation, underlying the county at depths of 350 to 3,000 ft., consists of light-red and orange-red to gray siltstone, silty sandstone, and shale, and at places, also includes some dolomite or dolomitic limestone, anhydrite, gypsum, and salt.

The chemical quality of the water in the Yeso is slightly to moderately saline. The specific conductance, a measure of the ability of the water to conduct an electric current and an index to the dissolved-solids content, ranges from 2,080 to 9,280 micromhos (table 6 in Appendix). The high specific conductance of 9,280 micromhos in one sample was due to an unusually high chloride content of 2,230 ppm (parts per million) probably indicating the presence of salt in the formation. The chloride content in the other water samples ranges from 32 to 650 ppm. The sulfate content in all samples ranges from 1,220 to 1,910 ppm, which is very high and probably results from solution of gypsum beds.

The Yeso Formation generally yields small amounts of water (1/2 to 7 gpm, gallons per minute) to stock and domestic wells in the western part at depths of 550 to 965 ft below the surface. Well 2.17. 30.333 (table 4 in Appendix) yields as much as 30 gpm; however, part of this water probably is from the overlying Glorieta Sandstone. The formation has not been utilized as a source of ground water in the eastern part of the county because it is overlain by more permeable units that provide larger yields of better quality.

GLORIETA SANDSTONE

The Glorieta Sandstone conformably overlies the Yeso Formation and crops out in small areas in northwestern and southwestern Guadalupe County. The formation underlies parts of the county at depths of as much as 2, 500 ft. It is a medium- to coarse-grained, massive to bedded sandstone containing some dolomite and shale and varying in color from buff or tan on a weathered surface to light gray on a fresh surface. The Glorieta ranges in thickness from 200 to 500 ft. and generally thins eastward.

The chemical quality of the water is slightly saline. The degree of salinity depends on the distance from recharge areas and the quality of the recharge water. Specific conductance of samples of water from, or at least partly from, the Glorieta ranges from 1,530 to 2, 840 micromhos. The chloride content ranges from 11 to 216 ppm, and the sulfate content ranges from 734 to 1,660 ppm. The quality of water (see table 6 in Appendix) is satisfactory for domestic use at most places.

The Glorieta generally yields small amounts of water (2 to 10 gpm) to stock and domestic wells at depths of 192 to 965 ft below the surface in the western area. The formation has not been utilized as a source of ground water in the eastern part of the county because the Glorieta is overlain by other equally permeable aquifers.

SAN ANDRES LIMESTONE

The San Andres Limestone conformably overlies the Glorieta Sandstone and crops out in most of the southwestern part of the county, and near the Pecos River in the northwestern part; and underlies the eastern parts at depths of as much as 2,000 ft. The San Andres consists of light-gray cavernous limestone, dolomite, anhydrite, gypsum, salt, and some shale. It changes gradationally from a limestone facies near the outcrop areas to an anhydrite-gypsum-salt facies as it dips eastward into the Tucumcari basin. The San Andres ranges in thickness from 40 to 500 ft. and generally thickens eastward into the anhydrite-gypsum-salt facies.

The chemical quality of the water is fresh to moderately saline as indicated by the results of analysis of water from wells, springs, and spring-fed lakes (tables 6 and 7 in Appendix). The specific conductance ranges from 313 to 5,800 micromhos, the chloride content ranges from 1.5 to 720 ppm, the sulfate content ranges from 30 to 2, 480 ppm, and the calcium-magnesium hardness, as calcium carbonate, ranges from 152 to 2,090 ppm. Water of poor chemical quality is to be expected where water in the San Andres has contacted beds of gypsum and salt; the best quality water is in the cavernous limestone near the outcrops.

The San Andres is the principal source of large supplies of water in western Guadalupe County where yields are small to large (1/2 to 2, 500 gpm) for domestic, stock, and irrigation wells, at depths of 0 to 815 ft. below the surface. Spring flow from the San Andres varies from 10 to 3,000 gpm. The large yields are from the limestone facies which is, at places, cavernous and fractured; but eastward in the anhydrite - gypsum - salt facies yields are only small and of poor chemical quality. The formation has not been utilized as a source of ground water in eastern Guadalupe County, because of overlying fresh-water aquifers at relatively shallow depth.

BERNAL FORMATION

The Bernal Formation conformably overlies the San Andres Limestone, and crops out in southern and western parts of the county and at many places along the reach of the Pecos River from San Miguel County to De Baca County. The Bernal underlies eastern parts of the county at depths of as much as 1, 600 ft., and is 50 to 250 ft. thick and consists of orange-red to gray shale and siltstone, fine-grained sandstone, dolomite, and gypsum.

The Bernal is the lateral equivalent of the Artesia Group (Tait and others, 1962, p. 511). In other reports of areas in east-central New Mexico (Mourant and Shomaker, 1970, p. 15, and Berkstresser and Mourant, 1966, p. 105) the Permian rocks above the San Andres Limestone have been assigned to the Artesia Formation (the term Artesia Formation is used where formations that comprise the Artesia Group are not well defined and separable). However, the Bernal Formation is well defined and is a mappable unit at the type locality (Tait and others, 1962, p. 504) in T. 13 N. , R. 16 W. , San Miguel County (Lochman-Balk, 1964, p. 57) about 8 miles north of the northwest corner of Guadalupe County. The authors believe that the formation also is a well-defined unit throughout Guadalupe County, as shown on fig. 3.

The chemical quality of the water is fresh to slightly saline. The specific conductance of samples of water ranges from 351 to 4,010 micromhos (table 6). The chloride content ranges from 3 to 350 ppm, the sulfate content ranges from 9. 9 to 2, 330 ppm, and the hardness ranges from 180 to 2,510 ppm.

The Bernal Formation generally yields small amounts of water (1/2 to 5 gpm) to many domestic and stock wells and to a few small irrigation wells in central and western Guadalupe County at depths of 13 to 737 ft below the surface. Larger yields have been obtained locally; well 7.20.35.144, for example, reportedly yields 90 gpm. Yields of more than a few gallons per minute should not be expected everywhere because the larger yields probably are caused by localized geologic conditions as fracture zones and solution channels. The formation has not been utilized as a source of ground water in the eastern part of the county because the Bernal is overlain by other equally permeable aquifers containing water of equal or better chemical quality.

TRIASSIC

SANTA ROSA SANDSTONE

The Santa Rosa Sandstone (Late Triassic), unconformably overlying the Bernal Formation, crops out in south-central and northwestern Guadalupe County, and underlies parts of eastern Guadalupe County at depths of as much as 1, 300 ft. The Santa Rosa is 250 to 350 It thick, and consists of red, brown, and tan, fine- to coarse-grained, massive to cross bedded sandstone containing lenticular beds of red to gray shale.

The chemical quality of the water is fresh to slightly saline. The specific conductance ranges from 446 to 3,590 micromhos, the sulfate content ranges from 25 to 2,090 ppm, the chloride content ranges from 5 to 132 ppm, and the hardness ranges from 16 to 2, 640 ppm. Water of the best chemical quality is found near recharge areas where the recharge is principally from precipitation.

The Santa Rosa Sandstone generally yields small amounts of water (1/8 to 10 gpm) to a few stock and domestic wells in central and western parts of the county at depths of 1 to 440 ft below the surface. Wells 8. 21. 12. 443 and 9. 21. 35. 421 reportedly produce about 150 gpm, and spring flow ranges from 1/10 to 15 gpm. Relatively large yields might be obtained locally; however, yields of more than a few gallons per minute should not be expected at most places. The formation has not been utilized as a source of ground water in the eastern part of the county because the Santa Rosa is overlain by other equally permeable aquifers.

CHINLE FORMATION

The Chinle Formation (Late Triassic) conformably overlies the Santa Rosa Sandstone and crops out in large areas in the eastern part of the county, and in a few smaller areas in the northwest part. The Chinle underlies small areas in the eastern part at depths of as much as 500 ft. The formation is about 800 ft. thick and consists of red, brown, and purple shale and siltstone; gray, brown, and red fine-grained sandstone; and some thin lenses of limestone conglomerate.

The chemical quality of the water is fresh to slightly saline. The specific conductance ranges from 533 to 4, 660 micromhos, the sulfate content ranges from 58 to 1, 430 ppm, the chloride content ranges from 6 to 390 ppm, and the hardness ranges from 8 to 705 ppm. Water of the best chemical quality is found near recharge areas where the recharge is mostly fresh water.

The Chinle generally yields small amounts of water (1/8 to 6 gpm) to many wells and relatively large amounts of water to a few wells east of the Pecos River at depths of 4 to 220 ft below the surface. Well 10. 25. 26.242 reportedly produces about 50 gpm from the Chinle, and spring flow ranges from 1 to 20 gpm. Most of the water yielded by the Chinle in the eastern part is from beds of sandstone, and relatively large yields might be obtained locally at places where the sandstone is fractured; however, yields of more than a few gallons per minute should not be expected at most places. In the western part, the Chinle has not been widely used as a source of ground water because the formation occurs only as outliers of small areal extent generally yielding little, if any, water.

JURASSIC

ENTRADA SANDSTONE

The Entrada Sandstone (Late Jurassic) overlies the Chinle Formation, probably conformably, and crops out only in northeastern Guadalupe County. The Entrada is alight-buff to pink, fine- to medium-grained, massive, cross bedded sandstone. The formation is about 50 ft. thick and is found at depths of as much as 450 ft. below the surface.

Chemical analysis of water from well 9.26.35.410 indicates the water is fresh but very hard.

The Entrada Sandstone has been little utilized as a source of ground water in the county, because the formation is not really extensive. Well 9.26.31.332 is no longer used, but is thought to tap the Entrada; the water level in this well was about 110 ft below land surface in 1955. Well 9. 26. 35. 410 probably also taps the Entrada; it supplies a small amount of water for domestic and stock use. Yields of more than a few gallons per minute should not be expected from this formation in Guadalupe County.

BELL RANCH FORMATION

The Bell Ranch Formation (Late Jurassic) (Griggs and Read, 1959, p. 2006) conformably overlies the Entrada Sandstone and crops out only in northeastern Guadalupe County. The Bell Ranch includes Todilto Limestone equivalent and consists of alternating beds of light-gray sandstone and brownish-red siltstone, dark-gray, thin-bedded limestone, and some gypsum. The formation attains a thickness of 65 ft. and is found at depths of 400 ft., but is not utilized as an aquifer because it is present only in very small areas in the northeastern part of the county.

MORRISON FORMATION

The Morrison Formation (Late Jurassic) conformably overlies the Bell Ranch Formation and crops out only in northeastern Guadalupe County. It consists of about 200 ft of variegated shale and grayto-buff, fine to medium-grained sandstone. The formation is not utilized as an aquifer because it is present only in very small areas in the northeastern part of the county.

CRETACEOUS

TUCUMCARI SHALE

The Tucumcari Shale (Early Cretaceous) overlies the Morrison Formation and crops out only in very small areas of northeastern Guadalupe County. It consists of olive-to-gray shale that contains some thin beds of siltstone and fine-grained sandstone. The Tucumcari ranges in thickness from about 50 to 100 ft and is not utilized as an aquifer in the county.

MESA RICA SANDSTONE

The Mesa Rica Sandstone (Early Cretaceous) conformably overlies the Tucumcari Shale and crops out as a resistant caprock only in very small areas of northeastern Guadalupe County. It consists of buff-to- gray, massive, cross bedded, we 11- cement-e d, cliff-forming sandstone. The formation is not tapped by wells in the county; however, spring 9. 26. 24.420 was flowing at a rate of 1/2 gpm from the sandstone in 1953 and was used to water stock.

TERTIARY

OGALLALA FORMATION

The Ogallala Formation crops out in eastern Guadalupe County as outliers from and along the western margin of the High Plains. It consists of poorly sorted sandstone, siltstone, and conglomerate capped by caliche. The formation ranges in thickness from a feather edge to about 100 ft. and yields small amounts of water to a few domestic and stock wells; however, it is not widely utilized as an aquifer because it is not really extensive in the county.

TERTIARY AND QUATERNARY UPLAND

SURFICIAL DEPOSITS

Upland surficial deposits crop out in moderately small areas throughout the county. These deposits range in thickness to about 100 ft. and generally consist of sand and gravel capped by caliche.

The chemical quality of the water is reported to be generally good, at least for stock use. Analysis of water from well 8. 26. 7.223 indicates that the water is hard but fresh; however, some of this water might be from the underlying Chinle Formation.

The upland surficial deposits yield small amounts of water (1/4 to 3 gpm) to a few stock and domestic wells in a small area of the eastern part of the county where the water is at depths of 18 to 53 ft. below land surface. Well 8.26. 7.222 reportedly produced 50 gpm, and part or all of this production might be from the upland deposits; therefore, relatively large yields might be found locally. Yields of more than a few gallons per minute, however, should not be expected at most places. These deposits have not been utilized as a source of ground water in other parts of the county because of inadequate yield.

QUATERNARY

TERRACE DEPOSITS, PEDIMENT, OLDER ALLUVIUM

The terrace deposits, pediment gravels, and older alluvium of Pleistocene age crop out in small to moderately large areas throughout the county. These deposits are at least 160 ft. thick at places, and generally consist of sand and gravel capped by caliche.

The chemical quality of the water is reported to be generally good for domestic and stock use. Chemical analyses of water from these deposits indicate that the water is fresh to slightly saline, the specific conductance ranges from 557 to 2,120 micromhos, the sulfate content ranges from 93 to 1,060 ppm, the chloride content ranges from 36 to 98 ppm, and the hardness ranges from 228 to 232 ppm.

These Pleistocene deposits yield small amounts of water (2 to 3 gpm) to domestic and stock wells in the central and southeastern parts of the county where water is found at depths of 7 to 150 ft. springs are not known to flow from these deposits. Yields of more than a few gallons per minute should not be expected at most places, and larger yields cannot be predicted from presently available data. These deposits have not been widely utilized as sources of ground water; either they are not adequate as aquifers, or, other aquifers are more permeable and more readily available.

ALLUVIUM

Alluvium of Holocene age is exposed along stream channels and in closed depressions. It consists mainly of silt, sand, and gravel along the Pecos River and its tributaries, and along tributaries to the Canadian River; material consists mainly of clay, silt, and sand in the closed depressions. The alluvium at places is at least 60 ft. thick.

The chemical quality of the water is fresh to slightly saline. Analyses of water indicate that the specific conductance ranges from 936 to 4,250 micromhos, the sulfate content ranges from 124 to 1, 030 ppm, the chloride content ranges from 10 to 555 ppm, and the hardness ranges from 150 to 650 ppm. Poor chemical quality of water in the alluvium might be due to contamination by water from underlying formations at some places.

The alluvium generally yields small amounts of water (1/8 to 3 gpm) to stock and domestic wells in the eastern part of the county where the water is found at depths of 2 to 40 ft. the alluvium is not known to yield large amounts of water at any place in the county, and yields of more than a few gallons per minute should not be expected at most places. Because the alluvium is relatively thin, it has not been widely utilized as a source of ground water.

Hydrology

Ground water is the chief source of water supply in Guadalupe County. Surface water is sparse and is available perennially only along the Pecos River. Both ground water and surface water are discussed because each is an integral part of the total water resources. The reciprocal relationship at places along the Pecos River is important to both the hydrologist and the water user.

GROUND WATER

Ground water is a finite resource; therefore, recharge and storage properties are important factors in the economic development of ground-water resources. The ground-water reservoir is recharged by precipitation falling on outcrops of permeable rocks, and by streams and ephemeral storm runoff flowing across outcrops of permeable rock. Most aquifers in the consolidated rocks are recharged by precipitation and storm runoff; the San Andres Limestone, the Bernal Formation, and the Santa Rosa Sandstone, however, are also recharged substantially by direct infiltration of water from the Pecos River upstream from the town of Santa Rosa; and the Chinle Formation is recharged partly from intermittent flow in tributaries in the eastern part of the county. The unconsolidated surficial deposits, with the exception of the deposits along stream channels, are recharged principally by precipitation and storm runoff on the outcrops.

The direction of movement of water through rock formations, from areas of recharge to areas of discharge, is an important factor in a study of groundwater resources. Development of ground - water supplies must be concerned with where the water goes and what the chemical quality of the water will be. Recharge water moves downward through permeable rocks to the zone of saturation and thence toward areas of discharge. The topography in Guadalupe County slopes generally eastward and southeastward; therefore, ground water in the zones of saturation moves generally eastward and southeastward to points of discharge at the lowest points possible. However, lateral facies changes and localized points of ground-water discharge cause anomalous flow patterns locally.

The potentiometric contours (fig. 4 in pocket) indicate the general configuration of the piezometric surfaces in aquifers in the Yeso Formation-Glorieta Sandstone, in the San Andres Limestone, in the Santa Rosa Sandstone, and in the Chinle Formation. The movement of ground water is in a direction normal to the contours, which are shown only in those areas from which reliable data have been obtained. The contours indicate that water in the Yeso-Glorieta moves eastward, that water in the San Andres Limestone moves southeastward in the vicinity of the Pecos River, that water in the Santa Rosa Sandstone moves generally eastward, and that water in the Chinle Formation moves generally eastward in the northeastern part of the county. The direction of water movement in the Chinle Formation is difficult to define because much of the water probably is perched. The Chinle contains saturated beds of sandstone of small areal extent and these transmissive, water-yielding beds might be isolated by strata of relatively low hydraulic conductivity that do not allow the waters to reach a common saturation zone rapidly; therefore, hydrologic discontinuities between water-bearing beds are likely, and contours of a potentiometric surface of water in this formation probably are meaningless over a broad area.

EFFECT OF SOLUTION AND COLLAPSE ON MOVEMENT

Solution and collapse have profoundly affected the topography and hydrology of western Guadalupe County. Permian limestone and gypsum have been removed by subsurface solution intermittently active from Late Permian or Triassic time to the present. Solution in Tertiary and Quaternary time has resulted in typical karst topography where the soluble rocks are exposed. Where overlain by relatively thin deposits of insoluble elastic rocks, a somewhat different karst-like topography has developed. This topography is characterized by vertical-walled collapse features that range from a few feet to several hundred feet in diameter, and from less than 10 ft to as much as 200 ft in depth.

The water-bearing units most affected by solution and collapse are the San Andres Limestone and the Santa Rosa Sandstone. The process of solution has created a highly transmissive limestone aquifer which allows water to move rapidly through the San Andres to areas of discharge. The combined processes of solution and collapse have facilitated recharge to the limestone.

In the vicinity of Santa Rosa more than a dozen collapse features in the outcrop area of the Santa Rosa Sandstone contain lakes that are sustained by ground water. These lakes have scenic value, and with suitable development have potential for recreational benefits to the people of Santa Rosa and to the tourist industry.

SURFACE WATER

Parts of two drainage basins are in Guadalupe County (fig. 5). In the northeast corner is the Canadian River basin; the remainder of the county is in the Pecos River basin. The Canadian River does not flow across the county, but the Pecos River traverses the county from the northwest, near Anton Chico, to the southeast, at Alamogordo Reservoir.

Closed basins, areas without surface drainage outlets, occupy 40 percent of the county; the largest

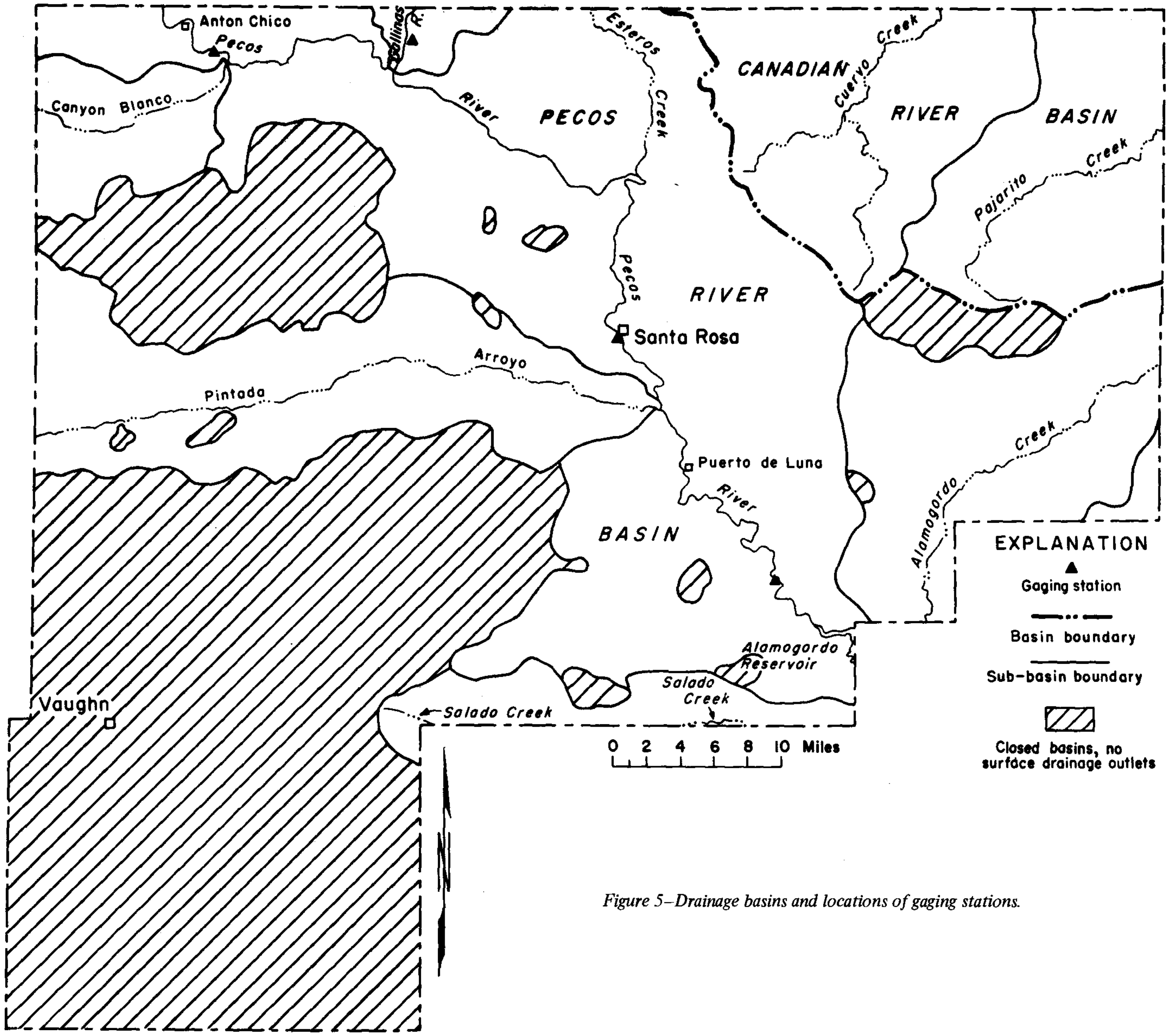


Figure 5–Drainage basins and locations of gaging stations.

is in the general vicinity of Vaughn. These closed-basin areas contribute no water by overland flow to the principal drainage systems.

The Pecos River is the only significant perennial stream in Guadalupe County; although some tributaries to the Pecos and Canadian Rivers contain reaches that flow perennially, most of the tributaries flow only intermittently. The Gallinas River, which flows into the Pecos River near Colonias, is the principal tributary to the Pecos.

