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HYDROLOGIC CONDITIONS IN THE SAN PEDRO RIVER VALLEY ARIZONA, 1971

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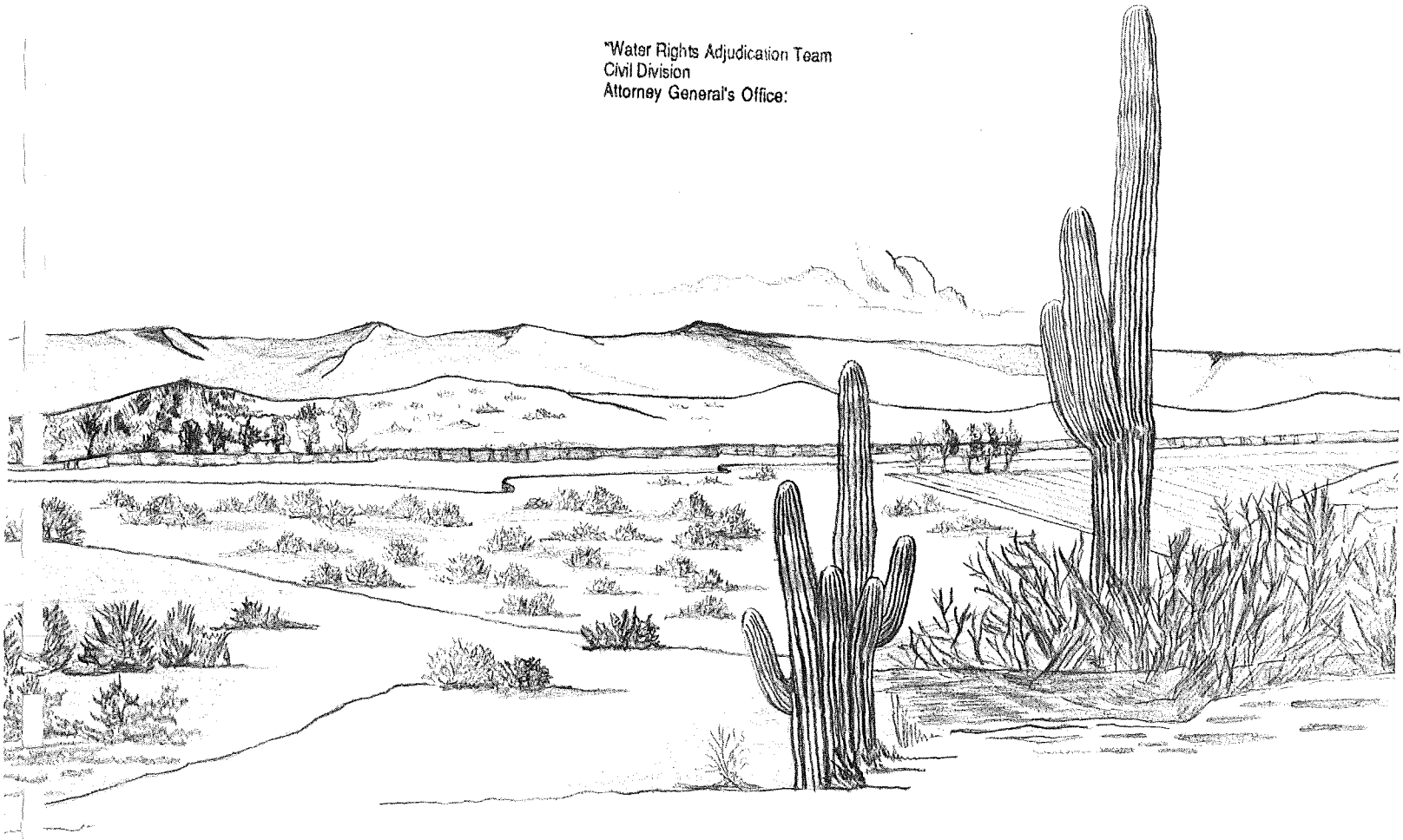

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HYDROLOGIC CONDITIONS IN THE SAN PEDRO RIVER VALLEY, ARIZONA, 1971

By

R. H. Roeske and W. L. Werrell

INTRODUCTION

The San Pedro River valley is in southeastern Arizona (fig. 1), where the amount of precipitation is small, the evaporation rate is high, and only a small amount of water is available for development. Ground water from wells furnishes most of the water supply in the valley; additional supplies are obtained by the diversion of surface water from the San Pedro River and by the development of springs. The main uses of water in the valley are for irrigation, mining, and industry.

Since 1939, a planned program of water-resources studies has been conducted in Arizona by the U. S. Geological Survey in cooperation with the State. From 1942 to April 1971 the State was represented by the Arizona State Land Department; currently the Arizona Water Commission represents the State in the cooperative program. The purpose of the program is to make available the basic hydrologic data that are useful in water-resources planning and development. For the most part, the data presented in this report were collected as a part of the continuing program of water-resources studies and summarize the hydrologic conditions in the San Pedro River valley. The study was made under the immediate supervision of H. M. Babcock, district chief of the U. S. Geological Survey in Arizona.

A well inventory was made in 1966 and 1967 in the valley, and water levels were measured in about 350 wells in spring 1968. The irrigated acreage was mapped from aerial photographs taken in the summer and fall of 1966 and from field observations made in spring 1967. Other fieldwork included measurements of streamflow and spring discharge. Ground-water pumpage data were collected from private companies and other Federal and State agencies; pumpage for irrigation use was computed from power-consumption records on the basis of measurements of

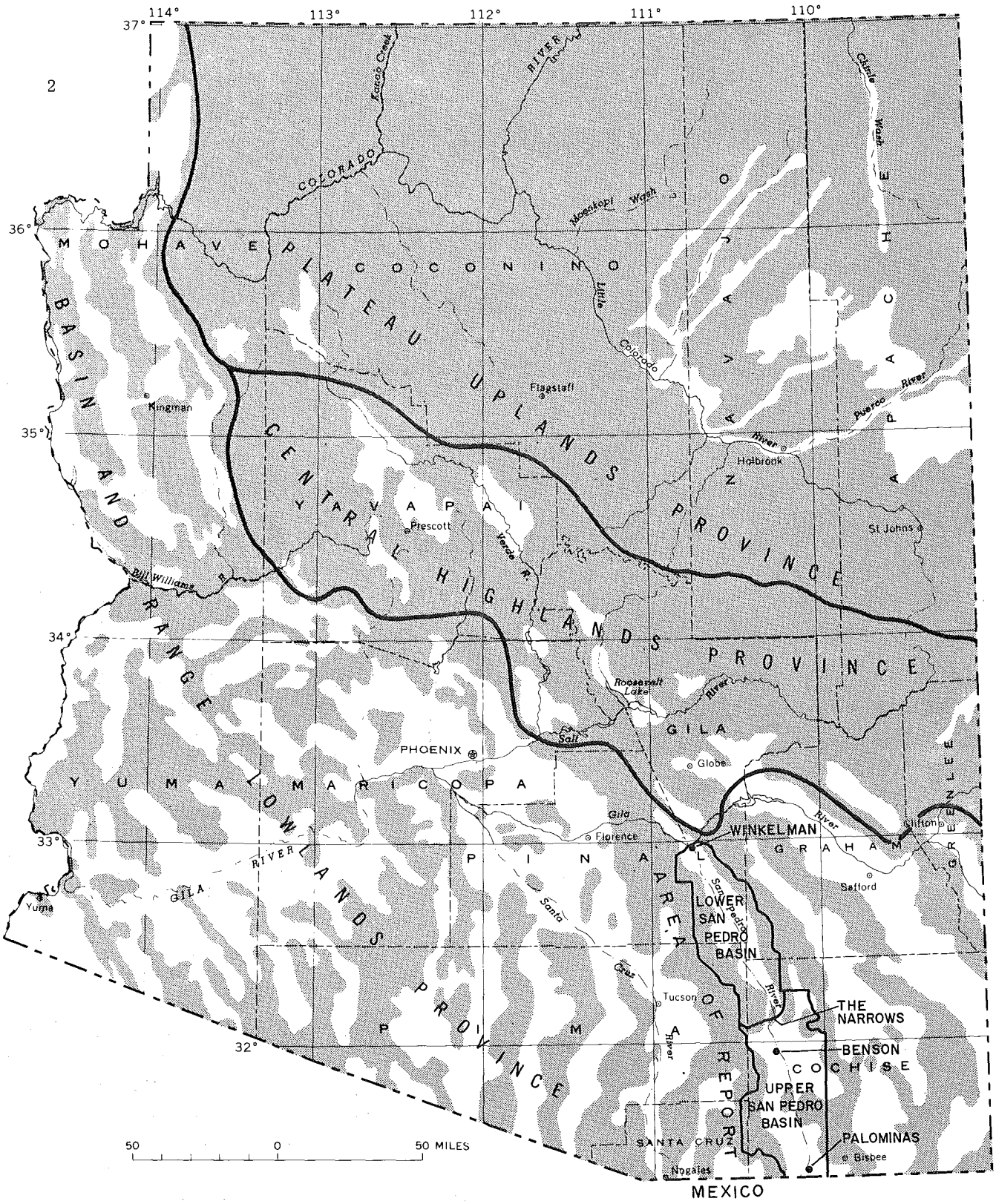


FIGURE 1.--AREA OF REPORT AND ARIZONA'S WATER PROVINCES.

well discharge per unit of power consumption. Much of the data collected are given in tables 2, 3, 4, and 5 in the appendix. Data for selected wells—including the depth, diameter, casing information, water levels, and pumping data—and springs are given in table 2. Drillers' logs of selected wells are given in table 3, and chemical analyses of water from selected wells and springs are given in table 4. Chemical analyses of water from the San Pedro River are given in table 5. All well and spring locations in the valley are described in accordance with the well-numbering system used in Arizona, which is explained and illustrated on figure 2; the well and spring locations are shown on plates 1 and 2.

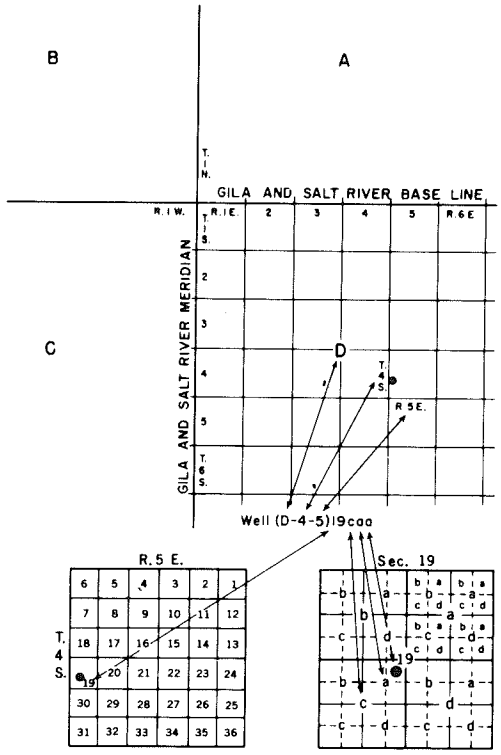
Location and Extent

The San Pedro River valley trends slightly west of north and, as defined in this report, extends from the international boundary to Winkelman, Ariz. —a distance of about 125 miles. The valley is divided into an upper and a lower basin at about its midpoint. The upper San Pedro basin extends from the international boundary to the Narrows 11 miles north of Benson, and the lower San Pedro basin extends from the Narrows to the mouth of the San Pedro River at Winkelman. (See fig. 1.)

The San Pedro River flows northward from its headwaters about 25 miles south of the international boundary in Sonora, Mexico, and crosses into Arizona just south of Palominas. The San Pedro River enters the United States at an altitude of 4,275 feet above mean sea level and joins the Gila River at Winkelman at an altitude of 1,920 feet. Most mountains bordering the San Pedro River valley rise to altitudes of more than 6,000 feet above mean sea level; the highest peak bordering the valley is Miller Peak at an altitude of 9,466 feet in the Huachuca Mountains. The San Pedro River drains as area of 4,483 square miles, 696 square miles of which is in Mexico. Aravaipa Creek, the largest tributary to the San Pedro River, drains an area of 562 square miles and joins the San Pedro River 12 miles upstream from Winkelman. Only the part of the Aravaipa drainage basin downstream from Aravaipa Canyon is included in the area of this report.

Previous Investigations

The first comprehensive study of the ground-water resources of the San Pedro River valley was made by Bryan, Smith, and Waring



The well numbers used by the Geological Survey in Arizona are in accordance with the Bureau of Land Management's system of land subdivision. The land survey in Arizona is based on the Gila and Salt River meridian and base line, which divide the State into four quadrants. These quadrants are designated counterclockwise by the capital letters A, B, C, and D. All land north and east of the point of origin is in A quadrant, that north and west in B quadrant, that south and west in C quadrant, and that south and east in D quadrant. The first digit of a well number indicates the township, the second the range, and the third the section in which the well is situated. The lowercase letters a, b, c, and d after the section number indicate the well location within the section. The first letter denotes a particular 160-acre tract, the second the 40-acre tract, and the third the 10-acre tract. These letters also are assigned in a counterclockwise direction, beginning in the northeast quarter. If the location is known within the 10-acre tract, three lowercase letters are shown in the well number. In the example shown, well number (D-4-5)19caa designates the well as being in the NE$\frac{1}{4}$NE$\frac{1}{4}$SW$\frac{1}{4}$ sec. 19, T. 4 S., R. 5 E. Where more than one well is within a 10-acre tract, consecutive numbers beginning with 1 are added as suffixes.

FIGURE 2.--WELL-NUMBERING SYSTEM IN ARIZONA.

(1934). Heindl (1952a; 1952b) described the geology, ground-water hydrology, and chemical quality of the water in the upper and lower San Pedro basins, and Davidson and White (1963) prepared geohydrologic maps of the basins.

Several hydrologic investigations have been made in selected areas in the valley. Lee (1905) discussed the early ground-water development near Benson. Page (1963) described the hydrology in a small area along the San Pedro River near Mammoth, and Brown and others (1966) reported on a comprehensive investigation of the water resources of the Fort Huachuca area. Other reports on the hydrology of small areas in the valley include those for the Tombstone area (Hollyday, 1963), the Narrows (Montgomery, 1963), and the Redington-San Manuel area (Agenbroad, 1967).

Acknowledgments

The authors wish to acknowledge the cooperation of the many residents of the valley who provided information for this study and who granted permission to collect data from wells on their properties. The authors also wish to express their appreciation to the well drillers and to personnel of the power companies, water companies, municipalities, mining and manufacturing companies, cattle companies, irrigation districts, and other Federal and State agencies who furnished information. Special thanks are given to J. J. Gewerth, Jr., Corps of Engineers, for the log of well (D-21-20)15dbb.

DEVELOPMENT OF WATER RESOURCES

At the time of Padre Eusebio Francisco Kino's visit to the San Pedro River valley in 1697, more than 2,000 Indians were living in the valley and were raising cotton, maize, beans, and melons using water diverted from the San Pedro River (Bolton, 1936, p. 367). Fort Huachuca was established in 1877, and in the same year a group of Mormons settled near the present-day town of St. David and soon began irrigation farming using water from the river. Shortly thereafter, several mining camps were established in the valley, and rapid development of mining and farming took place in the 1880's.

In 1890, 2,672 acres of land was under cultivation in the valley, and about 3,500 acres was being irrigated in 1899 (Newell, 1901, p. 352-353). In 1966 about 12,500 acres of land was being irrigated (pls. 1 and 2). By 1970, however, the amount of irrigated acreage had decreased to 9,700 acres (table 1, p. 8); most of the decrease was in the southern part of the valley near Palominas.

In 1889, 10 canals were used to divert irrigation water from the San Pedro River, and, by 1899, 41 canals were used to divert water from the river (Newell, 1901, p. 352-354). The St. David ditch has been diverting water for irrigation since 1881, and the Pomerene Canal has been in use since 1912 (pl. 1). In 1939, 4,000 acres was being irrigated with surface water from diversions, 2,300 acres of which was served by the St. David and Pomerene Irrigation Districts. In 1968 the St. David and Pomerene Irrigation Districts diverted 6,000 acre-feet of water from the San Pedro River for use on 2,400 acres of farmland (U.S. Geological Survey, 1970, p. 112-113).

Lee (1905, p. 169), who was one of the first investigators to report on the occurrence of ground water under artesian pressure in the valley, stated: "The first indication of artesian water in the San Pedro Valley is said to have been noted at the time of a severe earthquake which occurred in 1887. A long fissure is said to have been formed, from which water flowed for several hours. This led to the supposition that water existed under pressure beneath the surface of the valley, and boring soon afterward resulted in flowing wells." The first artesian well in the San Pedro River valley, and possibly the first in the State, was drilled in 1892, and, by 1903, more than 200 wells had been drilled in the area between Benson and Fairbank (Lee, 1905, p. 166).

In 1968 the estimated ground-water pumpage in the valley was 77,300 acre-feet, of which 50 percent was used for irrigation, 40 percent for mining and industry, and 10 percent for public supply. The amount and use of the ground water pumped in 1968 in the upper and lower San Pedro basins are as follows:

	Pumpage (acre-feet)	
Upper San Pedro basin:		
Irrigation.	22,100	
Mining and industry.	6,600	
Public supply	6,700	
		35,400

	Pumpage (acre-feet)	
Lower San Pedro basin:		
Irrigation.	16,500	
Mining and industry.	24,400	
Public supply	1,000	
		41,900
Total pumpage for San Pedro River valley.		77,300

Springs in the Huachuca Mountains have been used for water supplies for many years. The springs in Miller Canyon have furnished most of the water supply for Tombstone since 1881, and springs in Garden and Huachuca Canyons supply water to Fort Huachuca. Other springs furnish small amounts of water for livestock and irrigation use. Many springs flow only in direct response to precipitation or their flows are affected by small fluctuations in ground-water levels.

HYDROLOGIC SYSTEM

Most of the precipitation that falls in the San Pedro River valley returns to the atmosphere by evapotranspiration, but some becomes runoff, and some infiltrates to the sedimentary rocks that form the ground-water reservoir. Some of the runoff that results from precipitation in the mountains is recharged to the ground-water reservoir through infiltration along the mountain fronts. As the streams flow from the mountains across the sedimentary rocks of the valley, some of the water infiltrates into the permeable material of the stream channels and continues to move downward to become ground water. The ground water then moves downgradient toward the center of the valley, where, in some reaches, it is discharged to the San Pedro River. Some of the flow in the San Pedro River infiltrates into the permeable alluvium and recharges the ground-water reservoir. Ground water is discharged naturally to springs and artificially to wells. Ground water is returned to the atmosphere by transpiration where phreatophytes—plants that depend almost entirely on ground water for their water supply—grow on and near the flood plains of the San Pedro River and its tributaries. Surface water is used by plants along the streams and is diverted for irrigation; therefore, much of the surface water is returned to the atmosphere by evapotranspiration. Both surface water and ground water enter the valley at the international boundary and leave the valley at the downstream end at Winkelman.

Table 1.--Irrigated acreage in the San Pedro River valley

[Numbers rounded to nearest hundred acres]

Year	Irrigated land (acres)	Source of data
1890	2,700	Newell (1901, p. 352).
1899	3,500	Newell (1901, p. 353).
1913	5,800	LaRue (1916, p. 116).
1936(?)	6,400	Aerial photographs.
1941	1/ 6,900	U.S. Corps of Engineers (written commun., 1945).
1953	2/ 8,100	Barr (1954, p. 16).
1962	11,100	U.S. Bureau of Reclamation (written commun., 1970).
1966	12,500	Aerial photographs; field observations by personnel of the U.S. Geological Survey. May include some idle land.
1969	12,000	U.S. Bureau of Reclamation (written commun., 1970).
1970	9,700	Aerial photographs. Field checked by Harshbarger and Associates (written commun., 1970) for area above Redington; 1969 data used below Redington.

1/ Does not include 700 acres in Aravaipa Valley.

2/ Includes 200 acres near Fairbank.

Climate

The climate of the San Pedro River valley is semiarid and is characterized by warm summers and moderate winters. Precipitation is extremely variable from month to month and from year to year. The normal annual precipitation ranges from slightly less than 12 inches near Benson to slightly more than 30 inches in the Huachuca Mountains and averages about 15 inches for the valley; about 8 inches of the average annual precipitation falls from May through September (University of Arizona, 1965a; 1965b). The average January temperature is about 45°F, and the average July temperature is about 80°F in the San Pedro Valley (Green and Sellers, 1964, p. 26-27). At Benson, the annual potential evapotranspiration, which represents the amount of water that would be lost to the atmosphere by a continuous cover of green vegetation assuming no moisture deficiency, is three times greater than the annual precipitation (Buol, 1964).

Rock Units and Their Water-Bearing Properties

The rocks in the San Pedro River valley are divided into four groups based on their relative porosity and permeability. The rock units—listed in the order of increasing porosity and permeability and decreasing geologic age—are the crystalline and consolidated sedimentary rocks, the consolidated to semiconsolidated sedimentary rocks, the valley-fill deposits, and the flood-plain alluvium (pls. 1 and 2). The principal aquifers in the valley are the valley-fill deposits and the flood-plain alluvium. Locally, the consolidated to semiconsolidated sedimentary rocks are sufficiently permeable to yield as much as several hundred gallons per minute of water to wells; the crystalline and consolidated sedimentary rocks generally yield only small amounts of water to wells.

The crystalline and consolidated sedimentary rocks form the mountains that bound the valley, underlie discrete hills scattered throughout the area, and are covered by more than 1,000 feet of sedimentary deposits in the central part of the valley. The unit generally is referred to as bedrock and consists of crystalline granitic igneous and metamorphic rocks, volcanic rocks, and consolidated sedimentary rocks that include mainly limestone, sandstone, shale, conglomerate, and a small amount of quartzite. The granitic rocks are dominant in the unit. The mountains on the west side of the valley consist mainly of granitic rocks

and some bedded limestone, and the mountains on the east side of the valley consist of granitic, volcanic, and consolidated sedimentary rocks. The crystalline and consolidated sedimentary rocks have a low primary permeability and porosity, and the occurrence and abundance of ground water are dependent on whether the unit is sufficiently fractured to store water. Springs that issue from the unit generally are small, and wells drilled in the unit generally yield only enough water for livestock and small domestic supplies; however, a few large springs that discharge as much as several hundred gallons per minute issue from limestone beds in the Huachuca Mountains (Brown and others, 1966). In places, water in the consolidated sedimentary rocks is under artesian pressure.

The consolidated to semiconsolidated sedimentary rocks consist of reddish-brown to brown gravelly sandstone to conglomerate, which grade into and are interbedded with mudstone and siltstone. Gypsiferous beds, mudflow deposits, and talus breccia deposits are common, and bedded limestone and andesitic lava flows are present in places in the unit. The beds generally are strongly tilted and are offset by faults having large displacements. The principal exposures of the unit are along the northern slopes of the Huachuca Mountains, in the hills southwest of Mammoth and those south of Redington, and along the San Pedro River southeast of Redington (pls. 1 and 2). In general, the beds are tightly cemented and are low in permeability and porosity; northeast of the Huachuca Mountains, however, weakly cemented sandstone to conglomerate beds are tapped by wells that yield several hundred gallons per minute of water. The unit probably will yield small to moderate amounts of water to wells from the saturated sandstone or conglomerate. Water in the consolidated to semiconsolidated sedimentary rocks is under artesian pressure where permeable beds are overlain by less permeable beds and under unconfined or water-table conditions where there is no great vertical variation in permeability.

The valley-fill deposits consist of well-bedded semiconsolidated to unconsolidated material. The valley fill stores most of the ground water in the valley, and wells that tap permeable beds may yield more than 1,000 gpm (gallons per minute). The valley-fill deposits are divided into an upper part and a lower part; in the area downstream from the Narrows, however, erosion has removed most of the upper part of the valley-fill deposits (pl. 2).

The lower part of the valley-fill deposits consists mainly of whitish-gray to light-brown lenticular gravel, sandstone, and siltstone

beds. The coarsest-grained beds occur near the mountain source areas. Along the central part of the valley in the Mammoth-Winkelman area, sandstone beds grade into gypsiferous silt that contains some minable gypsum beds. The beds tilt 10° to 15° generally toward the center of the valley and are offset a minimum of several hundred feet by generally northwest-trending faults. The faults have not been mapped and are not shown on plates 1 and 2. The lower part of the valley-fill deposits ranges in thickness from a few tens of feet along the sides of the valley to possibly more than 1,000 feet in the center of the valley. Ground water occurs under artesian pressure in places where the saturated gravel beds of the lower part are overlain by silt beds of the upper part, such as near Benson and St. David.

The upper part of the valley-fill deposits consists of reddish-brown to brown flat-lying clayey and silty gravel beds near the mountains and well-bedded silt and sandy silt in the central part of the valley. The upper part of the valley fill is 300 to 800 feet thick in the area between Benson and the international boundary, but erosion has removed most of the upper part of the valley fill in the northern part of the valley. Ground water generally occurs under unconfined conditions in the upper part of the valley fill, but in the central part of the valley, where permeable sand and gravel beds are overlain by silt beds, ground water is under artesian pressure.