Four surface-water gaging stations are in the county, three on the Pecos River, and one on the Gallinas River. Relatively long-term records of stream flow at these stations are available. According to Water-Supply Paper 1732 (U. S. Geological Survey, 1964), the average discharge of the Pecos River past a station near Anton Chico was 103, 500 acre-feet per year, or 143 cfs (cubic feet per sec ond), during 47 years of record (1910-15, 1916-24, 1926-60); the average discharge of the Gallinas River past a station near Colonias was 13,320 acre-feet per year (18.4 cfs) during 9 years of record (1951-60); the average discharge of the Pecos River past a station at Santa Rosa was 110, 800 acre-feet per year (153 cfs) during 44 years of record (191224, 1928-60). Frequently the streambed between Anton Chico and Colonias is dry. The average discharge of the Pecos River past a station near Puerto de Luna was 172,300 acre-feet per year (238 cfs) during 22 years of record (1938-60).

Many samples of water from the Pecos River have been collected and analyzed by the U. S. Geological Survey. About 80 samples were collected from the Pecos near Anton Chico during the period 1939-41; about 80 samples were collected from the Pecos at Santa Rosa during 1939 and 1940; and about 130 samples were collected from the Pecos at Puerto de Luna during the period 1956-59. Figs. 6, 7, and 8 are graphic presentations of results of chemical analysis of these samples and indicate the relationship of the concentrations of selected chemical constituents with the amount of flow in the river. The figures show that at each of the three stations the highest concentrations of the chemical constituents are in the base flow (near left sides of the graphs) and that the concentrations diminish as flow increases.

Discharge in the river increases above base flow because of storm runoff. Base flow primarily is discharge from aquifers to the river. South of Santa Rosa the base flow is highly mineralized. The concentration of dissolved minerals is diminished, however, as the base flow is augmented by flood flows. This condition applies farther upstream but the contrast is less marked. This is further indicated by the fact that both the amount of base flow and the chemical content in the base flow increase downstream from Anton Chico to Santa Rosa, and from Santa Rosa to Puerto de Luna. Concentrations of sodium and magnesium have trends relative to downstream position and to river discharge similar to those of total dissolved solids, sulfate, calcium, and chloride as shown in figs. 6, 7, and 8; however, the magnitudes of concentrations of sodium and magnesium are so much less that these trends cannot be shown graphically.

INTERFLOW ALONG THE PECOS RIVER

The Pecos River has been observed to be a losing stream in some reaches and a gaining stream in other reaches. As early as March 1910 and October 1911 measurements were made between Anton Chico and Colonias. During the fieldwork for the present investigation, measurements were made in December 1954 and May 1955. Data collected by others in March and April 1961, and June 11 and 25 and September 10, 1956 are included also. All investigations were made during periods when the stream flow past Anton Chico was less than 200 cfs, most of them when the stream flow was less than 100 cfs, and some when the stream flow was less than 10 cfs.

The results of the gain-and-loss investigations and a geologic cross section along the Pecos River are shown in fig. 9 (in pocket). The gross features of the discharge-measurements curves illustrate the locations and amounts of losses and gains in flow; the geologic cross section illustrates the structural and stratigraphic conditions along the reach; and the graphs of specific conductance, sulfate content, and chloride content illustrate the changes in quality of water.

The river segments where gains and losses take place, the magnitudes of these gains and losses, and the accompanying variations in chemical quality of stream flow are all closely related to the subsurface geology in the vicinity of the river and, in particular, to the geology beneath the streambed.

Review of long-term discharge records from the four surface - water gaging stations in Guadalupe County, and analysis of results from the gain and loss investigations, indicate that more water is gained by the Pecos River downstream from Colonias between river mile 286 and river mile 253 than is lost from the river downstream from Anton Chico between river mile 308 and river mile 286. Therefore, new water is being contributed to the river along with water being returned from the losing reach upstream. The new water is ground water that probably originated as infiltration of precipitation, or runoff into outcrops of rocks west and northwest of the river. The new water travels down gradient from the outcrops through transmissive rocks (cavernous or fractured limestone, permeable sandstone, and solution openings) in the San Andres Limestone, in the Bernal Formation, and in the Santa Rosa Sandstone and discharges at the surface through springs near the river. Most of the returning water, that water previously lost from the river and being returned to the river downstream, was lost from the river to the cavernous and fractured San Andres Limestone where the river runs along the north edge of the Esteritos Dome in T. 11 N. , R. 18 and R. 19 E. ; some water probably was lost to the Glorieta Sandstone and to the Bernal Formation also exposed in this area. The returning water travels through highly transmissive rocks toward the discharge areas in the Santa Rosa-Puerto de Luna area. A general alignment of sinkholes and lakes from Esteritos Dome to Santa Rosa probably is an indication of the general route traveled by part of the returning water.

In connection with most of the more recent gain and loss measurements, water samples were collected for chemical analysis. The samples were obtained at selected sites in both the losing and gaining reaches of the river, and at places throughout the entire investigated reach at times when surface flow was continuous in the river. Results of the analyses indicate that specific conductance, sulfate content, and chloride content did not increase significantly in water that remained in the river as continuous surface flow. However, results of the analyses also indicate that the specific conductance, sulfate content, and chloride content did increase significantly in the gaining reaches downstream from Colonias, indicating surface flow in the river is being chemically degraded by water from the ground. The increase in sulfate content, downstream from Colonias and near Santa Rosa, indicates that circulating ground water has come in contact with beds of gypsum or anhydrite, both of which are present in the San Andres Limestone and the Bernal Formation. The increase in chloride content, mainly near Santa Rosa, indicates that circulating ground water probably has come in contact with beds of salt known to be present in the San Andres Limestone in this general area and which also might be present in relatively minor amounts in the Bernal Formation.

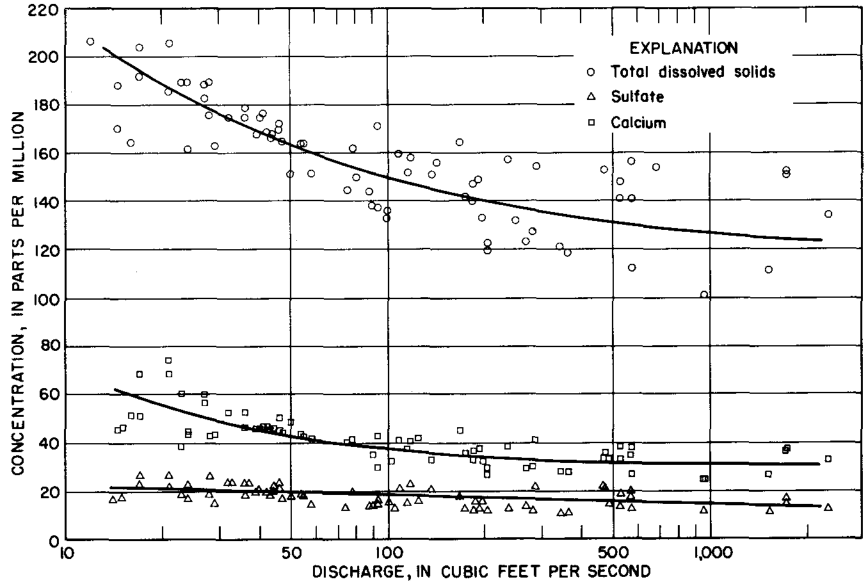


Figure 6–Concentrations of selected chemical constituents in water from the Pecos River vs. amount of flow past the gaging station near Anton Chico.

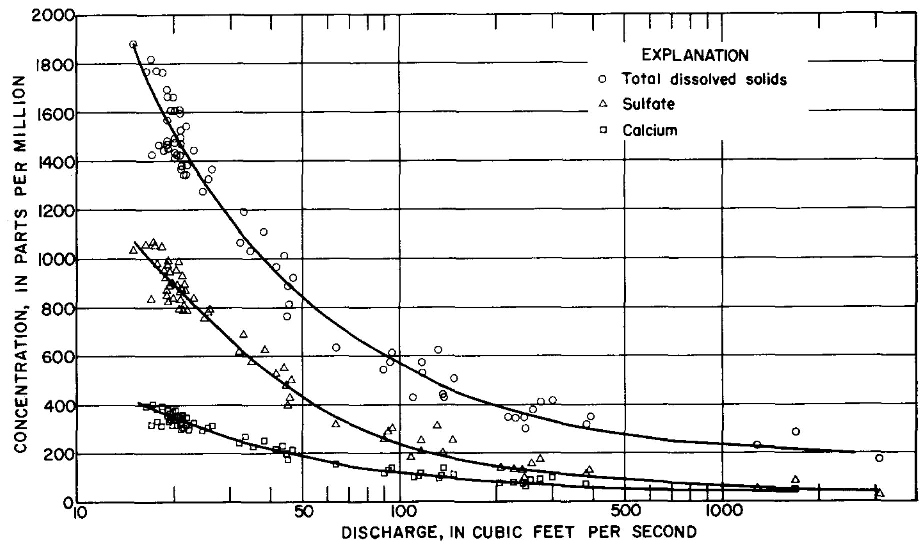


Figure 7–Concentrations of selected chemical constituents in water from the Pecos River vs. amount of flow past the gaging station at Santa Rosa.

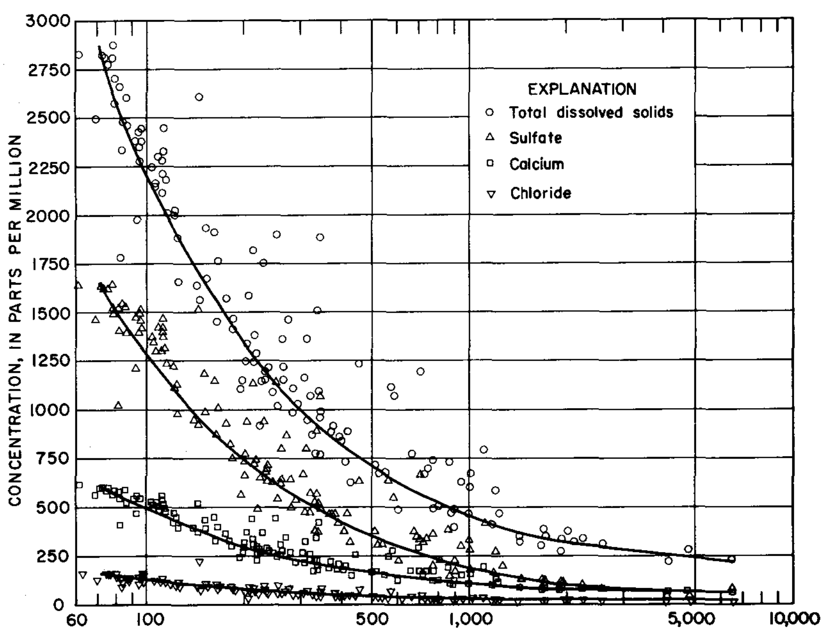


Figure 8–Concentrations of selected chemical constituents in water from the Pecos River vs. amount of flow at Puerto de Luna.

Summary

Supplies of ground water presently developed in Guadalupe County generally are meager, and surface water is not everywhere available. This report includes much basic data that can be used to more fully develop the total water resources of the county.

Ground water is obtained from geologic formations ranging in age from Permian to Holocene. The principal aquifers are in the consolidated sedimentary rocks of the Yeso Formation, Glorieta Sandstone, San Andres Limestone, Bernal Formation, Santa Rosa Sandstone, and Chinle Formation. Minor aquifers are in unconsolidated surficial deposits, remnants of older alluvium and pediments, and alluvium along present stream channels. The San Andres Limestone is most likely to yield water to wells in quantities sufficient for municipal supply or for irrigation use. However, the San Andres is known to change from a limestone facies in the western part of the county to an anhydrite-gypsum-salt facies in the eastern part. The facies change is buried because of the eastward dip of the rocks; subsurface data are inadequate to determine the exact location and character of the change. Extensive development of water in the San Andres may pull salt water into wells. Changes in water quality, therefore, should be closely documented through further investigation to detect impending contamination.

Presently, some wells tapping the San Andres near Colonias are used for supplemental irrigation water; if irrigable land is available, more of this water probably could be used. Recently drilled wells that tap the San Andres near Colonias also supply water to the town of Santa Rosa.

Most of the cropland in the vicinity of Anton Chico is irrigated with surface water diverted in ditches from the Pecos River. An interflow relationship exists between ground water and surface water along the river.

Results of analysis of presently available data indicate that extensive development of large supplies of ground water from geologic formations other than the San Andres Limestone is unlikely; however, relatively large yields might be obtained from almost any of the formations at places where hydrologic conditions are particularly favorable. Any further development of the water resources in Guadalupe County must be concerned with chemical quality as well as quantity because additional development is likely to result in quality changes.

References cited

Anderson, E. C., 1957, The metal resources of New Mexico and their economic features through 1954: New Mexico State Bur. Mines Mineral Resources Bull. 39, p. 80-82.

Berkstresser, C. F. , Jr. , and Mourant, W. A. , 1966, Ground- water resources and geology of Quay County, New Mexico: New Mexico State Bur. Mines Mineral Resources Ground-Water Rept. 9, 115 p. , 6 figs.

Clebsch, Alfred, Jr. , 1958, Effect of solution and collapse on ground-water movement in western Guadalupe County, New Mexico [abs.]: Geol. Soc. America Bull. , v. 69, no. 12, pt. 2, p. 1725.

Fenneman, N. M. , 1931, Physiography of. western United States: New York, McGraw-Hill Book Co., p. 274.

Griggs, R. L. , and Read, C. B. , 1959, Revisions in stratigraphic nomenclature in Tucumcari Sabinoso area, northeastern New Mexico: Am. Assoc. Petroleum Geologists Bull. , v. 43, no. 8, p. 2003-2007.

Krisle, J. E., 1959, General geology of the Tucumcari basin of northeastern New Mexico, in Panhandle Geol. Soc. Guidebook, 1959.

Lochman-Balk, Christina, 1964, Lexicon of strati-graphic names used in Lincoln County, New Mexico, in New Mexico Geol. Soc. Guidebook 15th Field Conf. , Ruidoso Country: p. 57-61.

Meinzer, 0. E. , 1923, The occurrence of ground water in the United States, with a discussion of principles: U. S. Geol. Survey Water-Supply Paper 489, 321 p.

Mourant, W. A. , and Shomaker, J. W. , 1970, Reconnaissance of water resources of De Baca County, New Mexico: New Mexico State Bur. Mines Mineral Resources Ground - Water Rept. 10, 87 p. , 9 figs.

Roswell Geological Society, 1956, The Stauber copper mine and Santa Rosa asphalt deposit, in Roswell Geol. Soc. Guidebook 9th Field Trip: 31 p.

Tait, D. B. , Ahlen, J. L. , Gordon, A. , Scott, G. L. , Motts, W. S. , and Spitler, M. E., 1962, Artesia group of New Mexico and West Texas: Am. Assoc. Petroleum Geologists Bull. , v. 46, no. 4, p. 504-517, 4 figs.

[U. S.] Bureau of the Census, 1971, Census of population-1970, Final population counts, New Mexico: U. S. Dept. Commerce Rept. PC(VI)-33, revised, 7 p.

[U. S.] Weather Bureau, 1965, Climatological data, New Mexico: Annual Summary, 1964, v. 68, no. 13, 12 p.

U. S. Geological Survey, 1964, Compilation of records of surface waters of the United States, October 1950 to September 1960, pt. 8, Western Gulf of Mexico basins: U. S. Geol. Survey Water-Supply Paper 1732, 574 p.

[U. S.] Natl. Resources Planning Board, 1942, Pecos River Joint Investigation-Reports of the participating agencies: Washington, U. S. Govt Printing Office, 407 p.

Appendix

Driller's log of well 2.18.17.421

STRATIGRAPHIC UNIT	THICKNESS (FEET)	DEPTH (FEET)
Soil	5	5
Shale, red, hard	220	225
Sand with streaks of lime	15	240
Lime, brown	60	300
Sand, hard, with streaks of lime	60	360
Lime, brown	10	370
Shale, brown, and gypsum	35	405
Sand	5	410
Sand, yellow	112	522
Lime	43	565
Sand, hard	10	575
Shale, sandy	10	585
Quicksand	10	595
Sand, hard	12	607
Sand and shale	13	620
Sand, hard	16	636
Sand, yellow	64	700
Sand and shale	75	775
Sand, hard (some water from 856 to 869 feet)	113	888
Sand, gray (water)	10	898

Driller's log of well 2.18.22.422

STRATIGRAPHIC UNIT	THICKNESS (FEET)	DEPTH (FEET)
Soil	5	5
Gypsum, white	25	30
Gravel and clay	55	85
Red bed	30	115
Limestone (crevice at 285 feet)	265	380
Lime, white	35	415
Lime, black, and hard, white sand	70	485
Lime, white	40	525
Sand, yellow	50	575
Lime, black (some water at 575)	85	660
Sand, yellow	250	910
Sand, white (water)	20	930

Driller's log of well 2.18.24.244

STRATIGRAPHIC UNIT	THICKNESS (FEET)	DEPTH (FEET)
Soil	10	10
Gypsum	10	20
Sand and gravel	20	40
Clay, sandy	90	130
Sandstone, brown	40	170
Sand and clay	20	190
Rock, red	40	230
Rock, red, and clay	10	240
Rock, red (water at 300 feet)	85	325

Driller's log of well 4.16.5.212

STRATIGRAPHIC UNIT	THICKNESS (FEET)	DEPTH (FEET)
Topsoil	2	2
Gravel and sand	8	10
Gravel and boulders	210	220
Lime, gray	4	224
Shale, red	6	230
Lime	59	289
Shale, gray	11	300
Shale, sandy	18	318
Lime	6	324
Clay, yellow	6	330
Lime	59	389
Shale, red	11	400
Shale, sandy	18	418
Sandstone, yellow	62	480
Sand, soft	10	490
Lime	3	493
Sandstone, yellow	21	514
Sandstone, gray, hard	28	542
Sand, soft	6	548
Sand, hard	15	563
Sandstone, gray	7	570
Sandstone	307	877
Sand, red (some water)	3	880
Sandstone, yellow	18	898
Sand, gray (water)	12	910
Lime	1	911

Driller's log of well 4.17.28.321

STRATIGRAPHIC UNIT	THICKNESS (FEET)	DEPTH (FEET)
Caliche	30	30
Clay, red, and gravel	90	120
Clay, yellow, and rock	150	270
Sandstone, white and yellow	110	380
Lime, gray	20	400
Sandstone	360	760
Lime, gray	40	800
Sandstone, gray, and clay (water)	43	843

Driller's log of well 5.16.24.330
(Stratigraphic interpretations by author.)

STRATIGRAPHIC UNIT	THICKNESS (FEET)	DEPTH (FEET)
Permian System:		
San Andres Limestone:		
Lime and boulders	25	25
Lime, broken	15	40
Crevice	5	45
Lime, loose	20	65
Lime	50	115
Anhvdrite	15	130
Anhydrite and streaks of blue slate	20	150
Lime	10	160
Rock, pink	15	175
Lime and anhydrite	30	205
Lime	45	250
Rock, red	5	255
Lime	5	260
Gravel and lime	25	285
Anhydrite and black shale	15	300
Lime	10	310
Sand	60	370
Limestone, gray, sandy	35	405
Limestone, white	7	412
Limestone, gray	13	425
Glorieta Sandstone:		
Sand, white and yellow	220	645
Sand, yellow	103	748

STRATIGRAPHIC UNIT	THICKNESS (FEET)	DEPTH (FEET)
Sandstone, red	3	751
Sand, yellow	39	790
Yeso Formation		
Shale, gray	10	800
Lime, sandy	20	820
Shale, blue	5	825
Limestone	5	830
Shale, blue	10	840
Slate, blue	10	850
Driller's log of well 5.19.6.324		
Soil	10	10
Caliche	40	50
Lime and gypsum	50	100
Lime	20	120
Sand	20	140
Lime	20	160
Lime and gypsum	40	200
Lime	20	220
Gypsum	10	230
Lime and gypsum	20	250
Gypsum	10	260
Sand (water)	9	269
Driller's log of well 5.19.10.332		
Sand	20	20
Caliche	30	50
Gypsum and lime	50	100
Lime	20	120
Lime and gypsum	30	150
Lime	10	160
Lime and gypsum	40	200
Lime	10	210
Sand (water)	5	215
Driller's log of well 5.19.29.230		
Soil	10	10
Caliche	50	60
Lime, hard	10	70
Gypsum	40	110
Water	10	120
Lime	20	140
Lime and gypsum	60	200
Driller's log of well 6.19.27.440		
Gravel	10	10
Caliche	10	20
Clay	20	40
Gypsum	30	70
Red beds	20	90
Rock, gray	30	120
Sand, yellow	20	140
Rock, gray	10	150
Sand, white	40	190
Lime, black	10	200
Sand, gray (water)	10	210
Lime	5	215
Sand, gray (water)	10	225

STRATIGRAPHIC UNIT	THICKNESS (FEET)	DEPTH (FEET)
Driller's log of well 6.22.31.410		
Dirt	10	10
Rock, soft	30	40
Rock, red	70	110
Shale, red	10	120
Shale, red to gray	20	140
Rock, white	30	170
Water (no rock description)	20	190
Driller's log of well 7.16.34.141		
Caliche	20	20
Sand, red	30	50
Sand, yellow	50	100
Gravel	8	108
Driller's log of well 7.18.8.140		
Red beds	80	80
Sandstone, white	20	100
Red beds	30	130
Sandstone	80	210
Shale, gray	10	220
Rock, white, hard	50	270
Quicksand	10	280
Water (no rock description)	10	290
Rock, hard	10	300
Driller's log of well 7.18.15.330		
Soil	10	10
Rock, red	10	20
Rock, blue	10	30
Rock, gray	10	40
Sand, gray	10	50
Sand, brown	10	60
Sandstone	10	70
Sand (water)	10	80
Driller's log of well 7.21.18.220 (Stratigraphic interpretations by author.)		
Triassic System:		
Santa Rosa Sandstone:		
Sand	98	98
Sand, light	24	122
Shale, red, and some sand	43	165
Permian System:		
Bernal Formation:		
Shale, red and blue	45	210
Shale, blue, and sand	50	260
Shale, red	14	274
Shale, gray	6	280
Shale, blue	2	282
Lime, gray, hard	18	300
Shale, blue	15	315
Shale, brown	5	320
Lime, gray, hard	5	325
Shale, blue, sandy	25	350
Shale, red and blue, sandy	25	375
Sandstone, gray	5	380
Shale, red and blue	30	410

STRATIGRAPHIC UNIT	THICKNESS (FEET)	DEPTH (FEET)
San Andres Limestone:		
Gypsum, white, hard	5	415
Gypsum, white, and hard, gray, lime	10	425
Gypsum, white	10	435
Lime, dark-gray, very hard	5	440
Lime, gray, very hard	5	445
Lime, light-blue, very hard	7	452
Lime, dark- and light-blue, hard	8	460
Gypsum, blue and white, very hard	17	477
Gypsum, brown, very hard	8	485
Lime, black, and gypsum	5	490
Gypsum, black and white	5	495
Gypsum, brown and white	11	506
Lime, brown, hard	14	520
Lime, gray, hard	10	530
Lime, gray, very hard	10	540
Lime, gray, and some hard gypsum	16	556
Lime, gray, red shale, and hard gypsum	6	562
Lime, gray, hard, and gypsum	10	572
Lime, gray, hard, and shale	14	586
Shale, gray, lime, and hard gypsum	6	592
Lime, gray, and hard gypsum	23	615
Lime, dark-gray	5	620
Lime, black	4	624
Lime, black, hard	8	632
Lime and gypsum	3	635
Gypsum, white	6	641
Gypsum, white, and lime	6	647
Slate, blue, soft	9	656
Shale, blue, and gypsum	5	661
Sand, gypsum, and shale	5	666
Sand, gray, and gypsum	6	672
Gypsum, white	8	680
Gypsum, white, hard	5	685
Lime, black, and black, hard sand	15	700
Slate, blue, and white gypsum	8	708
Gypsum, white	3	711
Glorieta Sandstone:		
Sand, white, sharp, soft	11	722
Sand, white	24	746
Sand, white, coarse	14	760
Sand, white	28	788

<u>Driller's log of well 7.22.16.132</u>

STRATIGRAPHIC UNIT	THICKNESS (FEET)	DEPTH (FEET)
Sandstone, gray	26	26
Shale, gray	6	32
Clay, red	6	38
Shale, red	5	43
Sandstone, gray, hard	21	64
Shale, gray	4	68
Shale, red	9	77
Shale, gray (some water, 3/4 gpm)	11	88
Shale, red	18	106
Shale, gray	14	120
Shale, red	10	130
Shale, gray	20	150
Shale, red	6	156
Gypsum (some water, 1½ gpm)	16	172
Shale, red	6	178
Gypsum	8	186
Shale, red	14	200

<u>Driller's log of well 8.20.15.310</u>

STRATIGRAPHIC UNIT	THICKNESS (FEET)	DEPTH (FEET)
Topsoil	1	1
Caliche	8	9
Sand, yellow	84	93
Shale, red, and sand	116	209
Lime, blue	2	211
Shale, red, and sand	21	232
Shale, blue, sandy	28	260
Lime, blue, sandy	29	289
Shale, blue, sandy	18	307
Sand, gray	29	336
Sand, red, and shale	22	358
Sand, light-yellow	2	360
Shale, red, sandy	24	384
Sand, gray	3	387
Shale, red	6	393
Lime, blue	2	395
Gypsum	9	404
Lime, blue	4	408
Sand, red	4	412
Gypsum	2	414
Gypsum and gray lime	40	454
Sand, yellowish-gray	11	465

<u>Driller's log of well 8.25.5.100</u>

STRATIGRAPHIC UNIT	THICKNESS (FEET)	DEPTH (FEET)
Soil	10	10
Caliche	10	20
Shale	30	50
Red beds	30	80
Shale, red	40	120
Rock, red	20	140
Shale, blue	10	150
Shale, red	30	180
Rock, red	10	190
Rock, gray	30	220
Shale, red	10	230
Rock, gray	20	250
Rock, blue	10	260

<u>Driller's log of well 8.25.9.131</u>

STRATIGRAPHIC UNIT	THICKNESS (FEET)	DEPTH (FEET)
Limestone (caliche?)	15	15
Clay	17	32
Sand (water)	74	106

<u>Driller's log of well 8.25.20.430</u>

STRATIGRAPHIC UNIT	THICKNESS (FEET)	DEPTH (FEET)
Soil	10	10
Caliche	10	20

STRATIGRAPHIC UNIT	THICKNESS (FEET)	DEPTH (FEET)
Clay, red	30	50
Clay, blue	20	70
Sandstone, gray	20	90
Sandstone, red (water)	100	190
Clay, red	10	200
Driller's log of well 9.17.26.334		
Topsoil	2	2
Caliche	19	21
Sand, yellow	20	41
Clay, yellow	15	56
Sand, yellow	59	115
Clay, yellow	1	116
Sand, yellow	28	144
Shale, red, sandy	11	155
Mud, red	2	157
Sand, brown (water)	17	174
Shale, red, sandy	2	176
Driller's log of well 9.18.34.422		
Soil	10	10
Caliche	30	40
Sandstone, brown	30	70
Rock, white	10	80
Clay, red	20	100
Sandstone, red	50	150
Sandstone, white (water)	40	190
Sandstone, red	40	230

STRATIGRAPHIC UNIT AND MATERIAL	INTERVAL (FEET)
Sample-description log of well 9.21.19.433 (Color coded to National Research Council color chart. Stratigraphic interpretations and lithologic descriptions by author.)	
Tertiary or Quaternary Systems:	
Upland surficial deposits:	
Sand and gravel, calcareous unconsolidated, light-brown (5 YR 6/4) when dry; caliche; and limestone. Gravel is as much as ½-inch in diameter; sand is fine to coarse and consists of quartz, chert, and limestone	30- 30
Sand and gravel, calcareous, unconsolidated, light-brown (5 YR 6/4) when dry. Gravel is as much as 1½-inches in diameter; sand is fine to coarse and consists of quartz, chert, feldspar, and limestone	48- 78
Triassic System:	
Santa Rosa Sandstone:	
Sandstone, calcareous, very fine- to fine-grained, very pale-orange (10 YR 8/2) when dry, moderately well sorted	34-112
Sandstone, calcareous, very fine- to medium-grained, grayish-orange (10 YR 7/4) when dry; moderately well sorted; consists of quartz grains and carbonate cement	28-140
Limestone and calcareous siltstone, light-gray (N7) when dry	3-143
Sandstone, very fine- to fine-grained, light-gray (N7) when dry; consists of quartz grains and pyrite; some fragments are calcareous. Sample contains some fragments of light-gray limestone	55-198
Sandstone, very fine- to fine-grained, light-gray (N7) when dry; consists of quartz grains; some of the cement is calcareous. Sample contains some fragments of black, vitreous, brittle material with conchoidal fracture; this may be a petroleum derivative	17-215
Sandstone, calcareous, very fine-grained, very light-gray (N8) when dry; also some slightly calcareous, very fine- to fine-grained sandstone which is very pale orange (10 YR 8/2) when dry	33-248
Sandstone, similar to interval from 215 to 248 feet, and a few chips of dense limestone which is dark yellowish-brown (10 YR 4/2) when dry	12-260
Similar to interval from 248 to 260 feet; also contains some asphalt	16-276
Sandstone, slightly calcareous, medium-light-gray (N6) when dry, very fine-grained, moderately well sorted; consists of quartz and a small amount of pyrite; some asphalt in the sample	29-305
Permian System:	
Bernal Formation:	
Siltstone, very slightly calcareous, pale-red (10 R 6/2) to pale-brown (5 YR 5/2) when dry	2-307
Siltstone, very slightly calcareous, grayish-red (10 R 4/2) when dry	8-315
Similar to interval from 307 to 315 feet; also contains some quartzite and pyrite	5-320

STRATIGRAPHIC UNIT AND MATERIAL	INTERVAL (FEET)
Similar to interval from 307 to 315 feet; also contains some pyrite, gypsum, and some very slightly calcareous, very fine-grained sandstone which is light-brown (5 YR 6/4) when dry	17-337
Similar to interval from 320 to 337 feet; also contains some noncalcareous shale which is medium-dark-gray (N4) when dry	7-344
Limestone and gypsum; also contains some very fine-grained, calcareous sandstone which is light-greenish-gray (5 GY 8/1) when dry	6-350
Sandstone, noncalcareous, very fine-grained, mottled [very-light-gray (N8) and medium-dark-gray (NA) when dry], quartz; also contains some shale, which is medium-dark-gray (NA) when dry	8-358
Similar to interval from 350 to 358 feet; also contains some pyrite	7-365
Sandstone (siltstone), very light-gray (N8) when dry, noncalcareous; contains a large percentage of clay and some selenite	20-385
Similar to interval from 365 to 385 feet; but contains more gypsum and some medium-dark-gray (N4) shale	55-440
Similar to interval 350 to 358 feet; also contains some chips of limestone and gypsum	40-480
Shale, medium-gray (N5) when dry, noncalcareous; siltstone, light-gray (N7) when dry, noncalcareous; and gypsum	10-490
Siltstone, noncalcareous, friable, light-brown (5 YR 6/4) when dry; and gypsum	10-500
Siltstone and gypsum, similar to the interval from 490 to 500 feet, and noncalcareous siltstone which is yellowish-gray (5 Y 8/1) when dry	13-513
Siltstone, noncalcareous, yellowish-gray (5 Y 8/1) when dry; anhydrite(?); gypsum; and shale	17-530
Similar to interval from 513 to 530 feet, but contains more medium-dark-gray shale which contains a large precentage of clay	5-535
Siltstone, firmly cemented, noncalcareous, grayish-red (10 R 4/2) when dry	5-540
Similar to interval from 535 to 540 feet; also contains a large percentage of gypsum	4-544

STRATIGRAPHIC UNIT AND MATERIAL	INTERVAL (FEET)
San Andres Limestone:	
Gypsum, crystalline and medium-gray (N5) shale	11-555
Similar to interval from 544 to 555 feet; also contains grayish-red siltstone	9-564
Similar to interval from 544 to 555 feet	14-578
Similar to interval from 544 to 555 feet; (may also contain anhydrite)	4-582
Similar to interval from 544 to 555 feet, but this gypsum is mottled (dark- and light-colored)	3-585
Gypsum, mottled [very light-gray (N8) and light-brownish-gray (5 YR 6/1)]	10-595
Dolomite(?), dense, light-olive-gray (5 Y 6/1) when dry (slight, but continuous, action with 10% HCl at room temperature)	1-596
Shale, very slightly calareous, medium-dark-gray (N4) when dry	1-597
Similar to interval from 544 to 555 feet	3-600
Limestone, silty, light-olive-gray (5 Y 6/1) when dry, dense	3-603
Limestone and dolomite, similar to intervals 595 to 596 and 600 to 603 feet	6-609
Similar to interval from 544 to 555 feet	21-630

Sample-description log of well 9.21.20.211
(Lithologic descriptions by author.)

Sand, medium to coarse, unconsolidated, and pebble conglomerate. The sand is quartz and there is a thin calcium carbonate coating on some pebble fragments	40- 40
Clay, reddish-purple with yellowish-green streaks	20- 60
Sand, coarse, and poorly cemented, fine-grained sandstone. The sand is angular quartz and feldspar, and the sandstone cement is slightly calcareous	10- 70
Sandstone, buff to pink, poorly cemented, fine-grained. The sandstone consists of rounded to subrounded quartz grains, a few small euhedral magnetite grains which are surrounded by limonite stain, and some layers that contain small amounts of muscovite	50-120
Sandstone, poorly cemented, fine- to coarse-grained; some gray, silty shale, and some dark-gray limestone	10-130
Sandstone, gray, brown, and pink, poorly cemented and some purple limestone. Sandstone consists of quartz grains	10-140

STRATIGRAPHIC UNIT AND MATERIAL	INTERVAL (FEET)
Shale, silty, gray to blue-gray. The shale contains pyrite crystals	20-160
Sandstone, gray to blue-gray, micaceous, well-cemented, fine-grained, and some blue-gray shale and crystals of pyrite and marcasite	80-240
Shale, silty, blue-gray	10-250
Sandstone, light-gray, poorly cemented, medium-grained, and silty, gray shale. Sandstone consists of subangular to subrounded quartz grains	20-270
Sandstone, silty, gray, fine-grained; gray limestone; and silty, blue-gray shale	15-285

STRATIGRAPHIC UNIT	THICKNESS (FEET)	DEPTH (FEET)
Driller's log of well 9.22.30.332		
Soil	10	10
Sandstone, gray	40	50
Sandstone, brown	50	100
Sandstone, gray	60	160
Sandstone, white (water)	30	190
Driller's log of well 9.23.15.220		
Topsoil	10	10
Sandstone, gray	10	20
Shale, red	50	70
Clay, red	20	90
Clay, blue	20	110
Sandstone, gray	20	130
Shale, blue	20	150
Sandstone, red	30	180
Shale, red	10	190
Driller's log of well 9.23.19.430		
Surface sand	10	10
Caliche	10	20
Shale, brown	20	40
Sandstone, gray	20	60
Shale, blue	10	70
Shale, brown	40	110
Shale, blue	10	120
Sandstone, gray	10	130
Shale, red	7	137
Driller's log of well 9.24.7.320		
Sandstone, gray	130	130
Sandstone, red	60	190
Sandstone, gray	40	230
Shale, red	40	270
Sandstone, red	20	290
Clay, red	10	300

STRATIGRAPHIC UNIT	THICKNESS (FEET)	DEPTH (FEET)
Driller's log of well 9.24.25.132		
Soil	10	10
Caliche	10	20
Shale, red	20	40
Sandstone, red, and shale	120	160
Sandstone	11	171
Driller's log of well 10.20.6.313		
Soil	20	20
Limestone, gray	11	31
Clay, red, and gravel	29	60
Sand and gravel	10	70
Limestone, red	10	80
Sand and gravel	6	86
Rock, red	14	100
Sand, fine	5	105
Driller's log of well 10.20.6.342		
Soil	32	32
Limestone, gray	24	56
Sand and gravel	30	86
Limestone, red	20	106
Driller's log of well 10.23.24.240		
Surface sand	3	3
Sandstone, white	24	27
Sandstone, yellow (water)	2	29
Sandstone, blue	31	60
Sand (water)	2	62
Sandstone, blue	28	90
Shale, brown	10	100
Sandstone	5	105
Clay, red	10	115
Driller's log of well 11.19.30.000 (Stratigraphic interpretations by author.)		
No description	187	187
Permian System:		
Glorieta Sandstone:		
Quartzite	66	253
Sandstone	4	257
Sand	9	266
Sandstone	114	380
Sand, dark	45	425
Sand, gray	55	480
Sand, black	20	500
Yeso Formation:		
Shale, black	20	520
Sand, red	8	528
Mud, red	18	546
Sand, red	99	645
Shale, red	10	655
Sand, red	355	1,010

EXPLANATION FOR TABLE 4, RECORD OF WELLS

Data presented in table 4 were collected mainly in 1954 and 1955; however, records made in the course of a few other brief investigations have been included also. The table is not a complete inventory of wells, but in areas where wells are widely spaced, more than 80 percent of the wells have been included. In areas where wells are closely spaced, as in the immediate vicinity of Santa Rosa, only a sufficient number of wells were tubulated to show general hydrologic conditions, probably less than 50 percent of the existing wells. In general, those wells on which it was practicable to obtain little or no information other than the location have not been included in the table.

Explanation of Column Headings

Location number: Number indicates successively the township, range, section, quarter section, and so on. See figure 2 for further explanation of numbering system.

Owner or user: Based on information from interviews conducted between August 1954 and January 1956 and from files of the County Assessor or the Soil Conservation Service.

Year completed: Uncertainty indicated by ?, + (since the year given), - (before the year given), and "old" (before about 1920).

Depth: Most depths are those reported by owners or users.

Diameter: Approximate diameter of surface casing in drilled wells, inside diameter of circular dug wells, or edge dimension of square dug wells.

Altitude: Based on following sources: 1) Magnolia Petroleum Co. maps showing location and altitude of gravity-survey stations, 2) Altimeter traverses from U. S. Coast and Geodetic Survey Bench Marks, 3) U. S. Geol. Survey, 1936, Plan and Profile of the Pecos River, 1:31,680, and 4) Army Map Service, Western United States, 1:250,000, sheets NI 13-5, and NI 13-2.

Most altitudes are accurate to ±10 feet. Those followed by (?) were interpolated from source 4 and are probably accurate to ±20 feet, except in areas of steep slopes where they are probably accurate to ±50 feet.

Water level: Depth to water, below land surface. Reported depths are in feet; measured depths are generally in feet and tenths. P indicates a pumping level; F, flowing. A water level in feet followed by a specific date indicates a measurement not accurate to a tenth of a foot.

Stratigraphic unit: Indicates the formation or formations that yield water to the well. See also figure 3. Qal, Alluvium; Qao, Terrace and pediment gravels and older alluvium; QTu, Upland surficial deposits; To, Ogallala Formation; Kmt, Mesa Rica Sandstone and Tucumcari Shale; Je, Entrada Sandstone; "Pc, Chinle Formation; Is, Santa Rosa Sandstone; Pb, Bernal Formation; Psa, San Andres Limestone; Pg, Glorieta Sandstone; Py, Yeso Formation.

Quality of water: Estimates of quality are reported and generally refer to taste. Abbreviations used are as follows: B, Bitter or "gyppy", CA, Chemical analysis in table 6; F, Fair; G, Good; H, Hard; P, Poor; S, Salty.

Use of water: Abbreviations used are as follows : D, Domestic uses; I, Irrigation; S, Stock; M, Municipal supply with a distribution system; N, None.

Remarks: Unless noted otherwise the pumps are piston-type pumps operated by windmill. Abbreviations used are as follows: WM, windmill; RY, reported yield; rept, reported; qual, quality; diam, diameter; perf, perforated; irrig, irrigation; temp, temperature; H_2S, hydrogen sulfide; aux, auxiliary; log, log of well available in table 3.

TABLE 4 —RECORDS OF WELLS IN GUADALUPE COUNTY, NEW MEXICO

Location No.	Owner or User	Year completed 19--	Depth (feet)	Diameter (inches)	Altitude (feet)	Water level Depth (feet)	Water level Date	Stratigraphic unit	Quality of water	Use of water	Remarks
2.16. 2.243	Arthur del Curto	16	700	6	5,740	632	1954	Pg or Py	CA	S	Pump set at 660 ft; silted in below that depth
2.16.23.222	Burguete Brothers	46?	585	-	5,750	550?	-	Pg or Py	H,B	S	WM and pump jack. Deepened from 320 to 585 ft, 1949.
2.16.27.444	do.	47	750	8	5,931	710?	-	Pg or Py	-	S	-
2.17. 2.133	Arthur del Curto	43?	718	10	5,854	673	-	Pg or Py	-	S	8-inch diam. below 460 ft. First water at 700 ft.
2.17.30.333	Burguete Brothers	-	619	8	5,770	580	-	Pg or Py	CA	S	WM and pump jack.
2.17.34.433	do.	-	920	6	5,742	-	-	Pg or Py	-	N	Cased to 400 ft. Deepened from 870 to 920 ft, 1949. Silted in.
2.17.35.111	do.	47	998	5	5,781	965	-	Pg or Py	-	S	Cased to 998 ft.
2.18.17.421	Timoteo Garde	46	900	5	5,588	850?	-	Pg	-	S	Cased to 898 ft. Main aquifer 888-898. Log.
2.18.22.422	do.	53	930	8	5,561	900?	-	Pg	CA	S	6-inch diam. below 10 ft. Log.
2.18.24.244	do.	49	325	6	5,512	280.9	2-16-55	Pb	CA	S	Cased to 325 ft. Log.
2.18.25.330	do.	51	500	-	5,500	Dry	-	-	-	-	-
2.18.30.444	Lewis and Sanders	-	900±	-	5,510	850	-	Py or Pg	-	S	Cased to total depth. WM and pump jack.
2.19. 3.142	B. H. Byrd	-	180	4	5,460	175.9	3-16-55	℞s or Pb	-	D,S	-
2.19. 3.142a	do.	-	220	5	5,460	175.0	3-16-55	℞s or Pb	-	S	-
2.19. 6.211	L. R. Morris	-	200±	-	5,580?	150.9	3-23-55	℞s or Pb	-	N	No pump.
2.19. 7.242	do.	50	170	5	5,590?	152.4	3-23-55	℞s	-	S	Cased to 108 ft.
2.19. 9.342	do.	-	165	6	5,505	142.8	2-24-55	Pb?	-	S	-
2.19.26.433	Clyde Reynolds	-	181.0	5	5,490?	54.6	3-22-55	℞s or Pb	-	S	-
3.16. 7.440	Manuel Vicente	51	950	7	5,973	700	-	Py	-	S	Cased to 900 ft.
3.16.12.242	G. D. Young	-	256	-	5,780?	-	-	Psa or Pg	B	S	Bedrock at 20 ft.
3.16.12.242a	do.	-	199M	-	5,780?	194.0	10-1-54	Psa or Pg	-	N	Poor measurement.
3.16.13.240	Manuel Vicente	-	660	-	5,740	600	-	Py or Pg	CA	S	-
3.16.18.224	do.	-	300	-	5,936	192.0	1-28-55	Pg	-	N	Rept. inadequate.
3.16.23.212	do.	-	670	-	5,765	610	-	Py or Pg	-	S	Rept. adequate and permanent.
3.16.31.333	Alex Hindi	-	550	-	5,950?	-	-	Py	-	S	-
3.16.31.333a	do.	-	602	-	5,950?	-	-	Py	-	S	WM and pump jack.
3.16.32.242	do.	-	653M	8	5,900	630.8	11- 8-55	Py	-	S	-
3.17.14.132	Manuel Vicente	50	975	8	5,874	740?	-	Pg	P	S	-
3.18. 9.000	L. R. Morris	53	128	6	5,659?	103	-	℞s	G	S	Rept. good qual.
3.18. 9.400	do.	-	120M	8	5,630?	108.1	9- 3-54	Pb?	-	S	Rept. inadequate.
3.18.21.234	Eugene Perez	41	1,045	8	5,586	-	-	Py	-	S	-
3.18.26.142	L. R. Morris	-	225	6	5,600?	96	3- -53	℞s?	G	S	Rept. shale in bottom of hole.
3.19. 7.000	do.	-	150	6	5,400	-	-	Pb?	G	S	-
3.19.16.434	B. H. Byrd	-	165	5	5,370	121.8	3-16-55	Pb?	G	S	Poor measurement.
3.19.24.233	Ramon Perez	45	165	-	5,420	130	-	℞s	G	S	-
3.19.24.344	B. H. Byrd	-	240	-	5,420	210	-	℞s	CA	S	Rept. strong.
3.19.31.414	L. R. Morris	50	90	5	5,520	62.0	3-23-55	℞s	G	S	Rept. good qual. Cased to total depth.
3.19.33.211	B. H. Byrd	-	300	8	5,520	Dry	-	-	-	-	-
4.16. 5.212	Charles Dunlap	-	911	-	6,128	880	-	Py	-	S	Log
4.16.12.311	A. E. Huntsinger	47	801	-	5,921	726	1947	Py	-	D,S	Pump jack; electric motor. Commercial analyses rept. pH = 7.2, Fe = 1.4, SiO_2 = 15.3 ppm. Total hardness = 568 ppm.

TABLE 4 (cont.)