The flood-plain alluvium consists of lenticular beds and mixtures of gravel, sand, and silt along the channels and flood plains of the San Pedro River and its tributaries. The flood-plain alluvium generally is from 40 to 100 feet thick but may be as much as 150 feet thick in places. Gravel and sand are dominant and usually are uncemented. The alluvium is very permeable and porous, and ground water withdrawn from this unit is replaced quickly by infiltration of streamflow during periods of runoff. Wells completed in the alluvium are capable of producing more than 2,000 gpm of water; most of the irrigation wells in the valley obtain their water from this unit.

Ground Water

In the San Pedro River valley ground water generally occurs under unconfined conditions in the flood-plain alluvium and under confined or unconfined conditions in the valley-fill deposits. In the valley-fill deposits ground water occurs under strong artesian pressure in three

general areas—Palominas-Hereford, St. David-Benson, and Mammoth—and the artesian pressure is sufficient to cause the water in most wells to flow at the land surface. In the Palominas-Hereford area artesian water generally is present at depths of about 200 feet below the land surface. In the area that extends from St. David southward for about 6 miles, water in the valley fill is under artesian pressure at depths greater than 200 feet. In the area that extends from Benson northward to near the Tres Alamos Ranch, water is under artesian pressure at depths of 500 to 1,000 feet below the land surface. Along the San Pedro River in the area that extends southward from Mammoth for about 10 miles, water in the valley fill is under artesian pressure at depths of 550 to 1,370 feet below the land surface. In the immediate vicinity of Mammoth artesian water has been reported in wells at depths of about 300 feet.

The general pattern of ground-water movement is from the areas of recharge along the mountain fronts toward the axis of the valley and then northward along the axis. Some of the artesian water in the valley-fill deposits moves upward to the flood-plain alluvium through breaks in the confining beds or through perforations in the casings of wells that penetrate both aquifers. The slope of the water table increases downvalley in conformance with the slope of the San Pedro River. In the upper San Pedro basin the average slope of the water table is 16 feet per mile, and in the lower San Pedro basin the average slope of the water table is 21 feet per mile. The configuration of the water table is shown on plates 1 and 2 by water-level contours that connect points of equal water-table altitude. The contours are based primarily on water-level measurements made in spring 1968. The potentiometric surface of the artesian head is not shown because of insufficient data. Few wells have been drilled along the flanks of the valley north of Benson, and the water table is poorly defined in this area.

Water-yielding characteristics of the aquifers.--The yield and specific capacity of a well are functions of the thickness and hydrologic characteristics of the water-bearing material, well construction, and pumping operations. The yield data in this report were obtained from records of well drillers and from measurements made during normal pumping operations; therefore, the figures may not represent maximum yields. The specific capacity of a well is the relation of yield to drawdown—that is, its yield in gallons per minute per foot of drawdown caused by pumping. The yield and specific-capacity data for wells in the San Pedro River valley—except those for domestic and livestock

wells—are summarized in the following tabulation, and yield data for selected wells are given in table 2 (see appendix).

Area	Aquifer	Yield			Specific capacity		
		Number of wells tested	Range (gpm)	Average (gpm)	Number of wells tested	Range (gpm per foot)	Average (gpm per foot)
Upper San Pedro basin	Flood-plain alluvium	33	200-1,800	770	11	10-110	40
	Valley-fill deposits	44	100-2,800	590	25	1- 40	13
Lower San Pedro basin	Flood-plain alluvium	46	250-2,700	1,200	15	20-320	100
	Valley-fill deposits and possibly the consolidated to semiconsolidated sedimentary rocks	7	70-1,900	850	4	3- 30	16

Data for wells that may obtain water from both the flood-plain alluvium and the valley-fill deposits in the Palominas-Hereford area are not included in the above tabulation; the wells yield as much as 1,800 gpm. The flood-plain alluvium generally yields water more readily to wells than the valley-fill deposits; although wells that obtain water from the valley-fill deposits may have large yields, a greater thickness of valley fill than of flood-plain alluvium generally must be penetrated to obtain similar yields. The contrast is shown by the difference in average specific capacity for the two aquifers.

In the upper San Pedro basin the largest yields from the valley-fill deposits are from wells in the Palominas-Hereford area. Five of the seven wells that yield more than 1,000 gpm from the valley fill, including one well that yields more than 2,000 gpm, are in this area. One

well in the area taps ground water under artesian pressure and reportedly flowed at a rate of 500 gpm when completed sometime prior to 1945. At the present time, flow from artesian wells in this area is controlled; in the St. David-Benson area, however, many small-diameter wells tap ground water under artesian pressure and are allowed to flow freely at the surface. The few water-level measurements available for artesian wells in the St. David-Benson area indicate that an artesian-pressure decline equivalent to at least 10 feet of head has occurred in some wells since 1940.

Two aquifer tests to determine the transmissivity and storage coefficient of the valley-fill deposits were made at different wells in the Fort Huachuca well field (Brown and others, 1966, p. 29). Transmissivity is the rate at which water is transmitted through a unit width of the aquifer under a unit hydraulic gradient. The storage coefficient of an aquifer is dimensionless and is defined as the volume of water released from or taken into storage per unit surface area of the aquifer per unit change in head. The first test was made in October 1958 and gave an estimated transmissivity of 20,000 cubic feet per day per foot of aquifer. The second test was made on November 1, 1960, and gave an estimated transmissivity of 31,000 cubic feet per day per foot of aquifer and a storage coefficient of 1.6×10^{-5}. Data from the second test are considered more representative of the characteristics of the aquifer than data from the first test.

In the lower San Pedro basin only a few large-capacity wells obtain water from the valley-fill deposits. Yield data are available for seven large-capacity wells in the Mammoth-San Manuel area; five of the wells are more than 1,000 feet deep and probably obtain part of their water from the underlying consolidated to semiconsolidated sedimentary rocks. In the Mammoth area wells that tap water under artesian pressure yield as much as 500 gpm when allowed to flow freely.

Effects of ground-water withdrawal. -- Water levels fluctuate seasonally in response to pumping and recharge in the San Pedro River valley, but in the last 25 years the net change has been small except in the Sierra Vista-Fort Huachuca area (fig. 3). Some of the land along the San Pedro River was occupied by phreatophytes before it was developed for irrigation; therefore, one water use has been replaced by another. The fact that there has been no long-term net decline in ground-water levels indicates that recharge to the flood-plain alluvium along the San

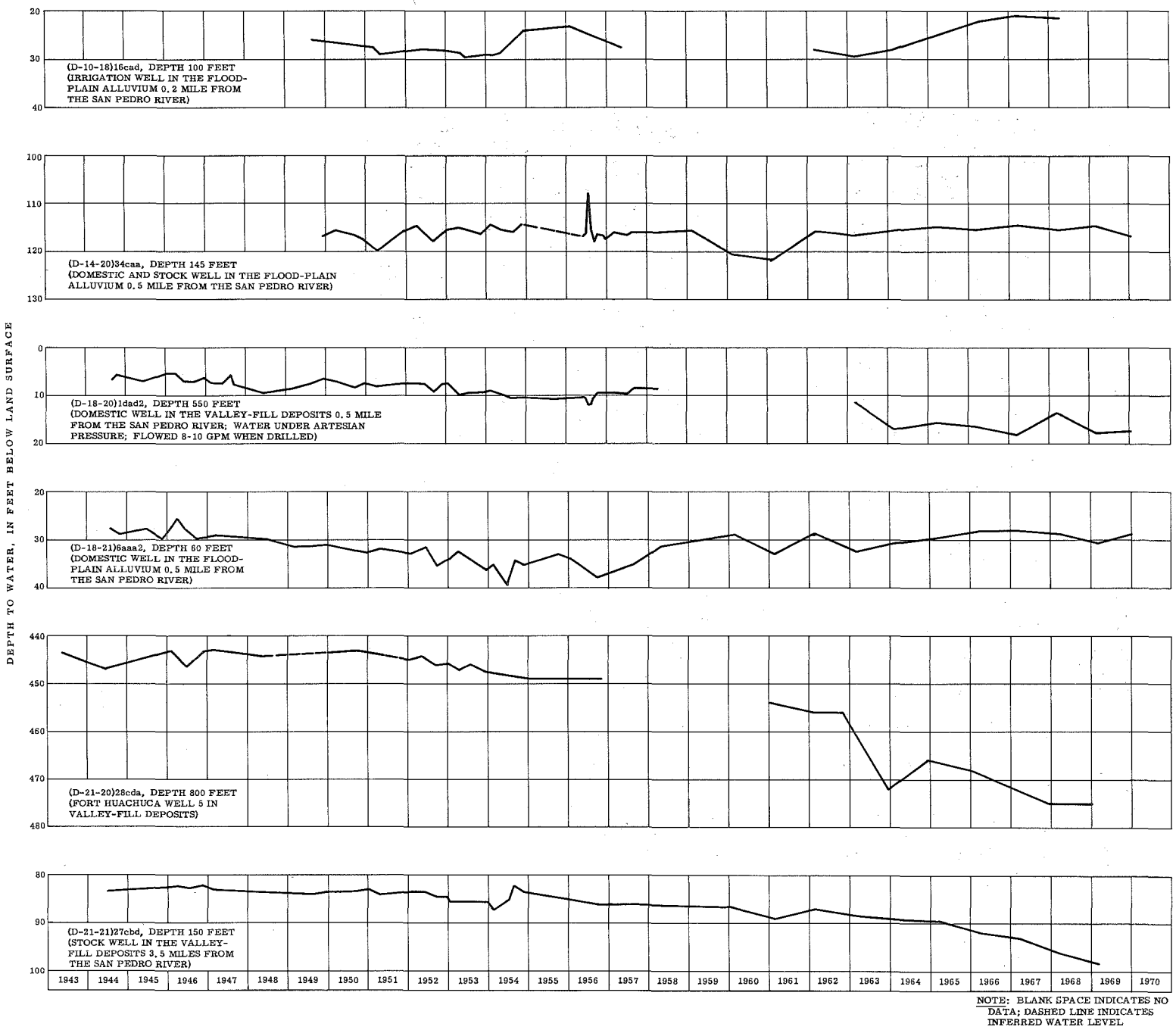


FIGURE 3.--WATER LEVELS IN SELECTED WELLS IN THE SAN PEDRO RIVER VALLEY.

Pedro River has been sufficient to balance the use of water by phreatophytes and the use of water for irrigation.

The amount of ground-water withdrawal is in excess of the amount of recharge in the Sierra Vista-Fort Huachuca area; a cone of depression has developed in the area, and near the center of the cone, water levels have declined about 30 feet in 25 years. As withdrawal continues in excess of recharge, the cone of depression will expand and deepen. From 1965 to 1969, the water level in well (D-21-21)27cbd about 6 miles east of Sierra Vista declined 9 feet owing to the expansion of the cone of depression (fig. 3).

Surface Water

The flow in the San Pedro River is continuous in places where the streambed intercepts the water table or where it is fed by springs; elsewhere, flow occurs only in direct response to precipitation. Records of the low flows at three long-term gaging stations on the San Pedro River—at Palominas, at Charleston, and near Redington—show the variations in the magnitude and duration of the flow from year to year (fig. 4). The percentage of time that the daily flows equal or exceed 1 cfs (cubic foot per second) at gaging stations in the San Pedro River valley is given below.

Station	Period of record	Percentage of time that daily flow equals or exceeds 1 cfs
San Pedro River at Palominas . . .	1930-33, 1935-40, 1950-67	69
San Pedro River at Charleston . . .	1928-33, 1935-67	99+
San Pedro River near Redington . .	1943-46, 1950-67	44
San Pedro River near Mammoth . .	1931-40	44
Aravaipa Creek near Mammoth. . .	1919-21, 1931-40, 1941-42, 1966-67	88

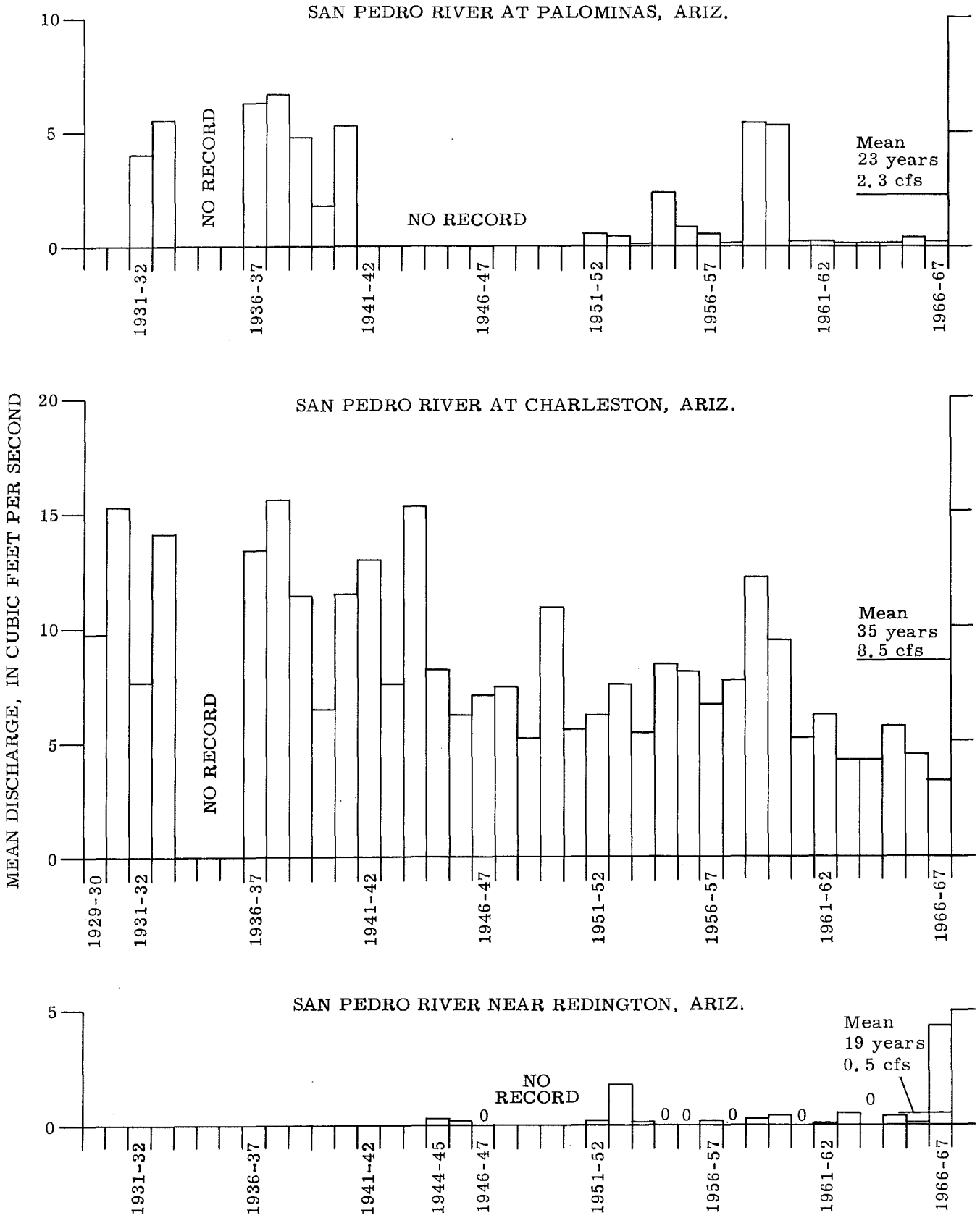


FIGURE 4.--LOWEST MEAN DISCHARGES FOR 90 CONSECUTIVE DAYS IN THE 12-MONTH PERIOD APRIL 1 THROUGH MARCH 31 FOR THE SAN PEDRO RIVER AT PALOMINAS, AT CHARLESTON, AND NEAR REDINGTON.

Periods of no flow occur at the Palominas gaging station in most summers. Flow increases between the Palominas and Charleston gaging stations; at Charleston, the underlying bedrock forces ground water to the surface, and the river flows continuously. From 1928 to 1970 the minimum flow at this station was 0.5 cfs (U.S. Geological Survey, 1971, p. 107). The San Pedro River at Fairbank, which is 8-1/2 miles downstream from Charleston, is dry at times in most summers. When available, water from the San Pedro River is diverted for irrigation by the St. David ditch about 7 miles south of St. David and by the Pomerene Canal 9 miles farther downstream. The river flows only in direct response to precipitation at the Narrows—an area 11 miles north of Benson. Ground water is forced to the surface several miles north of Cascabel, and the flow probably is perennial in the reach that extends almost to the gaging station near Redington. Flow usually ceases in the spring or early summer at the gaging station near Redington. Streamflow generally is not sustained for long periods downstream from Redington, except where seeps and springs contribute flow to the river. In the San Pedro River flood plain 6 miles south of Winkelman, Leroy Springs contribute flow to the river when the spring flow is not diverted for irrigation; based on 12 discharge measurements made since June 1962, the flow of the springs ranges from 1.1 to 3.5 cfs and averages 2.3 cfs. Flow at the mouth of the San Pedro River ceases during extended periods of no precipitation.

The flow of several spring-fed tributaries to the San Pedro River is lost through evapotranspiration and infiltration as the streams traverse the unconsolidated deposits along the margins of the valley. The Babocomari River, which is a major tributary to the San Pedro River in the upper basin, flows continuously only in parts of its lower reaches. In the lower San Pedro basin Aravaipa Creek usually is dry where it joins the San Pedro River; however, flow is continuous 6 miles upstream at the gaging station.

Chemical Quality of Water

The chemical quality of water in the San Pedro River valley generally is suitable for most uses; in places, however, the water contains large concentrations of fluoride or sulfate. Chemical analyses of water from selected wells and springs and of water from the San Pedro River sampled during low flow are given in tables 4 and 5, respectively. (See appendix.) Most of the water samples were collected in the 1950's;

generally, no significant changes in the quality of water are apparent where more recent analyses are available for comparison. The water-quality data in this report are given in milligrams per liter (mg/l), degress Celsius (°C), and micromhos at 25°C. The terms "parts per million" and "milligrams per liter" are practically synonymous for water containing less than 7,000 mg/l dissolved solids.

Domestic use and public supply.--The U. S. Public Health Service (1962) has recommended that water for drinking purposes should contain no more than 500 mg/l of dissolved solids. Water containing a higher dissolved-solids content is used, however, if better water is not available. Recommended limits for some of the chemical constituents are given below.

Constituent	Concentration (mg/l)
Sulfate (SO_4)	250
Chloride (Cl)	250
Nitrate (NO_3)	45
Dissolved solids	500

The U. S. Public Health Service (1962) recommends lower, optimum, and upper limits for fluoride based on the annual average of maximum daily air temperature. For the San Pedro River valley these limits are:

Annual average of maximum daily air temperatures	Recommended control limit (fluoride concentrations in mg/l)		
	Lower	Optimum	Upper
71° - 79°F (as at Tombstone and Fort Huachuca)	0.7	0.8	1.0
79° - 90°F (as at Winkelman and Benson)	.6	.7	.8

The concentration of fluoride in drinking water should not average more than the upper limit, and average concentrations greater than twice the

optimum values constitute grounds for rejection of the supply. The upper and lower limits indicate the range in which the average concentration should be kept where fluoridation is practiced.

Except for fluoride, concentrations of the above mentioned chemical constituents in excess of those recommended by the U. S. Public Health Service (1962) may not be cause for rejection of a water supply; however, high mineral concentrations in water affect the taste. Excess chloride imparts a salty taste to the water, and excess sulfate, particularly when associated with magnesium, imparts an unpleasant taste to the water and may have a laxative effect on the consumer. Excessive amounts of fluoride in drinking water cause mottling of the enamel in children's teeth, but amounts in the optimum range (0. 7 to 0. 8 mg/l for the San Pedro River valley) will help to prevent tooth decay. Fluoride concentrations of more than 8 mg/l in drinking water may cause bone changes if the water is consumed for a long period of time (Hodge and Smith, 1954, p. 86). Excessive nitrate is particularly harmful to infants, resulting in some instances in methemoglobinemia—the so-called blue-baby disease. Excessive nitrate may be an indication of contamination from sewage or chemical fertilizers.

In the St. David-Benson area in the upper San Pedro basin large amounts of fluoride are present in the ground water in the flood-plain alluvium and in the valley-fill deposits. In the upper basin the largest measured fluoride concentration is 6. 4 mg/l in water from well (D-18-21)5bb, which taps the valley-fill deposits at St. David. Fluoride concentrations in the water from wells vary areally and with depth owing to differences in the composition of the water-bearing materials penetrated. For example, in well (D-17-20)9cbc at Benson the fluoride content of the water decreased from 3. 4 mg/l at a depth of 355 feet to 2. 7 mg/l at a depth of 1,088 feet. Fluoride concentrations in ground water in the Sierra Vista-Fort Huachuca and Palominas-Hereford areas do not exceed the tolerable limit of 1. 6 mg/l. Municipal well (D-20-22)11aca at Tombstone yields water that contains 2. 2 mg/l fluoride; however, the water is mixed with spring flow from Miller Canyon in the Huachuca Mountains to lower the fluoride concentration.

In the upper San Pedro basin large amounts of sulfate are present in the water from several wells in the Benson-Pomerene area and from well (D-20-20)7bbd near the south end of the Whetstone Mountains. The largest sulfate concentration measured in the upper San Pedro basin is 2,360 mg/l in a water sample from a depth of 130 feet in well

(D-16-20)6acc2 at the Tres Alamos Ranch; however, the sulfate concentration decreased to 1,000 mg/l when the well was deepened to 875 feet. The sulfate content of the water in well (D-17-20)9cbc at Benson decreased from 1,950 mg/l at a depth of 355 feet to 850 mg/l at a depth of 1,088 feet.

Only one ground-water sample from the upper San Pedro basin contained an excessive amount of nitrate—53 mg/l. The water sample was collected in 1952 from well (D-18-21)6aaa2 at St. David, but an analysis of a sample collected from this well in 1954 showed 8.5 mg/l nitrate. The reason for the seeming decrease in nitrate is not known.

In the lower San Pedro basin south of Mammoth, large amounts of fluoride are present in the ground water in the flood-plain alluvium and in the valley-fill deposits. In the area that extends from north of Mammoth to Winkelman, the fluoride content in water from the San Pedro River and in water from many of the wells in the flood-plain alluvium exceeds the recommended limit for drinking water. In the lower San Pedro basin the largest measured fluoride concentration is 30 mg/l in water from well (D-8-17)36acd southeast of Mammoth.

The largest measured sulfate concentration in water in the lower San Pedro basin is 4,620 mg/l in a sample from well (D-13-20)23dcc near Cascabel. The water from this well also contains excessive chloride, and the dissolved-solids content is 9,200 mg/l. The dissolved-solids content generally is high in water from the flood-plain alluvium and the San Pedro River in the northern part of the lower San Pedro basin.

Several wells in the lower San Pedro basin yield hot water. The water temperature in artesian well (D-8-17)32daa south of Mammoth is 42°C (108°F), and the temperature of the water in several wells on the slopes of the valley south of Mammoth is more than 38°C (100°F).

Livestock use. --In general, water in the San Pedro River valley is of suitable chemical quality for use by livestock. Only one water sample collected for analysis contained more than 5,000 mg/l dissolved solids. Quantitative data are few concerning the tolerance levels of dissolved solids in water consumed by livestock; however, greater amounts of dissolved solids can be tolerated by animals than by humans. Although some investigators recommend about 5,000 mg/l as the upper limit of

dissolved solids for livestock, water of better quality is necessary for the best growth and development of the animals (Hem, 1970, p. 324).

The effects of fluoride in drinking water are similar for animals and humans (McKee and Wolf, 1963, p. 191). Water samples from one well in the lower San Pedro basin contained sufficient excess fluoride (30 mg/l) to cause concern as to bone changes in cattle.

Irrigation use. -- The main considerations in the evaluation of the chemical quality of water for irrigation use are total dissolved solids and the ratio of sodium to calcium and magnesium. Water that has a high sodium concentration relative to calcium and magnesium has an undesirable effect on the soil to which it is applied. Sodium is adsorbed in the soil and replaces calcium and magnesium. An increase in sodium in the soil decreases permeability and can make the soil difficult to cultivate (U.S. Salinity Laboratory Staff, 1954, p. 5). When water that contains a large amount of dissolved solids is applied to the soil, the salt content of the soil increases, and the plants do not grow well.

The U.S. Salinity Laboratory Staff (1954) has developed a method for evaluating water on the basis of the sodium-adsorption ratio (SAR) and the specific conductance of water (fig. 5). The SAR value is computed as

$$SAR = \frac{(Na^{+})}{\sqrt{\frac{(Ca^{+2}) + (Mg^{+2})}{2}}},$$

where the ion concentrations are expressed in milliequivalents per liter. Specific conductance is a measure of the ability of the ions in solution to conduct an electrical current and is an indication of the amount of dissolved-solids concentration in the water. The dissolved-solids content of water in the San Pedro River valley generally is between 0.6 and 0.7 of the specific conductance. The sodium-adsorption ratio is a measure of the alkali hazard to the soil, and the specific conductance is a measure of the salinity hazard.