Location No.	Owner or User	Year completed 19--	Depth (feet)	Diameter (inches)	Altitude (feet)	Water level Depth (feet)	Water level Date	Stratigraphic unit	Quality of water	Use of water	Remarks
4.16.17.212	Claude Collins	51	812	-	6,155	760	1951	Py or Pg	P	S	-
4.16.36.211	Manuel Vicente	-	650	-	5,811	-	-	-	-	S	-
4.17.26.424	Tom Seale	53	875	8	5,775	860	1947	Py?	P	S	Pump jack; gas engine. Rept. strong.
4.17.28.321	do.	52	843	8	5,920	820	1952	Py	P,B	S	Log
4.17.28.411	do.	32	880	4	5,950?	732	-	Pg or Py	H	N	No pump. Rept. cased to 865 ft. Rept. seep at 250. Caved below 600 ft and abandonded, 1952.
4.18.12.143	Eugene Perez	41	794	6	5,380	-	-	Pg	B	S	-
4.18.28.412	do.	-	900+	8	5,550?	894	1- -56	Py or Pg	CA	S	-
4.19.14.133	Obdulio Martinez	-	885	-	5,374	-	-	Pg?	P	S	-
4.19.34.112	B. H. Byrd	-	125	-	5,280	-	-	Pb?	-	S	Rept. weak.
5.16. 2.412	Eugene Perez	47	242	8	5,850?	215	1947	Psa	-	S	Cased to 69 ft. Rept. weak.
5.16.11.140a	Charles Dunlap	-	-	-	5,816	218.6	10-26-54	Psa	-	N	No pump.
5.16.11.140b	do.	52	250	6	5,816	218	-	Psa	-	S	Cased to 243 ft.
5.16.11.140c	do.	53	260	-	5,816	248	1953	Psa	-	S	Pump jack; gas engine. Rept. weak.
5.16.24.330	-	32	4,717	15	5,965	-	-	-	-	N	Oil-test well; log to 850 ft.
5.17. 2.322	Eugene Perez	45	202	8	5,534	190?	-	Psa	-	S	Cased to 202 ft; perf. 172 to 202. Abandoned well 10 ft southeast capped.
5.18. 6.414	do.	35?	248	6	5,510	191.6	8-25-54	Psa	-	S	Poor measurement.
5.18.11.313	do.	45	324	6	5,350	270	-	Psa	-	S	Rept. first water 270 ft; main aquifer 298 ft. Three holes at this location; one rept. dry at 717 ft.
5.18.26.222	do.	18?	250	6?	5,215	48.6	8-26-54	Psa	CA	S	-
5.18.31.311	do.	-	896	-	5,510?	650	-	Py	CA	S	Pump set at 700 ft.
5.19. 1.110	Bevo Johnson	52	50	6	5,170	31.8	8-16-55	Pb	P,B	S	-
5.19. 6.324	George Sims and Sons	51	269	6	5,340	-	-	Psa	-	S	Log.
5.19. 7.224	Bevo Johnson	-	109	5	5,340	78.3	8-16-55	Pb	-	S	Poor measurement.
5.19.10.332	George Sims and Sons	52	222	6	5,240	215	-	Psa	B	S	Log at 215 ft.
5.19.20.410	do.	-	150	-	5,170	85.3	8-17-55	Psa?	P,B	S	-
5.19.24.114	Bevo Johnson	46	300	6	5,305	194.1	8-12-55	Pb or ℞s	P,B	S	Rept. main aquifer 200 ft.
5.19.29.230	Obdulio Martinez	-	200	-	5,154	-	-	Psa	-	S	Drilled as irrigation test, but yield rept. too low. Log.
5.19.29.331	do.	52	-	-	5,160	74.3	8-17-55	Psa	-	N	Drilled as irrig. test. No pump.
5.19.29.331a	do.	-	120	-	5,160	82	-	Psa	CA	I	Turbine butane engine. See analysis table.
5.19.35.313	do.	-	80	7	5,120	45.7	8-17-55	Psa	P,B	S	-
5.19.35.322	Ben Good	-	-	4	5,120	-	-	Psa	B	S	-
5.20. 2.340	Bevo Johnson	-	100	6	5,050	70	-	Pb	B	S	-
5.20.10.344	Ben Good	-	122M	5	5,100?	109.3	8-25-55	Pb	-	S	-
5.20.11.142	Muniz	-	102	-	5,040	-	-	Pb	P	S	Rept. unfit for domestic use. Used to irrigate garden.
5.20.12.121	Ernest Mullens	-	40	6	5,005	-	-	Pb	P,B	S	-
5.20.17.441	Bevo Johnson	28	135	6	5,195	76.6	8-12-55	Pb	P	S	Poor measurement.
5.21. 7.311	Ernest Mullens	-	110	6	4,980	-	-	Pb	P,B	S	-
5.21. 8.331	Bevo Johnson	40	100	6	4,977	73	7-25-40	Pb	CA	S	-
5.21. 9.442	do.	50	81	6	4,920	-	-	Pb	F,B	S	-
5.21.12.123	Tomas Sena	20	40	-	4,820	-	-	Pb?	P,B	S	Elec. motor. Irrigates garden.
5.21.12.123a	do.	20	15	-	4,820	-	-	Pb?	P,B	S,I	-
5.21.19.321	Ernest Mullens	50	111	6	5,008	100	-	Pb	P,B	S	-
5.21.24.343	Earl Powell	-	190	6	4,872	144.5	8-10-55	℞s?	-	S	-
5.21.30.232	Ben Good	-	125	5	4,950?	-	-	Pb	F,B	S	-
5.22. 1.213	Earl Powell	-	210	6	4,670	100+	8- 8-55	℞s	-	S	-
5.22. 5.411	do.	-	-	7	4,840	178.0	8- 9-55	℞s	-	S	Poor measurement.

TABLE 4 (cont.)

Location No.	Owner or User	Year completed 19--	Depth (feet)	Diameter (inches)	Altitude (feet)	Water level Depth (feet)	Water level Date	Stratigraphic unit	Quality of water	Use of water	Remarks
5.22. 7.113	Earl Powell	-	-	6	4,792	110.4	8-10-55	Pb	-	S	-
5.22. 7.141	do.	-	-	6	4,775	113.2	8-10-55	Pb	CA	S,D,I	Used for sanitary facilities and to irrigate garden.
5.22. 8.430	do.	-	128M	8	4,670	84.9	8- 9-55	Pb or TRs	-	N	No pump. Cavity penetrated above water table.
5.22.13.333	Bill Hitson	-	-	4	4,685	-	-	TRs?	F	S	Slight iron taste.
5.22.13.444	Bill Hitson(?)	-	-	6	4,640	-	-	TRs	G	S	-
5.22.17.111	Earl Powell	-	160	-	4,700	112.8	8- 9-55	Pb	P,B	S	-
5.22.22.140	Abelino Sanchez	-	300	6	4,784	247.2	8-21-55	Pb	P,B	S	Poor measurement.
5.22.29.144	Menas Sena	Old	160	-	4,775	-	-	Pb?	S	S	Rept. adequate and permanent.
5.23. 1.211	Phillip Reeves	-	110M	6	4,315	75.3	10-27-55	TRs	-	S	-
5.23. 5.311	Earl Powell	-	80	6	4,513	-	-	TRs	G	S	-
5.23. 8.441	Jack Hitson	-	-	-	4,590	67.4	8- 8-55	TRs	-	S	-
5.23. 8.444	E. M. Whitaker	50	156	6	4,595	-	-	TRs	G	S	-
5.23.10.211	Adolpho Lopez	-	70M	6	4,360	53.0	8- 4-55	TRs	-	S	-
5.23.10.232	do.	-	-	6	4,380	79.2	8- 4-55	TRs	-	S,I	Pump jack; elec. motor. Irrigates small garden.
5.23.11.441	E. M. Whitaker	-	72	-	4,360	6.1	8- 4-55	TRs	G	S	Dug well.
5.23.23.414	do.	-	275	-	4,536	240	-	TRs	CA	D,S	Rept. no rock in hole.
5.23.26.431	do.	-	75	5	4,490	-	-	TRs	G	S	-
6.16. 2.230	Eugene Perez	47	820	8	5,720	812?	-	Pg?	CA	S	Rept. adequate and permanent. See analysis table.
6.16. 8.444	do.	-	108M	-	6,000?	Dry	8-19-54	-	-	-	Probably deeper when drilled.
6.16.15.343	do.	-	960	-	5,958	920?	-	Pg	-	S	-
6.16.21.344	Virdie Marshall	-	100	6	6,000?	-	-	TRs or Pb	CA	D,S	-
6.16.33.424	A. E. Rinker	54	843	-	5,882	800?	1954	Py?	P	S	-
6.17. 4.441	Julian Martinez	52	820	6	5,668	785	1955	Py or Pg	P	S	Cased to 200 ft.
6.17.15.122	do.	Old	122	6	5,700?	108	-	Psa	CA	S	-
6.17.17.331	Eugene Perez	35	175	-	5,780?	132.4	9- 1-54	Pb?	CA	S	-
6.17.28.344	do.	39	900+	-	5,722	-	-	Pg?	P	S	WM and pump jack.
6.18. 6.421	Julian Martinez	49	750	8	5,543?	720	-	Pg	-	S	Cased to 300 ft.
6.18.17.310	Eugene Perez	50	680	-	5,474	655?	-	Pg	P	S	-
6.18.30.321	do.	45	718	5	5,442	710?	-	Py	CA	S	-
6.18.33.442	do.	18	175?	-	5,410?	-	-	Pb?	CA	D,S	-
6.19. 1.324	W. H. Johnson	-	220	6	5,215	140	-	Pb	P	S	-
6.19. 5.324	George Sims and Sons	-	87	-	5,310	-	-	Pb or Psa	P	S	-
6.19. 8.310	do.	50+	220	8	5,285	-	-	Psa	-	S	-
6.19. 9.114	W. H. Johnson	-	100	-	5,325	67.2	8-15-55	Pb	P,B	S	-
6.19.11.320	Bevo Johnson	50	100	8	5,260	-	-	Pb	-	S	-
6.19.21.133	George Sims and Sons	54	160	-	5,310	-	-	Pb	CA	S	-
6.19.23.414	Bevo Johnson	-	210	-	5,260	-	-	-	-	S	-
6.19.24.441	W. H. Johnson	-	-	-	5,180	-	-	-	-	S	-
6.19.27.440	Pedro Campos	54	225	6	-	-	-	Psa?	-	-	Log.
6.19.35.143	Bevo Johnson	-	100	5	5,220	74.4	8-16-55	Pb	P,B	S	-
6.20. 4.244	W. H. Johnson	-	115	6	5,115	76.3	8-15-55	Pb	P,B	S	-
6.20. 8.322	Leo Muniz	-	70	5	5,140	61.3	8-15-55	Pb or TRs	-	S	-
6.20.11.233	W. H. Johnson	52	110?	6	5,090	-	-	TRs?	G	D	-
6.20.15.213	Bevo Johnson	-	115	6	5,120	-	-	TRs	CA	D,S	-
6.20.21.434	do.	-	120	5	5,180	103.2	8-15-55	Pb or TRs	-	S	-
6.20.22.242	do.	52	165?	-	5,150	-	-	Pb or TRs	-	-	-
6.20.22.244	do.	-	-	4	5,160	169.1	8-16-55	Pb or TRs	-	D,S	Pumping prior to measurement.

TABLE 4 (cont.)

Location No.	Owner or User	Year completed 19--	Depth (feet)	Diameter (inches)	Altitude (feet)	Water level Depth (feet)	Water level Date	Stratigraphic unit	Quality of water	Use of water	Remarks
6.20.24.243	Brassell Brothers	-	-	-	5,030	104.3	8-10-55	Pb or TRs	-	S	-
6.20.30.340	Bevo Johnson	-	25	5	5,150	-	-	Pb	P,B	S	-
6.20.32.334	do.	-	125	6	5,230	45.9	8-16-55	Pb	-	S	-
6.20.33.131	do.	-	125	6	5,180	-	-	TRs?	G	S	Rept. good quality.
6.20.33.432	W. H. Johnson	-	78	6	5,190	56.6	8-15-55	Pb?	P,B	S	-
6.20.35.142	Bevo Johnson	-	165	-	5,078	144.3	8-12-55	Pb	P,B	S	-
6.20.36.143	Brassell Brothers	Old	100	-	5,030	-	-	Pb	P,B	S	-
6.21. 8.144	do.	-	100	6	4,830	-	-	Pb	CA	S	-
6.21.20.310	Transito Montoya	40	139M	6	5,010	98.6	1-10-56	TRs or Pb	-	S,I	Irrigates garden.
6.21.21.430	Ernest Mullens	54	253	6	5,045	65?	-	Pb	-	S	-
6.21.23.114	Frank Ocana	-	34M	6	5,080	16.4	1-10-56	TRs	-	S,I	Irrigates garden.
6.21.25.441	Sam White	50	312	6	4,964	295+	8- 3-55	Pb?	-	S	-
6.21.29.130	Ernest Mullens	-	75M	6	4,975	64.7	1-10-56	Pb	CA	S	-
6.21.31.341	do.	-	120M	6	4,980	65.2	1-10-56	Pb	P,B	S	-
6.21.32.200	Brassell Brothers	Old	100	-	4,940	Dry	-	-	-	S	-
6.22. 3.340	Sam White	52	214	6	4,745	193.8	8- 2-55	TRs	-	S	-
6.22. 9.341	do.	-	214?	6	4,820	185?	-	TRs?	G	S	-
6.22.18.332	do.	-	-	6	4,690	36.4	8- 3-55	Pb	-	S	-
6.22.21.212	Desiderio Padilla	-	-	5	4,794	133.2	8- 9-55	TRs	-	S	-
6.22.28.443	Earl Powell	-	180	6	4,805	-	-	TRs	G	S	Rept. weak.
6.22.31.410	do.	51	200	5	-	-	-	TRs	-	-	Log to 190 ft.
6.22.34.142	do.	-	62M	-	4,785	Dry	8- 9-55	-	-	-	Abandoned, weak. Subsequently caved.
6.22.34.434	do.	-	115	6	4,737	75.6	8- 9-55	Pb	-	S	-
6.23. 3.144	J. C. Slaton	-	80M	-	4,440	57.6	10-17-55	TRs	-	S	-
6.23. 8.440	Joe Chaves	40	150	-	4,440	90	-	TRs	G	D,S	Rept. weak.
6.23.12.120	Phillip Reeves	-	187M	5	4,560	163.2	10-28-55	TRs or TRc	-	S	-
6.23.23.220	do.	-	265	6	4,625	-	-	TRc or TRs	G	S	-
6.23.27.422	J. C. Slaton	-	80M	6	4,415	67.7	10-30-55	TRs	G	S	-
6.23.31.444	Earl Powell	-	-	5	4,554	146.8	8- 3-55	TRs	-	S	Poor measurement.
6.24. 8.114	Phillips Reeves	-	22M	-	4,480	17.2	10-28-55	Qao	-	S	Dug well.
6.24.10.230	Mrs. W. I. Johnson	-	-	-	4,450	-	-	Qao	CA	D,S	Do.
6.24.10.344	C. O. Bray	15	23	-	4,430	7	-	Qao	G	D,S	Dug well. Rept. adequate and permanent.
6.24.13.130	R. de Olivera	-	65M	8	4,430	10.1	10-27-55	Qao	-	N	-
6.24.14.340	do.	-	25M	4	4,380	19.0	10-27-55	Qao or TRc	-	S	-
6.24.21.444	C. O. Bray	-	130	6	4,400	65	-	Qao	G	S	Cased to 130 ft. Main aquifer at 100 ft. Rept. strong well.
6.24.26.142	Mr. Dickens	-	25	4	4,350	22	-	Qao	-	S	Rept. cased to 25 ft. Not visited.
6.24.30.320	Phillip Reeves	-	205	6	4,500?	168.7	10-28-55	TRc	CA	S	-
7.16. 3.100	R. N. Krannawitter	-	20	-	5,450?	-	-	TRc	-	S	Dug well. Weak; intermittent.
7.16.10.410	do.	50	580	5	5,635	550	-	Psa?	P,B	D,S	Cased to 580 ft. Quality deteriorated with pumping.
7.16.24.410	H. A. Gustavus	-	696	-	5,610	-	-	Pg?	CA	S	WM and pump jack.
7.16.28.442	R. N. Krannawitter	46	90M	6	5,830?	-	-	TRs	-	-	-
7.16.28.442a	do.	38	77M	6	5,830?	61.3	4- 1-55	TRs	-	N	No pump. Water below blue shale; rose slightly.
7.16.28.444	do.	-	220	8	5,800?	179.3	4- 1-55	TRs	F	S	-
7.16.29.434	do.	-	-	5	5,880?	-	-	TRs	-	S	-
7.16.29.434a	do.	46	110	5	5,880?	98.2	4- 1-55	TRs	G	S	-
7.16.34.132	H. A. Gustavus	-	135	6	5,750?	-	-	TRs	CA	S	-
7.16.34.132a	do.	-	70M	4	5,750?	68.6	6- 9-55	TRs?	-	N	No pump.
7.16.34.132d	do.	-	121M	6	5,750?	97.1	6- 9-55	TRs	-	N	Do.

TABLE 4 (cont.)

Location	Owner or User	Year completed 19--	Depth (feet)	Diameter (inches)	Altitude (feet)	Water level Depth (feet)	Water level Date	Stratigraphic unit	Quality of water	Use of water	Remarks
7.16.34.141	T. F. Kyle?	50	108	8	5,750?	-	-	Ꞧs ?	-	-	Log.
7.17.14.230	-	-	200+	-	5,550?	Dry	-	-	-	N	No pump.
7.17.35.213	Julian Martinez	15	255	-	5,760	195	-	Ꞧs ?	-	S	-
7.18. 4.000	Albert Perez	49	350	-	5,400?	Dry	-	-	-	N	No pump.
7.18. 8.120	do.	51	250	-	5,480?	Dry	-	-	-	N	Do.
7.18. 8.140	do.	53	300	6	5,500?	288	-	Ꞧs or Pb	G	D	Rept. soft. Weak well. Log.
7.18.15.330	Arturo Tapia	54	80	6	-	-	-	Ꞧs	-	S	Log.
7.19. 8.144	Antonio Martinez	36	160	6	5,510	-	-	-	-	S	Rept. dry.
7.19. 8.144a	do.	36	160	6	5,510	-	-	Ꞧs ?	-	S	Weak well. Can be pumped only few hours per week.
7.19. 8.412	David Glass	-	135	-	5,500	-	-	Ꞧs ?	-	S	-
7.19.13.222	do.	-	200	6	5,205	173.3	4-14-55	Pb	CA	S	-
7.19.16.233	do.	-	70	4	5,305	-	-	Pb	-	S	-
7.19.16.410	do.	-	80	-	5,280?	60	-	Pb	-	S	-
7.19.23.111	do.	41?	250	4	5,220	207.6	4-14-55	Pb	CA	S	Poor measurement. Odor of hydrogen sulfide.
7.19.24.422	B. F. Walker	50	154	6	5,146	119.0	1-12-55	Ꞧs or Pb	F	S	Cased to 122 ft.
7.19.25.421	W. H. Johnson	-	150	-	5,145	103.3	8-15-55	Pb	P,B	S	Measured while pumping.
7.19.34.113	do.	-	-	-	5,266	-	-	Pb?	-	S	-
7.20. 1.414	B. F. Walker	-	326	-	4,930	289	-	Psa?	CA	S	-
7.20.11.410	W. H. Johnson	-	407	6	4,974	365.3	1-13-55	Pb or Psa	-	S	-
7.20.17.442	do.	-	90	6	5,070	46.6	1-12-55	Pb	-	S	-
7.20.18.240	Santiago Campos	-	148	-	5,125	112.8	12-7-55	Pb	P	S	-
7.20.19.325	do.	-	125	-	5,018	94.4	1-12-55	Pb	CA	S	-
7.20.21.144	do.	-	47	-	5,048	40.8	1-13-55	Pb	-	S	Dug well.
7.20.22.141	do.	-	50	6	5,020	36.5	1-13-55	Pb	-	S	-
7.20.34.121	W. H. Johnson	42	120	8	5,080	73.3	8-15-55	Pb?	-	S	-
7.20.35.122	Johnson Bros.	-	65	6	5,065	57.7	8-15-55	Pb	P,B	S	-
7.20.35.122a	do.	-	-	-	5,060	-	-	Pb	P,B	I	Turbine; electric motor.
7.20.35.144	do	-	-	-	5,060	-	-	Pb	-	I	Turbine; electric motor. Interferes with 7.20.35.122a. RY-90 gpm.
7.21. 1.333	B. F. Walker	-	100	-	4,911	-	-	Pb	CA	S	-
7.21. 8.220	do.	-	198M	6	4,992	-	-	Pb?	-	S	-
7.21.10.144	do.	-	142M	8	4,972	128.6	1-14-55	Pb?	P,B	S	-
7.21.12.340	R. C. Chavez	55	190	6	4,910	160+	5-24-55	Ꞧs	CA	S	-
7.21.15.441	B. F. Walker	-	50	6	4,977	36.1	1-13-55	Ꞧs	CA	S	Temp. 61°F.
7.21.16.344	do.	-	220	6	4,988	150+	1-13-55	Ꞧs and Pb	F	S	Temp. 62°F.
7.21.18.212	do.	-	198	6	5,048	-	-	Pb?	F,B	S	-
7.21.18.220	-	25	788	10	5,080	-	-	-	-	N	Oil-test well. Log.
7.21.22.434	B. F. Walker	-	47M	8	4,970	25.8	1-13-55	Ꞧs	G	S	Temp. 60°F.
7.21.29.441	do.	-	160	-	5,027	-	-	Pb	-	S	-
7.21.30.222	do.	-	-	4	5,010	110.7	1-13-55	Pb	P,B	S	Temp. 61°F.
7.22.12.332	Moise Bros.	-	296M	5	4,775?	Dry	-	-	-	-	-
7.22.16.132	-	53	200	-	-	-	-	Pb	B	N	Log.
7.22.18.410	Reynoldo Chavez	45	15M	-	4,560	13.2	5-23-55	Pb	-	-	Dug well.
7.22.25.244	J. C. Slaton	-	-	-	-	-	-	Ꞧs	CA	-	-
7.22.26.440	do.	50	312	-	4,610	99.1	10-18-55	Ꞧs	G	S	Weak.
7.22.28.112	L. Flores	-	60	-	-	-	-	Ꞧs and Pb	CA	-	-
7.22.34.230	Ben Gerhardt	Old	22	-	4,430	20	-	Pb	P,S	S,I	Irrigates garden.
7.22.35.211	-	-	75	-	-	-	-	Ꞧs	CA	S	-
7.23. 4.113	Double L. Ranch	-	-	-	-	-	-	Qal?	CA	S	Dug well.
7.23. 5.220	Moise Bros.	-	-	60	4,570	11.4	10-13-55	Qao	-	-	Dug well. No pump.
7.23.19.344	J. C. Slaton	25	187	-	4,640	173.9	10-18-55	Ꞧs	-	S	Pumped prior to measurement.
7.23.22.141	R. J. Jones	-	175	6	4,520	50+	10-31-55	Ꞧs?	G	D,S	-

TABLE 4 (cont.)

Location No.	Owner or User	Year completed 19--	Depth (feet)	Diameter (inches)	Altitude (feet)	Water level Depth (feet)	Water level Date	Stratigraphic unit	Quality of water	Use of water	Remarks
7.23.24.244	R. J. Jones	55	125	6	4,620	80.9	10-31-55	TRc	G	S	-
7.23.24.422	do.	-	78	4	4,625	74.6	10-31-55	TRc	-	-	-
7.23.27.112	do.	-	24M	6	4,490	16.8	10-31-55	TRc	G	S	-
7.23.30.133	J. C. Slaton	47	287	-	4,590	-	-	TRs	G	D,S	-
7.23.34.432	R. J. Jones	-	84M	6	4,450	70P	10-31-55	TRc	-	S	-
7.24. 1.131	Earl Smith	-	-	-	4,770	29.9	4-11-55	TRc	-	-	No pump.
7.24. 2.410	do.	-	-	5	4,740	-	-	TRc ?	-	S	Weak.
7.24. 5.111	R. W. Cox	-	150	-	4,770	142	-	TRc	G	S	-
7.24. 5.113	-	-	-	6	4,770	-	-	TRc ?	G	S	-
7.24. 5.224	Welch	-	155	5	4,740	-	-	TRc	G	S	-
7.24. 7.140	B. F. Claunch	-	-	-	4,690	-	-	TRc	G	S	-
7.24. 7.442	do.	-	130M	6	4,665	124.0	12- 1-55	TRc	G	S	-
7.24. 8.123	R. W. Cox	-	61	-	4,680	55	-	TRc	G	D,S	-
7.24. 9.333?	Nicholson Estate	Old	-	-	4,645	-	-	-	-	S	-
7.24.11.210	Earl Smith	-	150	-	-	50	-	TRc	CA	S	Temp. 59°F.
7.24.12.113	John Luna	-	67M	-	4,730	-	-	TRc ?	-	S	-
7.24.13.141	do.	-	-	5	4,710	-	-	-	-	S	-
7.24.17.114	Nicholson Estate	-	90	5	4,650	66.8	10-28-55	TRc	-	S	No pump.
7.24.19.313	R. J. Jones	Old	114	-	4,630	80.0	10-31-55	TRc	-	-	Do.
7.24.22.333	Charles Fallon	-	-	-	4,600	-	-	-	-	D,S	-
7.24.24.424	L. B. Merrill	-	-	6	4,500?	-	-	-	G	S	-
7.24.28.244	B. B. Blakey	-	22	-	4,600	-	-	TRc	-	D,S	Dug well.
7.24.30.233	Phillip Reeves	-	119M	6	4,610	96.2	10-28-55	TRc	-	S	-
7.24.32.423	do.	-	9M	30	4,520	7.4	10-28-55	Qao	G	S	Dug well.
7.24.35.244	Charles Fallon	-	62M	8	4,495	54.0	10-27-55	TRc	G	S	-
7.25. 9.113	L. B. Merrill	-	25	36	4,590	24.9	10-31-55	Qal	-	S	Dug well.
7.25.11.320	-	-	-	5	4,600	-	-	Qal	-	S	-
7.25.12.131	Earl Smith	-	-	6	4,620	-	-	Qal	CA	S	-
7.25.13.322	-	-	30M	-	4,640	29.2	4-11-55	Qal	-	S	Dug well.
7.25.15.213	L. B. Merrill	-	25	-	4,565	23	-	Qal?	-	D,S	Do.
7.25.17.411	do.	-	25M	5	4,560	-	-	Qal	G	S	-
7.25.26.421	Joe Killough	-	60M	4	4,620	45.3	10-31-55	TRc	-	S	-
7.25.27.224	L. B. Merrill	-	34M	30	4,550	31.2	10-31-55	Qal	-	S	Dug well.
7.26. 3.143	Jerry Clayton	-	-	-	4,770	-	-	-	-	S	Do.
7.26. 6.132	do.	-	-	-	4,650	-	-	-	-	D,S	Dug and drilled.
7.26. 8.412	do.	-	70M	5	4,780	-	-	TRc?	-	S	Weak well.
7.26.12.334	-	-	-	-	5,281	-	-	To	-	D,S	Temp. 60°F.
7.26.19.421	-	-	38M	-	4,695	36.1	11- 4-55	Qal	-	S	Dug well.
7.26.21.412	Jerry Clayton	-	42M	22	4,810	37.6	11- 3-55	Qal or TRc	-	-	Dug well. No pump.
7.26.22.244	-	-	130	5	5,275	-	-	To	-	S	-
7.26.24.443	Steve Williams	-	61M	4	5,226	53.1	8-24-55	To	-	D,S	-
7.26.27.111	Jerry Clayton	-	76M	5	4,880?	41.6	11- 3-55	TRc	-	S	-
7.26.29.420	-	-	133M	-	4,945	92.2	5-20-55	TRc	-	-	-
8.16. 3.234	Blivens McKenzie	-	15M	-	5,900?	8.8	6- 2-55	TRs ?	-	-	Dug well. No pump.
8.16. 5.311	Robert Marquez?	-	47M	-	5,950?	35.0	5-27-55	TRs	-	S,I	Dug well. Irrigates garden.
8.16. 5.413	Blivens McKenzie	-	18M	-	5,900	15.0	5-27-55	TRs	-	S	Dug well.
8.16. 5.413a	do.	-	-	-	5,900?	7.0	5-27-55	TRs	-	S	-
8.16. 6.230	do.	-	22M	-	5,980?	22.0	5-26-55	TRs	CA	S	Temp. 56°F.
8.16. 9.224	Milagro Community	-	400	8	5,900?	Dry	-	-	-	-	-
8.16.12.420	Carlos Muniz	-	200	-	5,850?	Dry	-	-	-	-	-
8.17. 6.222	N. W. York	49	850	-	5,800?	800	1949	Pg	CA	S	-
8.17. 9.340	Mrs. S. E. Bonney	47	76	6	5,800?	62.8	6- 3-55	TRs	G	D,S	Good quality.
8.17.26.414	Claudio Nelson	Old	485	4	5,366	-	-	Psa	P,B	S	-
8.17.32.410	Robert Wellborn	49	500	6	5,350?	420	1959	Psa?	CA	S	-
8.17.34.440	do.	50	441	6	5,300?	220?	-	Pb	P	S	-
8.18. 8.441	H. L. Duggins	-	250	6	-	-	-	TRs ?	G	S	-
8.18.15.114	do.	-	260	6	5,400?	-	-	TRs ?	G	S	-
8.18.20.140	do.	-	850	6	5,550?	600	-	Psa?	P	S	Rept. to contain biturmens.
8.18.22.414	Santiago Tennorio	40	250	6	5,330?	230	-	TRs?	G	D,S	Weak well.
8.18.26.241	David Glass	-	-	6	5,180	-	-	-	P,B	S	-
8.18.31.211	Julian Martinez	36	420	6	5,261	346.6	7- 5-55	Psa	P	S	-
8.18.31.222	Pintada Community	-	-	-	-	-	-	Psa?	CA	-	-

TABLE 4 (cont.)

Location No.	Owner or User	Year completed 19--	Depth (feet)	Diameter (inches)	Altitude (feet)	Water level Depth (feet)	Water level Date	Stratigraphic unit	Quality of water	Use of water	Remarks
8.18.31.333	Albert Perez	50	418	6	5,350?	380	-	Psa	P	S	-
8.19. 1.423	Margarito Madrid	46	456	6	5,320	-	-	Pb	P	S	-
8.19. 1.432	do.	33	170	10	5,342	14	1933	TRs	G	D,S	-
8.19.13.340	do.	50	120	6	5,000	60.2	7-12-55	Psa	P	S	-
8.19.14.311	A. Romero	-	-	-	5,000	-	-	Psa?	P	S	-
8.19.16.224	M. T. Apodaca	-	47M	6	5,140	31.4	7-11-55	Psa	P	S	-
8.19.16.242	Virginio Fajardo	-	-	6	5,160	24.4	7-12-55	Psa	P	S	-
8.19.17.414	Severo Chavez	-	135	-	-	-	-	Psa	CA	S	-
8.19.17.442	-	-	80	6	5,096	44.8	1-11-56	Psa	P	S	-
8.19.19.132	Paublin Romero Estate	-	235	6	5,140	-	-	Psa	-	S	-
8.19.19.132a	do.	-	103M	-	5,140	69.2	1- 7-55	Psa	-	-	No pump.
8.19.20.112	Virginio Fajardo	-	76	6	5,075	68.1	1- 7-55	Psa	P	S	-
8.20. 5.411	Moise Livestock Co.	-	400	-	5,237	370	-	Pb	P	S	-
8.20. 8.431	do.	-	21	-	5,200	7.3	12-23-54	TRs	G	S	Dug well.
8.20.11.113	do.	46?	180	8	5,094	162.1	12-23-54	Pb or TRs	-	S	Pumped prior to measurement.
8.20.12.330	do.	-	400	6	4,809	168.3	12-27-54	Pb	-	S	-
8.20.13.134	do.	-	-	6	4,780	118.0	12-29-54	Pb?	-	-	No pump.
8.20.13.442	do.	-	102	-	4,720	99	-	Pb?	P	D,S	-
8.20.15.310	do.	52	465	6	5,052	459	1952	Pb	P	S	Temp. 61°F. Log.
8.20.27.112	do.	-	538	8	5,080	500	-	Pb?	P,B	S	-
8.20.36.311	do.	-	350	8	4,934	324.0	12-28-54	PB?	P	S	-
8.21. 1.410	L. Harrison	52	212	-	4,740	185	-	Pb or TRs	CA	-	-
8.21. 2.414	J. Coury	54	70M	7	4,635	23.7	6- 7-55	TRs	-	-	No pump.
8.21. 2.432	H. McBee	-	40	-	4,617	10	-	TRs?	CA	-	-
8.21. 3.430	Al' rt Velasquez	-	12	-	4,581	2	1-20-53	TRs	CA	N	No pump, dug well originally flowed.
8.21. 4.121	Max Rivera	48	106	10	4,670	60	-	TRs	-	-	No pump.
8.21. 4.213	Manuel Chavez Jr.	-	119M	12	4,662	79.5	10- 5-54	TRs	-	-	Do.
8.21. 4.331	Moise Livestock Co.	-	79M	6	4,700	Dry	12-30-54	-	-	-	Do.
8.21. 8.212	do.	-	100	8	4,684	92.3	12-27-54	TRs?	F	S	Pumped prior to measurement.
8.21. 9.442	do.	-	200	6	4,764	-	-	Pb	P	S	-
8.21.11.212	J. A. Coikes	-	40	-	4,591	37	1-20-53	TRs	CA	-	-
8.21.12.134	-	-	40	5	4,605	30.6	10-11-54	TRs?	-	I?	-
8.21.12.443	A. J. Irwin	-	26M	12	4,620	10.4	10- 3-55	TRs	-	-	No pump. RY-160 gpm.
8.21.15.213	B. F. Walker	-	-	-	4,615	-	-	TRs?	CA	-	-
8.21.19.441	do.	-	97	6	4,681	-	-	Pb?	CA	S	-
8.21.21.144	do.	-	140	6	4,716	107.5	1- 3-55	Pb	CA	S	-
8.21.22.344	do.		157	6	4,735	150	-	Qao?	CA	D	-
8.21.23.444	do.	52	225	6	4,692	210	1952	Pb	-	S	-
8.21.30.431	do.	-	125	-	4,679	-	-	Pb	-	S	-
8.21.32.222	do.	-	71M	6	4,672	66.4	1- 5-55	Pb	-	S	-
8.21.33.213	do.	-	1,100	-	4,642	34	1940	Pg and Psa	CA	I	Turbine; butane engine. Drilled as oil test. Water rept. 600-1,000 ft. RY-2,500 gpm.
8.21.33.330	do.	-	173M	6	4,750	147.5	1-21-55	Pb	P	S	-
8.21.36.000	do.	40	90	-	-	38	1940	Pb	CA	-	-
8.21.36.224	do.	40	45	10	-	25	1940	Pb	CA	-	-
8.22. 1.411	L. C. Moorhouse	-	28M	6	4,840	8.7	10-13-55	TRc	-	S	-
8.22. 2.323	do.	-	60	6	4,965	26.1	10-13-55	TRc	-	S	-
8.22. 2.422	do.	-	-	6	4,890	12.2	10-13-55	TRc	-	S	-
8.22. 6.234	H. McBee	-	180	-	4,700	115	-	TRs	CA	-	-
8.22. 7.343	A. J. Irwin	53	135	6	4,720	-	-	TRs	-	D,S	-
8.22.11.130	L. C. Moorhouse	50	579	6	4,995	-	-	TRs	CA	S	Temp. 64°F.
8.22.12.322	do.	-	45M	6	4,880	40.8	10-13-55	TRc	-	-	No pump.
8.22.13.222	do.	-	30	30	4,770	-	-	TRc	-	S	Dug well.
8.22.17.422	-	-	-	-	-	-	-	TRc	CA	-	-
8.22.18.431	A. J. Irwin	52	105	6	4,610	77.8	9-15-55	Pb	CA	S	-
8.22.18.433	B. G. White	-	94	6	-	81.4	6- 4-53	Pb	F	S	-
8.22.19.234	-	-	-	-	-	-	-	Pb?	-	S	-

TABLE 4 (cont.)

Location No.	Owner or User	Year completed 19--	Depth (feet)	Diameter (inches)	Altitude (feet)	Water level Depth (feet)	Water level Date	Stratigraphic unit	Quality of water	Use of water	Remarks
8.22.26.110	A. J. Irwin	-	450	-	4,740	228.9	9-30-55	Pb	-	-	No pump. Meas. depth 247 ft.
8.22.26.232	do.	-	7	60	4,720	-	-	TRc	G	S	Dug well.
8.23. 5.111	Moise Bros. Co.	-	80	6	4,740	50.0	10-13-55	TRc	-	S	-
8.23.10.221	J. L. Hicks	-	164	6	4,850	101.3	10-15-55	TRc	-	S	-
8.23.11.221	do.	-	200	6	4,890	-	-	TRc	-	D,S	-
8.23.15.410	do.	-	168	4	4,760	19.4	10-13-55	TRc	-	S	-
8.23.17.340	Moise Bros. Co.	-	-	-	4,660	9.5	10-13-55	TRc	F	S	-
8.23.26.230	do.	-	-	6	4,800	441.7	10-12-55	TRs?	-	S	-
8.23.31.130	do.	-	160	6	4,650	-	-	TRc	P	S	-
8.23.36.413	do.	-	12	48	4,750	6.8	10-12-55	TRc	CA	S	Dug well.
8.24. 1.244	C. B. Waller	-	90	6	4,990	-	-	TRc	CA	D,S	-
8.24. 1.334	do.	-	64	-	4,965	-	-	TRc	-	S	-
8.24. 2.444	P. M. Armstrong	-	38M	22	4,960	30.2	12- 2-55	Qal?	-	S	-
8.24. 4.130	Ed Riley	-	30	6	4,950	18.4	10-17-55	Qal	-	S	-
8.24.11.114	P. M. Armstrong	-	-	8	4,950	56.2	12- 2-55	TRc	-	S	-
8.24.12.331	C. B. Waller	-	125	-	4,960	40	-	TRc	G	S	-
8.24.14.434	Mr. Armstrong	-	-	36	4,870	-	-	TRc	-	S	Dug well.
8.24.14.441	C. B. Waller	-	51M	4	4,880	14.1	12- 2-55	Qal or TRc	-	-	No pump.
8.24.15.314	-	-	47M	6	4,950	44.8	12- 2-55	TRc	-	S	-
8.24.23.430	Mrs. McClure	-	-	36	4,810	-	-	Qal?	-	S	Dug well.
8.24.27.433	W. L. Blakey	-	12	60	4,730	8	-	Qal?	-	-	Dug well. No. pump.
8.24.35.321	E. 1 Smith	-	25	-	-	-	-	Qal?	CA	-	-
8.24.35.333	do.	-	16M	36	4,750	7.4	12- 1-55	Qal?	-	S	Overflow from tank piped into well.
8.24.36.134	do.	-	12	60	4,800	7.8	11- 4-55	Qal?	-	S	-
8.25. 2.133	Ed Riley	51	220	6	5,120	100	1951	TRc	-	S	-
8.25. 3.313	do.	-	38M	-	5,095	-	-	QTu	G	S	Dug well.
8.25. 5.100	C. B. Waller	55	260	6	-	-	-	TRc	-	-	Log.
8.25. 6.443	do.	-	128	6	5,010	-	-	TRc	G	S	Weak well.
8.25. 7.332	R. Minor	55	75	4	4,990	50	1955	TRc	G	S	-
8.25. 7.442	do.	-	-	6	5,015	60.2	12- 2-55	TRc?	-	-	No pump.
8.25. 8.442	do.	Old	175	-	5,050	-	-	TRc	G	D,S	-
8.25. 9.131	Morris Woodward	50	106	6	5,050	25.1	12- 1-55	QTu?	-	-	No pump. Log.
8.25.11.244	Iley Scott	-	44	-	5,145	31.1	11-30-55	QTu	-	S	Dug well.
8.25.12.212	E. L. Sollberger	-	130	-	5,185	45	-	QTu?	-	D,S	-
8.25.17.422	R. Minor	53?	175	5	5,045	124	-	TRc	G	S	-
8.25.19.311	C. B. Waller?	-	-	17	4,925	17.1P	12- 2-55	TRc	-	S	-
8.25.20.344	-	-	-	6	4,945	32.0	12- 2-55	TRc	-	S	-
8.25.20.430	C. B. Waller	54	200	6	-	150	-	TRc	-	-	Log.
8.25.23.221	-	-	22	36	5,120	17.9	11-30-55	QTu	-	S	-
8.26. 1.130	H. Merrill	54?	98M	6	5,035	53.5	11- 2-55	Qao?	-	S	-
8.26. 4.313	H. G. Johnson	-	-	-	4,960	55.4	11-30-55	TRc	-	S	-
8.26. 6.212	do.	Old	80	-	5,235	-	-	QTu or TRc	G	S	-
8.26. 6.212a	do.	54?	81M	5	5,235	49.6	11-30-55	QTu or TRc	-	-	No pump.
8.26. 6.231	do.	-	48M	12	5,240	25.4	11-30-55	QTu or TRc	-	-	Irrigation test. No pump.
8.26. 6.331	E. D. Caskey	-	80	5	5,205	-	-	QTu or TRc	-	S	-
8.26. 7.222	E. L. Sollberger	34	63	-	5,250	53	1934	QTu or TRc	-	S	RY-50 gpm.
8.26. 7.223	E. D. Caskey	-	110	6	5,440	-	-	QTu or TRc	CA	S	Temp. 60°F.
8.26. 9.242	do.	-	-	-	4,865	-	-	Qal?	-	S	-
8.26.10.131	do.	-	78M	-	4,865	66.7	11-30-55	TRc?	-	D,S	-
8.26.15.333	Jerry Clayton	-	-	30	4,776	-	-	Qal?	P	S	Dug well. H_2S odor.
8.26.24.123	do.	-	24M	6	4,790	15.8	11- 1-55	Qal	P	D,S	-
8.26.24.133	do.	-	13M	30	4,780	9.6	11- 2-55	Qal	-	-	No pump.

TABLE 4 (cont.)

Location No.	Owner or User	Year completed	Depth (feet)	Diameter (inches)	Altitude (feet)	Water level Depth (feet)	Water level Date	Stratigraphic unit	Quality of water	Use of water	Remarks
8.26.24.222	Jerry Clayton	-	-	4	4,820	-	-	Qao	-	S	-
8.26.24.222a	do.	-	42M	7	4,820	24.0	11- 2-55	Qao	-	-	No pump.
8.26.27.440	do.	-	-	-	4,785	116.3	11- 3-55	TRc	-	S	Poor measurement.
8.26.29.130	do.	-	200	5	4,800	37.5	11- 4-55	TRc	-	S	-
8.26.34.334	do.	-	-	-	4,745	9.5	11- 3-55	TRc	G	S	-
9.16.15.144	Felipe Marquez	-	85M	6	5,930	62.7	5-27-55	TRs?	-	S	-
9.16.22.323	Gusto Gonzales	-	160	6	5,930?	130	-	TRs?	G	D	Hard.
9.16.23.310	Mr. Giles	56	362	-	5,950?	330	1956	TRs	-	-	No pump.
9.16.23.330	Felipe Marquez	51	300	-	5,950?	130.5	7-25-55	TRs	-	-	No pump. 450-foot dry hole 75 ft east.
9.16.24.110	Arthur Sears	40?	860	6	5,850	815?	-	Pg or Psa	CA	S	-
9.16.27.334	Candido Lucero	-	90	8	5,880?	-	-	TRs?	G	D,S	-
9.16.33.230	do.	-	90	-	5,880?	-	-	TRs?	G	S	-
9.16.33.444	-	-	-	-	5,820?	80	-	TRs?	CA	S	Temp. 57°F.
9.17. 6.432	Arthur Sears	-	980	-	5,870	935?	-	Pg?	P,B	S	-
9.17.19.443	Roy Cline	53	957	8	5,810	840	-	Pg?	CA	-	Pump jack, electric motor.
9.17.24.332	James Turner	50	188	-	5,580?	-	-	TRs	G	S	-
9.17.25.130	N. W. York	51	200	-	5,580?	160	-	TRs	G	S	-
9.17.26.334	do.	49	176	6	5,620	150	-	TRs	CA	S	Log.
9.18.12.220	E. F. Cowden	25	6	-	5,350	-	-	TRs?	G	S	-
9.18.17.140	Fred Turner	-	212	-	5,485	-	-	TRs?	-	S	-
9.18.23.444	H. L. Duggins	-	190	-	5,335	160	-	TRs?	G	D,S	-
9.18.25.130	do.	-	189	-	-	183	-	TRs?	CA	S	-
9.18.26.422	do.	-	-	6	5,340	-	-	TRs	CA	S	-
9.18.27.422	do.	52	194	6	5,380	190	1952	TRs	G	S	Weak well.
9.18.30.141	N. W. York	Old	220	-	5,830?	140	-	TRs	CA	D,S	Temp. 58°F.
9.18.34.422	H. L. Duggins	53	235	6	5,430	190	-	TRs	G	S	Weak. Log to 230 ft.
9.19. 6.224	E. F. Cowden	-	804	-	5,540	785	-	Py?	CA	S	Seep at 250. Temp. 64°F.
9.19. 6.331	do.	-	220	-	5,388	-	-	TRs?	CA	D,S	-
9.19.10.330b	Manuel Arela	-	70M	12	5,384	63.0	1- 3-55	TRs	G	S	Temp. 59°F.
9.19.11.330	do.	-	-	12	5,394	72.7	1- 3-55	TRs	G	S	-
9.19.12.424	Canuto Sanchez	-	-	6	5,352	-	-	TRs	CA	S	-
9.19.13.142	do.	53	170	6	5,315	39.6	1- 3-55	TRs	-	S	-
9.19.14.414	Moise Livestock Co.	-	100	6	5,320	54.6	12-30-54	TRs	-	S	-
9.19.15.413	do.	-	70M	6	5,366	56.4	12-30-54	TRs	-	S	-
9.19.20.424	G. W. Bibb	27	91	6	5,410	80	1927	TRs	G	D,S	-
9.19.20.424a	do.	24	91	6	5,410	80	1924	TRs	G	S	-
9.19.28.330	-	-	400	-	-	-	-	Pb?	CA	S	-
9.20. 1.113	Shaw and Craig	-	162M	6	5,205	122.2	8-12-54	TRs	-	S	-
9.20. 9.322	Margarito Ulibarri	20?	140	6	5,180	97.9	12-21-54	TRs	G	D,S	Failed 1951-53.
9.20.10-344	Donato Saiz	54	159M	5	5,213	94.8	11-16-54	TRs	CA	S	-
9.20.13.212	Shaw and Craig	-	-	6	5,150	48.9	8-13-54	TRs	-	S	-
9.20.15.230	Donato Saiz	-	-	6	5,202	-	-	TRs	-	S	-
9.20.15.442	Moise Livestock Co.	39	120	-	5,165	90	-	TRs	G	S	-
9.20.16.300	Lehmon Metcalf	52	55	-	5,220	42.3	12-21-54	TRs	G	S	-
9.20.22.113	do.	28	104	-	5,180	-	-	TRs	G	D,S	-
9.20.25.221	C. Rivera	-	-	8	5,100	106.1	11- 5-54	TRs	-	S	-
9.20.25.313	W. Phillips	-	46	6	5,032	41.3	12-23-54	TRs	G	S	-
9.20.26.312	Moise Livestock Co.	Old	25	10	5,063	12.8	12-23-54	TRs	G	S	-
9.20.26.343	do.	-	192	-	5,134	139.6	7-22-40	TRs?	CA	-	No pump.
9.20.27.141	Frank Baca	-	-	6	5,146	113.5	12-21-54	TRs	G	S	-
9.20.28.132	Felipe Sanchez	-	240	-	5,232	190.0	3-10-56	Pb and TRs	F	S	Poor measurement.
9.20.30.333	Moises Lucero	50	247	4	5,370	221.0	12-30-54	TRs	G	D,S	-
9.20.34.444	Moise Livestock Co.	-	160	6	5,211	144.1	12-23-54	TRs	G	S	-

TABLE 4 (cont.)