Many of the analyses of water from the San Pedro River valley indicate some salinity hazard but no sodium hazard (fig. 5). The ground water in the Palominas-Hereford area generally is low in salinity hazard.

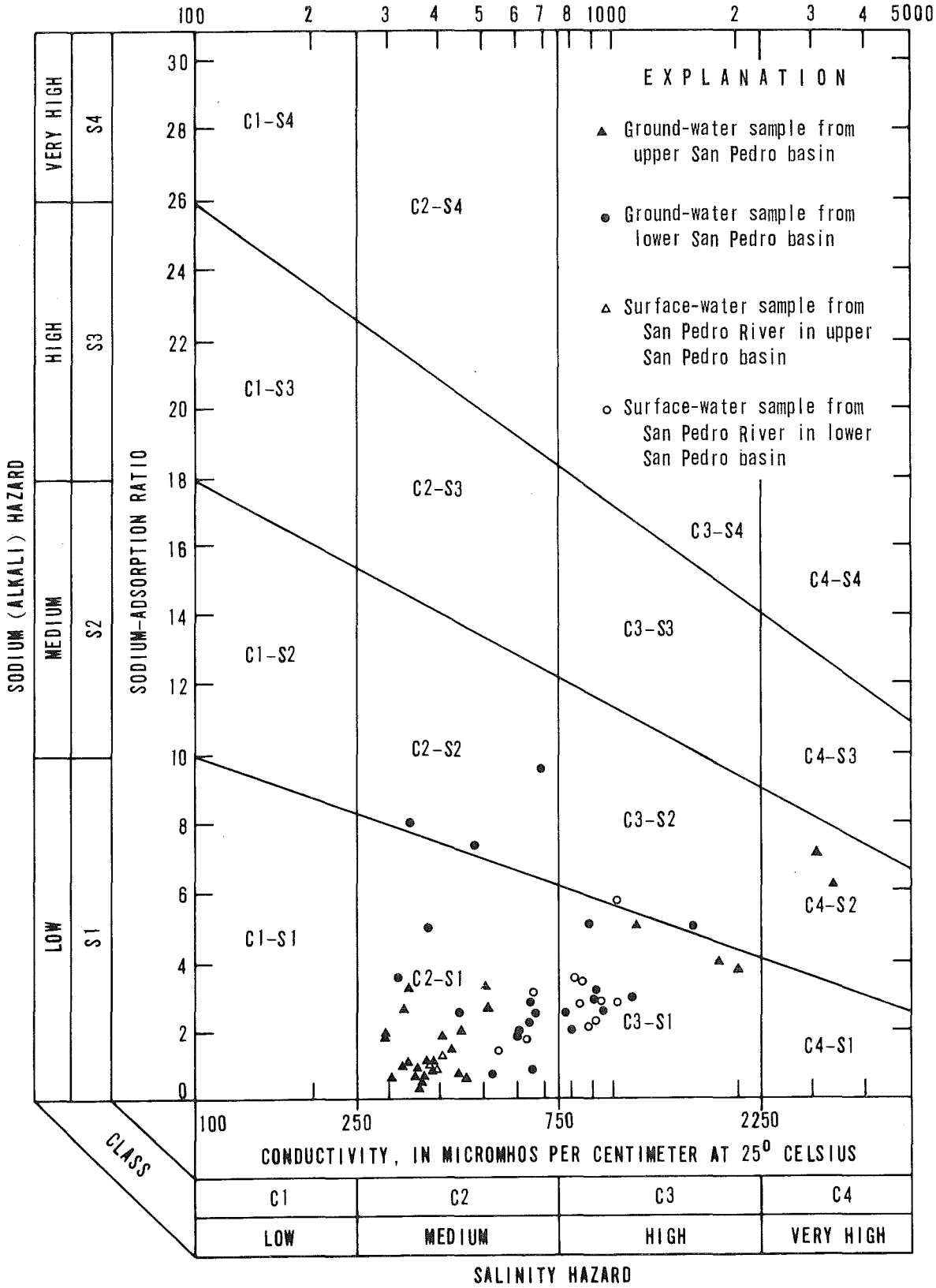


FIGURE 5. --SODIUM AND SALINITY HAZARD OF WATER. DIAGRAM ADOPTED FROM U. S. SALINITY LABORATORY STAFF (1954).

Several samples of ground water from the St. David-Benson-Pomerene area are classed as high or very high in salinity hazard, and most samples of ground water and surface water from the lower end of the lower basin are high in salinity hazard. According to the U. S. Salinity Laboratory Staff (1954, p. 81), water of high and very high salinity is not suitable for irrigation under ordinary conditions but may be used occasionally under very special circumstances; the soil must be permeable, drainage must be adequate, and special management practices must be employed.

SUMMARY

Ground water from wells furnishes most of the water used in the San Pedro River valley. Additional supplies are obtained by the diversion of surface water from the San Pedro River and by the development of springs. In 1968 the estimated ground-water pumpage was 77,300 acre-feet, of which 50 percent was used for irrigation, 40 percent for mining and industry, and 10 percent for public supply; in addition, 6,000 acre-feet was diverted from the San Pedro River for irrigation. The amount of irrigated acreage in the valley increased from about 2,700 acres in 1890 to 12,500 acres in 1966 and then decreased to 9,700 acres in 1970.

The principal aquifers are the valley-fill deposits and the flood-plain alluvium. Ground water generally occurs under unconfined conditions in the flood-plain alluvium and under confined or unconfined conditions in the valley-fill deposits. Water in most wells that tap the valley-fill deposits flows at the land surface in three general areas—Palominas-Hereford, St. David-Benson, and Mammoth. Much of the irrigation pumpage is from the flood-plain alluvium along the San Pedro River; the unit receives recharge readily from flow in the river. In general, the water levels in the valley have shown little net change in the last 25 years, except in the Sierra Vista-Fort Huachuca area where water levels have declined as much as 30 feet.

In general, the chemical quality of the ground water in the San Pedro River valley is suitable for most uses; in places, however, the water contains large concentrations of fluoride or sulfate. Excessive fluoride is present in water in the St. David-Benson and Mammoth areas. Water of high to very high salinity, which is undesirable for irrigation, occurs in some wells in the St. David-Benson-Pomerene area and in the lower end of the lower basin.

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APPENDIX—BASIC DATA

Table 2.--Records of selected wells and springs, San Pedro River valley

Location: See page 4 for description of well-numbering and location system.
Land-surface altitude: Determined from U.S. Geological Survey topographic maps, unless otherwise indicated. L, spirit level by University of Arizona; S, spirit level by U.S. Geological Survey.
Perforated interval: OH, open hole.
Water level: R, reported.

Pumping data: E, estimated; R, reported.
Well log: X, driller's log of well included in table 3.
Chemical analysis: X, chemical analysis included in table 4.
Use of water: D, domestic; I, irrigation; Ind, industrial; N, none; PS, public supply; S, stock.

Location	Land-surface altitude (feet above mean sea level)	Date completed (year)	Reported depth (feet)	Diameter of casing (inches)	Depth of casing (feet)	Perforated interval (feet below land surface)	Water level		Pumping data			Well log	Chemical analysis	Use of water	Remarks
							Date (month, year)	Feet below land surface	Date (month, year)	Yield (gpm)	Pumping level (feet below land surface)				
LOWER SAN PEDRO BASIN															
(D-5-15)23cac	1,920	----------	---------	---------	-------	----------	3/68	6.2	-------	-------	----------	----	---------	N	
23ddb	1,910	1951	8	8	-------	----------	5/51 3/68	6.0 2.9	-------	-------	----------	----	---------	N	
24cac	1,920	1946	33	8	33	----------	9/49 3/69	13.8 16.1	-------	-------	----------	----	X	N	Domestic use prior to 1966.
25bad	1,940	1967	130	20	130	48- 100	3/67	48 R	-------	-------	----------	X	---------	Ind	
25bcd	1,950	1948	68	16	68	----------	3/50 3/68	19.5 17.2	-------	-------	----------	----	---------	I	
25cdb	1,955	----------	---------	8	-------	----------	3/68	14.7	-------	-------	----------	----	---------	D	Windmill pumping during measurement.
25ddb	1,960	----------	---------	---------	-------	----------	9/66	10.0	-------	-------	----------	----	---------	I	
(D-5-16)31bbd2	1,970	----------	---------	20	-------	----------	3/68	22.7	5/67	2,120	35.8	----	---------	I	Water temperature 21°C, May 1967.
31bdac2	2,000	1952	110	20	-------	----------	3/54 3/68	46.2 41.6	3/54	1,260	----------	----	---------	I	Water temperature 21°C, March 1954.
31cdda	1,980	1953	80	20	-------	----------	3/68	12.6	5/67	815	46.0	----	---------	I	Water temperature 22°C, May 1967.
(D-6-15)33cba	3,350	----------	263	36-6	-------	----------	3/50 3/68	61.0 44.3	-------	-------	----------	----	---------	D, S	Dug to 95 feet; drilled to 263 feet.
(D-6-16)6add	1,990	1953	42	20	38	OH 38- 42	3/54 3/68	17.4 17.6	3/54	450 R	37	----	---------	D, I	
6dbc2	2,025	----------	---------	16	-------	----------	-------	----------	3/68	-------	23.3	----	---------	I	
8acd	2,040	1950	60	8	60	----------	9/50 2/67	28.1 29.9	-------	-------	----------	----	---------	I	Dug well; originally 20 feet deep. Driller reports all gravel below 20 feet.
8cbb	2,020	1949	106	18	106	80- 105	3/50 3/66	26.6 32 R	1949 5/67	1,250 1,060	---------- 38.7	----	X	I	Drawdown 5 feet below static water level. Driller reports gravel to very fine sand at 25-100 feet.
8cdb	2,035	1945	119	10	119	50- 119	10/50 3/68	28.9 27.6	-------	-------	----------	X	---------	I	
16cbda	2,060	1956	70	10	-------	----------	7/56 3/68	31.0 18.4	-------	-------	----------	----	---------	I	
17dbd	2,035	----------	---------	---------	-------	----------	-------	----------	10/50 12/67	1,000 980	---------- ----------	----	X	-----	Leroy Springs.

Table 2.--Records of selected wells and springs, San Pedro River valley—Continued

Location	Land-surface altitude (feet above mean sea level)	Date completed (year)	Reported depth (feet)	Diameter of casing (inches)	Depth of casing (feet)	Perforated interval (feet below land surface)	Water level: Date (month, year)	Water level: Feet below land surface	Pumping data: Date (month, year)	Pumping data: Yield (gpm)	Pumping data: Pumping level (feet below land surface)	Well log	Chemical analysis	Use of water	Remarks
LOWER SAN PEDRO BASIN—Continued															
(D-6-16)17dcc	2,070	----------	---------	8	-------	----------	3/68	4.3	-------	-------	----------	----	---------	-----	
21cac	2,075	1952	90	16	90	30- 80	6/52 3/68	32 R 32.3	7/56	430	----------	----	---------	I	Drawdown 15.7 feet below static water level. Water temperature 21°C, July 1956.
29bdd	2,125	1947	237	6	-------	----------	1947 3/68	52 R 45.7	-------	-------	----------	----	---------	N	
33aab	2,120	1964	90	20	90	33- 75	5/64 3/68	21 R 18.3	5/64	2,700	38	----	---------	Ind	
33abdb	2,120	----------	---------	---------	-------	----------	3/68	32.3	-------	-------	----------	----	---------	Ind	
33aca	2,120	1959	100	20	100	40- 85	3/68	20.2	-------	2,400	----------	X	---------	Ind	Drawdown 9.5 feet below static water level.
33bcdc	2,110	1938	81	16	81	36- 81	1938 3/68	14 R 7.9	1938	2,200 R	45 R	----	---------	I	
33cac	2,115	1948	85	20	85	14- 85	3/48 3/68	14 R 13.8	7/56	2,020	----------	----	X	I	
33ccd	2,115	----------	---------	---------	-------	----------	-------	----------	2/51	50-100 E	----------	----	X	-----	One of several springs at Cooks Lake.
(D-7-15)4baa	3,330	----------	420	8	300	----------	9/49	246	4/51	2 E	----------	----	X	S	
(D-7-16)4bca	2,145	1948	52	20	-------	0- 30	4/52 4/66	22.9 18.8	8/50 5/67	400 E 1,580	21.9 ----------	----	X	I	
8daa	2,240	1955	130	20	125	60- 123	1955 3/68	47 R 41.3	1955	25 R	80 R	X	---------	Ind	
9dac	2,170	----------	87	10	87	27- 87	9/46 3/68	17 R 7.4	9/49 9/50	700 R 420	---------- ----------	X	X	I	Drawdown 20 feet below static water level reported, September 1949. Water temperature 23°C, July 1956.
10aac	2,195	----------	---------	54	-------	----------	10/50 3/68	37.3 11.4	-------	-------	----------	----	---------	N	
10bac1	2,190	----------	75	8	-------	----------	4/66 3/68	17.9 13.8	-------	-------	----------	----	---------	-----	
10bcc1	2,170	1935	40	8	-------	----------	10/50 3/68	24.9 8.8	-------	-------	----------	----	---------	D, S	
10caa	2,190	----------	84	16	84	40- 84	3/48	40 R	9/66	2,070	----------	----	---------	I	
10cca	2,180	----------	---------	6	-------	----------	9/49 3/68	44.5 33.9	-------	-------	----------	----	---------	-----	

Table 2.--Records of selected wells and springs, San Pedro River valley—Continued

Location	Land-surface altitude (feet above mean sea level)	Date completed (year)	Reported depth (feet)	Diameter of casing (inches)	Depth of casing (feet)	Perforated interval (feet below land surface)	Water level: Date (month, year)	Water level: Feet below land surface	Pumping data: Date (month, year)	Pumping data: Yield (gpm)	Pumping data: Pumping level (feet below land surface)	Well log	Chemical analysis	Use of water	Remarks
LOWER SAN PEDRO BASIN—Continued															
(D-7-16)11acc	2,220	----------	---------	---------	-------	----------	3/68	12.1	-------	-------	----------	----	---------	I	
11adc	2,210	----------	87	16	-------	----------	4/52 3/68	38.7 14.5	9/66	1,810	35.8	----	X	I	
16aad	2,170	----------	72	8	-------	----------	3/50 3/68	11.3 6.8	-------	-------	----------	----	---------	S	
22add	2,206 S	----------	---------	20	-------	----------	9/49 4/68	16.0 14.2	5/67	1,720	54.6	----	---------	I	
22dbb	2,245	1958	120	10	-------	----------	2/58 4/66	37.0 38.4	-------	-------	----------	----	---------	Ind	
26aac	2,270	----------	---------	12	-------	----------	3/68	25.3	-------	-------	----------	----	---------	-----	
26ddc1	2,270	1947	116	20	-------	----------	9/49 4/66	28.5 27.8	9/49 5/67	850 E 1,270	38.1 ----------	----	X	I	
27aad	2,240	----------	25	6	-------	----------	3/50 3/68	23.3 20.3	-------	-------	----------	----	---------	S	
35acc	2,250	----------	14	48	-------	----------	3/50 3/68	13 12.7	-------	-------	----------	----	---------	S	Dug well.
36cda	2,270	1953	150	20	150	----------	2/58 3/68	46.6 38.2	9/66 5/67	1,740 2,010	47.1 50.2	----	---------	I	Water temperature 27°C, May 1967.
(D-7-17)4dbb	2,400	----------	---------	---------	-------	----------	4/66	12.0	-------	-------	----------	----	---------	D, I	Dug well.
7abb	2,290	1948	85	20	85	30- 85	10/50 3/68	39.1 21.1	-------	-------	----------	----	---------	N	
8baa	2,330	----------	---------	---------	-------	----------	3/68	5.3	-------	-------	----------	----	---------	N	
23dbc2	3,260	1951	76	6	76	----------	1/51	27 R	-------	2 E	----------	----	X	S	
(D-8-16)1abc	2,280	1943	120	10	-------	----------	9/49 3/68	25.1 23.8	9/49	750 R	----------	----	---------	I	
1cbb	2,340	1958	100	6	100	95- 100	6/58 3/68	73.8 69.8	-------	-------	----------	----	---------	N	
12dad	2,315	1950	---------	6	-------	----------	10/50 3/68	25.6 13.5	-------	-------	----------	----	---------	S	
25dcd	2,910 S	1948	2,144	---------	-------	----------	7/48 3/68	375 456.5	-------	-------	----------	X	---------	N	
35adc1	3,020	1945	1,230	---------	-------	----------	9/45 3/68	357 R 494.7	-------	-------	----------	----	---------	N	
(D-8-17)7bbb	2,310	1950	90	16	-------	----------	12/50 3/68	38 R 31.7	-------	-------	----------	X	---------	D	

Table 2.--Records of selected wells and springs, San Pedro River valley—Continued

Location	Land-surface altitude (feet above mean sea level)	Date completed (year)	Reported depth (feet)	Diameter of casing (inches)	Depth of casing (feet)	Perforated interval (feet below land surface)	Water level		Pumping data			Well log	Chemical analysis	Use of water	Remarks
							Date (month, year)	Feet below land surface	Date (month, year)	Yield (gpm)	Pumping level (feet below land surface)				
LOWER SAN PEDRO BASIN—Continued															
(D-8-17)14bcd	3,040	----------	---------	6	-------	----------	7/58 3/68	308 296.4	-------	-------	----------	----	---------	S	
17cbb1	2,360	----------	---------	---------	-------	----------	10/50 3/68	30.1 32.0	-------	-------	----------	----	---------	-----	
17ccd	2,340	----------	80	12	-------	----------	8/44 3/68	21.8 13.2	8/44	350	----------	----	---------	I	
18baa	2,320	----------	75	12	-------	----------	2/51 3/68	32.5 24.1	-------	-------	----------	----	---------	N	
18cba	2,380	----------	---------	12	-------	----------	3/68	52.1	-------	-------	----------	----	---------	D	
18cda2	2,400	1954	340	8	-------	24- 236	1954 6/67	54 R 37 R	-------	-------	----------	----	---------	PS	Originally drilled to 162 feet, date unknown.
18cdc	2,400	1955	347	8- 6	347	127- 347	1955 3/58	86 R 85.7	-------	-------	----------	X	---------	PS	School water supply.
18dbc	2,360	1953	306	8	-------	----------	1953 6/67	37.4 R 37 R	-------	-------	----------	----	---------	PS	
18dcb	2,360	1955	150	---------	-------	----------	3/55 6/67	37 R 40 R	-------	-------	----------	----	---------	PS	
19dad1	2,350	1949	46	6	-------	----------	9/49 3/69	11.6 11.7	-------	-------	----------	----	X	D	
29dda	2,382 S	1949	100	16	-------	----------	9/49 2/67	13.4 10.0	9/50 5/67	1,700 1,590	---------- 36.0	X	X	I	
30aab	2,460	1954	295	12	295	90- 290	1954 8/68	90 R 94.5 R	1954 8/68	30 100	95 162	X	---------	PS	
30acb	2,580	----------	1,750	---------	-------	----------	8/68	221 R	8/68	310 R	230 R	----	---------	PS	
31cba	----------	1964	400	6	400	330- 400	6/64	320 R	-------	-------	----------	----	---------	-----	
32daa	2,385	1937	1,485	16-12	1,200	OH 1,200-1,485	9/50	Flowing	9/50	20	Artesian flow	X	X	N	
33bdd	2,421 S	----------	70	6	-------	----------	3/54 3/68	31.6 26.0	-------	-------	----------	----	---------	D	Dug to 9 feet; drilled to 70 feet.
36acd	2,980	1949	425	6	425	----------	1949	255 R	2/51	26	----------	----	X	S	
(D-8-18)19baa	3,200	1953	1,939	20-16-10	1,606	----------	1953	420 R	-------	-------	----------	X	---------	N	Casing has been removed.
(D-9-16)2bab	3,185	1949	1,300	72 x 144	-------	----------	-------	317 R	-------	1,160 R	----------	----	X	Ind	Mine shaft.
(D-9-17)4ada	2,470	1952	---------	18	-------	----------	3/54 3/68	41.3 37.3	-------	1,200 R 1,110	---------- 43.6	----	---------	I	Drawdown 5 feet below static water level reported. Water temperature 22°C, September 1966.

Table 2.--Records of selected wells and springs, San Pedro River valley—Continued

Location	Land-surface altitude (feet above mean sea level)	Date completed (year)	Reported depth (feet)	Diameter of casing (inches)	Depth of casing (feet)	Perforated interval (feet below land surface)	Water level: Date (month, year)	Water level: Feet below land surface	Pumping data: Date (month, year)	Pumping data: Yield (gpm)	Pumping data: Pumping level (feet below land surface)	Well log	Chemical analysis	Use of water	Remarks
LOWER SAN PEDRO BASIN—Continued															
(D-9-17)4cdd	2,435	1930	36	6	-------	----------	4/50 3/68	18 R 10.3	4/50	2.5 E	----------	----	---------	D	Dug well to 18 feet; $4\frac{1}{2}$ by $4\frac{1}{2}$ feet.
9ddd	2,470	----------	1,520	12	-------	----------	6/67 3/68	84 R 43.4	-------	-------	----------	----	---------	Ind	
10dcb	2,494 S	----------	85	6	-------	----------	11/49 3/68	57.0 54.1	9/49	4 E	----------	----	X	S	Water temperature 32°C, September 1949.
14cdb	2,487 S	----------	54	6	-------	----------	9/50 3/69	22.6 14.0	-------	-------	----------	----	X	D, S	
14cdc	2,490	----------	---------	16	-------	----------	3/58 4/66	12.4 11.9	3/58 5/67	1,000 R 1,480	---------- 24.8	----	---------	I	Water temperature 24°C, May 1967.
14cdd	2,515	----------	---------	8	-------	----------	9/49 4/66	Flowing Flowing	9/49	30	Artesian flow	----	X	-----	
15adb	2,472 S	----------	53	8	-------	----------	9/49 4/59	15.8 17.4	-------	-------	----------	----	---------	I	
15cba	2,520	1958	1,300	22	480	240- 480 OH 480-1,300	10/58 2/59	103.3 99.4	-------	-------	----------	X	---------	Ind	
22abb2	2,525	1954	1,007	20-16	1,007	110-1,007	3/54	57 R	3/54 3/54	1,500 R 1,900 R	116 R 263 R	X	X	Ind	
23bcd	2,550	1954 1961	1,011 1,411	20-16 10- 8	1,011 1,411	---------- 540-1,406	1954 12/61 4/68	Flowing 15 80.8	1954 1954 12/61	200-300 900 R 900	Artesian flow 182 R 305	----	---------	Ind	Did not recover to artesian flow after pumping, 1954. Casing, 10 inch, 540-1,045 feet; casing, 8 inch, 1,035-1,411 feet.
23ddd	2,510	1954 1961	1,005 1,305	24-20 12	-------	---------- 999-1,300	10/54 4/68	Flowing 1.7	10/54 8/61	20 E 1,200	Artesian flow 296	X	X	Ind	Casing, 12 inch, 999-1,305 feet.
24dcb1	2,530	----------	82	12	-------	----------	3/58 3/68	34.5 33.3	-------	-------	----------	----	---------	N	
24ddc	2,555	1947	870	24	-------	----------	8/47	Flowing	8/47	400	Artesian flow	----	X	I	
25bdc	2,539	1947	967	24-20	964	628- 900	12/47	Flowing	12/47 10/54	540 600 E	Artesian flow Artesian flow	X	X	Ind	
25dbb	2,539	1954	1,006	24-20-16	1,006	----------	10/54	Flowing	10/54 2/58	100 E 1,500 R	Artesian flow	----	X	Ind	
(D-9-18)31bbd	2,560	----------	1,294	12	-------	----------	-------	----------	-------	-------	----------	----	---------	Ind	Artesian water reported at 550 and 1,263 feet.
32ccd	2,570	----------	---------	6	-------	----------	9/50 3/68	23.0 22.9	-------	-------	----------	----	---------	S	

Table 2.--Records of selected wells and springs, San Pedro River valley—Continued

Location	Land-surface altitude (feet above mean sea level)	Date completed (year)	Reported depth (feet)	Diameter of casing (inches)	Depth of casing (feet)	Perforated interval (feet below land surface)	Water level: Date (month, year)	Water level: Feet below land surface	Pumping data: Date (month, year)	Pumping data: Yield (gpm)	Pumping data: Pumping level (feet below land surface)	Well log	Chemical analysis	Use of water	Remarks
LOWER SAN PEDRO BASIN—Continued															
(D-9-19)32cab	3,820	----------	800	8	-------	----------	1949	503 R	1954	0.8 R	----------	X	---------	S	Well deepened in 1954. Hot water reported at about 1,170 feet.
		1954	1,225	---------	670	OH 670-1,225	-------	----------	1954	7 R					
(D-10-16)22cbb	4,640	1947	365	6	365	----------	4/48	102.8	-------	12 R	----------	----	---------	S	
							4/68	97.0							
(D-10-17)5bca	3,520	1953	700	16	692	532- 690	3/53	513	-------	70 R	----------	----	X	Ind	
15bbb	3,260	1935	285	6	285	----------	8/49	213.8	-------	5 E	----------	----	X	S	
							4/68	258.8							
27dca	3,350	----------	462	8	462	----------	8/49	334.9	1949	7 R	----------	----	X	S	
(D-10-18)3bad2	3,025	1954	277	6	-------	----------	3/54	213 R	3/54	12	----------	----	X	S	Struck water at 222 feet, rose to 213 feet.
							4/68	238.0							
16cad	2,650	1941	100	18	100	25- 95	9/49	25.9	9/66	1,130	26.6	X	---------	I	
							4/68	21.4							
21dba	2,650	----------	---------	---------	-------	----------	4/68	12.1	-------	-------	----------	----	---------	S	
28dab	2,670	1950	491	6	51	----------	3/54	19.6	-------	-------	----------	----	---------	S	
							4/68	2.5							
34bdb	2,710	1926	150	6	-------	----------	9/50	28.6	-------	-------	----------	----	---------	S	
							4/68	49.8							
34ccb	2,720	1953	144	16	144	50- 144	3/54	56.6	7/53	1,000 R	----------	----	---------	I	Drawdown 20 feet below static water level.
							4/68	38.9							
(D-10-19)30bda	3,325	1939	490	8	-------	----------	3/66	184.2	-------	-------	----------	----	X	S	
(D-11-17)1bda	3,120	----------	48	---------	-------	----------	8/49	39.6	8/49	2	----------	----	---------	S	Dug well.
9bba	3,680	1938	536	---------	-------	----------	4/49	286 R	-------	6 R	----------	----	---------	S	Drawdown 25 feet below static water level.
		1940	736	6	-------	OH 536- 736	4/68	338.6							
18adb	3,780	1947	203	6	197	OH 197- 203	8/48	155 R	-------	7 R	----------	----	---------	S	
24cac	3,340	----------	160	6	-------	----------	7/52	50 R	7/52	2	----------	----	X	-----	
							3/66	22.9							
30aaa	4,060	----------	---------	---------	-------	----------	-------	----------	7/52	5	----------	----	X	S	Davis Spring.
(D-11-18)10acc	2,770	----------	---------	16	-------	----------	3/54	45.7	-------	250 R	----------	----	---------	N	
							4/68	34.6							
15aca	2,780	----------	---------	---------	-------	----------	4/68	17.2	-------	-------	----------	----	---------	S	
15ada	2,775	1950	110	16	110	26- 105	10/50	27 R	10/50	750 R	----------	----	---------	I	Drawdown reported as none. Water temperature 20°C, June 1951.

Table 2.--Records of selected wells and springs, San Pedro River valley—Continued

Location	Land-surface altitude (feet above mean sea level)	Date completed (year)	Reported depth (feet)	Diameter of casing (inches)	Depth of casing (feet)	Perforated interval (feet below land surface)	Water level: Date (month, year)	Water level: Feet below land surface	Pumping data: Date (month, year)	Pumping data: Yield (gpm)	Pumping data: Pumping level (feet below land surface)	Well log	Chemical analysis	Use of water	Remarks
LOWER SAN PEDRO BASIN—Continued															
(D-11-18)18bbd	3,200	----------	---------	---------	-------	----------	-------	----------	7/52	1	----------	----	X	S	Peck Spring.
23cad	2,790	----------	---------	3	-------	----------	4/68	6.2	-------	-------	----------	----	---------	N	
26abb	2,820	1947	85	6	-------	----------	9/50 4/68	22.9 18.9	-------	-------	----------	----	---------	S	
26bca	2,825	1947	50	16	-------	----------	6/67 4/68	5 R 3.1	5/67 4/68	2,320 2,140	22.3 10.1	----	---------	I	Water temperature 21°C, May 1967. Water temperature 20°C, April 1968.
34bdc	2,850	----------	---------	6	-------	----------	4/68	23.4	-------	-------	----------	----	---------	S	
(D-11-19)10dca	3,575	1950 1954	300 600	8 8	300 -------	---------- ----------	4/50 4/66	98 R 119.6	-------	1 R 3 R	---------- ----------	X	X	N	Well deepened in 1954.
31ccd	3,005	----------	---------	6	-------	----------	11/50	67.0	11/50	3 E	----------	----	X	S	
(D-12-18)2bba	2,890	----------	---------	6	-------	----------	4/68	32.7	-------	-------	----------	----	---------	D	
2bcd	2,890	----------	---------	---------	-------	----------	-------	----------	6/67	990	47 R	----	---------	I	Water temperature 21°C, June 1967.
3aaa	2,890	1939	122	16	122	----------	9/50 3/62	46.4 47.1	7/46 6/67	1,180 R 1,270	---------- ----------	----	X	I	
11daa	2,910	1950	---------	16	-------	----------	9/50 4/68	61.3 43.3	-------	-------	----------	----	---------	I	
11dca	2,930	----------	---------	6	-------	----------	4/63 4/66	63.2 61.7	-------	-------	----------	----	---------	S	
12bbd	2,930	----------	---------	8	-------	----------	4/68	36.8	-------	-------	----------	----	---------	S	
13bcd	2,940	1948	96	6	-------	----------	4/68	49.0	-------	-------	----------	----	---------	D	
13cab	2,940	1947	165	16	165	70- 150	7/48 3/54	67.5 R 70.6	9/66 6/67	1,280 1,420	---------- ----------	X	---------	I	
13dbc	2,940	1951	---------	16	-------	----------	3/54 4/68	75.1 62.2	-------	-------	----------	----	---------	I	
24aab	2,940	1963	---------	---------	-------	----------	4/66 4/68	60.0 56.5	-------	-------	----------	----	---------	I	
(D-12-19)19adb	3,000	1948	80	---------	-------	----------	12/49 4/68	43.6 27.0	-------	-------	----------	X	---------	N	
23bca	3,350	----------	---------	---------	-------	----------	3/63 3/69	107.6 117.3	-------	-------	----------	----	---------	-----	
29dcc	3,038 L	----------	---------	6	-------	----------	3/63 4/68	51.7 49.6	-------	-------	----------	----	---------	D	

Table 2.--Records of selected wells and springs, San Pedro River valley—Continued

Location	Land-surface altitude (feet above mean sea level)	Date completed (year)	Reported depth (feet)	Diameter of casing (inches)	Depth of casing (feet)	Perforated interval (feet below land surface)	Water level: Date (month, year)	Water level: Feet below land surface	Pumping data: Date (month, year)	Pumping data: Yield (gpm)	Pumping data: Pumping level (feet below land surface)	Well log	Chemical analysis	Use of water	Remarks
LOWER SAN PEDRO BASIN—Continued															
(D-12-19)32acd	3,020	1956	--------	--------	-------	----------	3/69	13.0	-------	-------	----------	----	--------	I	
32bad	3,018 L	----------	--------	16	-------	----------	6/60 3/63	26.3 26.6	-------	-------	----------	----	--------	I	
32dbb	3,013 L	----------	--------	8	-------	----------	5/61 4/68	10.1 9.6	-------	-------	----------	----	--------	I	
33ccc1	3,032 L	----------	--------	6	-------	----------	10/50 4/68	23.8 15.3	-------	-------	----------	----	--------	S	
(D-12-20)11dad	4,550	1948	312	6	10	OH 10- 312	11/50	109	-------	-------	----------	X	--------	D, S	
(D-13-18)1aaa	3,110	----------	180	6	-------	----------	1/51 4/63	57.9 89.4	-------	-------	----------	----	X	S	
2bdd	3,240	1942	249	10	-------	----------	4/68	114.7	10/50	4 R	----------	----	--------	D, S	
11aad	3,225	1942	220	6	-------	----------	11/62	109.9	1/51	7.5	----------	----	X	D, S	Water-level measurement by University of Arizona.
(D-13-19)4cda	3,047 L	1946	133	10	-------	----------	10/62 4/68	16.4 11.6	6/67	950	----------	----	X	I	
4dca	3,063 L	1950	135	14	135	40- 130	10/62 4/68	26.0 14.9	-------	-------	----------	X	--------	I	
9aab	3,070	----------	--------	--------	-------	----------	4/66 4/68	23.9 22.3	-------	-------	----------	----	--------	I	
9acd	3,064 L	----------	--------	--------	-------	----------	3/63 4/68	20.5 15.2	-------	-------	----------	----	--------	N	
10bcd2	3,075	1946	196	12	69	25- 68 OH 69- 196	6/46	25 R	-------	-------	----------	----	--------	I	
10dbd	3,084 L	1940	27	6	27	----------	10/50 3/63 4/68	20.6 21.5 14.5	-------	-------	----------	----	X	D, S	
10dcb	3,094 L	----------	102	16	102	52- 93	5/37 4/68	24.4 R 29.2	7/46	1,200 R	----------	X	X	I	Drawdown 40 feet below static water level.
12dcc	3,234 L	----------	--------	6	-------	----------	11/50 3/63	65.8 70.4	-------	-------	----------	----	--------	S	
15cdd	3,129 L	1948	60	6	-------	----------	10/50 3/63 4/68	45.3 49.3 37.0	-------	-------	----------	----	--------	S	
15dac	3,109 L	----------	--------	--------	-------	----------	10/50 3/63 4/68	29.0 29.8 24.9	-------	-------	----------	----	--------	N	
21baa	3,275	----------	--------	8	-------	----------	4/66	73.9	4/68	-------	81.2	----	--------	S	

Table 2.--Records of selected wells and springs, San Pedro River valley—Continued

Location	Land-surface altitude (feet above mean sea level)	Date completed (year)	Reported depth (feet)	Diameter of casing (inches)	Depth of casing (feet)	Perforated interval (feet below land surface)	Water level: Date (month, year)	Water level: Feet below land surface	Pumping data: Date (month, year)	Pumping data: Yield (gpm)	Pumping data: Pumping level (feet below land surface)	Well log	Chemical analysis	Use of water	Remarks
LOWER SAN PEDRO BASIN—Continued															
(D-13-19)22ddd	3,146 L	----------	---------	6	-------	----------	10/50 3/63 4/68	44.9 45.7 31.0	-------	-------	----------	----	---------	N	
23acd	3,151 L	----------	60	6	-------	----------	10/62 4/68	48.2 36.2	-------	-------	----------	----	---------	D	
23bca	3,136 L	1949	---------	---------	-------	----------	1949 3/63 4/68	28 R 41.3 28.3	-------	-------	----------	----	---------	D, S	
23dad	3,145	----------	85	6	-------	----------	12/49 9/52 4/68	40.2 36.8 29.1	-------	-------	----------	----	---------	S	
24ccc	3,162 L	----------	70	6	-------	----------	10/62 3/69	54.4 35.7	-------	-------	----------	----	X	I	
25bbb	3,151 L	1950	145	20-16	145	45- 140	10/50 4/68	42.6 40.5	6/67	925	47.2	----	---------	I	
26cca	3,183 L	1950	90	6	-------	----------	4/68	19.9	-------	-------	----------	----	---------	S	
30dbd	3,590	----------	---------	---------	-------	----------	4/66	81.3	-------	-------	----------	----	---------	S	
36aac	3,176 L	----------	---------	5	-------	----------	12/49 4/68	52.4 43.9	-------	-------	----------	----	---------	S	
(D-13-20)7ddd	3,579 L	1952	440	6	440	380- 440	1952 4/66	390 R 372.5	-------	-------	----------	X	X	S	
23dcc	3,725	1952	---------	6	-------	----------	-------	----------	-------	-------	----------	----	X	S	
31baa	3,200	----------	---------	14	-------	----------	4/68	67.9	-------	-------	----------	----	---------	N	
31ddd	3,190	1951	120	14	-------	----------	12/51 4/68	27 R 21.1	-------	-------	----------	X	---------	I	
(D-14-20)4cac	3,364 L	----------	225	---------	-------	----------	7/62 4/68	102.6 114.2	-------	-------	----------	----	---------	S	
6dad	3,195 L	1951	101	14	-------	----------	12/51 10/62	28 R 27.2	-------	-------	----------	X	---------	I	
8bdd	3,250	1960	140	16	135	60- 135 OH 135- 140	4/60 4/68	85 R 86.0	6/67	530	96.0	----	X	I	
8cad	3,230	----------	---------	---------	-------	----------	-------	----------	6/67	990	----------	----	---------	I	Water temperature 23°C, June 1967.
8cba	3,220 L	----------	125	6	-------	----------	9/50 4/68	37 R 38.1	-------	-------	----------	----	X	D, S	

Table 2.--Records of selected wells and springs, San Pedro River valley—Continued

Location	Land-surface altitude (feet above mean sea level)	Date completed (year)	Reported depth (feet)	Diameter of casing (inches)	Depth of casing (feet)	Perforated interval (feet below land surface)	Water level: Date (month, year)	Water level: Feet below land surface	Pumping data: Date (month, year)	Pumping data: Yield (gpm)	Pumping data: Pumping level (feet below land surface)	Well log	Chemical analysis	Use of water	Remarks
LOWER SAN PEDRO BASIN—Continued															
(D-14-20)8ccd	3,230	----------	---------	16	-------	----------	12/66 4/68	35.4 20.5	-------	-------	----------	----	---------	I	
8dcd1	3,226 L	----------	125	12	-------	----------	10/50 4/68	37 R 32.8	10/50	500 R	----------	----	---------	I	
17dbb2	3,225	----------	---------	16	-------	----------	12/66 4/68	30.4 31.8	-------	-------	----------	----	---------	I	
19cdc	3,775	----------	---------	8	-------	----------	12/66	484.7	-------	-------	----------	----	---------	S	
20acc	3,237 L	1953	94	14	-------	----------	4/54 4/68	25.9 19.1	4/54	800 R	51 R	----	---------	I	
20cad	3,273 L	1941	125	8	-------	----------	10/50 3/63 4/68	59.4 59.1 53.8	-------	-------	----------	----	---------	S	
20ddb	3,251 L	----------	---------	6	-------	----------	10/50 3/63 4/68	34.2 34.4 31.6	-------	-------	----------	----	---------	N	
21bbb	3,250	1964	70	16	70	30- 70	8/64 4/68	44 R 23.5	6/67	580	28.7	X	---------	I	
27cca	3,291 L	----------	---------	---------	-------	----------	3/63 4/68	45.7 45.0	-------	-------	----------	----	---------	S	Water-level measurement for 1963 made by University of Arizona.
28abb	3,255 L	----------	84	---------	-------	----------	10/50 3/63 4/68	22.5 30.5 27.2	-------	-------	----------	----	---------	D, S	
28dac1	3,251 L	----------	82	16	-------	----------	4/54 3/63	12.2 13.4	9/66	1,790	28.2	----	---------	I	Water temperature 22°C, September 1966.
28dac2	3,250	1964	50	16	-------	----------	-------	----------	6/67 10/67	680 650 R	30.0 ----------	----	---------	I	Drawdown 41 feet below static water level, October 1967. Water temperature 23°C, June 1967.
31aaa	3,701 L	----------	470	6	-------	----------	10/62 4/68	435.0 431.1	-------	-------	----------	----	---------	-----	
33aad	3,263 L	----------	---------	---------	-------	----------	5/62 4/68	16.0 14.9	12/66	990	29.0	----	X	I	
33aca	3,268 L	----------	---------	---------	-------	----------	10/50 3/63 4/68	31.0 28.8 27.8	-------	-------	----------	----	---------	S	
34bbc	3,264 L	1945	246	12	135	0- 90 OH 135- 246	12/45 3/63	20.5 R 17.5	10/46	500 R	----------	----	X	I	

Table 2.--Records of selected wells and springs, San Pedro River valley—Continued

Location	Land-surface altitude (feet above mean sea level)	Date completed (year)	Reported depth (feet)	Diameter of casing (inches)	Depth of casing (feet)	Perforated interval (feet below land surface)	Water level: Date (month, year)	Water level: Feet below land surface	Pumping data: Date (month, year)	Pumping data: Yield (gpm)	Pumping data: Pumping level (feet below land surface)	Well log	Chemical analysis	Use of water	Remarks
LOWER SAN PEDRO BASIN—Continued															
(D-14-20)34caa	3,377 L	----------	145	6	-------	----------	12/49 4/68 1/70	116.8 115.8 116.8	-------	-------	----------	----	X	D, S	
34ccd	3,282 L	1953	65	14	65	30- 60	4/54 4/68	20.6 25.0	9/66 6/67	620 570	47.0 ----------	----	---------	I	Water temperature 21°C, September 1966.
(D-14-21)11bcb	4,575	----------	415	6	-------	----------	4/68	342.4	11/50	6	----------	----	---------	S	
19cad	4,220	1950	644	6	644	----------	1950 4/68	270 R 212.9	-------	-------	----------	----	X	N	
(D-15-18)11bbd	4,190	1965	300	12	300	50- 300	4/65	17 R	-------	-------	----------	----	---------	I	
11bdb	4,190	1960	300	12	201	35- 197 OH 201- 300	11/60	36 R	-------	-------	----------	X	---------	I	
(D-15-20)8cbd	3,757 L	1949	515	6	-------	----------	10/62 12/66	472.0 472.4	-------	-------	----------	----	X	S	
9aab2	3,309 L	----------	48	36	-------	----------	10/50 3/63 4/68	33.1 31.1 28.8	-------	-------	----------	----	---------	S	
10bbc	3,308 L	----------	---------	15	-------	----------	5/62 4/68	28.8 27.5	9/66	880	----------	----	---------	I	
10bdc	3,350	1961	96	16	-------	----------	-------	----------	9/66 6/67	550 590	49.7 50.8	----	---------	I	Water temperature 23°C, September 1966.
10cab	3,319 L	1961	---------	16	-------	----------	5/62 4/68	36.9 39.8	9/66 6/67	930 910	---------- ----------	----	---------	I	Water temperature 23°C, June 1967.
UPPER SAN PEDRO BASIN															
(D-14-21)25adb	4,435	----------	300	6	-------	----------	1945 4/68	240 R 211.4	11/50	1.5	----------	----	X	D, S	
(D-14-22)31abc	4,430	----------	---------	6	-------	----------	4/68	224.2	7/51	4	----------	----	X	S	Depth reported as 160 feet, July 1951.
34bdc	4,570	----------	430	6	-------	----------	7/51 4/68	400 R 357.1	7/51	4.5	----------	----	---------	S	Water temperature 22°C, July 1951.
(D-15-19)26ccd	3,690	----------	---------	---------	-------	----------	4/68	111.9	-------	-------	----------	----	---------	S	
(D-15-20)15cdc	3,347 L	----------	56	6	-------	----------	6/46 3/63 4/68	37.5 40.1 37.6	-------	-------	----------	----	---------	S	
20dda	3,366 L	1950	135	12	-------	----------	10/50 4/68	35.3 36.1	-------	-------	----------	----	---------	S	Well deepened in 1959; depth unknown.

Table 2.--Records of selected wells and springs, San Pedro River valley—Continued

Location	Land-surface altitude (feet above mean sea level)	Date completed (year)	Reported depth (feet)	Diameter of casing (inches)	Depth of casing (feet)	Perforated interval (feet below land surface)	Water level: Date (month, year)	Water level: Feet below land surface	Pumping data: Date (month, year)	Pumping data: Yield (gpm)	Pumping data: Pumping level (feet below land surface)	Well log	Chemical analysis	Use of water	Remarks
UPPER SAN PEDRO BASIN—Continued															
(D-15-20)28bbc	3,360	----------	---------	15	-------	----------	9/66 4/68	33.1 33.3	-------	-------	----------	----	---------	I	
29dbb2	3,375	1959	145	14	145	25- 140	4/68	39.5	-------	-------	----------	----	---------	D, S	
29dcc	3,383 L	----------	---------	16	-------	----------	10/62	44.4	-------	-------	----------	----	---------	I	
30ccc	3,480	1954	100	6	-------	----------	4/54 4/68	18.5 24.8	-------	-------	----------	----	---------	S	
31aca	3,390	1959	140	14	140	50- 135	9/59 4/68	30 R 39.1	-------	-------	----------	----	---------	I	
31dbb	3,425	1960	115	16	115	70- 115	6/60 3/63 4/68	55 R 68.5 57.2	4/65 8/65	1,100 980	70 72	X	---------	I	
31dbd	3,410	1962	136	16	136	40- 130	10/62 4/68	54.6 43.9	4/65 8/65	780 740	87 107	----	---------	I	
(D-15-21)1bbc	4,370	----------	160	4	-------	----------	10/50 4/68	144.7 144.8	-------	-------	----------	----	---------	N	
27bad	4,180	----------	330	6	-------	----------	10/50	290 R	10/50	4	----------	----	---------	S	
35baa	4,400	----------	660	6	-------	----------	-------	550 R	-------	-------	----------	----	X	S	
(D-16-19)11dbb	3,560	----------	---------	---------	-------	----------	-------	----------	2/34 10/50	4 .4	---------- ----------	----	X	-----	Pacheco Spring.
11dbb1	3,540	----------	70	16	54	----------	5/51 3/68	37.1 31.1	-------	-------	----------	----	---------	I	
12aac	3,460	----------	---------	8	-------	----------	12/66	46.5	-------	-------	----------	----	---------	D,S,I	
12aca2	3,460	1951	107	16	-------	----------	5/51 12/66	60 R 45.1	5/51	1,200 R	----------	----	---------	I	
12aca3	3,460	----------	270	24	-------	250- 270	3/68	47.5	-------	-------	----------	X	---------	I	
12add	3,455	----------	---------	16	-------	----------	3/63 12/66	65.0 40.0	-------	-------	----------	----	---------	I	
17aba	3,825	----------	150	---------	-------	----------	5/51 9/63	68.3 107.8	5/51	1.5	----------	----	X	S	
36ddc	3,830	----------	220	6	-------	----------	10/63 3/68	196.7 194.7	-------	-------	----------	----	---------	S	
(D-16-20)5bcb	3,405	----------	---------	20	-------	----------	9/63 12/66	45.9 39.9	-------	-------	----------	----	---------	I	
6acc1	3,420	1962	119	18	119	55- 114	9/63 10/68	59.2 50.6	6/67	420	87.6	----	---------	I	Water temperature 20°C, June 1967.