Location No.	Owner or User	Year completed 19--	Depth (feet)	Diameter (inches)	Altitude (feet)	Water level Depth (feet)	Water level Date	Stratigraphic unit	Quality of water	Use of water	Remarks
9.20.36.330	Moise Livestock Co.	54	200	6	5,004	179.0?	12-23-54	Pb	P	S	Temp. 61°F.
9.21. 1.223	W. I. Diggers	-	75	6	4,720	40.4	9-22-55	TRs	P	-	No pump.
9.21. 1.420	do.	-	72	-	4,735	57.7	11-17-54	TRs	-	S	-
9.21. 2.122	L. C. Moorhouse	-	72M	8	4,685	53.1	11-30-54	TRs	-	-	No pump.
9.21. 4.420	do.	-	254	-	4,925	163.2	11-29-54	TRs	-	-	Do.
9.21. 6.241	Shaw and Craig	-	-	6	5,072	104.2	8- 6-54	TRs	CA	S	-
9.21.12.442	Ed Riley	-	95	6	4,773	12.6	12- 1-54	TRs	-	D,S	-
9.21.13.242	L. C. Moorhouse	-	29	6	4,806	1.2	12- 1-54	TRs	-	S	-
9.21.17.422	Ed Riley	-	-	8	4,974	48.5	10-11-54	TRs	G	S	-
9.21.18.343	Shaw and Craig	-	120	6	5,100	63.6	8-11-54	TRs	CA	S	-
9.21.19.433	Town of Santa Rosa	63	630	6	-	117.5	2-14-63	TRs	P	-	Test well. Log.
9.21.20.211	Southwestern Public Service Co.	55	285	8	5,075	179.6	6-25-55	TRs	-	M	Turbine pump; electric motor. Log.
9.21.29.111	Mrs. C. Rivera	36	135	-	5,024	64.4	10- 4-54	TRs	G	S	-
9.21.33.100	-	-	88	-	-	79.5	7-22-40	TRs?	CA	S	-
9.21.33.333a	Frank Rivera	48	96	-	4,658	-	-	Pb?	P	D,S	-
9.21.33.334	Max Rivera	-	102M	6	4,662	70.8	10- 4-54	Pb?	-	-	No pump.
9.21.33.441	Manuel Chavez	46	60	6	4,635	28.6	10- 4-54	Pb?	P	S,I	Irrigates garden.
9.21.35.411	Town of Santa Rosa	56	157	10	-	70	3-13-62	TRs	CA	M	-
9.21.35.421	do.	55	171	10	-	90	-	TRs	-	M	-
9.21.35.423	Southwestern Public Service Co.	55	171M	12	4,679	88.4	4-25-55	TRs and Pb	CA	-	No pump.
9.22.18.120	Ed Riley	-	113	7	4,840	60.7	12- 1-54	TRs	-	-	Do.
9.22.18.232	L. C. Moorhouse	-	-	6	4,847	96.9	12- 1-54	TRs	CA	S	-
9.22.25.222	do.	-	-	-	4,882	28.7	12- 3-54	TRc	-	S	Dug well. Temp. 60°F.
9.22.29.443	do.	-	17M	-	4,790	11.1	11-24-54	Qal	-	S	Dug well. Temp. 64°F.
9.22.30.124	do.	-	129M	6	4,780	60.6	11-24-54	TRs	-	S	-
9.22.30.314	do.	-	32M	-	4,810	26.9	11-24-54	TRs	-	-	Dug well. No pump.
9.22.30.332	do.	53	195	6	4,800	190	3- -55	TRs	-	S	Log to 190 ft.
9.22.30.442	do.	-	125	6	4,700	-	-	TRs	F	S	-
9.22.32.132	do.	-	77	6	4,723	52.8	11-24-55	TRc?	-	-	No pump.
9.22.32.142	do.	-	187M	8	4,725	138.7	11-24-54	TRs	-	S	Temp. 62°F.
9.22.35.114	do.	-	54	6	4,830	19.6	10-13-55	TRc	-	S	-
9.23. 1.343	Bond and Wiest	-	28M	5	4,850	17.4	1- 3-56	TRc?	-	-	No pump.
9.23. 7.310	do.	55	-	-	4,965	-	-	TRc	-	S	Gasoline engine.
9.23. 9.320	do.	-	-	-	4,985	2	-	Qal	-	S	Water level controlled by level of lake NE.
9.23.11.410	do.	Old	20	36	4,900	17.2	1- 3-56	TRc	-	S	Dug well.
9.23.15.220	do.	54	190	6	-	-	-	TRc	-	-	Log.
9.23.18.330	do.	-	-	12	4,900	18.1	1- 3-56	TRc	-	S	-
9.23.19.430	J. L. Hicks	54	137	6	-	-	-	TRc	-	-	Log.
9.23.28.211	do.	-	186	8	4,935	116.6	10-17-55	TRc	-	S	-
9.23.30.211	do.	-	-	6	4,895	32.5	10-17-55	TRc	-	S	-
9.23.30.413	do.	-	78M	6	4,860	8.2	10-17-55	TRc?	-	-	No pump.
9.23.31.310	L. C. Moorhouse	-	125	5	4,805	70.4	10-13-55	TRc	G	S	-
9.23.31.332	A. J. Capps	-	160	-	4,802	-	-	TRc	P	S	-
9.23.31.333	do.	-	24	-	4,810	-	-	TRc	G	D,S	-
9.23.32.433	J. L. Hicks	-	65	-	-	-	-	TRc	CA	S	-
9.23.33.424	do.	-	164	6	4,900	100	-	TRc	-	S	-
9.23.34.223	Stewart Holbrook	-	176	4	5,000	-	-	TRc	-	S	-
9.23.35.122	J. L. Hicks	-	100	6	5,040	27.5	10-13-55	TRc	-	S	-
9.24. 5.420	Burnick Keeter	-	92	6	4,800?	60	-	TRc	CA	D	Jet pump; electric motor.
9.24. 6.310	Bond and Wiest	53	105	5	4,850?	-	-	TRc	-	S	-
9.24. 7.320	do.	55	300	8	-	-	-	TRc	-	-	Log.
9.24.15.300	Ed Riley	-	240M	4	5,000?	220P	12- 6-55	TRc	-	S	-
9.24.16.330	do.	-	-	4	5,000?	49.4	12- 6-55	TRc	-	-	No pump.
9.24.18.120	Bond and Wiest	-	100+	4	4,950?	81.5	1- 3-56	TRc	-	S	Poor measurement.
9.24.19.144	J. L. Hicks	-	116	6	4,955	-	-	TRc	-	S	-

TABLE 4 (cont.)

Location No.	Owner or User	Year completed 19--	Depth (feet)	Diameter (inches)	Altitude (feet)	Water level Depth (feet)	Water level Date	Stratigraphic unit	Quality of water	Use of water	Remarks
9.24.23.112	Ed Riley	-	153M	6	4,980?	94.0	12- 6-55	TRc	-	S	Pumped prior to measurement.
9.24.25.132	C. B. Waller	52	171	6	4,950?	70	-	TRc	F	S	Fair quality. Log.
9.24.28.333	Edward Riley	55	239M	6	5,050	147.4	10-26-55	TRc	-	S	-
9.24.33.244	C. B. Waller	-	-	6	4,970	40.6	12- 6-55	Qal or TRc	CA	S	-
9.24.34.210	do.	-	-	6	4,950	-	-	-	-	S	-
9.24.34.322	do.	-	31M	4	4,950	19.6	12- 6-55	Qal?	-	-	No pump.
9.25. 4.433	R. L. Lieper	-	100	36	4,750?	47.8	12-15-55	TRc	-	D,S	-
9.25. 7.120	Edward Riley	-	150	6	4,780?	-	-	TRc	G	S	-
9.25. 9.244	R. L. Lieper	-	-	-	4,780?	-	-	TRc	-	-	Formerly used for irrigation. Turbine; gasoline engine.
9.25.16.140	Edward Riley	-	400	6	4,800	97.7	12- 6-55	TRc	-	S	-
9.25.22.420	do.	-	171M	-	5,200?	Dry	-	-	-	-	No pump.
9.25.23.443	do.	-	70M	6	5,250?	61.7	11-28-55	TRc?	-	-	Do.
9.25.23.443a	do.	-	160	-	-	-	-	TRc?	CA	S	-
9.25.27.433	do.	-	201	5	5,100?	187.0	12- 7-55	TRc	-	S	-
9.25.31.300	do.	-	52M	6	-	25.1	12- 6-55	TRc?	-	-	Rept. depth 108 ft. No pump.
9.26. 5.223	do.	-	150	6	4,780?	125	-	TRc	CA	S	-
9.26. 9.422	do.	-	98	6	4,600?	-	-	TRc	G	D,S	-
9.26.18.410	do.	-	68M	4	4,980	37.8	12- 8-55	TRc	-	-	No pump.
9.26.24.344	Duke Hornsby	53	225	8	5,530	Dry	11- -53	-	-	-	Do.
9.26.24.433	do.	53	190	-	5,550	Dry	11- -53	-	-	-	Do.
9.26.30.241	Edward Riley	-	129M	5	5,320?	128?	11-28-55	TRc	-	-	Do.
9.26.31.112	do.	-	184M	6	5,300?	158.4	11-28-55	TRc?	-	S	-
9.26.31.332	do.	-	400	6	5,280?	109.1	11-28-55	Je?	-	S	Weak. No longer used.
9.26.35.410	Duke Hornsby	-	-	-	5,450?	-	-	Je?	CA	D,S	-
10.16. 5.120	Dahlia Community	40?	506	8	5,607	-	-	Pg?	CA	D,S	-
10.16.27.320	Jose Marquez	-	-	-	5,850	F	7-27-55	TRs	-	D,S	Dug well.
10.16.30.433	Abelino Sanchez	Old	-	-	5,850?	8.4	7-27-55	TRs	-	S	Dug well.
10.16.30.433a	do.	-	15M	4	5,850?	-	-	TRs	-	S	-
10.16.32.240	-	-	64M	-	5,910	64.0	5-27-55	TRs	-	-	No pump.
10.16.32.240a	Jose Marquez	Old	12M	-	5,910	7.3	5-27-55	TRs	-	S	Dug well.
10.17. 1.420	Stewart Holbrook	-	-	4	5,306	-	-	-	-	S	-
10.17.21.243	Roman Ortega	55	132	-	5,610	Dry	7-29-55	-	-	-	No pump.
10.17.21.243a	do.	-	-	5	5,610	-	-	-	-	S	10 ft E of 10.17.21.243.
10.17.21.243b	do.	-	-	-	5,610	31.7	7-29-55	TRs	-	S	Dug well.
10.17.31.340	Arthur Sears	-	300	-	5,860	Dry	-	-	-	-	No pump.
10.17.35.320	Fred Turner	-	-	4	5,680	-	-	-	P	S	-
10.18. 1.112	E. F. Cowden	-	500	6	5,296	-	-	-	P	S	-
10.18.11.110	do.	-	652	6	5,439	630	-	Pg?	-	S	-
10.18.15.400	-	-	34	-	-	16.7	7-25-40	Qao?	CA	-	-
10.18.15.440	E. F. Cowden	-	80	6	5,290	-	-	TRs	G	S	Temp. 66°F.
10.18.16.320	Fred Turner	-	-	4	5,365	-	9-16-55	-	CA	S	-
10.18.21.133	do.	-	-	4	5,370	103.5	9-16-55	TRs?	F,B	S	-
10.18.36.242	E. F. Cowden	-	30?	6	5,500?	285	-	Pb?	-	S	-
10.19. 5.110	do.	-	638	-	5,435	620	-	Psa?	CA	S	-
10.19.18.420	do.	-	550	-	5,386	-	-	Psa?	CA	S	-
10.20. 6.313	Carlos Gutierrez	52?	106	12	4,905	Dry	8- 6-54	Psa	-	-	No pump. Original WL rept. 75 ft. Ry-45 gpm. Log.
10.20. 6.314	Lorenzo Chavez	-	-	12	4,890	117	8- 4-54	Psa	-	I	Turbine, gasoline engine.
10.20. 6.323	Valentin Ulibarri	52	115+	12	4,875	115	-	Psa	CA	I	Do.
10.20. 6.330	do.	-	97	8	4,870	76.8	8- 4-54	Psa	-	D,S	-
10.20. 6.342	Luis Ulibarri	-	106	12	4,870	Dry	-	-	-	-	Turbine; gasoline engine. Log.
10.20. 6.433	Cleovisio Madrid	-	-	6	4,875	77.0	8- 6-54	Psa	-	S	-
10.20. 7.212	Paulin Ulibarri	52	88	12	4,865	Dry	8- 4-54	-	-	-	No pump.
10.20. 7.221	Max Sisneros	52	97	12	4,865	78.8	8- 4-54	Psa	-	I	Turbine; gasoline engine.
10.20. 8.130	Colonias Community	-	-	6	4,905	118.3	8- 6-54	Psa	CA	P,S	-
10.20. 8.141	Prudencio Marez	35	95	6	4,860	80.0	8- 5-54	Psa	CA	D,S	-
10.20. 8.143	Perfecto Urban	-	100	6	4,880	87.8	8- 5-54	Psa	G	D,S	Failed in 1934.

TABLE 4 (cont.)

Location No.	Owner or User	Year completed 19--	Depth (feet)	Diameter (inches)	Altitude (feet)	Water level Depth (feet)	Water level Date	Stratigraphic unit	Quality of water	Use of water	Remarks
10.20. 8.144	Jose Sanchez	27	77	8	4,865	65.4	8- 5-54	Psa	CA	-	-
10.20. 8.144a	do	-	64	12	4,865	Dry	8- 5-54	Psa	-	I	RY-2,000 gpm. No pump.
10.20. 8.421	Ramon Sisneros	52	98	12	4,850	48	3- -52	Psa	CA	I	Turbine; gasoline engine.
10.20.14.344	W. I. Driggers	-	-	6	4,810	21.2	11-22-54	Psa?	CA	S	-
10.20.16.110	Frank Sisneros	52	128M	12	4,835	46.0	8- 5-54	Psa	-	I	Original water level rept. 40 ft. Turbine; gasoline engine.
10.21. 3.412	W. I. Diggers	51	213	6	4,900	120?	-	Ꞧs?	P	S	Temp. 64°F.
10.21. 4.140	do.	-	-	-	4,974	152.4	9-23-55	Ꞧs?	-	S	-
10.21.21.144	do.	-	134	-	5,000	76.1	11-22-54	Ꞧs	-	S	-
10.21.28.312	Shaw and Craig	-	108M	8	5,050	92.1	11-18-54	Ꞧs	-	S	-
10.21.32.123	do.	-	-	6	4,780	49.4	8- 6-54	Pb or Psa	CA	S	-
10.21.32.224	do.	-	52	-	4,780	50.4	8- 6-54	Pb or Psa	-	S	Dug well. Failed 1954.
10.21.32.230	do.	-	96	12	4,790	55.5	8- 6-54	Psa	CA	I	Turbine; butane engine. RY-2,000 gpm.
10.22. 3.310	W. I. Diggers	-	334	6	4,890	220+	9-23-55	Ꞧs	F	S	-
10.22.16.130	L. R. Spires	-	240M	6	4,830	196.2	10- 5-55	Ꞧs	-	-	No pump.
10.22.20.140	W. I. Diggers	-	350	-	4,810	-	-	Ꞧs?	P	S	Temp. 70°F.
10.22.20.240	L. R. Spires	-	228	6	4,790	106.9	10- 5-55	Ꞧs	CA	S	-
10.22.27.412	do.	-	-	6	4,850	57.4	10- 5-55	Ꞧc	G	S	Poor measurement.
10.22.33.140	-	-	40	-	-	20	-	-	-	-	-
10.23. 9.342	J. H. Simpson Estate	-	7	-	4,630	2.1	10- 7-55	Qal	-	S	Dug well.
10.23.11.230	do.	-	65	-	4,580?	-	-	Ꞧc	-	S	-
10.23.15.200	do.	-	65	6	4,630?	22.4	10- 7-55	Ꞧc	CA	S	-
10.23.22.120	do.	-	60	-	-	-	-	Ꞧc	CA	S	-
10.23.24.240	do.	50	115	6	-	-	-	Ꞧc	-	-	Log.
10.23.27.420	do.	Old	60	6	4,800?	-	-	Ꞧc	-	S	Rept. weak.
10.23.29.144	do.	50	162	6	4,820	-	-	Ꞧc	-	S	-
10.23.29.144a	do.	-	103M	5	4,820	34.6	10- 7-55	Ꞧc	-	S	-
10.24. 3.110	P. E. Bailey	-	46	-	-	-	-	Ꞧc	-	D,S	-
10.24. 3.333	do.	08	80	-	4,700?	-	-	Ꞧc	P	S	-
10.24. 5.221	Bond and Wiest	-	47M	6	4,630?	21.1	1- 3-56	Ꞧc	CA	S	-
10.24. 6.111	do.	-	107M	6	4,580?	23.6	1- 3-56	Ꞧc	-	S	-
10.24. 7.430	do.	-	65M	6	4,600?	21.2	1- 3-56	Ꞧc	-	S	-
10.24. 8.422	-	-	80	-	4,680	-	-	Ꞧc	G	S	-
10.24. 9.112	P. E. Bailey	08	121	5	4,680?	46.0	1- 2-56	Ꞧc	-	-	Meas. depth 75 ft. No pump.
10.24. 9.141	do.	08	17M	5	-	Dry	1- 2-56	-	-	-	Rept. depth 80 ft. No pump.
10.24.10.240	-	-	53	-	-	25	-	Ꞧc	-	-	-
10.24.11.244	A. E. Brashears	-	40	-	-	20	-	Ꞧc	-	-	-
10.24.12.331	J. F. Higgins	-	40	-	4,700?	15	-	Ꞧc	G	S	-
10.24.13.331	do.	-	60	-	4,750?	38	-	Ꞧc	G	S	Weak
10.24.13.411	do.	21	135	5	4,730?	-	-	Ꞧc	F	S	-
10.24.16.340	P. E. Bailey	-	80	-	4,700?	48.7	1- 2-56	Ꞧc	-	S	-
10.24.20.210	Bond and Wiest	-	16	36	4,650?	14.8	1- 3-56	Qal or Ꞧc	-	S	Dug well.
10.24.22.211	Paul E. Bailey	-	-	-	4,700?	-	-	Ꞧc	-	-	No pump.
10.24.23.244	Marcelino Romo	-	60	-	4,780?	22.2	12-27-55	Ꞧc	G	S	-
10.24.24.111	J. F. Higgins	52	800	10	4,770?	65+?	-	Ꞧc	CA	D,S	-
10.24.24.131	do.	-	-	6	4,770?	37.4	12-22-55	Ꞧc	-	-	No pump.
10.24.25.222	Marcelino Romo	-	26M	5	4,700?	Dry	12-27-55	-	-	-	Do.
10.24.25.222a	do.	53	100	6	4,700?	82.1	12-27-55	Ꞧc	F	S	-
10.24.27.310	P. E. Bailey	38	38	-	4,780?	19.1	1- 2-56	Ꞧc	-	S	-
10.24.27.333	Bond and Wiest	55	250	-	4,780?	48.0	1- 3-56	Ꞧc	-	-	No pump; too weak.
10.24.29.140	do.	50	100	8	4,730?	25.9	1- 3-56	Ꞧc	-	S	-
10.25. 2.110	Albert Branch Jr.	-	100	-	-	30	-	Ꞧc	CA	S	-
10.25. 2.134	do.	-	120	12	4,600?	37.5	12-13-55	Ꞧc	-	S	-

TABLE 4 (cont.)