Table 2.--Records of selected wells and springs, San Pedro River valley—Continued

Location	Land-surface altitude (feet above mean sea level)	Date completed (year)	Reported depth (feet)	Diameter of casing (inches)	Depth of casing (feet)	Perforated interval (feet below land surface)	Water level: Date (month, year)	Water level: Feet below land surface	Pumping data: Date (month, year)	Pumping data: Yield (gpm)	Pumping data: Pumping level (feet below land surface)	Well log	Chemical analysis	Use of water	Remarks
UPPER SAN PEDRO BASIN—Continued															
(D-16-20)6acc2	3,420	1962	915	16-12- 8	915	75- 141 600- 915	-------	----------	-------	-------	----------	X	X	N	Artesian well. Destroyed 1962.
6adc	3,410	1962	126	16	-------	40- 122	9/63 3/68	48.8 41.0	-------	-------	----------	----	---------	I	
6dcd	3,420	1962	127	16	127	----------	12/66 3/68	40.1 43.4	9/66	1,210	52	X	---------	I	Water temperature 21°C, September 1966.
7bdd	3,445	1962	114	18	114	45- 100	8/62 3/68	55 R 42.0	8/62	1,200 R	77 R	----	---------	I	
7cdb	3,490	----------	---------	---------	-------	----------	-------	----------	10/50	< 0.25	----------	----	X	-----	Spring.
8bbc	3,420	1968	125	16	125	45- 125	4/68	45 R	-------	-------	----------	----	---------	N	
8dca	3,430	1954	100	16	-------	----------	9/63 3/68	29.8 32.5	-------	-------	----------	----	---------	I	
8dcd	3,445	1954	---------	14	-------	----------	4/54 12/66	51.2 42.8	-------	-------	----------	----	---------	I	
9ccd	3,440	----------	115	16	-------	----------	9/68	33.8	-------	-------	----------	----	---------	I	
16bca	3,440	----------	---------	16	-------	----------	3/68	32.7	-------	-------	----------	----	---------	I	
17add	3,440	1963	105	16	-------	----------	9/63 3/68	32.0 31.2	-------	-------	----------	----	---------	I	
27bbb	3,510	----------	674	6	-------	----------	8/49 4/58 3/66 3/68	14.2 16.7 34.4 55.1	-------	-------	----------	----	---------	S	Windmill pumping, March 1968.
27dcc2	3,510	1946	72	12	72	46- 72	9/46 3/68	44.4 46.3	9/46	500 R	----------	----	X	I	
28cba	3,500	----------	---------	6	-------	----------	9/63 3/68	36.8 35.3	-------	-------	----------	----	X	D, S	
28dbb	3,455	----------	---------	16	-------	----------	9/63	40 R	-------	-------	----------	----	---------	I	
28dcb	3,475	----------	100	16	-------	----------	9/63 3/68	33.4 30.4	-------	-------	----------	----	---------	I	
28dcc	3,475	----------	100	16	-------	----------	9/63 10/66	33.7 32.9	-------	-------	----------	----	---------	I	
29bbc	3,600	----------	---------	---------	-------	----------	10/50 3/68	26.1 19.4	-------	-------	----------	----	---------	S	
33cdd	3,550	----------	---------	4	-------	----------	10/63 3/68	Flowing Flowing	10/63	15	Artesian flow	----	---------	D, S	

Table 2.--Records of selected wells and springs, San Pedro River valley—Continued

Location	Land-surface altitude (feet above mean sea level)	Date completed (year)	Reported depth (feet)	Diameter of casing (inches)	Depth of casing (feet)	Perforated interval (feet below land surface)	Water level: Date (month, year)	Water level: Feet below land surface	Pumping data: Date (month, year)	Pumping data: Yield (gpm)	Pumping data: Pumping level (feet below land surface)	Well log	Chemical analysis	Use of water	Remarks
UPPER SAN PEDRO BASIN—Continued															
(D-16-20)34aca	3,530	1944	114	16	114	72- 105	5/45 3/68	68 R 86.4	5/45	300 R	96 R	----	---------	I	Quicksand and large gravel, 72-100 feet.
34baa	3,510	1953	75	10	-------	----------	10/63 3/68	60.2 46.8	6/67	360	----------	----	---------	I	Water temperature 19°C, April 1954.
34bca	3,500	1950	125	16	-------	----------	10/63	47.7	6/67	960	----------	----	---------	I	Water temperature 19°C, April 1954.
34bcd2	3,500	----------	109	---------	-------	----------	3/68	51.5	-------	-------	----------	----	---------	I	
34cab	3,500	----------	---------	16	-------	----------	10/63 3/68	50.2 44.3	-------	-------	----------	----	---------	I	
34cdb	3,500	1900	640	3	-------	----------	8/49	Flowing	8/49	1	Artesian flow	----	---------	I	Reportedly flowed 16 gpm when drilled. Artesian pressure equal to water level of 5 feet above land surface, August 1949.
34dab	3,520	1951	1,000	12- 8	796	500- 796 OH 796-1,000	6/51	18.3	6/51	120	99.7	X	X	PS	Struck several artesian zones beginning at 550 feet.
(D-16-21)4acd	4,120	1965	493	5	493	453- 493	1965	450 R	-------	-------	----------	----	---------	-----	
11cdc	4,290	----------	625	6	-------	----------	11/63	500 R	-------	-------	----------	----	---------	S	
31ddc	3,770	----------	---------	6	-------	----------	1/70	215.2	-------	-------	----------	----	---------	S	
(D-16-22)25acb	4,590	1951	350	5	-------	----------	10/56	345.3	-------	-------	----------	----	---------	S	
(D-17-19)4aaa	3,970	----------	---------	6	-------	----------	10/63 4/68	196.7 200.9	-------	-------	----------	----	---------	S	
5cca	4,080	----------	200	6	-------	----------	10/63 4/68	149.4 155.8	-------	-------	----------	----	---------	D, S	
8bab	4,080	----------	300	4	-------	----------	10/63	200 R	-------	-------	----------	----	---------	D, S	
9ccc	4,200	1971	---------	8	-------	----------	1971	325 R	-------	-------	----------	----	---------	-----	
11aca	4,060	----------	350	6	-------	----------	10/63	250 R	-------	-------	----------	----	---------	S	
13adb	4,110	1963	550	6	-------	----------	11/63	480 R	-------	-------	----------	----	---------	D, S	
14aaa	4,140	1953	570	6	-------	----------	11/63	498 R	-------	-------	----------	----	---------	D	
15bba	4,210	----------	417	6	-------	----------	10/63	220 R	-------	-------	----------	----	---------	D	
17abc1	4,220	1928	1,550	12	-------	----------	-------	----------	-------	-------	----------	X	---------	N	Oil test well.
22bab	4,360	----------	---------	6	-------	----------	11/63 4/68	251.8 255.6	-------	-------	----------	----	---------	D, S	

Table 2.--Records of selected wells and springs, San Pedro River valley—Continued

Location	Land-surface altitude (feet above mean sea level)	Date completed (year)	Reported depth (feet)	Diameter of casing (inches)	Depth of casing (feet)	Perforated interval (feet below land surface)	Water level: Date (month, year)	Water level: Feet below land surface	Pumping data: Date (month, year)	Pumping data: Yield (gpm)	Pumping data: Pumping level (feet below land surface)	Well log	Chemical analysis	Use of water	Remarks
UPPER SAN PEDRO BASIN—Continued															
(D-17-19)26ccd	4,550	----------	275	6	-------	----------	9/63	137.6	-------	-------	----------	----	---------	S	
36bab	4,470	----------	---------	6	-------	----------	9/63 4/68	268.2 266.2	-------	-------	----------	----	---------	S	
(D-17-20)2caa	3,520	1950	123	14	123	44- 123	6/50 3/68	47 R 40.0	6/66	920	77	X	---------	I	
3aad	3,520	----------	118	16	118	50- 112	11/48 3/68	40 R 45.8	11/48	1,000 R	60 R	----	---------	I	
4daa	3,530	1951 1953	300 1,020	12 6	300 1,020	---------- ----------	------- 3/53 3/68	---------- Flowing Flowing	1951 3/53	275 R 20 R	---------- Artesian flow	----	---------	S	Drawdown reported 190 feet below static water level, 1951. Deepened in 1953. Water temperature 31°C, December 1966.
7ddc	3,960	1970	540	6	540	364- 368 408- 412 452- 456 496- 500	12/70	360 R	-------	-------	----------	X	---------	-----	
9aac	3,570	1952	937	18-13- 9	935	562- 915 OH 935- 937	3/52	Flowing	3/52 1/57	25 R 120 R	Artesian flow ----------	----	---------	Ind	
9aad	3,560	1952	990	16-13- 9	981	644- 981 OH 981- 990	3/52	Flowing	3/52 1/57	40 R 120 R	Artesian flow ----------	----	---------	Ind	Water temperature 31°C, January 1957.
9adc	3,600	1946	1,000	12-10- 8	1,000	215-1,000	8/49	Flowing	8/49 8/49	35 R 450 R	Artesian flow 295	X	X	PS	Artesian pressure equal to water level of 11.6 feet above land surface, August 1949.
9bac	3,620	1948	1,094	10- 6	1,094	894-1,094	11/49	6 R	11/49	160-200 R	150-160 R	----	---------	I	
9bcc	3,670	1962	1,165	12- 8	1,165	825-1,165	8/62	48 R	8/62	1,020 R	235 R	X	---------	PS	
9cbc	3,680	1946	1,088	8	1,088	776-1,088	10/46	49 R	-------	-------	----------	----	X	D,S	
10acd	3,550	----------	700	3	-------	----------	3/68	Flowing	-------	-------	----------	----	---------	D	Six artesian wells at this location.
10ccc	3,610	1954	1,025	16-12	790	----------	1/54	20 R	-------	-------	----------	X	---------	PS	Well was drilled to 1,025 feet, plugged and cemented at 790 feet.
10dcb	3,560	----------	927	16-10- 8	927	----------	-------	----------	-------	-------	----------	X	---------	PS	
11bca	3,490	----------	60	12	-------	----------	10/63	10.0	10/63	650 R	----------	----	---------	I	
11bcd	3,500	1948	60	16	-------	----------	10/63 3/68	10.0 6.4	10/63	1,200 R	----------	----	---------	I	

Table 2.--Records of selected wells and springs, San Pedro River valley—Continued

Location	Land-surface altitude (feet above mean sea level)	Date completed (year)	Reported depth (feet)	Diameter of casing (inches)	Depth of casing (feet)	Perforated interval (feet below land surface)	Water level		Pumping data			Well log	Chemical analysis	Use of water	Remarks
							Date (month, year)	Feet below land surface	Date (month, year)	Yield (gpm)	Pumping level (feet below land surface)				
UPPER SAN PEDRO BASIN—Continued															
(D-17-20)11bdd1	3,510	----------	60	16	60	45- 60	6/46	45 R	6/46	500 R	----------	----	---------	I	
11bdd2	3,510	----------	---------	14	-------	----------	10/63 3/68	32.6 38.0	-------	-------	----------	----	---------	I	
11cda2	3,520	1962	90	8	-------	----------	10/63	76 R	-------	-------	----------	----	---------	I	
11cdd	3,530	1961	100	8	-------	----------	10/63	45 R	-------	-------	----------	----	---------	I	
11dcb	3,540	----------	---------	18	-------	----------	6/50 3/68	44.7 40.1	-------	-------	----------	----	---------	I	
12cdc	3,590	1956	250	6	-------	----------	11/63	46.5	-------	-------	----------	----	---------	D	
14acd	3,530	----------	---------	14	-------	----------	10/63 3/68	32.6 31.1	-------	-------	----------	----	---------	I	
14bad	3,520	----------	---------	16	-------	----------	-------	----------	6/65	700	46	----	---------	I	
14ccc	3,600	----------	640	3	-------	----------	10/46	Flowing	10/46	10	Artesian flow	X	X	D	Artesian pressure equal to water level of 8 feet above land surface, October 1946. Artesian pressure equal to water level 2.1 feet above land surface, March 1963.
15dbb	3,700	1958	800	12	-------	----------	-------	----------	-------	-------	----------	----	---------	PS	
18ddb1	4,040	1913	627	13	627	----------	4/13 3/51	450 R 520 R	4/13 3/51	63 R 400 R	580 R ----------	X	---------	-----	Water temperature 23°C, March 1951.
24bbd	3,540	1957	150	10	-------	----------	10/63 4/68	30.4 27.6	-------	-------	----------	----	---------	I	
27bba	3,740	1949	360	6	-------	----------	10/63	70 R	-------	-------	----------	----	---------	-----	
35aad	3,620	1938	700	3	-------	----------	10/63	Flowing	-------	-------	----------	X	---------	D	
35dca1	3,660	----------	600	2	-------	----------	4/68	Flowing	-------	-------	----------	----	---------	D	
(D-17-21)3aca	4,130	1965	638	5	638	503- 638	4/65	402 R	-------	-------	----------	X	---------	D	Water reported at 526 feet and rose to 402 feet.
5cac	3,795	----------	---------	4	-------	----------	11/63 3/68	229.7 234.2	-------	-------	----------	----	---------	S	
15ddb	4,045	1918	1,000	12-10	1,000	350- 380 577- 980	1918 3/69	325 R 333.7	3/46	100 R	----------	X	---------	N	Pumping yield was capacity of pump.
31aad	3,670	----------	116	12	-------	----------	11/63 3/68	84.4 77.4	-------	-------	----------	----	---------	I	

Table 2.--Records of selected wells and springs, San Pedro River valley—Continued

Location	Land-surface altitude (feet above mean sea level)	Date completed (year)	Reported depth (feet)	Diameter of casing (inches)	Depth of casing (feet)	Perforated interval (feet below land surface)	Water level: Date (month, year)	Water level: Feet below land surface	Pumping data: Date (month, year)	Pumping data: Yield (gpm)	Pumping data: Pumping level (feet below land surface)	Well log	Chemical analysis	Use of water	Remarks
UPPER SAN PEDRO BASIN—Continued															
(D-17-21)31ada2	3,670	----------	128	12	-------	60- 110	-------	----------	9/44	250	----------	----	---------	I	
							7/46	72 R	7/46	450 R	98 R				
31cba	3,590	1962	500	12	-------	----------	4/68	Flowing	11/63	5	Artesian flow	----	---------	I	
31ccc	3,590	1948	94	12	-------	----------	4/68	19.6	-------	-------	----------	----	---------	I	
31dca1	3,630	1954	132	14	132	112- 132	11/63	47.5	1/64	500 R	----------	----	---------	I	Drawdown 40 feet below static water level reported.
							4/68	44.6							
31dcd	3,630	1953	145	16	-------	----------	-------	----------	-------	-------	----------	----	---------	I	
31dda	3,650	1897	333	4	90	----------	-------	----------	-------	-------	----------	----	---------	I	
32bab	3,705	1910	520	6	500	----------	9/44	17.4	-------	-------	----------	----	X	S	
							3/68	29.9							
32bcc2	3,670	1962	362	8- 6	362	----------	11/63	46 R	-------	-------	----------	----	---------	I	
32cca	3,670	1956	100	12	-------	----------	11/63	50 R	-------	-------	----------	----	---------	I	
32ccd1	3,660	----------	100	8	-------	----------	11/63	40 R	-------	-------	----------	----	---------	I	
							4/68	37.9							
32ccd3	3,660	1947	103	8	103	60- 103	10/47	40 R	10/47	200 R	----------	X	---------	I	
							11/63	52.1							
32dad	3,700	1956	180	16	-------	----------	10/63	20 R	10/63	620 R	----------	----	X	I	
32ddb1	3,690	1892	300	---------	-------	----------	1892	Flowing	1892	60 R	Artesian flow	----	---------	N	First artesian well reported in San Pedro River valley. Sealed in 1963.
							12/49	2.3							
32ddc1	3,690	1936	200	6	200	----------	9/44	6.3	-------	9 R	----------	----	X	D	Drawdown 26 feet below static water level.
32ddc3	3,690	1948	1,012	12- 8	350	OH 350-1,012	1949	Flowing	10/49	11 R	Artesian flow	X	---------	PS	School well. Drawdown 60 feet below land surface.
									10/49	250 R	----------				
(D-17-23)30ddc	4,830	----------	125	6	-------	----------	11/62	71.2	-------	-------	----------	----	---------	D, S	
							3/68	81.4							
(D-18-20)1aad	3,600	----------	---------	---------	-------	----------	4/66	Flowing	4/66	10	Artesian flow	----	---------	I	
1dad2	3,660	1913	550	3	550	----------	9/44	6.7	-------	-------	----------	----	---------	D	Artesian flow reported at 8-10 gpm when first drilled.
							3/68	13.6							
							1/70	17.6							
6bdd	4,440	----------	350	6	-------	----------	12/66	265.4	-------	-------	----------	----	---------	S	
							3/69	274.6							

Table 2.--Records of selected wells and springs, San Pedro River valley—Continued

Location	Land-surface altitude (feet above mean sea level)	Date completed (year)	Reported depth (feet)	Diameter of casing (inches)	Depth of casing (feet)	Perforated interval (feet below land surface)	Water level: Date (month, year)	Water level: Feet below land surface	Pumping data: Date (month, year)	Pumping data: Yield (gpm)	Pumping data: Pumping level (feet below land surface)	Well log	Chemical analysis	Use of water	Remarks
UPPER SAN PEDRO BASIN—Continued															
(D-18-20)21dcb	4,200	----------	---------	6	-------	----------	9/63	140 R	-------	-------	----------	----	---------	S	
(D-18-21)1dca	4,140	----------	396	10	-------	----------	12/61 4/68	361.0 362.6	-------	-------	----------	----	---------	S	
5abb1	3,670	----------	295	6	-------	----------	-------	----------	-------	-------	----------	----	---------	PS	
5acb	3,660	----------	78	5	-------	----------	9/44 10/63 4/68	56.1 57.2 52.0	-------	-------	----------	----	---------	D	
5acc2	3,650	----------	---------	12	-------	----------	10/63	50 R	-------	-------	----------	----	---------	I	
5bb	3,650	----------	270	2	-------	----------	12/20	Flowing	12/20	2	Artesian flow	----	X	-----	Artesian pressure equal to water level of 8 feet above land surface. Well not located in 1966.
5cab	3,630	----------	125	12	-------	----------	-------	----------	-------	-------	----------	----	---------	I	
5cad3	3,635	----------	190	8	-------	----------	10/63	75 R	-------	-------	----------	----	---------	I	
5daa1	3,660	1938	400	6	60	OH 60- 400	4/66 4/68	Flowing Flowing	-------	-------	----------	X	---------	D,S,I	
6aaa2	3,620	1936	60	4	60	----------	7/44 4/68 1/70	27.6 28.8 28.8	-------	-------	----------	----	X	D	
6aba2	3,620	1940	135	10	118	OH 118- 135	3/40	32.0	5/67	440	49.5	----	---------	I	Water temperature 18°C, May 1967.
6aba3	3,620	1951	104	12	104	50- 104	6/52	36 R	5/67	510	----------	----	---------	I	Water temperature 20°C, May 1967.
6abb1	3,605	1928	64	10	-------	----------	7/44 10/63	22 R 27.1	7/44	450 R	31 R	----	---------	I	
6ada3	3,630	1945	100	12	100	54- 94	4/45 6/45	35 R 51	4/45 6/45	500 R 200	65 R ----------	----	---------	I	
6baa2	3,600	1943	60	12	60	----------	1943 4/68	26 R 21.8	1943 1943	500 R 800 R	33 R 35 R	----	---------	I	Drawdown 7 feet below static water level reported at 500 gpm, and 9 feet reported at 800 gpm.
7cac	3,710	1961	715	16-10	715	400- 715	1961 5/66	80 R 102 R	10/63 10/68	100 R 120 R	---------- 198 R	----	---------	Ind	
7ccc1	3,710	1922	760	16	-------	320- 333 450- 650	10/63 10/68	65 R 53 R	9/63 10/68	525 R -------	---------- 187 R	X	---------	Ind	

Table 2.--Records of selected wells and springs, San Pedro River valley—Continued

Location	Land-surface altitude (feet above mean sea level)	Date completed (year)	Reported depth (feet)	Diameter of casing (inches)	Depth of casing (feet)	Perforated interval (feet below land surface)	Water level: Date (month, year)	Water level: Feet below land surface	Pumping data: Date (month, year)	Pumping data: Yield (gpm)	Pumping data: Pumping level (feet below land surface)	Well log	Chemical analysis	Use of water	Remarks
UPPER SAN PEDRO BASIN—Continued															
(D-18-21)7ccc2	3,710	1951	634	12	527	256- 296 422- 527 OH 527- 634	10/63 5/66	65 R 49 R	6/60 5/66	525 R -------	---------- 159 R	----	---------	Ind	
7ddc1	3,640	1954	630	8- 4	630	----------	10/63	Flowing	10/63 5/67	20 150	Artesian flow ----------	----	---------	I	Water temperature 26°C, May 1967.
8add3	3,650	1949	108	12	108	60- 108	11/49	52 R	11/49	770	----------	X	---------	I	
8cda	3,630	1955	88	18	88	40- 88	1955 10/63	12 R 18 R	1955	1,800 R	----------	----	---------	I	
9bbb1	3,670	----------	635	12	-------	----------	4/68	Flowing	-------	-------	----------	X	---------	D	
9bcd	3,690	1961	120	8	-------	----------	10/63 4/68	78.8 74.7	-------	-------	----------	----	---------	D	
13dab	4,160	----------	---------	8	-------	----------	12/61 4/68	356.6 357.1	-------	-------	----------	----	---------	S	
16bca1	3,670	----------	---------	14	-------	----------	-------	----------	10/66	440	----------	----	---------	I	Water temperature 18°C, October 1966.
16cbc	3,650	----------	---------	---------	-------	----------	-------	----------	10/66	600	----------	----	---------	I	Water temperature 19°C, October 1966.
16ccc1	3,645	1942	680	16	-------	----------	4/68	21	5/67	280	----------	----	---------	I	Water temperature 28°C, May 1967.
20cbb3	3,700	----------	---------	8	-------	----------	4/66	Flowing	-------	-------	----------	----	---------	I	Pumps or flows into pond.
20cbb4	3,700	----------	425	10	-------	----------	4/66	Flowing	-------	-------	----------	----	---------	I	Do.
28ada	3,720	----------	---------	14	-------	----------	4/68	67.0	-------	-------	----------	----	---------	I	
28cbd	3,700	----------	---------	20	-------	----------	12/54 4/68	30 R 20.6	10/63	1,800 E	----------	----	---------	I	
28ccb	3,690	1946	122	20	122	60- 122	11/46 4/68	23 R 16.7	5/67	1,460	44.1	X	---------	I	Water temperature 21°C, May 1967.
28daa	3,730	1958	177	12	177	77- 177	10/58 4/68	77 R 67.7	10/58	450 R	160 R	----	---------	I	
28dcc	3,710	----------	405	16	-------	----------	4/68	45.5	-------	-------	----------	----	---------	I	
33bda	3,710	----------	550	3	140	OH 140- 550	6/47 4/68	Flowing R Flowing	6/47	8 R	Artesian flow	----	---------	S	
33da	3,740	----------	470	---------	-------	----------	2/34	Flowing R	2/34	4 R	Artesian flow	----	X	-----	
34bdc	3,790	1914	560	3	-------	----------	9/44 4/58 4/68	23.8 31.9 39.1	-------	-------	----------	----	---------	N	

Table 2.--Records of selected wells and springs, San Pedro River valley—Continued

Location	Land-surface altitude (feet above mean sea level)	Date completed (year)	Reported depth (feet)	Diameter of casing (inches)	Depth of casing (feet)	Perforated interval (feet below land surface)	Water level		Pumping data			Well log	Chemical analysis	Use of water	Remarks
							Date (month, year)	Feet below land surface	Date (month, year)	Yield (gpm)	Pumping level (feet below land surface)				
UPPER SAN PEDRO BASIN—Continued															
(D-18-22)14bcc	4,580	----------	727	---------	-------	----------	4/62	672.3	-------	-------	----------	----	---------	S	
30bcd	4,190	----------	420	6	-------	----------	11/62 4/68	380.4 375.4	-------	-------	----------	----	---------	S	
(D-19-19)26ddd	4,500	----------	---------	5	-------	----------	9/63	317	-------	-------	----------	----	---------	S	
(D-19-20)22cbb	4,150	----------	---------	6	-------	----------	9/69	155.2	-------	-------	----------	----	---------	S	
(D-19-21)9cba	3,755	----------	100	6	-------	----------	10/63 3/68	25.7 20.8	-------	-------	----------	----	---------	S	
12dbb2	4,045	----------	250	5	-------	----------	11/62 3/69	215.1 223.4	-------	-------	----------	----	---------	S	
14aac	3,955	----------	---------	6	-------	----------	11/61 3/68	134.1 135.4	-------	-------	----------	----	---------	S	
24bcc	4,030	----------	---------	6	-------	----------	11/61 3/68	192.0 196.2	-------	-------	----------	----	---------	S	
36bca	4,055	----------	---------	8	-------	----------	11/61	214.4	-------	-------	----------	----	---------	S	
(D-19-22)26bdd	4,380	1952	463	20	10	OH 10- 463	11/61	360.0	-------	-------	----------	X	---------	N	Specific capacity 0.5 gpm per foot from bail test at 445 feet.
35ccc	4,300	----------	---------	6	-------	----------	11/61 3/68	75.0 129.7	-------	-------	----------	----	---------	S	
(D-19-23)31cca	4,520	----------	500	---------	-------	----------	-------	----------	-------	-------	----------	----	---------	PS	
(D-20-18)3dca	4,900	1961	200	6	175	OH 175- 200	4/61	125 R	4/61	24 R	----------	----	X	D, S	Most water reported below 175 feet.
(D-20-19)14cbb	4,520	1960	404	8	-------	----------	10/60 3/68	251.0 253.8	-------	-------	----------	----	---------	-----	
24dba	4,400	1959	320	6	-------	----------	4/69	263.0	-------	-------	----------	----	---------	S	
28bdd	4,581	----------	---------	6	-------	----------	12/59	155.8	-------	-------	----------	----	---------	S	
(D-20-20)2ddd	4,183	----------	>200	6	-------	----------	10/60 3/69	93.2 94.1	-------	-------	----------	----	---------	S	
7bbd	4,360	1961	367	10- 6	367	217- 367	12/61	217 R	12/61	195 R	264 R	----	X	PS	
16bcc	4,290	----------	192	8	-------	----------	10/60 3/68	159.3 159.9	-------	-------	----------	----	---------	N	
18dbc	4,360	----------	---------	8	-------	----------	4/69	214.1	-------	-------	----------	----	---------	PS	
22abb	4,240	1969	222	8	222	122- 222	4/69	110.2	-------	-------	----------	X	---------	D	

Table 2.--Records of selected wells and springs, San Pedro River valley—Continued

Location	Land-surface altitude (feet above mean sea level)	Date completed (year)	Reported depth (feet)	Diameter of casing (inches)	Depth of casing (feet)	Perforated interval (feet below land surface)	Water level: Date (month, year)	Water level: Feet below land surface	Pumping data: Date (month, year)	Pumping data: Yield (gpm)	Pumping data: Pumping level (feet below land surface)	Well log	Chemical analysis	Use of water	Remarks
UPPER SAN PEDRO BASIN—Continued															
(D-20-20)23acb	4,150	----------	100	6	-------	----------	12/59	30.3	-------	-------	----------	----	---------	D	
24bab	4,080	1965	76	16	76	33- 73	7/65	33 R	-------	-------	----------	----	---------	-----	
27cdc	4,170	----------	127	6	-------	----------	4/41 4/60 3/68	41.3 50.7 44.9	-------	-------	----------	----	X	S	Depth reported as 110 feet, April 1960.
31dcd	4,260	----------	325	---------	-------	----------	-------	----------	-------	-------	----------	----	---------	PS	
31dda	4,255	1957	300	12	300	54- 297	1/57	52 R	-------	-------	----------	X	---------	PS	
32cca	4,240	----------	---------	---------	-------	----------	2/62 3/68	98.1 87.2	-------	-------	----------	----	---------	-----	
32cdb	4,240	----------	125	6	-------	----------	4/41 4/51 1/60	86.2 92.0 95.7	-------	-------	----------	----	---------	-----	Destroyed in 1961.
(D-20-21)3bdd	3,850	----------	187	8	-------	----------	11/61	37.1	-------	-------	----------	----	---------	D, S	
5cda	4,015	----------	---------	10	-------	----------	12/59 3/68	17.8 14.8	-------	-------	----------	----	---------	S	
12abb	4,040	----------	194	6	-------	----------	6/62	178.4	-------	-------	----------	----	---------	S	
16ddc	3,890	----------	385	16	353	50- 348 OH 353- 385	6/64	13.3 R	-------	-------	----------	X	---------	-----	
18cbb	4,060	----------	---------	---------	-------	----------	12/59 3/68	17.2 15.2	-------	-------	----------	----	---------	D	
32ccc	4,120	----------	110	6	-------	----------	4/41	50.9	-------	-------	----------	----	---------	S	
(D-20-22)1add	4,420	----------	420	10	-------	----------	11/61	313.7	-------	-------	----------	----	---------	-----	
11aca	4,550	1948	700	12	550	430- 550 OH 550- 700	5/48 9/52	428 R 475 R	-------	260	----------	X	X	PS	Drawdown 5 feet below static water level. Hole filled in from 610-700 feet.
(D-20-23)8baa	4,540	1934	520	6- 5	520	----------	11/61	361.7	-------	-------	----------	----	---------	S	
(D-21-19)1ddc	4,325	----------	180	6	-------	----------	4/41 8/54	163.4 171.5	-------	-------	----------	----	X	D, S	
2dca	4,390	----------	84	6	-------	----------	4/41 3/68	56.7 57.2	-------	-------	----------	----	---------	S	
6cca	4,580	----------	---------	20	-------	----------	12/59	28.2	-------	-------	----------	----	---------	D, I	
32cbc	5,175	----------	---------	---------	-------	----------	-------	----------	3/60	4	----------	----	X	S	Kino Spring.

Table 2.--Records of selected wells and springs, San Pedro River valley—Continued

Location	Land-surface altitude (feet above mean sea level)	Date completed (year)	Reported depth (feet)	Diameter of casing (inches)	Depth of casing (feet)	Perforated interval (feet below land surface)	Water level		Pumping data			Well log	Chemical analysis	Use of water	Remarks
							Date (month, year)	Feet below land surface	Date (month, year)	Yield (gpm)	Pumping level (feet below land surface)				
UPPER SAN PEDRO BASIN—Continued															
(D-21-20)5acc	4,350	1959	287	6	-------	----------	3/61	204	-------	-------	----------	----	X	D	
5cdc	4,350	----------	300	---------	-------	----------	-------	----------	-------	-------	----------	----	---------	PS	
6bad	4,290	1965	218	16	218	68- 215	3/68 1/70	145.5 146.2	-------	-------	----------	X	---------	N	
6bcb	4,310	----------	---------	6	-------	----------	3/68	51.3	-------	-------	----------	----	---------	N	
15dbb	4,425	1971	807	10	804	----------	1/72	276	1/72	325	----------	X	---------	N	Drawdown 49 feet below static water level.
16aadb	4,420	1971	807	10	800	----------	12/71	277	12/71	425	296	----	---------	N	
20dcd	4,600	1971	801	10	793	454- 781 OH 793- 801	11/71	438	12/71	300	478	----	---------	N	
21aad	4,480	1961	600	12	600	----------	1/61 3/68	317.7 321.5	-------	350 R	----------	----	---------	-----	Drawdown 22 feet below static water level. Specific capacity 16 gpm per foot.
28cda	4,610	----------	800	18-16	800	----------	5/43 1/69	443.4 475 R	1958	700	----------	----	X	PS	Fort Huachuca well 5. Drawdown 50 feet below static water level. Specific capacity 14 gpm per foot.
30bdb	4,740	1971	796	10	787	414- 775 OH 787- 796	11/71	559	11/71	350	623	----	---------	N	
33aca	4,619 L	----------	912	8	807	0-145.5 460- 587 OH 807- 912	1942 12/67	462 R 498 R	1942	700	480	----	X	PS	Fort Huachuca well 4. Specific capacity 39 gpm per foot.
33adb	4,618	----------	802	18-16	802	----------	5/48 12/67	453.2 517 R	1958	700	----------	----	X	PS	Fort Huachuca well 3. Drawdown 33 feet below static water level. Specific capacity 21 gpm per foot.
33dbb	4,645	1958	1,230	16	803	500- 760 OH 803-1,230	2/58 1/67	492 R 500 R	1959	310	----------	X	X	PS	Fort Huachuca well 6. Drawdown 8.2 feet below static water level. Specific capacity 38 gpm per foot.
34aaa	4,566	1968	700	16	-------	----------	4/68	415.50	-------	-------	----------	----	---------	PS	
34caa	4,600	1954	645	12	644	437- 640	11/54	440 R	2/55	380 R	468 R	X	---------	PS	
34dcc1	4,610	1956	655	10	655	432- 653	7/56	455 R	-------	-------	----------	----	---------	PS	

Table 2.--Records of selected wells and springs, San Pedro River valley—Continued

Location	Land-surface altitude (feet above mean sea level)	Date completed (year)	Reported depth (feet)	Diameter of casing (inches)	Depth of casing (feet)	Perforated interval (feet below land surface)	Water level: Date (month, year)	Water level: Feet below land surface	Pumping data: Date (month, year)	Pumping data: Yield (gpm)	Pumping data: Pumping level (feet below land surface)	Well log	Chemical analysis	Use of water	Remarks
UPPER SAN PEDRO BASIN—Continued															
(D-21-20)34dcc2	4,610	----------	---------	8	-------	----------	3/68	573.7	-------	-------	----------	----	---------	PS	
35cbc	4,580	----------	650	---------	-------	----------	1967	405 R	-------	-------	----------	----	---------	PS	
35dbb	4,550	1968	722	12-10	722	410- 607	3/69	390.9	-------	-------	----------	X	---------	PS	
35dcc	4,560	1956	640	12	640	395- 638	4/56	395 R	-------	-------	----------	----	---------	PS	
36dcc	4,500	1966	450	10	-------	----------	7/66	338 R	7/66	280 R	410 R	----	---------	PS	
(D-21-21)11aac	3,975	1946	90	6	-------	----------	3/68 6/70	29.2 28.0	-------	-------	----------	----	---------	D	
22ddc	4,190	----------	130	6	-------	----------	4/41 3/68	56.2 63.9	-------	-------	----------	----	X	D	
27cbd	4,260	----------	150	6	-------	----------	4/41 3/68 3/69	80.7 96.1 98.3	-------	-------	----------	----	---------	S	Water temperature 21°C, April 1960.
29cca	4,360	----------	280	6	-------	----------	4/41 3/68	195.0 209.9	-------	-------	----------	----	X	S	
31ccc	4,470	---------- 1963	--------- 450	4 8	-------	----------	5/42 8/63	283.2 292 R	-------	-------	---------- ----------	----	---------	PS	Originally 4-inch diameter. Redrilled in 1963.
31cdb	4,440	1960	501	12	501	300- 501	5/60 3/68	269.8 276.3	5/60	250 R	----------	----	---------	PS	
34dbb	4,275	1969	233	8	233	122- 230	1/70	81.3	-------	-------	----------	----	---------	-----	Driller reported water at 122 feet.
(D-21-22)9acc	4,170	----------	120	---------	-------	----------	4/62	94.0	-------	-------	----------	----	---------	D, S	
10bca	4,225	---------- 1952	450 642	--------- 16- 8	-------	----------	-------	----------	-------	-------	---------- ----------	---- X	---------	I	Deepened from 450 to 642 feet in 1952. Driller's log only for deepened portion.
11bda	4,280	----------	---------	6	-------	----------	4/62	211.5	-------	-------	----------	----	---------	S	Measured depth 231 feet, April 1962.
13cad	4,280	1902	240	---------	-------	----------	4/62	210.3	-------	-------	----------	----	---------	D, S	
16bbb	4,125	----------	85	6	-------	----------	4/62 3/68 1/70	55.6 65.1 57.1	-------	-------	----------	----	---------	S	
23ada	4,270	----------	---------	6	-------	----------	4/62	186	-------	-------	----------	----	---------	N	Measured depth 215 feet, April 1962.
(D-21-23)29dbc	4,485	1935	973	6	-------	----------	12/49 3/69	400 R 300.4	-------	-------	----------	X	---------	D	

Table 2.--Records of selected wells and springs, San Pedro River valley—Continued

Location	Land-surface altitude (feet above mean sea level)	Date completed (year)	Reported depth (feet)	Diameter of casing (inches)	Depth of casing (feet)	Perforated interval (feet below land surface)	Water level: Date (month, year)	Water level: Feet below land surface	Pumping data: Date (month, year)	Pumping data: Yield (gpm)	Pumping data: Pumping level (feet below land surface)	Well log	Chemical analysis	Use of water	Remarks
UPPER SAN PEDRO BASIN—Continued															
(D-22-20)1ada	4,480	----------	---------	---------	-------	----------	6/70	301 R	-------	-------	----------	----	---------	-----	
1bca	4,535	----------	504	---------	-------	----------	6/67 3/68	355 R 359.0	6/67 10/68	------- 400	380 R 454 R	----	---------	PS	Surging during pumping at 400 gpm.
1cbb	4,555	1965	605	16	605	380- 600	6/67 10/68	375 R 362 R	6/67 10/68	------- 200	405 R 408	----	---------	PS	
1dda	4,500	----------	---------	---------	-------	----------	6/70	275 R	-------	-------	----------	----	---------	-----	
3bbb2	4,640	1939	701	14	-------	----------	6/44 12/67	483 R 517 R	-------	500	----------	X	X	PS	Fort Huachuca well 1. Drawdown 31 feet below static water level. Specific capacity 16 gpm per foot.
3bbb3	4,640	----------	710	14	-------	----------	1958 12/67	490 R 521 R	-------	900	----------	----	X	PS	Fort Huachuca well 2. Drawdown 46 feet below static water level. Specific capacity 20 gpm per foot.
3bbd	4,650	1956	695	12	695	495- 693	7/56	495 R	2/61	280 R	----------	----	---------	PS	Zero drawdown.
12aab	4,510	----------	---------	---------	-------	----------	6/70	280 R	-------	-------	----------	----	---------	-----	
12bcc	4,590	1970	542	6	542	415- 540	3/70	400 R	-------	-------	----------	X	---------	D	
26abb	4,740	----------	290	---------	-------	----------	10/59	85.7	-------	-------	----------	----	---------	S	
(D-22-21)3abc	4,300	1969	180	8	180	100- 179	1/70	79.2	-------	-------	----------	X	---------	-----	Driller reported water at 135 feet; water level rose to 82 feet.
6aaa	4,430	----------	---------	---------	-------	----------	6/70	280 R	-------	-------	----------	----	---------	-----	
10cba	4,330	----------	200	6	-------	----------	12/59	165.5	-------	-------	----------	----	---------	D, S	
14cbc	4,300	1968	250	10	250	121- 240	7/68	120 R	-------	-------	----------	X	---------	-----	
19cdd	4,610	1970	450	8	450	350- 450	6/70	370 R	-------	-------	----------	X	---------	-----	
22cad	4,375	1969	260	8	252	160- 248 OH 252- 260	1/70	160.7	-------	-------	----------	----	---------	D	
23bad	4,295	1969	220	11	220	100- 210	6/69	110 R	-------	-------	----------	X	---------	D	
30bcc	4,680	1963	600	8	-------	----------	-------	----------	-------	-------	----------	----	---------	PS	
31abb	4,645	1967	---------	12	-------	----------	3/68	396.4	-------	-------	----------	----	---------	-----	
31bcb	4,720	1963	600	8	-------	----------	3/68	390.1	-------	-------	----------	----	---------	PS	

Table 2.--Records of selected wells and springs, San Pedro River valley—Continued

Location	Land-surface altitude (feet above mean sea level)	Date completed (year)	Reported depth (feet)	Diameter of casing (inches)	Depth of casing (feet)	Perforated interval (feet below land surface)	Water level: Date (month, year)	Water level: Feet below land surface	Pumping data: Date (month, year)	Pumping data: Yield (gpm)	Pumping data: Pumping level (feet below land surface)	Well log	Chemical analysis	Use of water	Remarks
UPPER SAN PEDRO BASIN—Continued															
(D-22-21)35ddd	4,365	1950	---------	6	-------	----------	11/59 3/68	139.3 141.5	-------	-------	----------	----	X	S	Water temperature 22°C, April 1960.
(D-22-22)6daa	4,060	1964	715	16	462	80- 452 OH 462- 715	10/64	17 R	5/64 1968	1,100 780	214 ----------	X	---------	I	
7dad	4,080	1964	855	16	460	25- 450 OH 460- 855	6/64	15 R	1968	780	----------	X	---------	I	
17bcd	4,080	1964	908	16- 8	660	60- 460 627- 657 OH 660- 908	5/64	9 R	8/64 1968	850 R 570	254 R ----------	X	---------	I	
30acc	4,220	---------	---------	---------	-------	----------	11/59	48.2	-------	-------	----------	----	---------	D, S	
(D-23-20)1aaa	4,750	1962	403	12	145	65- 143 OH 145- 403	10/62 4/69	60 R 50.6	-------	-------	----------	X	---------	D	
(D-23-21)4cab	4,540	1962	376	---------	-------	----------	4/69	315.5	-------	-------	----------	----	---------	D	
6aaa	4,640	1920	120	6	-------	----------	3/69	104.6	-------	-------	----------	----	---------	D, S	Depth reported as 165 feet in 1969.
6ccc	4,820	---------	70	8	-------	----------	4/41 4/53 3/68 3/69	7.7 42.1 6.2 31.0	-------	-------	----------	----	---------	S	Water level fluctuates with flow in Carr Canyon.
6ddd	4,690	---------	100	6	-------	----------	11/53 3/68	33.5 6.8	-------	-------	----------	----	---------	D	
9cdd	4,625	---------	---------	6	-------	----------	11/59 3/68	251.0 256.9	-------	-------	----------	----	---------	S	Water temperature 21°C, April 1960.
11dcc	4,460	---------	240	6	-------	----------	11/59	215.9	-------	-------	----------	----	---------	D, S	
12ddc	4,375	---------	---------	6	-------	----------	11/59 3/68	125.0 129.5	-------	-------	----------	----	---------	S	
19adb	4,920	1968	165	10- 8	-------	----------	10/68	31.8	-------	-------	----------	----	---------	D	
35adb	4,460	1966	235	10	235	155- 235	3/68	199.7	-------	-------	----------	X	---------	S	
(D-23-22)3daa	4,240	---------	---------	---------	-------	----------	3/68	103.2	-------	-------	----------	----	---------	-----	
9dda	4,150	---------	---------	---------	-------	----------	3/68	10.7	-------	-------	----------	----	---------	I	
10cab	4,160	1951	384	16	384	155- 365	8/51 3/69	23 R 20.0	-------	-------	----------	X	---------	N	Sounded depth 375 feet, March 1969.
10cdd	4,190	1912	300	12	201	40- 201 OH 201- 300	1912 3/69	11 R 33.3	1912	60 R	19 R	----	---------	N	
15acc1	4,185	---------	240	4	-------	----------	-------	----------	7/46	200 E	----------	----	X	I, S	Artesian well.

Table 2.--Records of selected wells and springs, San Pedro River valley—Continued

Location	Land-surface altitude (feet above mean sea level)	Date completed (year)	Reported depth (feet)	Diameter of casing (inches)	Depth of casing (feet)	Perforated interval (feet below land surface)	Water level: Date (month, year)	Water level: Feet below land surface	Pumping data: Date (month, year)	Pumping data: Yield (gpm)	Pumping data: Pumping level (feet below land surface)	Well log	Chemical analysis	Use of water	Remarks
UPPER SAN PEDRO BASIN—Continued															
(D-23-22)15acc2	4,175	1952	250	16	-------	----------	3/69	7.6	6/67	450	----------	----	---------	I	Reportedly pumped 1,500 gpm in 1952.
15bcc	4,160	----------	---------	6	-------	----------	-------	----------	1945	250	Artesian flow	----	X	I	Flow reported at 500 gpm when drilled. Water temperature 21°C, March 1966.
							7/46	Flowing	7/46	210	Artesian flow				
16adc	4,165	----------	353	16	350	----------	-------	----------	1968	1,610	----------	----	---------	I	
18cba	4,350	----------	---------	6	-------	----------	11/59	134.3	-------	-------	----------	----	---------	S	
							3/68	132.8							
20aab	4,270	1964	485	12-10	460	195- 460	10/64	115 R	10/64	620 R	----------	----	---------	I	Drawdown 32 feet below static water level reported, October 1964.
						OH 460- 485			1968	880	----------				
20ddb	4,260	1965	460	16	460	100- 455	2/65	59 R	5/65	800 R	----------	X	---------	I	Drawdown 57 feet below static water level reported, May 1965.
									1968	780	----------				
21aac	4,185	----------	500	6	-------	----------	7/46	Flowing	7/46	30	Artesian flow	----	X	N	
							3/68	23.9							
21acd	4,195	1953	264	16	264	----------	7/53	27	-------	-------	----------	----	X	I	
							3/68	22.9							
21cda	4,220	----------	55	10	-------	----------	7/46	36.0	-------	-------	----------	----	X	D	
							3/68	36.3							
21ddb	4,200	----------	350	16	350	60- 345	-------	----------	1968	1,690	----------	X	---------	I	
22bdd	4,190	1951	475	16	328	23- 317	1/54	8.1	4/55	1,800 R	----------	X	X	I	Drawdown 80 feet below static water level reported, April 1955.
						OH 328- 475	3/68	12.2	6/67	1,510	41.9				
27bcc	4,205	1918	300	6	-------	----------	-------	----------	-------	-------	----------	----	---------	I	
27cac	4,215	1952	400	8	-------	----------	4/69	15.1	-------	-------	----------	----	---------	I	
29acb	4,275	1964	460	16	460	100- 455	8/64	76 R	9/64	2,800 R	150 R	----	---------	I	
							3/68	68.4	1968	1,010	----------				
29daa	4,245	----------	563	16	563	----------	3/68	49.7	1968	1,560 R	----------	X	---------	I	
29dbd	4,275	1964	460	16	460	100- 457	9/64	73 R	1968	1,140 R	----------	----	---------	I	
31cad	4,335	1960	700	16	-------	----------	3/68	105.7	-------	-------	----------	----	---------	I	
33adb	4,205	1968	90	10	90	30- 85	1/70	16.2	-------	-------	----------	X	---------	D	
33cbc	4,240	1946	400	12	-------	----------	3/69	43.2	7/46	390 R	----------	----	X	I	

Table 2.--Records of selected wells and springs, San Pedro River valley—Continued

Location	Land-surface altitude (feet above mean sea level)	Date completed (year)	Reported depth (feet)	Diameter of casing (inches)	Depth of casing (feet)	Perforated interval (feet below land surface)	Water level: Date (month, year)	Water level: Feet below land surface	Pumping data: Date (month, year)	Pumping data: Yield (gpm)	Pumping data: Pumping level (feet below land surface)	Well log	Chemical analysis	Use of water	Remarks
UPPER SAN PEDRO BASIN—Continued															
(D-23-22)33ccc	4,240	----------	185	8- 6	-------	----------	-------	----------	7/46 6/67	300 R 490	---------- ----------	----	X	I	
33cdc	4,230	----------	---------	6	-------	----------	3/68	28.9	-------	-------	----------	----	---------	I	
33cdd	4,230	1944	---------	---------	-------	----------	3/66	31.2	7/46	150 E	----------	----	---------	I	
33dcc	4,220	----------	465	14	-------	----------	3/66 3/68	18.2 17.2	6/67	540	----------	----	---------	I	
34abd	4,240	----------	170	8	-------	----------	3/66 3/68	36.6 29.4	-------	-------	----------	----	---------	I	
34bcb	4,215	1953	400	16	-------	----------	3/66	21.3	6/67	1,020	----------	----	---------	I	
34cbd	4,240	1943	165	10	165	100- 165	7/46 3/68	14.8 22.2	9/52	300 E	----------	----	X	I	
34ccd	4,250	1952	189	12	-------	----------	3/66	22.4	-------	-------	----------	----	---------	I	
(D-23-23)32bcc	4,465	----------	---------	---------	-------	----------	3/68	256.8	-------	-------	----------	----	---------	S	
(D-24-21)1abc	4,400	1958	800	16	-------	----------	-------	----------	-------	-------	----------	----	---------	I	
4baa	4,840	1940	324	6	-------	----------	4/44 7/57	275 R 295.9	-------	-------	----------	X	---------	N	
11acc	4,470	----------	1,015	16	1,000	220- 988 OH 1,000-1,015	10/48 3/68	180 R 196.5	10/54	600 E	----------	X	---------	I	Water temperature 24°C, October 1954.
(D-24-22)1dba	4,330	1933	222	6	-------	----------	9/69	120.3	-------	-------	----------	----	---------	D	Deepened in 1933. Original depth unknown.
4bab	4,230	1967	70	8	70	20- 50	3/68	17.1	-------	-------	----------	----	---------	D	
4cca	4,235	1948	46	8	-------	----------	3/68	27.3	-------	-------	----------	----	---------	I	
5aca	4,255	1954	325	16	325	----------	------ 8/56	---------- 35.8	12/54 8/56	1,380 R 815	---------- 61.3	X	X	I	Drawdown 87 feet below static water level, December 1954. Water temperature 22°C, August 1956.
6bbb	4,360	1958	60	16	-------	----------	-------	----------	-------	-------	----------	----	---------	I	
8ada	4,240	----------	250	---------	-------	----------	3/68	14.6	5/67	390	106	----	---------	I	Water temperature 24°C, May 1967.
8dba	4,250	1949	46	8	-------	----------	3/68	15.9	-------	-------	----------	----	---------	I	
12ccc	4,390	1934	181	6	-------	----------	9/69	164.4	-------	-------	----------	----	---------	S	Deepened in 1934. Original depth unknown.