Location No.	Owner or User	Year completed 19--	Depth (feet)	Diameter (inches)	Altitude (feet)	Water level Depth (feet)	Water level Date	Stratigraphic unit	Quality of water	Use of water	Remarks
10.25. 2.231	Albert Branch Jr.	-	100	6	4,600?	40.5	12-14-55	TRc	G	S	-
10.25. 3.240	do.	-	100	-	4,630?	34.6	12-14-55	TRc	-	S	-
10.25. 3.310	do.	-	65	-	4,630?	-	-	TRc	-	S	-
10.25. 5.230	Mr. Ortiz	-	-	6	4,700?	41.6	12-20-55	TRc	-	S	-
10.25. 6.333	P. E. Bailey	-	20M	36	4,680?	19.0	12-22-55	TRc?	-	-	No pump.
10.25. 6.440	Albert Branch Jr.	-	74M	12	4,700?	18.2	12-14-55	TRc	-	S	Reamed to 12 inches, 1952.
10.25. 7.131	J. F. Higgins	-	69	6	4,680?	32.3	12-22-55	TRc	-	-	No pump.
10.25. 7.244	do.	-	90	6	4,680?	40	-	TRc	G	S	-
10.25. 9.332	do.	18	100	6	4,650?	17	-	TRc	G	S	-
10.25. 9.340	John Higgins	Old	40	-	4,630?	29.6	12-23-55	TRc	-	-	No pump.
10.25.10.421	Albert Branch Jr.	-	175	12	4,650?	42.1	12-14-55	TRc	-	S	-
10.25.17.320	J. F. Higgins	-	110	-	4,630?	15	-	TRc	-	S	-
10.25.17.420	do.	-	113	-	4,580?	14	-	TRc	G	S	Main aquifer at 80 ft.
10.25.22.120	John Higgins	-	90	-	4,550?	20	-	TRc	G	S	-
10.25.25.110	L. C. DeBaca	-	206	-	-	13	-	TRc	CA	-	-
10.25.26.111	-	36?	187	6	-	-	-	TRc	CA	-	-
10.25.26.242	Albert Branch Jr.	-	145	12	4,580?	3.6	12-13-55	TRc	CA	S	Drilled for irrigation. Drawdown 10.2 ft after 1.3 hours pumping. Temp. 61°F. RY-50 gpm. Centrifugal pump; gasoline engine.
10.25.30.311	Marcelino Romo	Old	130	-	4,680?	-	-	TRc	G	D,S	-
10.25.30.343	do.	Old	60	-	4,620?	20.4	12-27-55	TRc	F	S	-
10.25.32.130	A. E. Brashears	-	60	-	-	30	-	Qal or TRc	-	-	-
10.26. 3.141	T 4 Cattle Co.	-	14	-	4,400?	13.5	12- 8-55	Qal	-	S	Dug well.
10.26. 3.141a	do.	55	45	5	4,400?	-	-	Qal	-	S	-
10.26. 5.430	do.	-	150M	6	4,550?	67.3	12- 9-55	TRc	G	S	Poor measurement.
10.26. 9.421	do.	-	90M	6	4,500?	68.0	12- 8-55	TRc	G	D,S	-
10.26.10.222	do.	-	80M	6	4,400?	25.8	12- 9-55	TRc	-	S	-
10.26.22.322	J. K. Kinkead	-	-	-	-	-	-	TRc	CA	-	-
10.26.23.420	Howard Kinkead	-	-	6	4,500?	60M	12-12-55	TRc	-	S	Poor measurement.
10.26.30.121	L. C. DeBaca Est.	-	100	12	4,500?	45	-	TRc	G	S	-
10.26.30.331	Martin Moya	-	66M	-	4,580?	45.4	12-15-55	TRc	-	S	-
10.26.30.411	L. C. DeBaca Est.	-	45M	6	4,580?	31.9	12-15-55	TRc	-	S	-
10.26.32.112	Howard Kinkead	-	20M	36	4,600?	18.2	12-13-55	TRc	-	-	Dug well. No pump.
10.26.32.112a	do.	-	-	6	4,600?	20.0	12-13-55	TRc	-	S	-
10.26.36.310	do.	-	26M	36	4,500?	Dry	12-13-55	-	-	-	Dug well. No pump.
10.26.36.322	do.	-	55	6	4,470?	32.8P	12-13-55	TRc	-	S	-
11.16. 6.310	Florencio Quintana	-	-	5	5,760	149.6	7-28-55	-	G	S	Poor measurement.
11.17. 9.120	Anton Chico Community	51	418	10	5,250	380	-	Psa?	CA	M	Turbine; electric motor.
11.17.10.430	La Loma Community	51	50	10	5,210	-	-	Psa	CA	M	Electric motor.
11.17.36.420	N. W. York	-	480	-	5,280?	-	-	Pg?	CA	S	-
11.18. 5.232	Corsinio Garcia	46?	98	5	5,200?	-	-	TRs	G	D,S	-
11.18. 6.220	T. R. Sowell	-	100	6	5,300?	80	-	TRs	CA	S	-
11.18. 7.220	Dilia Community	50	500?	6	5,250	-	-	Psa?	CA	M	Submersible turbine.
11.18. 7.410	Mr. Gutierrez	5	80	-	5,250	-	-	TRs	-	D,S	-
11.18. 8.240	Mrs. Elizabeth Pierce	-	425	-	5,230	-	-	Pg	G	D,S	Aux. pump jack; electric motor.
11.18.16.340	do.	-	225	8	5,120	-	-	Psa?	H	D,S	RY-26 gpm. Submersible turbine.
11.18.17.140	C. A. Sullivan	40	137	8	5,180	116.3	9-21-55	TRs	-	D,S	-
11.18.25.130	E. F. Cowden	-	575	-	5,343	-	-	Pg?	CA	S	-
11.19. 2.210	Guy Sowell	-	230+	5	5,028	-	-	TRs?	CA	S	-
11.19. 4.200	S. E. Sowell	-	-	5	5,120	-	-	Pb and TRs	G	S	-
11.19.12.430	Guy Sowell	-	270+	6	5,150?	-	-	TRs?	G	S	-
11.19.13.441	do.	-	310+	6	5,133	300?	-	Pb?	G	D,S	-

TABLE 4 (cont.)

Location No.	Owner or User	Year completed 19--	Depth (feet)	Diameter (inches)	Altitude (feet)	Water level Depth (feet)	Water level Date	Stratigraphic unit	Quality of water	Use of water	Remarks
11.19.23.300	Guy Sowell	-	230+	6	5,150?	221.1	9-21-55	Psa?	G	S	-
11.19.26.342	do.	-	100	8	4,930	41+	11-16-54	Psa	CA	S	-
11.19.29.222	E. F. Cowden	-	248	-	5,101	230	-	Psa	CA	S	-
11.19.30.000	-	19	2,013	10	5,250	-	-	-	-	-	Oil-test well. Log to 1,010 ft.
11.20.10.240	G. T. Cowden	-	745	-	-	737	-	Pb?	CA	S	-
11.20.18.310	do.	51	347	-	-	340	-	TRs or Pb	CA	S	-
11.20.25.112	W. I. Driggers	-	69M	6	5,140	67.2	9-23-55	TRs?	-	-	Rept. depth 80 ft. No pump.
11.20.33.112	do.	-	-	5	4,975	121.0	9-23-55	Psa	CA	S	-
11.21. 3.321	G. T. Cowden	53	337	6	5,100?	330	-	TRs	CA	S	-
11.21. 7.222	Guy Cowden	50	145	-	5,300?	-	-	TRc	-	D,S	-
11.21. 7.332	do.	-	35	6	5,200?	31.4	9-28-55	TRc	-	S	-
11.21.13.120	W. I. Driggers	-	20M	6	4,940	10.4	6- 8-55	Qal or TRc	CA	S	-
11.21.17.211	Guy Cowden	-	35	6	5,120?	12.8	9-28-55	Qal or TRc	P	S	-
11.21.27.130	W. I. Driggers	-	280	6	5,025	260+	-	TRs	CA	S	-
11.21.27.132	do.	51	161M	-	5,010	149.4	9-27-55	TRs	-	-	-
11.22.14.311	do.	-	49	8	5,050?	29.3	9-22-55	TRc	G	S	-
11.22.17.233	do.	-	150	8	5,020	-	-	TRc?	CA	S	-
11.22.29.242	do.	51	120	6	4,940	40?	-	TRs	-	S	-
11.22.33.433	do.	-	84M	-	4,900	39.8	9-23-55	TRs?	-	-	No pump.
11.22.35.344	do.	-	390	5	4,860	268.4	9-23-55	TRs?	CA	S	-
11.22.36.322	J. H. Simpson Estate	-	-	-	4,745	-	-	TRc?	CA	S	-
11.23. 3.144	-	-	-	-	4,800?	-	-	TRc	CA	S	-
11.23. 5.443	L. R. Spires	-	63M	4	4,700?	51.4	10- 6-55	TRs?	-	S	-
11.23. 8.410	do.	-	31M	8	4,700?	-	-	Qal or TRc	G	S	-
11.23.13.410	do.	-	225	6	4,570?	-	-	TRc	P	S	-
11.23.19.320	do.	-	200	6	4,820?	164.7	10- 6-55	TRc	-	S	-
11.23.20.140	do.	-	40	6	4,700	-	-	Qal	-	S	-
11.23.31.244	J. H. Simpson Estate	-	1,400	8	4,650	111.0	10- 7-55	TRs	CA	S	Rept. to flow when first drilled.
11.24.14.113	J. F. Higgins	-	200	5	4,480?	117.0	12-27-55	TRc	-	S	-
11.24.15.122	T. J. Yates	-	-	-	4,600?	-	-	-	-	S	-
11.24.17.430	Martin Sena	30	40M	4	4,480?	33.0	1- 2-56	TRc	P	S	Poor measurement.
11.24.18.230	Max Rael	46	100	5	4,450?	53.3	1- 2-56	TRc	-	D,S	-
11.24.20.323	Elias Quintana	-	40M	-	4,550?	33.2	12-28-55	Qal or TRc	-	S	-
11.24.23.244	Max Rael	-	170M	-	4,830?	126.8	12-22-55	TRc	-	-	No pump.
11.24.28.100	Mrs. William Benton	-	100	-	4,620?	20	-	TRc	G	S	Rept. to flow when first drilled.
11.24.32.240	do.	-	100	8	4,650?	40	-	TRc	F	D,S	-
11.24.36.340	-	-	75?	-	-	-	-	TRc?	CA	-	-
11.25. 1.223	Mrs. Louis Monsimer	-	136	6	4,580?	69.3	12- 8-55	TRc	CA	D,S	-
11.25. 5.330	J. C. Neafus	55	291M	-	4,770?	220.0	12-19-55	TRc	-	-	No pump; too weak.
11.25.11.233	do.	-	55M	5	4,670?	46.3	12-19-55	TRc	-	-	-
11.25.12.424	-	-	41M	12	4,700?	25.6	12-13-55	TRc	-	S	-
11.25.14.424	J. C. Neafus	-	-	-	4,900?	71.5	12-19-55	TRc	-	-	No pump; too weak.
11.25.16.210	do.	-	160	6	4,470?	30.0	12-14-55	TRc	-	S	-
11.25.19.113	W. L. Harrison	-	163M	-	4,850?	133.0	12-20-55	TRc	-	-	No pump.
11.25.21.442	J. C. Neafus	-	60	6	4,530?	22.0	12-14-55	Qal	-	S	-
11.25.24.312	do.	-	210	-	4,930	Dry	12-19-55	-	-	-	No pump.
11.25.25.312	Albert Branch Jr.	-	200	12	4,800?	141.4	12-14-55	TRc	-	S	-
11.25.29.224	J. F. Higgins	-	106	-	4,580?	62.5	12-20-55	TRc	-	S	-
11.25.29.230	do.	-	19	72	4,600?	16	-	TRc	F	S	Dug well.
11.25.30.131	do.	15	90	-	4,820?	75	-	TRc	G	S	-
11.25.33.110	-	-	17M	-	4,510?	10.7	12-20-55	Qal	-	S	-

TABLE 4 (cont.)

Location No.	Owner or User	Year completed 19--	Depth (feet)	Daimeter (inches)	Altitude (feet)	Water level Depth (feet)	Water level Date	Stratigraphic unit	Quality of water	Use of water	Remarks
11.25.33.140	J. F. Higgins	-	18M	48	4,580?	16.2	12-20-55	Qal	-	-	No pump.
11.26. 5.130	T 4 Cattle Co.	-	-	-	4,700?	-	-	-	-	S	-
11.26.22.144	do.	-	41M	6	4,570?	30.1	12- 8-55	₹c or Qal	-	S	-
11.26.25.314	do.	27	128M	6	4,400?	53.5	12- 8-55	₹c	-	S	-
11.26.28.330	do.	52	97M	6	4,520?	77.0	12- 9-55	₹c	-	S	Pumping water level.
11.26.32.322	do.	55	75	6	4,430?	-	-	₹c	G	S	-
11.26.35.341	do.	-	119	4	4,470?	82.4	12- 8-55	₹c	-	S	-

TABLE 5—RECORDS OF SPRINGS IN GUADALUPE COUNTY, NEW MEXICO

This table includes most of the springs on which information was obtained in the course of this study or on which data were available from previous investigations. It is far from a complete inventory. Undoubtedly there are many springs in the short tributary canyons of the Pecos River that were missed, and in areas of intensive ground-water discharge, such as in the vicinity of Santa Rosa, many springs and seeps exist that are not included in the table. In fact, springs in that area are too numerous to inventory completely. The bedrock is highly jointed and at river level virtually every joint is a spring. Abbreviations used are generally the same as those in table 4. Additional ones are as follows: Ss, sandstone; cgl, conglomerate or conglomeratic; sh, shale; sltst, siltstone; gyp, gypsum; R, reported; E, estimated.

Location No.	Owner or User	Altitude (feet)	Rock type and structure	Stratigraphic unit: At orifice	Stratigraphic unit: Source of water	Yield (gpm)	Date	Quality of water	Use of water	Remarks
5.23. 2.240	Gibbins	4,300	Ss., thin-bedded; jointed	TRs	TRs	10-15	10-30-55	G	S	Formerly used for irrigation.
6.22. 9.441	Sam White	4,800	Cgl. lense in ss.; underlain by red sandy sh.	TRs	TRs	-	-	-	-	-
6.23.34.244	J. C. Slaton	4,320	Ss., crossbedded	TRs	TRs	-	-	-	S?	-
7.17.26.442	Julian Martinez	5,800	Ss., crossbedded; jointed; slumped	TRs	TRs	None	4-12-55	CA	S?	Water seeps into alluvium below.
7.18. 8.330	do.	5,750	Ss., crossbedded; jointed; underlain by sh.	TRs	TRs	None	6-10-55	G	N	Discharge evaporates.
7.18.20.332	Ed Tapia	5,800	Ss., crossbedded; interbedded with sh.	TRs	TRs	¼ R	-	F,H	D,S	Access by gallery 4 x 6 ft.
7.21.24.122	Arthur Ariaz	4,700	Sltst., jointed; wavy bedding	Pb	TRs and Pb	2-3	5-23-55	CA	S	-
7.21.24.210	do.	4,660	do.	Pb	TRs and Pb	1-2	5-23-55	P	S	Temp 57°F.
7.22. 3.124	Moise Bros.	4,650	Ss., crossbedded; conglomeratic; underlain by sh.	TRs	TRs	-	-	G	S	-
7.22.22.412	do.	4,600	Ss., jointed; thickbedded	TRs	TRs	-	-	-	N	-
7.22.22.424	J. C. Slaton	4,600	Ss.	TRs	TRs	0.1	6- 4-53	CA	D,S	-
7.22.27.144	-	4,450	Gyp.	Pb	TRs and Pb	1	6- 4-53	CA	S	-
7.22.35.231	J. C. Slaton	4,500	Ss., underlain by orange sltst. (Pb)	TRs	TRs	.1	6- 4-53	CA	S	-
8.21. 1.333	U.S. Government	4,600	Ss., crossbedded; slumped	TRs	Psa and others [1/]	3,000R	-	CA	S,I	Blue hole. Principal use, fish culture.
8.21. 3.133	Manuel Chavez	4,600	Ss., crossbedded; jointed	TRs	Pb and Psa	10	5-10-54	-	N	-
8.21. 3.311	do.	4,600	Ss., crossbedded; jointed; slumped	TRs	Pb and Psa	50-100	5-10-54	P,B	N	-
8.21.14.342	B. F. Walker	4,575	-	-	Psa and others [1/]	-	-	CA	S,I	Spring-fed lake.
8.22. 4.414	L. C. Moorhouse	4,850	Ss.	TRc	QTu and TRc	IR	1-19-53	CA	-	-
8.25.22.313	Bob Minor	4,990	Cgl., ss., crossbedded; jointed	TRc	TRc	3-5	12-1-55	CA	S	-
8.26.18.421	Jerry Clayton	5,100	-	-	-	-	-	-	-	-
9.21.28.122	L. C. Moorhouse	-	Ss., crossbedded; slumped	TRs	TRs	-	-	-	S	-
9.21.35.131	-	4,590	Ss., underlain by Pb	TRs	TRs	5	12-2-55	P	S	-
9.21.35.131a	Barela?	4,600	Ss. and alluvium	Pb	Psa and others [1/]	500	12-16-55	CA	M	Used as emergency supply for Santa Rosa in 1954, 1955, and 1956.
9.22.31.344	City of Santa Rosa	4,730	Ss., crossbedded; slumped	TRc	TRc	5	11-24-54	F	N	Seepage from E. Railroad Lake
9.25. 5.432	Edward Riley	-	Ss., crossbedded; contains conglomerate lenses	TRc	TRc	5-10	12-6-55	-	S	-
9.25.27.342	do.	5,150	Cgl., slumped	QTu	-	3-5	12-7-55	G	S	-
9.26.24.420	Duke Hornsby	5,455	Ss., underlain by sh.	Kmt	Kmt	.5	10-27-53	-	S	Temp 55°F.
10.20.25.243	Shaw and Craig	4,780	Sltst.	Pb	Pb	-	-	P,B	N	-
10-20-25-413	do.	5,020	Ss., crossbedded; jointed; underlain by gray sh.	TRs	TRs	1¼	8-11-54	CA	S	-
11.18. 2.200	T. R. Sowell	5,100	Ss., conglomeratic cross-bedded; jointed	TRc	TRc	10-20	9-21-55	G	S	-
11.18. 8.334	C. A. Sullivan	5,142	Cgl., crossbedded; jointed	TRs	TRs	-	-	G	S	-
11.19. 6.412	S. E. Sowell	5,200	Ss., crossbedded; jointed; underlain by sh.	TRs	TRs	3/4 R	11-13-55	G	S	Temp 63°F.
11.21. 2.120	G. T. Cowden	5,100	Ss., conglomeratic; jointed; crossbedded	TRc	TRc	2	9-27-55	CA	S	-
11.21. 2.211	W. I. Driggers	5,100	Ss., conglomeratic; crossbedded	TRc	TRc	10	9-27-55	G	S	-
11.21. 4.222	Guy Cowden	5,200	Ss., crossbedded; jointed	TRc	TRc	1	9-28-55	-	S	-

1/ Most of the water comes from the San Andres Limestone, but the Glorieta Sandstone, Bernal Formation, and Santa Rosa Sandstone also yield water to these springs.

TABLE 6—CHEMICAL ANALYSES OF WATER FROM WELLS IN GUADALUPE COUNTY, NEW MEXICO

(Chemical constituents are in parts per million. Values reported for dissolved-solids contents less than 1,000 ppm are residues on evaporation and for contents more than 1,000 ppm are calculated from determined constituents.)

Stratigraphic unit: Qal, alluvium; Qao, terrace and pediment gravels and older alluvium; QTu, upland surficial deposits; Je, Entrada Sandstone; TRc, Chinle Formation; TRs, Santa Rosa Sandstone; Pb, Bernal Formation; Psa, San Andres Limestone; Pg, Glorieta Sandstone; Py, Yeso Formation.