Table 2.--Records of selected wells and springs, San Pedro River valley—Continued

Location	Land-surface altitude (feet above mean sea level)	Date completed (year)	Reported depth (feet)	Diameter of casing (inches)	Depth of casing (feet)	Perforated interval (feet below land surface)	Water level		Pumping data			Well log	Chemical analysis	Use of water	Remarks
							Date (month, year)	Feet below land surface	Date (month, year)	Yield (gpm)	Pumping level (feet below land surface)				
UPPER SAN PEDRO BASIN—Continued															
(D-24-22)15daa	4,400	----------	---------	8	-------	----------	9/69	157.1	-------	-------	----------	----	---------	S	
17bab	4,260	1949	37	10	-------	----------	5/69	19.5	5/67	830	----------	----	---------	I	Water temperature 21°C, May 1967.
17bdc	4,265	----------	32	6	-------	----------	4/69	16.9	-------	-------	----------	----	---------	I	
17cac	4,270	1952	250	16	-------	----------	-------	----------	5/67	1,200	78.7	----	---------	I	Water temperature 23°C, May 1967.
18add	4,270	----------	---------	---------	-------	----------	3/68	34.6	-------	-------	----------	----	---------	S	
20bba	4,300	----------	---------	6	-------	----------	9/69	40.4	-------	-------	----------	----	---------	S	
(D-24-23)5aaa	4,485	----------	---------	10	-------	----------	3/69	265.4	-------	-------	----------	----	---------	S	
6aaa	4,420	----------	250	---------	-------	----------	12/49 2/59 3/68	199.5 211.9 209.6	-------	-------	----------	----	---------	D	
16bba	4,470	----------	480	6	270	OH 270- 480	9/69	228.2	-------	-------	----------	----	---------	S	

Table 3.--Modified drillers' logs of selected wells in the San Pedro River valley

[Formation identification inferred where possible; authors do not have access to well cuttings for most wells]

Stratigraphic unit	Description	Thickness (feet)	Depth (feet)
LOWER SAN PEDRO BASIN			
(D-5-15)25bad			
Flood-plain alluvium	Gravelly soil	16	16
	Clay	3	19
	Clay and coarse gravel	26	45
	Gravel and water	15	60
	Clay	5	65
?	Clay and gravel	30	95
Valley-fill deposits	Cemented gravel	5	100
	Sticky clay	30	130
	TOTAL DEPTH		130
(D-6-16)8cdb			
Flood-plain alluvium	Clay	15	15
	Sand and gravel	96	111
Valley-fill deposits	Clay	8	119
	TOTAL DEPTH		119
(D-6-16)33aca			
Flood-plain alluvium	Soil	2	2
	Clay	38	40
	Coarse clean gravel and sand	45	85
Valley-fill deposits	Clay, gypsum	15	100
	TOTAL DEPTH		100
(D-7-16)8daa			
Valley-fill deposits	Gravel and boulders	50	50
	Gravel with cemented seams, water in loose layers	30	80
	Conglomerate	41	121
Crystalline and consolidated sedimentary rocks	Quartzite	9	130
	TOTAL DEPTH		130
(D-7-16)9dac			
Flood-plain alluvium	Black topsoil	8	8
	Topsoil and sand	12	20
	River gravel and sand—struck first water	2	22
	Fine sand	13	35
	Heavy river gravel and rock—more water	2	37
	Sand and some gravel	23	60
	Mixture of rock and gravel	15	75
	Coarse clean river sand	12	87
	TOTAL DEPTH		87
(D-8-16)25dcd			
Valley-fill deposits and consolidated to semi-consolidated sedimentary rocks (undivided)	Ordinary conglomerate	785	785
Crystalline and consolidated sedimentary rocks	Red material	1,359	2,144
	TOTAL DEPTH		2,144
(D-8-17)7bbb			
Flood-plain alluvium	Sand—wash gravel	38	38
?			
Valley-fill deposits	Water gravel	16	54
	Clay	9	63
	Gravel	9	72
	Clay	8	80
	Gravel	8	88
	Clay (tight)	2	90
	TOTAL DEPTH		90
LOWER SAN PEDRO BASIN—Continued			
(D-8-17)18cdc			
Flood-plain alluvium	Gravel	41	41
	Clay and sand	79	120
Valley-fill deposits	Clayey gravel—some water	20	140
	Tight cemented sands	101	241
	Loose muddy gravel—more water	6	247
	Tight conglomerate	28	275
	Coarse rocky conglomerate—water raised	72	347
	TOTAL DEPTH		347
(D-8-17)29dda			
Flood-plain alluvium	Sand and clay	22	22
	Water sand	48	70
	Boulders, water	10	80
Valley-fill deposits	Reddish clay	20	100
	TOTAL DEPTH		100
(D-8-17)30aab			
Flood-plain alluvium	Clayey gravel	45	45
	Sandy clay	47	92
Valley-fill deposits	Muddy gravel	12	104
	Sandy clay	4	108
	Muddy sand and water	42	150
	Soft conglomerate—some water	101	251
	Hard conglomerate (Gila)	44	295
	TOTAL DEPTH		295
(D-8-17)32daa			
Flood-plain alluvium	Sand and gravel	80	80
Valley-fill deposits	Sand	5	85
	Sand and boulders	55	140
	Sand	20	160
	Gravel	45	205
	Hard sand	15	220
	Gravel	65	285
	Sand	30	315
	Sand and boulders	136	451
	Sand	144	595
	Sand and gravel	10	605
	Gravel	20	625
	Sand and gravel	35	660
	Running sand	5	665
	Sand	80	745
	Clay and gravel	10	755
?	Sand and clay	10	765
Consolidated to semi-consolidated sedimentary rocks(?)	Red clay and gravel	240	1,005
	Brown shale with sand	10	1,015
	Red clay and gravel	15	1,030
	Sticky black clay (show oil)	5	1,035
	Sticky brown shale (show oil)	5	1,040
	Red clay and gravel	65	1,105
	Gypsum	5	1,110
	Red clay and gravel	25	1,135
	Brown lime	9	1,144
	Red clay and gravel	16	1,160
	Hard sand (small amount of water)	35	1,195
	Red clay	2	1,197
	Hard brown sand	8	1,205
	Hard gray lime	15	1,220
	Conglomerate with lime	37	1,257
	Red clay	8	1,265
	Hard conglomerate	2	1,267
	Red clay	8	1,275
	Sandstone (artesian water, flowing 20 gpm)	95	1,370
	Hard sandstone	70	1,440
	Red beds	45	1,485
	TOTAL DEPTH		1,485

Table 3. --Modified drillers' logs of selected wells in the San Pedro River valley—Continued

LOWER SAN PEDRO BASIN—Continued

(D-8-18)19baa

Stratigraphic unit	Description	Thickness (feet)	Depth (feet)
Valley-fill deposits	Conglomerate	235	235
	Conglomerate and clay	105	340
	Clay, sand, trace gypsum, some tuff beds	167	507
Crystalline and consolidated sedimentary rocks	Red-brown tuff or welded tuff	160	667
	Vitrophyre	48	715
	Clayey tuff	76	791
	Tuff	137	928
	Rhyolite	152	1,080
	Conglomerate, fragments small, poorly cemented	69	1,149
	Red to brown clay; thin beds of volcanics	191	1,340
	Basalt	45	1,385
	Sandy volcanic clay	82	1,467
	Welded tuff and basic flows	68	1,535
	Clay with volcanic material	25	1,560
	Clay with rhyolite and basalt fragments	115	1,675
	Basic volcanic rocks	60	1,735
	Rhyolite	78	1,813
	Alternating rhyolite and basic volcanic rocks	126	1,939
	TOTAL DEPTH		1,939

(D-9-17)15cba

Stratigraphic unit	Description	Thickness (feet)	Depth (feet)
Valley-fill deposits	Gravel	4	4
	Rocky conglomerate	24	28
	Sticky brown clay	20	48
	Medium tight conglomerate	27	75
	Dirty gravel, water	16	91
	Dirty gravel, water	7	98
	Sandy clay	24	122
	Muddy gravel and water	53	175
	Tight conglomerate	25	200
	Gray sticky clay	5	205
	Medium tight conglomerate with cemented ribs	240	445
	Soft conglomerate, water	30	475
	Medium hard conglomerate	115	590
	Hard cemented conglomerate	22	612
	Soft conglomerate, water	2	614
	Medium hard conglomerate	8	622
	Soft muddy conglomerate, water(?)	3	625
?	Medium hard conglomerate, hard ribs	201	826
Consolidated to semi-consolidated sedimentary rocks	Hard red clay	15	841
	Medium hard gravel with red clay	40	881
	Hard sticky red clay	3	884
	Medium hard gravel-clay	62	946
	Hard sandstone	25	971
	Medium hard sand-clay	13	984
	Hard red clay	5	989
	Hard red sand-clay	45	1,034
	Hard red sandstone	42	1,076
	Hard red lava rock	18	1,094
	Hard red gravel-clay	9	1,103
?	Hard red sticky clay	12	1,115
Consolidated to semi-consolidated sedimentary rocks(?) or crystalline and consolidated sedimentary rocks(?)	Hard gray conglomerate	103	1,218
	Hard brown sandstone	8	1,226
	Hard sticky gouge	14	1,240
	Hard sticky brown clay	16	1,256
	Hard sticky gouge	3	1,259
	Hard brown sandstone	3	1,262
	Muddy silt-sand	4	1,266
	Gouge	7	1,273
	Very hard brown sandstone	11	1,284
	Gouge	3	1,287
	Brown siltstone	5	1,292
	Very hard brown sandstone	2	1,294
	Medium hard conglomerate	6	1,300
	TOTAL DEPTH		1,300

(D-9-17)22abb2

Stratigraphic unit	Description	Thickness (feet)	Depth (feet)
Valley-fill deposits	Loose gravel and sand	135	135
	Gravel with clay binder	15	150
	Hard packed sand and gravel	362	512
	Sand, gravel, and clay (hard streaks)	204	716
?	Rock with streaks of clay	69	785
Consolidated to semi-consolidated sedimentary rocks(?)	Cemented rock	60	845
	Red rock	127	972
	Gravelly clay (hard like conglomerate)	35	1,007
	TOTAL DEPTH		1,007

LOWER SAN PEDRO BASIN—Continued

(D-9-17)23ddd

Stratigraphic unit	Description	Thickness (feet)	Depth (feet)
	Topsoil	8	8
Flood-plain alluvium	Sand (water at 40 feet)	42	50
?	Sand and gravel	40	90
Valley-fill deposits	Sandy gravelly clay	40	130
	Sandy clay	45	175
	Gravelly clay with cement ribs	45	220
	Sticky clay with ribs	60	280
	Packed sand	25	305
	Sandy gravelly clay	45	350
	Gravelly clay with ribs	60	410
	Gravelly clay with ribs	70	480
	Cemented sand and gravel	25	505
	Sandy gravelly clay with ribs	75	580
?	Sand and gravel	100	680
Consolidated to semi-consolidated sedimentary rocks(?)	Conglomerate	325	1,005
	Clay	5	1,010
	Gravelly clay	60	1,070
	Conglomerate	150	1,220
	Medium hard conglomerate	15	1,235
	Hard conglomerate	32	1,267
	Medium hard conglomerate	33	1,300
	Gravelly clay	5	1,305
	TOTAL DEPTH		1,305

(D-9-17)25bdc

Stratigraphic unit	Description	Thickness (feet)	Depth (feet)
Flood-plain alluvium	River sand and silt	20	20
	River gravel	60	80
Valley-fill deposits	Heavy clay and a little gravel	240	320
	Sandy clay	140	460
	Sandy gypsum	20	480
	Gypsum sand; water at 487 feet, not artesian	120	600
	Clay and sand	28	628
	Artesian water-bearing coarse sand	12	640
	Fine sand	60	700
	Coarse sand, few clay seams	120	820
	Sand and gravel	40	860
	Sand and clay seams. Flow of water increased steadily from 628 feet to 864 feet. No increase below 864 feet	95	955
	Hard clay	10	965
	Running sand but no increase in water flow	2	967
	TOTAL DEPTH		967

(D-9-19)32cab

Stratigraphic unit	Description	Thickness (feet)	Depth (feet)
Flood-plain alluvium and valley-fill deposits (undivided)	Dug well; rocky silt and dry gravel reported to 26 feet; clay below	40	40
Valley-fill deposits	Boulders	38	78
	Sandy shale	282	360
	Gravelly conglomerate	140	500
?	Sand, gravel, and water	3	503
Crystalline and consolidated sedimentary rocks(?)	Sedimentary rock	97	600
	Sandy shale	73	673
	Rock	127	800
	Log of deepening		
	Conglomerate and clay	225	1,025
	Conglomerate and sand. At slightly above 1,070 feet, bailed dry in one hour	45	1,070
	Conglomerate and clay. No new water	100	1,170
	Drilling firmer, cuttings finer, but still looks like conglomerate with sand. Hole began to drift between 1,170 feet and 1,185 feet. Bailed for 2-1/2 hours without lowering the water any after the first hour. Bailed at about 7 gpm. Hot water	15	1,185
	Drills firmer, cuttings finer, seems to have crevasses, but still looks like conglomerate	40	1,225
	TOTAL DEPTH		1,225

Table 3.--Modified drillers' logs of selected wells in the San Pedro River valley—Continued

Stratigraphic unit	Description	Thickness (feet)	Depth (feet)
	LOWER SAN PEDRO BASIN—Continued		
	(D-10-18)16cad		
Flood-plain alluvium	Dirt and boulders	10	10
	Gravel	85	95
Valley-fill(?) deposits	Clay	5	100
	TOTAL DEPTH		100
	(D-11-19)10dca		
Valley-fill deposits	Soil and boulders	20	20
	Conglomerate—seep of water on top of volcanics. Seep rose to 98 feet	122	142
Crystalline and consolidated sedimentary rocks	Volcanics(?) like "Galiuro red rock"	158	300
	No log of deepening	300	600
	TOTAL DEPTH		600
	(D-12-18)13cab		
Flood-plain alluvium ?	Clay, boulders	70	70
	Sand, gravel and water	25	95
Valley-fill deposits	Clay, gravel	40	135
	Possibly water	15	150
Consolidated to semi-consolidated sedimentary rocks(?)	Conglomerate (tight)	15	165
	TOTAL DEPTH		165
	(D-12-19)19adb		
Consolidated to semi-consolidated sedimentary rocks ?	Boulders	4	4
	Conglomerate	46	50
	Sand, gravel, water	22	72
Crystalline and consolidated sedimentary rocks(?)	Volcanic conglomerate	8	80
	TOTAL DEPTH		80
	(D-12-20)11dad		
Crystalline and consolidated sedimentary rocks	Red volcanic rock	90	90
	Rhyolite	215	305
	Red volcanic rock	7	312
	TOTAL DEPTH		312
	(D-13-19)4dca		
Flood-plain alluvium and valley-fill(?) deposits ?	Clay, boulders	10	10
	Clay, sand, boulders	30	40
	Sand, gravel—water	90	130
Consolidated to semi-consolidated sedimentary rocks(?)	Conglomerate rock	5	135
	TOTAL DEPTH		135
	(D-13-19)10dcb		
Flood-plain alluvium	Sandy clay	24	24
	Boulders, sand and silt	16	40
	Sandy clay (brown)	12	52
	Clean sand, small gravel	12	64
	Sticky brown clay	4	68
	Brown boulders, clay	10	78
?	Clear water, sand and gravel	15	93
Valley-fill(?) deposits	Sandy clay	9	102
	TOTAL DEPTH		102
	(D-13-20)7ddd		
Valley-fill deposits	Sandy gravel	50	50
	Pebbly sand	60	110
	Sandy gravel	60	170
	Pebbly sand	100	270
	Sandy gravel	10	280
	Pebbly sand	30	310
	Sandy gravel	110	420
	No sample	20	440
	TOTAL DEPTH		440
	LOWER SAN PEDRO BASIN—Continued		
	(D-13-20)31ddd		
	Surface sand	2	2
	Blue clay, water seep	30	32
	Clay, pink and blue	6	38
	Sand (water)	32	70
	Clay, sandy	25	95
	Sand and clay	25	120
	TOTAL DEPTH		120
	(D-14-20)6dad		
	Surface sand	2	2
	Clay	36	38
	Sand (water)	32	70
	Clay	10	80
	Very hard granite-conglomerate	21	101
	TOTAL DEPTH		101
	(D-14-20)21bbb		
Flood-plain alluvium	Sandy loam	26	26
	Water gravel	40	66
Valley-fill(?) deposits	Red clay	4	70
	TOTAL DEPTH		70
	(D-15-18)11bdb		
Flood-plain alluvium	Sandy soil	10	10
	Gravel, water at 35 feet	26	36
Valley-fill deposits	Hard conglomerate	70	106
	Clean sand, water	5	111
	Layers of hard and soft conglomerate, possible water	34	145
	Soft conglomerate, possible water	20	165
	Hard conglomerate	40	205
	Hard rock ledge	10	215
	Sticky clay	20	235
	Medium hard conglomerate	55	290
Crystalline and consolidated sedimentary rocks(?)	Very hard rock	10	300
	TOTAL DEPTH		300
	UPPER SAN PEDRO BASIN		
	(D-15-20)31dbb		
Flood-plain alluvium	Layers of soil, sand, and clay	60	60
	Silt, fine sand, water	20	80
	Fine sand, some clay	10	90
	Good sand, water, coarse sand	20	110
Valley-fill deposits	Clay, casing driven down tight in clay bottom	5	115
	TOTAL DEPTH		115
	(D-16-19)12aca3		
Flood-plain alluvium	Topsoil	8	8
	Sand and gravel	32	40
	Black silt	28	68
	Sand and gravel—water	7	75
	Black clay	10	85
?	Conglomerate	20	105
Valley-fill deposits	Red clay	150	255
	Caving not same gravel	5	260
	Red clay	10	270
	TOTAL DEPTH		270

Table 3.--Modified drillers' logs of selected wells in the San Pedro River valley—Continued

Stratigraphic unit	Description	Thickness (feet)	Depth (feet)
UPPER SAN PEDRO BASIN—Continued			
(D-16-20)6acc2			
Flood-plain alluvium	Topsoil	2	2
	Sand and gravel	43	45
Valley-fill deposits	Red clay	25	70
	Sandy clay, gravel and water	105	175
	Red clay	430	605
	Clay, sand and water	120	725
	Clear water, sand	15	740
	Fine sand—silt	120	860
	Conglomerate	20	880
	Clean water, sand	15	895
Crystalline and consolidated sedimentary rocks(?)	Hard rock	20	915
	TOTAL DEPTH		915
(D-16-20)6dcd			
Flood-plain alluvium	Sandy clay	53	53
	Sand	12	65
	Gravel	60	125
Valley-fill(?) deposits	Clay	2	127
	TOTAL DEPTH		127
(D-16-20)34dab			
Flood-plain alluvium	Soil, dark	3	3
	Sand and gravel, yellow	92	95
	Clay, red	2	97
	Sand, gravel; 5 gpm at 98 feet	4	101
Valley-fill deposits	Clay, red; water raised to 80 feet below surface at 550 feet	449	550
	Sand, gray	10	560
	Clay, sandy, red	16	576
	Sand, gray; water raised to 40 feet below surface	5	581
	Clay, sandy, red	26	607
	Sand, rock and clay, red; gray at 620 feet. Water raised to 32 feet below surface	13	620
Consolidated to semi-consolidated sedimentary rocks	Rock, gray	45	665
	Clay, red	3	668
	Rock, gray	22	690
	Rock, sandy, gray	29	719
	Clay, rock, light	21	740
	Rock, light	60	800
	Rock, light	178	978
	Rock and clay, light	15	993
	Rock, light	7	1,000
	TOTAL DEPTH		1,000
(D-17-19)17abc1			
Valley-fill deposits	Surface soil	20	20
	Lime and gravel	40	60
	Red bed	18	78
	Clay and gravel	42	120
	Gray lime	20	140
	Sandy white lime	10	150
	Red bed	75	225
	Lime	10	235
	Red bed	10	245
	Hard conglomerate	10	255
	Red bed	50	305
	Blue lime	3	308
	Red bed	7	315
	Lime and shells	7	322
	Gray lime, water test 30 barrels per hour	13	335
	Red bed	5	340
	Lime	45	385
	Lime and shells	20	405
	Red beds	25	430
	Blue lime, water test 200 barrels per hour	19	449
	Red bed	34	483
Consolidated to semi-consolidated sedimentary rocks?	White shale	12	495
	Gray lime	15	510
	Shale	10	520
UPPER SAN PEDRO BASIN—Continued			
(D-17-19)17abc1—Continued			
Crystalline and consolidated sedimentary rocks(?)	Brown sandy shale; dry, no water in it	22	542
	Sandy shale	12	554
	Gray lime, offensive odors	11	565
	Gray shale, less offensive odors	15	580
	Hard gray lime	115	695
	Blue shale; soft, no water	100	795
	Blue lime	5	800
	Sandy shale	10	810
	Blue lime; some water	30	840
	Gray-green shale	5	845
	Lime	10	855
	Gray shale	10	865
	Dark-blue to black shale; hard for shale	5	870
	Lime	15	885
	Blue shale	20	905
	Gray lime, very light color	55	960
	Blue shale	30	990
	Lime	25	1,015
	Blue shale	25	1,040
	Lime	30	1,070
	Blue shale	50	1,120
	Lime	25	1,145
	Blue shale	80	1,225
	Sandy shale	30	1,255
	Blue shale	45	1,300
	Blue shale; water in hole	250	1,550
	TOTAL DEPTH		1,550
(D-17-20)2caa			
Flood-plain alluvium	Soil	20	20
	Red sandy soil	20	40
	Sandy and a little water	15	55
	Red soft sandy clay	25	80
	Sand and gravel and water	20	100
Valley-fill deposits	Red broken clay and sand	20	120
	Hard red clay	3	123
	TOTAL DEPTH		123
(D-17-20)7ddc			
Valley-fill deposits	Rocky granite fill	90	90
	Clay	230	320
	Sand with layers of clay	50	370
	Clay	10	380
	Sand and gravel with layers of clay	105	485
	Gravelly clay	55	540
	TOTAL DEPTH		540
(D-17-20)9adc			
Flood-plain alluvium	Red sand and soil	3	3
	Red clay	24	27
	Sand	3	30
	Red clay	20	50
	Sand, water	18	68
Valley-fill deposits	Red sticky clay	592	660
	Red clay, thin layers of cemented sand	23	683
	Sand, water raised to 390 feet	3	686
	Red clay, little sand	14	700
	Red clay	12	712
	Red clay, layers of hard cemented sand at 720 feet; water raised to 310 feet	28	740
	Red clay, thin layers of sand; water raised to 215 feet	10	750
	Red clay, sticky	53	803
	Packed sand and gravel	17	820
	Cemented sand, thin layers of packed sand	40	860
	Cemented sand	140	1,000
	TOTAL DEPTH		1,000

Table 3.--Modified drillers' logs of selected wells in the San Pedro River valley—Continued

Stratigraphic unit	Description	Thickness (feet)	Depth (feet)
UPPER SAN PEDRO BASIN—Continued			
(D-17-20)9bcc			
Flood-plain alluvium	Sand, gravel, and silt	85	85
Valley-fill deposits	Clay, small streaks of caliche	45	130
	Red clay	150	280
	Red clay, soft drilling, some gypsum	30	310
	Red clay	180	490
	Red clay, rough drilling, gypsum streaks	5	495
	Red clay	205	700
	Red clay	75	775
	Red clay, streaks of white caliche	30	805
Consolidated to semi-consolidated sedimentary rocks	Strips white caliche and sand	10	815
	Sandy clay	20	835
	Water in sand and limestone	5	840
	Red clay	69	909
	Water sand and gravel, streaks red clay	16	925
	Sandy clay	35	960
	Sand and coarse gravel—water, streaks of clay	38	998
	Coarse sand and gravel water	77	1,075
	Sandy clay	10	1,085
	Coarse sand and gravel water, some clay streaks	20	1,105
	Sandy clay, caliche boulders	20	1,125
Crystalline and consolidated sedimentary rocks(?)	Very hard drilling, pink formation	5	1,130
	Very hard drilling, some soft spots	35	1,165
	TOTAL DEPTH		1,165
(D-17-20)10ccc			
Flood-plain alluvium	Sandy soil	20	20
Valley-fill deposits	Red sticky clay	625	645
	Sand—water at 650 feet	7	652
	Coarse cemented sand	48	700
	Cemented sand, sticky clay	80	780
	Cemented clay	170	950
	Sticky clay	20	970
	Cemented boulders	10	980
Crystalline and consolidated sedimentary rocks(?)	Rock	45	1,025
	TOTAL DEPTH		1,025
(D-17-20)10dcb			
Flood-plain(?) alluvium ?	Red caliche-filled material	4	4
	Sandy red clay	12	16
Valley-fill deposits	Red and black clay	514	530
	Packed sand, some red clay	4	534
	Red clay	6	540
	Packed sand, red clay	7	547
	Clean coarse gravel, struck water	6	553
	Red clay	63	616
	Sand and gravel, hard brown clay	16	632
	Conglomerate, some sandstone	292	924
Crystalline and consolidated sedimentary rocks(?)	Hard granite	3	927
	TOTAL DEPTH		927
(D-17-20)14ccc			
Flood-plain alluvium	Sand, gravel	115	115
Valley-fill deposits	Clay	400	515
	Sand, gravel, some streaks hardpan	125	640
	TOTAL DEPTH		640
(D-17-20)18ddb1			
Valley-fill deposits	Gravel	159	159
	Clay and gravel	207	366
	Clay	75	441
	Clay and gravel	75	516
	Sand and gravel	9	525
UPPER SAN PEDRO BASIN—Continued			
(D-17-20)18ddb1—Continued			
Valley-fill deposits—continued	Gravel	20	545
	Sand and gravel	15	560
	Sand	8	568
	Sand and gravel	12	580
	Gravel	20	600
	Sand and gravel	27	627
	TOTAL DEPTH		627
(D-17-20)35aad			
Flood-plain alluvium	Soil, gravel	45	45
Valley-fill deposits	Clay	505	550
	Sand, gravel	150	700
	TOTAL DEPTH		700
(D-17-21)3aca			
Valley-fill deposits	Red clay and rock	50	50
	Light dirt and rock	200	250
	White rock; water at 538 feet	288	538
	Light dirt and rock	100	638
	TOTAL DEPTH		638
(D-17-21)15ddb			
Valley-fill deposits	Sand	41	41
	Clay	21	62
	Sand	9	71
	Clay	11	82
	Cement gravel	50	132
	Boulders	48	180
	Sandstone	9	189
	Cement, gravel and boulders; struck water at 325 feet	161	350
	Water gravel	22	372
	Cement, gravel and boulders	608	980
	Yellow clay	20	1,000
	TOTAL DEPTH		1,000
(D-17-21)32ccd3			
Flood-plain alluvium	Topsoil	20	20
	Red sandy clay	63	83
	Water sand and gravel	17	100
Valley-fill deposits	Hard red clay	3	103
	TOTAL DEPTH		103
(D-17-21)32ddc3			
Flood-plain alluvium and valley-fill deposits (undivided)	Red soil	10	10
	Red and gray soil	15	25
	Blue clay	79	104
	Water, sand and clay	76	180
Valley-fill deposits	Red clay	31	211
	Sand, gravel and water	19	230
	Red sandy clay—broken	11	241
	Red clay	79	320
	Sandy red clay	15	335
	Clay	15	350
	Red broken sand and shale	30	380
	Yellow shale and broken rock	100	480
	Lime shells and broken yellow shale	145	625
	Gray sandstone—water	35	660
	Broken sandstone—more water	15	675
Consolidated to semi-consolidated sedimentary rocks(?)	Red clay	7	682
	Red sand	33	715
	Red clay	125	840
	Red sandy shale—little water	20	860
	Light-red clay	55	915
	Red clay	97	1,012
	TOTAL DEPTH		1,012

Table 3.--Modified drillers' logs of selected wells in the San Pedro River valley—Continued