Location No.	Stratigraphic unit	Date collected	Temperature (°F)	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Hardness as $CaCO_3$: Calcium magnesium	Hardness as $CaCO_3$: Noncarbonate	Percent sodium	Sodium adsorption ratio (SAR)	Specific conductance (micromhos at 25°C)	pH
2.16. 2.243	Pg or Py	7-30-40	-	-	546	80	19		113	0	1,520	32	-	19	2,270	-	-	2	0.2	2,420	-
2.17.30.333	Pg or Py	7-30-40	-	-	442	69	11		112	0	1,220	34	-	5.4	1,830	-	-	2	.1	2,080	-
2.18.22.422	Pg	2-14-55	65	-	-	-	-		127	0	1,510	19	-	13	-	1,730	1,630	0	.0	2,440	7.4
2.18.24.244	Pb	2-16-55	-	-	-	-	-		207	0	9.9	3	-	-	-	180	10	-	-	351	7.7
3.16.13.240	Py or Pg	7-30-40	-	-	504	86	10		122	0	1,420	35	-	5.2	2,120	-	-	1	.1	2,350	-
3.19.24.344	TRs	3-17-55	58	-	-	-	-		258	0	14	12	-	-	-	248	36	-	-	467	7.8
4.18.28.412	Py or Pg	9- 3-54	74	-	-	-	-		177	0	1,400	54	-	-	-	1,670	1,520	-	-	2,430	7.1
5.18.26.222	Psa	8-26-54	-	-	-	-	-		197	0	-	22	-	-	-	1,760	1,600	-	-	2,480	7.1
5.18.31.311	Py	8-26-54	67	-	-	-	-		161	0	1,910	2,230	-	-	-	-	-	-	-	9,280	-
5.19.29.331a	Psa	5-30-55	59	20	560	123	5.1		147	0	1,650	43	0.9	16	2,490	1,900	1,780	.6	.1	2,710	7.2
5.21. 8.331	Pb	7-25-40	-	-	400	130	33		173	0	1,320	54	-	19	2,040	-	-	4	.4	2,370	-
5.22. 7.141	Pb	8-10-55	-	-	-	-	-		82	0	2,330	134	-	-	-	2,460	2,390	-	-	3,640	8.1
5.23.23.414	Rs	6-28-55	-	-	-	-	-		172	0	199	56	-	-	-	380	239	-	-	807	7.7
6.16. 2.230	Pg?	3-28-55	-	-	-	-	-		214	0	1,420	44	-	-	-	1,700	1,520	-	-	2,460	7.2
6.16.21.344	TRs or Pb	3-23-48	-	-	-	-	-		220	25	-	-	-	-	-	285	-	-	-	596	-
6.17.15.122	Psa	3-28-55	-	-	-	-	.2		102	0	1,710	49	-	10	-	1,940	1,860	0	0	2,730	7.3
6.18.33.442	Pb?	8-19-54	-	-	-	-	-		256	0	12	10	-	-	-	-	-	-	-	480	-
6.19.21.133	Pb	5-30-55	59	-	-	-	-		214	0	564	27	-	-	-	780	604	-	-	1,340	7.4
6.20.15.213	TRs	8-15-55	59	-	-	-	-		214	0	131	16	-	-	-	318	142	-	-	624	8.1
6.21. 8.144	Pb	5-30-55	59	-	-	-	-		103	0	1,790	45	-	-	-	1,940	1,860	-	-	2,800	6.8
6.21.29.130	Pb	7-25-40	-	-	520	149	20		106	0	1,730	42	-	3.4	2,520	-	-	2	.2	2,700	-
6.24.10.230	Qao	6- 1-55	-	-	-	-	-		306	0	183	98	-	-	-	228	0	-	-	1,150	7.5
7.16.24.410	Pg?	6- 9-55	64	-	-	-	-		223	0	867	36	-	-	-	1,100	918	-	-	1,790	6.9
7.16.34.132	TRs	6- 9-55	-	-	-	-	8.7		258	0	25	34	-	47	-	322	110	6	.2	639	7.2
7.19.13.222	Pb	4-15-55	64	-	-	-	-		266	0	2,030	325	-	-	-	2,400	2,180	-	-	4,010	7.4
7.19.23.111	Pb	4-14-55	66	-	-	-	-		159	0	2,220	95	-	-	- 1/	2,510	2,380	-	-	3,480	7.3
7.20. 1.414	Psa?	7- 3-40	-	-	184	68	24		192	0	581	20	-	-	1,030 2/	-	-	7	.4	1,260	-
		7-24-50	-	-	175	66	12		197	0	520	18	-	6.5	982	-	-	3	.2	1,220	-
7.20.19.324	Pb	7- 3-40	-	-	356	138	60		222	0	1,320	20	-	-	2,000	-	-	8	.7	2,250	-
7.21. 1.333	Pb	5-24-55	68	32	326	97	124		130	0	1,240	58	.4	1.2	1,940	1,210	1,110	18	1.5	2,300	7.4
7.21.12.340	TRs	5-24-55	66	-	-	-	-		287	0	226	19	-	-	-	444	209	-	-	898	6.6
7.21.15.441	TRs	5-24-55	63	26	81	57	9.7		263	0	174	41	.4	2.3	536 3/,4/	436	221	5	.2	840	7.4
7.22.25.244	TRs	6- 4-53	-	20	128	89	57		283	0	494	44	-	.8	972	686	454	15	.9	1,380	-
7.22.28.112	TRs and Pb	6- 4-53	-	-	-	-	-		-	-	1,660	-	-	-	-	-	-	-	-	2,970	-
7.22.35.211	TRs	6- 4-53	-	-	-	-	-		-	-	-	-	-	-	-	382	-	-	-	895	-
7.23. 4.113	Qal?	6-27-55	-	-	-	-	-		394	0	124	25	-	-	-	150	0	-	-	936	7.4
7.24.11.210	TRc	6- 1-55	59	-	-	-	-		279	0	1,090	468	-	-	-	860	632	-	-	3,620	7.2
7.25.12.131	Qal	5-20-55	-	-	-	-	-		432	0	603	138	-	-	-	210	0	-	-	2,220	7.2
8.16. 6.230	TRs	5-26-55	56	-	-	-	-		266	0	74	29	-	-	-	312	94	-	-	678	7.5
8.17. 6.222	Pg	6- 3-55	63	-	-	-	-		222	0	1,230	11	-	-	-	1,370	1,190	-	-	2,130	7.1
8.17.32.410	Psa?	6- 9-55	60	-	-	-	-		246	0	470	35	-	-	-	1,250	1,050	-	-	1,930	7.2
8.18.31.222	Psa?	6-26-55	-	22	421	69	25		203	0	1,090	19	.4	73	1,820	1,330	1,170	4	.3	2,080	7.2
8.19.17.414	Psa	6-26-55	-	-	-	-	-		46	0	2,430	720	-	-	-	1,790	1,750	-	-	5,800	7.5
8.21. 1.410	Pb or TRs	1-20-53	-	28	-	-	67		191	0	1,570	38	.5	.5	-	1,700	1,540	8	.7	2,600	-
8.21. 1.412	Pb or TRs	1-28-54	-	25	-	-	98		640	0	1,160	28	.2	.0	-	1,560	1,040	12	1.1	2,520	-
8.21. 2.432	TRs?	1-19-53	-	11	-	-	84		97	0	1,610	118	.5	.3	-	1,740	1,660	10	.9	2,780	-
8.21. 3.430	TRs	1-20-53	62	22	-	-	81		185	0	1,670	130	.7	.1	-	1,900	1,750	8	.8	2,970	-
8.21.11.212	TRs	1-20-53	62	-	-	-	-		176	0	-	132	-	-	-	-	-	-	-	2,970	-
8.21.15.213	TRs?	-	64	17	-	-	95		176	0	1,590	130	.7	1.0	-	1,780	1,640	10	1.0	2,860	-
8.21.19.441	Pb?	1-19-53	63	19	-	-	69		136	0	1,240	104	0	51	-	1,440	1,330	9	.8	2,440	-
8.21.21.144	Pb	1-19-53	64	23	-	-	67		164	0	813	97	.8	.5	-	975	840	13	.9	1,820	-
8.21.22.344	Qao?	1-19-53	62	25	-	-	29		170	0	93	36	.4	6.8	-	232	92	21	.8	557	-
8.21.33.213	Psa and Pg	7-23-40	-	-	377	55	181		153	0	1,090	216	-	.5	1,990	-	-	25	2.3	2,560	-
8.21.36.	Pb	10-18-40	-	-	320	231	342		46	0	1,880	350	-	-	3,150	-	-	30	3.6	3,890	-
8.21.36.224	Pb	10-18-40	-	-	576	141	164		29	0	1,870	284	-	-	3,050	-	-	15	1.6	3,560	-
8.22. 6.234	TRs	1-19-53	-	12	-	-	67		677	0	2,090	38	.6	0	-	2,640	2,080	5	.6	3,590	-
8.22.11.130	TRs	10-13-55	65	-	-	-	-		607	0	684	61	-	-	-	765	268	-	-	2,150	7.2
8.22.17.422	TRc	10-18-40	-	-	56	46	28		296	12	112	8.0	-	-	422	-	-	16	.7	667	-
8.22.18.431	Pb	6- 4-53	-	-	-	-	-		-	-	392	-	-	-	-	580	-	-	-	1,090	-
		9-15-55	-	-	-	-	-		249	0	357	16	-	-	-	556	352	-	-	1,020	8.1
8.22.19.234	Pb?	8-20-40	-	-	627	145	83		188	0	1,900	137	-	23	3,010	-	-	8	.8	3,350	-
8.23.36.413	TRs	6-27-55	-	-	-	-	-		550	0	511	338	-	-	-	480	30	-	-	2,670	7.7
8.24. 1.244	TRc	12- 6-55	-	-	-	-	-		329	0	86	44	-	-	-	328	58	-	-	819	7.6
8.24.35.321	Qal?	6- 1-55	59	-	-	-	-		603	0	1,030	555	-	-	-	650	156	-	-	4,250	7.7
8.24.36.134	Qal?	6- 1-55	57	-	-	-	-		275	0	288	114	-	-	-	175	0	-	-	1,390	7.4
8.26. 7.223	QTu or TRc	11-30-55	60	-	-	-	-		266	0	113	76	-	-	-	126	0	-	-	879	7.5
9.16.24.110	Pg or Psa	6-15-55	63	-	-	-	-		235	5	734	12	-	-	-	975	774	-	-	1,530	8.3
9.16.33.444	TRs?	5-27-55	57	-	-	-	-		226	0	44	14	-	-	-	232	47	-	-	503	7.1
9.17.19.443	Pg?	6- 3-56	56	26	457	81	34		251	0	1,270	14	.3	.0	2,010	1,470	1,270	5	.4	2,230	7.1
9.17.26.334	TRs	6- 3-55	58	-	-	-	-		196	0	39	18	-	-	-	222	62	-	-	446	7.1
9.18.25.130	TRs?	7- 2-40	62	-	104	22	15		190	0	182	27	-	-	493	-	-	9	.4	702	-
		7-22-40	-	-	116	22	15		222	0	184	26	-	4.0	523	-	-	8	.3	755	-
9.18.26.422	TRs	6-26-55	-	-	-	-	-		193	14	158	32	-	-	-	374	193	-	-	702	8.6
9.18.30.141	TRs	6- 3-55	58	-	-	-	-		212	0	66	33	-	-	-	268	94	-		575	7.4

TABLE 6 (cont.)

Location No.	Stratigraphic unit	Date collected	Temperature (°F)	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Hardness as $CaCO_3$: Calcium magnesium	Hardness as $CaCO_3$: Noncarbonate	Percent sodium	Sodium adsorption ratio (SAR)	Specific conductance (micromhos at 25°C)	pH
9.19. 6.224	Py?	6-13-55	64	-	-	-	-		252	0	1,690	650	-	-	-	1,900	1,690	-	-	4,670	7.3
9.19. 6.331	TRs?	6-13-55	-	-	-	-	-		257	0	184	10	-	-	-	408	198	-	-	746	7.6
9.19.12.424	TRs	1-17-55	59	-	-	-	-		182	0	324	20	-	-	-	510	361	-	-	938	7.7
9.19.28.330	Pb?	5-26-55	-	-	-	-	-		219	0	1,280	38	-	-	-	1,270	1,090	-	-	2,370	7.6
9.20.10.344	TRs	4-15-55	66	-	-	-	-		228	0	57	15	-	-	-	250	63	-	-	510	7.3
9.20.26.343	TRs?	7-22-40	-	-	498	83	29		236	0	1,320	54	-	0.25	2,100	-	-	4	0.3	2,370	-
9.21. 6.241	TRs	9-19-40	-	-	72	57	45		235	0	253	39	-	.25	614	-	-	19	1.0	934	-
9.21.18.343	TRs	9-19-40	-	-	80	24	30		194	6.9	142	29	-	6.2	468	298	-	18	.8	699	-
9.21.33.100	TRs?	7-22-40	-	-	473	73	60		162	0	1,310	78	-	4.5	2,080	-	-	8	.7	2,420	-
		9-19-40	-	-	-	-	-		-	-	-	76	-	-	-	-	-	-	-	2,410	-
9.21.35.411	TRs	3-13-62	62	16	572	71	45		181	0	1,540	46	0.5	.2	2,380	1,720	1,570	5	.5	2,560	7.3
9.21.35.423	TRs and Pb	5- 3-55	61	-	-	-	-		234	0	1,320	36	-	-	-	1,560	1,370	-	-	2,380	7.2
		5-24-55	-	16	337	159	8.7		257	0	1,210	29	.8	1.3	1,890	1,500	1,280	1	.1	2,220	7.2
9.22.18.232	TRs	6- 8-55	68	-	-	-	-		637	0	1,330	95	-	-	-	1,880	1,360	-	-	2,920	7.4
9.23.32.433	TRc	6- 1-55	59	-	-	-	-		320	0	60	22	-	-	-	276	14	-	-	671	7.4
9.24. 5.420	TRc	6-27-55	-	11	13	9.1	398		493	0	380	90	2.7	2.8	1,150	70	0	93	21	1,780	8.0
9.24.33.244	Qal or TRc	6- 1-55	59	-	-	-	-		289	0	479	184	-	-	-	580	343	-	-	1,840	7.4
9.25.23.443	TRc?	6- 1-55	59	-	-	-	-		246	0	74	54	-	-	-	138	0	-	-	727	7.4
9.26. 5.223	TRc	12- 7-55	59	-	-	-	-		519	0	526	44	-	-	-	100	0	-	-	1,930	7.7
9.26.35.410	Je?	11-28-55	-	-	-	-	-		195	0	127	83	-	-	-	326	166	-	-	800	7.3
10.16. 5.120	Pg?	7-11-47	-	14	436	90	37		238	0	1,270	14	.4	0	1,980	1,460	-	5	.4	2,200	7.7
		5-19-55	59	21	427	107	7.6		218	0	1,270	13	.7	1.5	1,950	1,510	1,330	1	.1	2,180	7.9
10.18.15.400	Qao?	7-25-40	-	-	359	63	93		188	0	1,060	66	-	3.0	1,740	-	-	15	1.2	2,120	-
10.19. 5.110	Psa?	6-13-55	63	-	-	-	-		218	0	764	22	-	-	-	870	692	-	-	1,660	7.8
10.19.18.420	Psa?	6-13-55	64	-	-	-	-		200	0	947	54	-	-	-	1,100	936	-	-	1,930	7.4
10.20. 6.323	Psa	8- 4-55	63	-	-	-	-		158	0	42	2	-	-	-	174	44	-	-	344	7.2
10.20. 8.130	Psa	10-15-55	-	12	52	8.5	11		171	0	40	3.0	.2	1.8	216	164	24	12	.4	344	7.3
		5- 5-59	-	11	54	7.9	5.3		151	0	47	3.2	3	.9	204[3]	167	44	6	.2	345	7.9
10.20. 8.141	Psa	8- 5-54	-	-	-	-	-		170	0	47	3	-	-	-	-	-	-	-	364	-
		4-15-55	62	-	-	-	-		171	0	54	4	-	-	-	198	58	-	-	385	7.7
		5-16-55	-	11	64	8.3	7.4		170	0	60	4	.2	1.7	238	194	54	8	.2	400	7.3
		6-14-55	-	-	-	-	-		175	0	72	3.0	-	-	-	208	64	-	-	426	6.9
10.20. 8.144	Psa	5- 5-59	-	11	54	6.0	6.7		153	0	40	3.0	.4	1.9	198[3]	159	34	8	.3	336	7.8
10.20. 8.421	Psa	5- 5-59	-	10	52	6.9	3.9		148	0	39	1.5	.3	1.9	188[3]	158	36	5	.1	330	7.8
10.20.14.344	Psa?	12-15-54	-	-	-	-	-		174	0	48	6.0	-	-	-	-	-	-	-	374	-
10.21.32.123	Pb or Psa	8- 6-54	-	-	-	-	-		167	0	583	21	-	-	-	-	-	-	-	1,310	-
10.21.32.230	Psa	4- 7-55	-	17	318	47	34		168	0	872	10	.2	1.4	1,380	987	850	7	.5	1,630	7.4
10.22.20.240	TRs	6- 8-55	67	-	-	-	-		678	0	1,220	94	-	-	-	480	0	-	-	3,400	7.3
10.23.22.120	TRc	6-20-55	60	-	-	-	-		346	0	355	68	-	-	-	320	36	-	-	1,420	8.0
10.24. 5.221	TRc	6-20-55	63	-	-	-	-		455	0	1,020	159	-	-	-	275	0	-	-	3,100	7.4
10.24.24.111	TRc	12-23-55	62	-	-	-	-		417	0	1,430	390	-	-	-	80	0	-	-	4,660	7.6
10.25. 2.110	TRc	6-27-55	-	-	-	-	-		254	0	58	10	-	-	-	118	0	-	-	533	7.0
10.25.25.110	TRc	6-27-55	-	11	5.2	1.4	569		493	6	563	176	2.9	.0	1,580	19	0	98	57	2,430	8.3
10.25.26.111	TRc	5-27-36	-	7.2	5.0	1.7	582	2.6	454	22	620	170	2.5	.25	1,640[5]	19	0	98	57	-	-
10.25.26.242	TRc	12-13-55	61	-	-	-	-		443	27	241	61	-	-	-	8	0	-	-	1,420	8.8
10.26.22.322	TRc	6-27-55	-	-	-	-	-		434	30	202	64	0	-	-	14	0	-	-	1,360	8.8
11.17. 9.120	Psa?	5-19-55	59	18	108	30	-		200	0	207	6	.6	.5	490	393	229	0	.0	688	8.1
		8-10-56	-	-	-	-	-		194	0	-	5	-	-	-	372	213	-	-	684	7.1
11.17.10.430	Psa	5-19-55	59	14	71	23	12		299	0	37	3	.8	8.4	314	272	26	8	.3	534	7.2
11.17.36.420	Pg?	6-15-55	77	-	-	-	-		230	0	1,310	11	-	-	-	1,490	1,300	-	-	2,240	7.4
11.18. 6.222	TRs	6- 6-55	58	15	60	22	129		272	0	253	21	.6	3.8	693	240	17	54	3.6	1,030	7.4
11.18. 7.220	Psa?	5-19-55	53	15	77	28	4.4		216	0	118	9	.2	4.4	378	307	130	3	.1	584	7.4
11.18.25.130	Pg?	6-13-55	61	-	-	-	-		401	0	1,660	23	-	-	-	2,000	1,670	-	-	2,840	7.3
11.19. 2.210	TRs?	6-17-55	61	-	-	-	-		169	0	207	20	-	-	-	315	176	-	-	722	7.5
11.19.26.342	Psa	5-18-55	61	-	-	-	-		149	0	30	4	-	-	-	152	30	-	-	313	7.1
11.19.29.222	Psa	6-13-55	59	14	107	20	17		203	0	200	7	.2	.0	512	349	182	9	.4	698	7.3
11.20.10.240	Pb?	6-17-55	-	-	-	-	-		198	0	1,410	15	-	-	-	1,580	1,420	-	-	2,340	7.8
11.20.18.310	TRs or Pb	6-17-55	63	-	-	-	-		204	0	307	5	-	-	-	475	308	-	-	876	7.2
11.20.33.112	Psa	6-17-55	60	-	-	-	-		199	0	148	6	-	-	-	310	147	-	-	605	7.5
11.21. 7.222	TRc	10- 5-55	61	-	-	-	-		399	0	769	6.0	-	-	-	705	378	-	-	1,890	7.4
11.21.13.120	Qal or TRc	6- 8-55	57	-	-	-	-		222	0	604	10	-	-	-	610	428	-	-	1,440	8.2
11.21.27.130	TRs	6- 8-55	62	19	189	115	53		569	0	542	19	.9	.0	1,220	944	478	11	.8	1,650	7.2
11.22.17.233	TRc?	6- 8-55	61	-	-	-	-		601	0	333	41	-	-	-	24	0	-	-	1,690	7.3
11.22.35.344	TRs?	9- 9-55	-	-	-	-	-		736	0	405	26	-	-	-	16	0	-	-	2,000	8.0
11.22.36.322	TRc?	10- 7-55	64	-	-	-	-		443	25	451	13	-	-	-	478	74	-	-	1,540	8.5
11.23. 3.144	TRc	6-27-55	-	-	-	-	-		357	0	428	66	-	-	-	72	0	-	-	1,650	7.1
11.24.36.340	TRc?	6-27-55	-	-	-	-	-		351	0	145	55	-	-	-	115	0	-	-	997	7.3
11.25. 1.223	TRc	6-27-55	-	-	-	-	-		310	0	185	42	-	-	-	240	0	-	-	944	7.7
11.25.16.210	TRc	12-19-55	61	-	-	-	-		538	0	-	122	-	-	-	190	0	-	-	2,260	7.5

1/ Cu = 0.0 ppm.

2/ Residue on evaporation at 180°C.

3/ Calculated from determined constituents.

4/ Fe = 0.09.

5/ Fe = 0.01, B = 1.3.

TABLE 7—CHEMICAL ANALYSES OF WATER FROM SPRINGS IN GUADALUPE COUNTY, NEW MEXICO

[Chemical constituents are in parts per million. Dissolved-solids concentrations calculated from determined constituents.]

Stratigraphic unit: QTu, upland surficial deposits; TRc, Chinle Formation; TRs, Santa Rosa Sandstone; Pb, Bernal Formation; Psa, San Andres Limestone.

Location No.	Stratigraphic unit (Source of water)	Date Collected	Temperature (°F)	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Hardness as $CaCO_3$: Calcium magnesium	Hardness as $CaCO_3$: Non-carbonate	Percent sodium	Sodium adsorption ratio (SAR)	Specific conductance (micromhos at 25°C)	pH	Remarks
7.17.26.442	TRs	4-12-55	54	-	-	-		-	240	0	369	130	-	-	-	650	454	-	-	1,370	7.8	-
7.21.24.122	TRs and Pb	5-23-55	59	-	-	-		-	100	0	1,840	38	-	-	-	1,940	1,860	-	-	2,850	7.1	-
7.22.22.424	TRs	6- 4-53	-	-	-	-		-	-	-	48	-	-	-	-	236	-	-	-	525	-	-
7.22.27.144	TRs and Pb	6- 4-53	-	-	-	-		-	-	-	1,440	-	-	-	-	-	-	-	-	2,630	-	-
7.22.35.231	TRs	6- 4-53	-	-	-	-		-	-	-	-	-	-	-	-	388	-	-	-	910	-	-
8.21. 1.333	Psa and others [1]	7-22-39	-	-	632	62		26	163	0	1,610	54	-	-	2,470	-	-	-	-	2,670	-	Blue Hole Spring
		4- 1-41	-	-	618	64		46	191	0	1,600	57	-	0.0	2,480	1,810	1,650	-	-	2,690	-	Do.
		9-22-43	-	-	616	61		27	189	0	1,560	51	-	.0	2,400	1,788	1,630	-	-	2,670	-	Do.
		8-29-45	64	-	621	61		43	188	0	1,600	53	-	1.2	2,470	1,800	1,650	5	-	2,630	-	Do.
		11-12-47	-	-	622	62		35	193	0	1,590	50	-	.4	2,450	1,810	1,650	4	-	2,680	-	Do.
		5- 2-49	62	-	608	79		17	183	0	1,590	52	-	.2	2,440	1,840	1,690	2	-	2,670	-	Do.
		4-30-51	-	-	616	64		29	187	0	1,570	53	-	.0	2,420	1,800	1,650	3	-	2,650	-	Do.
		7-28-53	64	-	-	-		-	192	0	-	52	-	-	-	-	-	-	-	2,670	-	Do.
		7-14-55	-	14	584	71	46	2.0	187	0	1,590	51	0.4	.1	2,450	1,750	1,600	5	0.5	2,670	7.1	Blue Hole Spring Fe, 0.02.
		11-13-59	62	14	622	58	44	1.8	182	0	1,600	50	.6	.0	2,480	1,790	1,640	5	.5	2,620	7.3	Blue Hole Spring Fe, 0.01; Tot. Fe, 0.04; Al, 0.07; B, 0.05; PO_4, 0.00
		4-20-65	66	-	-	-		-	181	0	-	52	-	-	-	-	-	-	-	2,730	7.4	Blue Hole Spring
8.21. 2.434	Psa and others [1]	6-28-55	70	-	-	-		-	80	0	1,920	136	-	-	-	2,090	2,020	-	-	3,170	8.2	Overflow from spring-fed lake.
8.21.10.444	Psa and others [1]	7-21-39	-	-	559	76		121	108	0	1,560	192	-	-	2,550	-	-	-	-	3,040	-	Flows from several springs SW of this point.
		6-11-40	-	-	524	94		140	154	0	1,520	206	-	-	2,560	-	-	15	1.5	3,020		Do.
		1- 2-44	-	-	-	-		-	-	-	-	184	-	-	-	-	-	-	-	2,940	-	Do.
		10-10-49	-	-	560	90		53	203	0	1,500	110	-	-	2,410	1,770	1,600	6	-	3,070	-	Do.
		9- 5-50	-	-	580	136		173	289	0	1,650	302	-	1.0	2,980	2,010	1,770	16	-	3,570	-	Do.
		3-20-51	-	-	536	84		124	192	0	1,470	188	-	.2	2,500	1,680	1,530	14	-	2,940	-	Do.
8.21.11.234	Psa and others [1]	7-22-39	-	-	697	105		76	92	0	1,990	133	-	-	3,050	-	-	-	-	3,350	-	Flow from several springs N of this point.
8.21.11.424	Psa and others [1]	6-11-40	-	-	686	83		95	148	0	1,880	128	-	-	2,950	-	-	9	.9	3,170	-	-
8.21.11.434	Psa and others [1]	5- 6-59	-	17	620	62		60	166	0	1,630	68	.7	.1	2,540	1,800	1,660	7	.6	2,720	7.6	Fe, 0.04.
8.21.12.320	Psa and others [1]	6-11-40	-	-	764	159		137	57	4.9	2,480	156	-	-	3,730	-	-	-	-	3,850	-	Spring-fed lake.
8.21.14.243	Psa and others [1]	6-11-40	-	-	636	79		114	170	0	1,710	169	-	-	2,790	-	-	-	-	3,090	-	Flow from 8.21.14.342 and several springs SW of this point.
		2- 1-44	-	-	626	79		114	197	0	1,650	182	-	.4	2,750	1,890	1,730	-	-	3,170	-	Do.
		7-25-60	76	-	-	-		-	152	0	-	180	-	-	-	-	-	-	-	3,050	7.6	Do.
8.21.14.342	Psa and others [1]	1-19-53	49	24	-	-		207	159	0	1,640	340	.7	1.2	-	1,870	1,740	19	-	3,520	-	Spring-fed lake.
8.22. 4.414	QTu and TRc	1-19-53	-	35	-	-		47	209	5	51	15	2.4	12	-	168	0	38	1.6	487	-	-
8.25.22.313	TRc	2-12-55	-	-	-	-		-	145	7	41	20	-	-	-	136	6	-	-	381	8.4	-
9.21.35.131a	Psa and others [1]	12-16-54	63.5	18	528	81		27	190	0	1,440	37	.3	2.5	2,230	1,650	1,500	3	.3	2,430	-	-
10.20.25.243	Pb	-	60	-	-	-		-	184	0	1,440	8	-	-	-	-	-	-	-	2,330	-	-
10.20.25 413	TRs	8-11-54	-	-	-	-		-	264	0	51	11	-	-	-	266	50	-	-	538	7.8	-
11.21. 2.120	TRc	9-27-55	-	-	-	-		-	378	0	198	25	-	-	-	278	-	-	-	1,030	7.3	-

1/ Most of the water comes from the San Andres Limestone, but the Glorieta Sandstone, Bernal Formation, and Santa Rosa Sandstone also yield water to these springs.

CONTENTS OF POCKET