Stratigraphic unit	Description	Thickness (feet)	Depth (feet)
UPPER SAN PEDRO BASIN—Continued			
(D-18-21)5daa1			
Flood-plain alluvium	Surface dirt, some sand	50	50
Valley-fill deposits	Clay	250	300
	Water strata, sand and gravel	100	400
	TOTAL DEPTH		400
(D-18-21)7ccc1			
Valley-fill deposits	Surface soil (adobe and rock)	32	32
	Adobe with veins of gypsum (very hard)	168	200
	Hard red clay	47	247
	Soft red clay	20	267
	Sandstone	3	270
	Hard red clay	55	325
	Water gravel (first water strata)	3	328
	Hard red clay	22	350
	Red clay, slightly sandy	50	400
	Sandy red clay, some gravel	50	450
	Rocks, gravel, and sand, cemented together with red clay	100	550
	Gravel and sand (second water strata)	30	580
	Rocks, gravel, and sand, cemented together with red clay	70	650
	Gravel embedded in sandy red clay	6	656
	Hard sandy red clay	28	684
Consolidated to semi-consolidated sedimentary rocks	Sand and small gravel cemented together with clay	7	691
	Sandstone and cemented quicksand with layers of silty clay	69	760
	TOTAL DEPTH		760
(D-18-21)8add3			
Flood-plain alluvium	Sandy loam	42	42
	Fine sand	18	60
	Sand, water and gravel	45	105
Valley-fill deposits	Red clay	3	108
	TOTAL DEPTH		108
(D-18-21)9bbb1			
Flood-plain alluvium and valley-fill deposits (undivided)	Caliche	315	315
Valley-fill deposits	Blue-gray clay	300	615
	Sand, gravel, boulders	20	635
	TOTAL DEPTH		635
(D-18-21)28ccb			
Flood-plain alluvium and valley-fill deposits (undivided)	Red and yellow clay	32	32
	Blue-gray clay with very fine black sand	21	53
	Fine black sand heavy with water	22	75
	Dark-gray clay	6	81
	Red clay, sand and coarse gravel mixed	9	90
	Red, white and brown water-bearing sand and coarse gravel	32	122
	TOTAL DEPTH		122
(D-19-22)26bdd			
	Red, sticky clay with gravel streaks (pebble and cobble)	58	58
	Red clay and sand	32	90
	Half gravel and half red clay	120	210
	Fine pea gravel, some sand, very little sticky clay	37	247
	Light-colored to white clay with a little gravel	25	272
	Sticky gray clay with about 10 to 20 percent gravel	31	303
	Dense, red quartz sand (in clay), very hard drilling	1	304
	Large sharp gravel	1	305
	White clay with some sand and approximately 15 to 20 percent sharp quartz gravel; wears the bit	23	328
UPPER SAN PEDRO BASIN—Continued			
(D-19-22)26bdd—Continued			
	More sand, less quartz in gravel, does not ball on bit	10	338
	White clay, almost no gravel (2 to 5 percent), a little sand, drills easy. First water noticed after drilling to 370 feet. 347 feet to water 75°F	55	393
	Sand, coarse gravel, and clay. Gravel the size of a hen's egg	22	415
	Gravel and sand with carbonate binder	24	439
	Sand with lime binder, almost no gravel	6	445
	Coarse gravel and some rocks	9	454
	Clay with some fine sand and gravel	6	460
	Tight fine sand, pebbles of granite	3	463
	TOTAL DEPTH		463
(D-20-20)22abb			
Valley-fill deposits	Red clay and boulders	32	32
	Red clay	18	50
	Sand, brown clay	65	115
	Sand and gravel (water)	5	120
	Hard brown clay	2	122
	Soft brown clay	55	177
	Hard brown clay	2	179
	Soft brown clay	19	198
	Sand, some gravel (water)	5	203
	Brown clay	19	222
	TOTAL DEPTH		222
(D-20-20)31dda			
Flood-plain alluvium	Soil	18	18
	Cemented gravel, water at 60 feet	42	60
Valley-fill deposits	Clay	5	65
	Rocky clay	20	85
	Clay	15	100
	Muddy gravel, water	10	110
	Clay	8	118
	Cemented gravel	22	140
	Clay	12	152
	Tight sticky gravel—clay	35	187
	Clay	11	198
	Cemented gravel	17	215
	Clay	5	220
	Cemented gravel	20	240
	Clay	20	260
	Coarse, clean sand and water	5	265
	Clay	5	270
	Cemented gravel	22	292
	Tight clay—conglomerate	8	300
	TOTAL DEPTH		300
(D-20-21)16ddc			
Flood-plain alluvium	Soil	10	10
	Light-brown clay	15	25
	Blue	30	55
	Good gravel	5	60
Valley-fill deposits	Dark-blue mud	5	65
	Good sand	5	70
	Light-red mesa	125	195
	Sand	50	245
	Very sandy light red clay	105	350
Crystalline and consolidated sedimentary rocks(?)	Decomposed granite	30	380
	Very hard	5	385
	TOTAL DEPTH		385
(D-20-22)11aca			
Valley-fill deposits	Caliche	20	20
Crystalline and consolidated sedimentary rocks	Blue shale	100	120
	Very hard blue lime	430	550
	Reddish porphyritic rock	150	700
	TOTAL DEPTH		700

Table 3.--Modified drillers' logs of selected wells in the San Pedro River valley—Continued

Stratigraphic unit	Description	Thickness (feet)	Depth (feet)
UPPER SAN PEDRO BASIN—Continued			
(D-21-20)6bad			
Flood-plain alluvium	Sandy red clay	20	20
	Sandy red clay and boulders	25	45
Valley-fill deposits	Sticky red clay	30	75
	Water, sand and gravel	5	80
	Sandy red clay	25	105
	Water, sand and gravel	5	110
	Hard conglomerate	87	197
	Water, sand and gravel	8	205
	Conglomerate	13	218
	TOTAL DEPTH		218
(D-21-20)15dbb			
Valley-fill deposits	Gravelly clayey sand, reddish-brown, rounded gravel to 1 inch, less than 10 percent gravel	12	12
	Clayey gravelly sand, brown, rounded gravel to 1-1/4 inches, 20 percent gravel	12	24
	Gravelly sandy clay, reddish-brown, rounded gravel to 1/2 inch	6	30
	Clayey sand, brown, sand fine to coarse, subangular to rounded, 80 percent fine to medium, scattered rounded pea gravel	7	37
	Sandy clay, brown, moderately plastic, 30 percent fine to medium sand	6	43
	Clayey gravelly sand, subangular to rounded gravel to 1-1/4 inches 20 percent, sand fine to coarse, subangular to rounded, 5 to 10 percent brown clay	3	46
	Sandy clay, brown, 20 percent fine to medium sand	5	51
	Gravelly clayey sand, rounded gravel to 1 inch, sand fine to coarse, rounded to subangular, 10 to 15 percent clay	6	57
	Sandy clay, brown, sand fine to coarse 30 to 40 percent, subangular to rounded	11	68
	Sandy clay, brown, sand fine to coarse 30 to 40 percent, subangular to rounded	1	69
	Sandy clay, brown, sand fine to coarse 30 to 40 percent, subangular to rounded, with scattered gravel to 1-1/2 inches	1	70
	Sandy clay, brown, sand fine to coarse 30 to 40 percent, subangular to rounded	3	73
	Gravelly sand, sand medium to coarse, subangular to rounded, gravel to 2-1/2 inches angular to rounded, scattered cobbles, 30 to 40 percent gravel	9	82
	Sand, clay, brown, with scattered gravel to 3/4 inch, sand fine to coarse 20 to 30 percent	12	94
	Sandy clay, brown, with scattered gravels to 3/4 inch, 20 to 30 percent fine to medium sand	14	108
	Clayey gravelly sand, medium to coarse, subrounded to angular, gravels to 1-1/2 inches rounded to subangular, trace tan clay in scattered layers	6	114
	Sandy clay with scattered gravels to 3/4 inch	21	135
	Sandy clay, brown, with scattered gravel to 1 inch, fine to coarse sand, rounded to angular, scattered thin seams sand and sandy gravel	11	146
	Gravelly sand, sand rounded to angular, medium to coarse, with rounded to angular gravels to 2 inches, encountered boulders	15	161
	Gravelly sand, sand rounded to angular, medium to coarse, with rounded to angular gravels to 2 inches, encountered boulders	7	168
	Gravelly sandy clay, brown, moderately plastic, 40 percent fine to coarse sand, rounded to angular, scattered gravels	9	177
	Gravelly clayey sand, medium to coarse, rounded to angular, scattered gravels	17	194
UPPER SAN PEDRO BASIN—Continued			
(D-21-20)15dbb—Continued			
Valley-fill deposits—continued	Gravelly sandy clay, brown, moderately plastic, 40 percent fine to coarse sand, rounded to angular, scattered gravels	19	213
	Sandy clay, brown, 20 to 30 percent fine to medium sand, clay moderately plastic	8	221
	Gravelly sand, fine to coarse less than 5 percent fine, subangular to subrounded, gravel subrounded to broken angular chips to 1-1/2 inches	10	231
	Sandy clay, brown, sand 20 percent, mostly fine to medium	5	236
	Gravelly sand, fine to coarse less than 5 percent fine, subangular to subrounded, gravel subrounded to broken angular chips to 1-1/2 inches	2	238
	Sandy clay, brown, sand 20 percent mostly fine to medium	11	249
	Gravelly clayey sand, medium to coarse, subangular to subrounded, scattered gravel to 1-1/2 inches, 15 to 25 percent clay	4	253
	Sandy clay, brown, less than 15 percent fine to medium sand, clay moderately plastic	12	265
	Sandy clay, brown, less than 15 percent fine to medium sand, clay moderately plastic	1	266
	Gravelly sand	4	270
	Sandy clay, brown, less than 15 percent fine to medium sand, clay moderately plastic	8	278
	Sandy clay, brown, sand mostly fine with scattered medium to coarse grains, clay moderately plastic	12	290
	Gravelly clayey sand	1	291
	Sandy clay, brown, sand mostly fine with scattered medium to coarse grains, clay moderately plastic	13	304
	Clayey gravelly sand, fine to coarse but less than 10 percent fine, 30 to 40 percent gravel to 3/4 inch	6	310
	Sandy clay, brown, 10 to 20 percent fine to medium sand	4	314
	Sandy clay, 30 percent medium to coarse sand	2	316
	Sandy clay, brown, 10 to 20 percent fine to medium sand	2	318
	Sandy clay, brown, sand fine to coarse 30 to 40 percent, clay moderately plastic	8	326
	Clayey gravelly sand, clay less than 5 percent, gravel 25 percent	2	328
	Sandy clay, brown, sand fine to coarse 30 to 40 percent, clay moderately plastic	2	330
	Gravelly clayey sand, fine to coarse less than 10 percent fine, subangular to subrounded, 20 percent gravel to 3/4 inch	13	343
	Clayey sand to sandy clay, brown, sand fine to coarse 40 percent fine, scattered gravel to 1/2 inch	13	356
	Gravelly clayey sand, 20 percent clay, sand fine to coarse, 30 to 40 percent fine, scattered gravel to 1 inch	3	359
	Gravelly sand, less than 5 percent clay, gravel to 3/4 inch, sand medium to coarse	1	360
	Gravelly clayey sand, 20 percent clay, sand fine to coarse, 30 to 40 percent fine, scattered gravel to 1 inch	4	364
	Gravelly sand, less than 5 percent clay, gravel to 3/4 inch, sand medium to coarse	1	365
	Gravelly clayey sand, 20 percent clay, sand fine to coarse, 30 to 40 percent fine, scattered gravel to 1 inch	4	369
	Gravelly sandy clay, brown, sand fine to coarse 30 to 40 percent, 5 percent gravel to 1 inch	8	377
	Gravelly sand, fine to coarse, 10 percent fine, less than 5 percent clay, gravel to 1/2 inch	9	386
	Sandy clay, brown, moderately plastic, 30 to 40 percent fine to coarse sand	9	395

Table 3.--Modified drillers' logs of selected wells in the San Pedro River valley—Continued

UPPER SAN PEDRO BASIN—Continued

(D-21-20)15dbb—Continued

Stratigraphic unit	Description	Thickness (feet)	Depth (feet)
Valley-fill deposits—continued	Sandy clay, brown, moderately plastic, 30 to 40 percent fine to coarse sand	13	408
	Sandy clay, brown, with scattered gravels to 3/4 inch, sand fine to medium with scattered coarse grains	8	416
	Clayey gravelly sand	1	417
	Sandy clay, brown, with scattered gravels to 3/4 inch, sand fine to medium with scattered coarse grains	4	421
	Sandy clay, brown, with scattered gravels to 3/4 inch, sand fine to medium with scattered coarse grains	7	428
	Gravelly sand with trace clay	2	430
	Sandy clay, brown, with scattered gravels to 3/4 inch, sand fine to medium with scattered coarse grains	4	434
	Sandy clay, brown, sand fine to coarse 30 to 40 percent	3	437
	Clayey gravelly sand, fine to coarse less than 10 percent fine, gravel angular chips to subrounded up to 3/4 inch, less than 5 percent clay	5	442
	Sandy clay, brown, 30 percent sand	1	443
	Clayey gravelly sand, fine to coarse less than 10 percent fine, gravel angular chips to subrounded up to 3/4 inch, less than 5 percent clay	4	447
	Gravelly sand, fine to coarse, angular to subrounded, 10 to 15 percent fine, 10 to 20 percent brown clay	15	462
	Gravelly sand, fine to coarse less than 10 percent fine, angular to subrounded, gravel angular chips to subrounded to 3/4 inch, less than 5 percent brown clay	20	482
	Gravelly sand, less than 5 percent brown clay, fine to coarse sand less than 10 percent fine, gravel to 1-1/4 inches 10 to 15 percent	13	495
	Gravelly sand, less than 5 percent brown clay, fine to coarse sand less than 10 percent fine, gravel to 1-1/4 inches 10 to 15 percent	13	508
	Gravelly sand, less than 10 percent clay, 5 to 10 percent fine sand, gravel to 1 inch angular to subrounded	13	521
Consolidated to semi-consolidated sedimentary rocks	Gravelly sand, trace clay, less than 5 percent fine sand	13	534
	Gravelly sand, medium to coarse grained, rounded to angular, gravels to 1-1/2 inches subrounded to angular, less than 10 percent brown clay	13	547
	Gravelly sand, medium to coarse grained, rounded to angular, gravels to 1-1/2 inches subrounded to angular, less than 5 percent brown clay, evidence of cementation	13	560
	Gravelly sand, medium to coarse grained, rounded to angular, gravels to 1-1/2 inches subrounded to angular, less than 10 percent brown clay	13	573
	Gravelly sand, medium to coarse grained, rounded to angular, 15 percent gravel to 1 inch, subrounded to angular, less than 5 percent clay	13	586
	Gravelly sand, fine to coarse, low percent of fine, angular to subrounded, gravel angular to subrounded to 1 inch, trace brown clay	13	599
	Clayey gravelly sand, fine to coarse less than 5 percent fine, angular to subrounded, gravel to 1-1/4 inches angular fragments to subrounded, less than 5 percent clay	2	601
	Sandy gravel to 3/4 inch	1	602
	Clayey gravelly sand, fine to coarse less than 5 percent fine, angular to subrounded, gravel to 1-1/4 inches angular fragments to subrounded, clay to 10 percent	1	603

UPPER SAN PEDRO BASIN—Continued

(D-21-20)15dbb—Continued

Stratigraphic unit	Description	Thickness (feet)	Depth (feet)
Consolidated to semi-consolidated sedimentary rocks—continued	Sandy gravel to 3/4 inch	5	608
	Clayey gravelly sand, fine to coarse less than 5 percent fine, angular to subrounded, gravel to 1-1/4 inches angular fragments to subrounded, less than 5 percent clay	4	612
	Clayey gravelly sand, fine to coarse less than 5 percent fine, angular to subrounded, gravel to 1-1/4 inches angular fragments to subrounded, less than 5 percent clay	6	618
	Clay increase to 10 to 15 percent	1	619
	Clayey gravelly sand, fine to coarse less than 5 percent fine, angular to subrounded, gravel to 1-1/4 inches angular fragments to subrounded, less than 5 percent clay	6	625
	Clayey gravelly sand, fine to coarse less than 5 percent fine, angular to subrounded, gravel to 1-1/4 inches angular fragments to subrounded, clay increase to 10 percent	13	638
	Gravelly sand, fine to coarse, subangular to subrounded, less than 5 percent fine, gravel to 3/4 inch, less than 10 percent clay	13	651
	Gravelly sand, fine to coarse, subangular to subrounded, less than 5 percent fine, gravel to 3/4 inch, less than 10 percent clay	13	664
	Clayey gravelly sand, fine to coarse, angular to rounded, gravels to 3/4 inch	13	677
	Clayey sand, with scattered fine gravel to 3/4 inch, 10 to 20 percent clay	13	690
	Gravelly sand with trace clay, sand fine to coarse, 5 to 10 percent gravel in angular chips to subrounded to 1-1/8 inches	2	692
	Clay content to 10 percent	5	697
	Clay content to 10 percent	2	699
	Clay content to 10 percent	4	703
	Gravelly sand with clay content varying from a trace to 10 percent, sand fine to coarse, fine less than 10 percent, gravel angular chips to rounded to 1 inch	13	716
	Gravelly sand with clay content varying from a trace to 30 percent, sand fine to coarse, fine less than 10 percent, gravel angular chips to rounded to 1 inch	13	729
	Gravelly clayey sand, 10 percent fine, rest medium to coarse, rounded to angular, 30 percent clay moderately to highly plastic, 10 percent gravel to 1 inch	13	742
	Gravelly clayey sand, 10 percent fine, rest medium to coarse, rounded to angular, 30 percent clay moderately to highly plastic, 10 percent gravel to 1 inch	13	755
	Gravelly clayey sand, 10 percent fine, rest medium to coarse, rounded to angular, 30 percent clay moderately to highly plastic, 10 percent gravel to 1 inch	13	768
	Gravelly clayey sand, fine to coarse grained, rounded to angular, 30 percent brown cohesive clay, more than 20 percent gravels to 1 inch	13	781
	Gravelly clayey sand, fine to coarse grained, rounded to angular, 30 percent brown cohesive clay, more than 20 percent gravels to 1 inch	15	796
	Gravelly clayey sand, fine to coarse grained, rounded to angular, 30 percent brown cohesive clay, more than 20 percent gravels to 1 inch	11	807
	TOTAL DEPTH		807

Table 3.--Modified drillers' logs of selected wells in the San Pedro River valley—Continued

Stratigraphic unit	Description	Thickness (feet)	Depth (feet)
UPPER SAN PEDRO BASIN—Continued			
(D-21-20)33dbb			
Valley-fill deposits	Bouldery loose fill	32	32
	Sand and gravel	8	40
	Caving sand and gravel	5	45
	Bouldery red clay	30	75
	Gravel	8	83
	Gravelly red clay	25	108
	Seep of water	8	116
	Gravelly red clay	189	305
	Very gravelly red clay	15	320
	Gravelly red clay	30	350
	Caving gravelly red clay	42	392
	Sandy red clay	19	411
	Bouldery red clay	9	420
	Tight sandy red clay; first strong water, static water level at 492 feet	72	492
	Tight sandy red clay grading into conglomerate	78	570
	Conglomerate	32	602
	Indications of water in break zone	2	604
	Conglomerate	6	610
	Indications of water in break zone	6	616
?	Conglomerate	142	758
Consolidated to semi-consolidated sedimentary rocks	Very hard conglomerate	13	771
	Conglomerate	114	885
	Very hard conglomerate	35	920
	Conglomerate	105	1,025
	Little sand in crevices, indications of water	13	1,038
	Conglomerate	62	1,100
	Conglomerate, little redder in color	50	1,150
	Mudstone or reddish shale	13	1,163
	Conglomerate	27	1,190
	Hard conglomerate with soft ribs of coarse sandstone cemented with limy material	40	1,230
	TOTAL DEPTH		1,230
(D-21-20)34caa			
Valley-fill deposits	Rocky soil	4	4
	Hardpan	4	8
	Gravel	2	10
	Laminated gravel and hardpan	55	65
	Sticky clay	30	95
	Cemented gravel	55	150
	Gravel with boulders	20	170
	Sandy clay	30	200
	Gravel with boulders	150	350
	Rocky conglomerate	30	380
	Muddy gravel and water at 475 feet	110	490
	Coarse clean gravel and water	20	510
	Laminated loose and cemented gravel, water raised 15 feet	60	570
	Sandy clay, water raised 5 feet	52	622
Consolidated to semi-consolidated sedimentary rocks(?)	Hard conglomerate	23	645
	TOTAL DEPTH		645
(D-21-20)35dbb			
Valley-fill deposits	Topsoil	1	1
	Loose sand, gravel	4	5
	Red caliche	23	28
	Red clay and gravel	17	45
	Yellow clay and gravel	35	80
	Red clay and boulders	40	120
	Red cemented gravel	110	230
	Red clay and gravel	70	300
	Cemented boulders, hard	65	365
	Sand and gravel, water at 410 feet	75	440
	Cemented boulders, hard	70	510
	Cemented sand	60	570
Consolidated to semi-consolidated sedimentary rocks(?)	Cemented boulders, very hard	152	722
	TOTAL DEPTH		722
UPPER SAN PEDRO BASIN—Continued			
(D-21-22)10bca			
	No sample	450	450
Crystalline and consolidated sedimentary rocks	Gray quartzite	20	470
	Gray shale	55	525
	Flinty gray shale	14	539
	Siliceous purplish-gray shale	10	549
	Flinty gray shale	12	561
	Sandy gray shale	10	571
	Gray sandstone	54	625
	Brownish shale	17	642
	TOTAL DEPTH		642
(D-21-23)29dbc			
Valley-fill deposits	Loose gravel, sand, clay (dry)	250	250
Crystalline and consolidated sedimentary rocks	Limestone, shale and sandy lime, stratified (dry) (Paleozoic limestone)	705	955
	Fissure in limestone (water)	18	973
	TOTAL DEPTH		973
(D-22-20)3bbb2			
Valley-fill deposits	Adobe	8	8
	Boulder bed	19	27
	Adobe and boulders	61	88
	Sand, gravel, and boulders	24	112
	Adobe and boulders	58	170
	Loose boulders, very hard	86	256
	Adobe, gravel, and boulders	16	272
	Adobe, sand, gravel, and boulders	47	319
	Boulders, very hard, and clay	46	365
	Adobe and gravel	52	417
	Hard sand and gravel, cemented	9	426
	Adobe, sand, and gravel	39	465
	Hard sand	4	469
	Water, gravel, and sand	1	470
	Sand and gravel	18	488
	Loose sand and gravel, strong showing of water at 488 feet	36	524
	Hard sand, gravel, and boulders	21	545
	Loose sand and gravel	35	580
	Loose boulders	11	591
	Loose water sand and gravel	24	615
	Loose sand, gravel, and boulders	5	620
	Hard boulders	9	629
	Loose sand and boulders	16	645
	Hard sand	10	655
	Loose sand and gravel	25	680
	Adobe	12	692
Consolidated to semi-consolidated sedimentary rocks(?)	Hard drilling, apparently drilling in rock	9	701
	TOTAL DEPTH		701
(D-22-20)12bcc			
Valley-fill deposits	Gravelly red clay	80	80
	Rocky red clay	130	210
	Bouldery red clay	40	250
	Rocky conglomerate. First water at 417 feet. Static water level at 400 feet	292	542
	TOTAL DEPTH		542
(D-22-21)3abc			
Valley-fill deposits	Caliche	7	7
	Red clay	46	53
	Red sandy clay	57	110
	White clay, struck water at 135 feet	25	135
	Red clay, sand, water raised to 82 feet	45	180
	TOTAL DEPTH		180

Table 3.--Modified drillers' logs of selected wells in the San Pedro River valley—Continued

Stratigraphic unit	Description	Thickness (feet)	Depth (feet)
UPPER SAN PEDRO BASIN—Continued			
(D-22-21)14cbc			
Valley-fill deposits	Rock and clay	10	10
	Red clay and gravel	107	117
	Sand (water)	3	120
	Rock	3	123
	Gray clay and gravel	27	150
	Sand	5	155
	Rock	2	157
	Red clay and gravel	38	195
	Sand	5	200
	Rock	3	203
	Red clay and gravel	47	250
	TOTAL DEPTH		250
(D-22-21)19cdd			
Valley-fill deposits	Topsoil	3	3
	Boulders	127	130
	Decomposed boulders and sandstone	95	225
	Clay and large gravel	168	393
	Sand and gravel	52	445
	Clay	5	450
	TOTAL DEPTH		450
(D-22-21)23bad			
Valley-fill deposits	Sandy soil	12	12
	Caliche	3	15
	Conglomerate with large rocks	12	27
	Conglomerate with gravel	15	42
	Conglomerate	23	65
	Gravel	7	72
	Sandy soil	18	90
	Heavy soil; water at 110 feet	20	110
	Gravel and sand	2	112
	Sandy soil	13	125
	Sand and gravel (water strata)	2	127
	Sandy soil	18	145
	Sandy gravel with large rocks	3	148
	Conglomerate	17	165
	Sandy soil	10	175
	River gravel (water strata)	3	178
	Sandy soil	2	180
	Clay	10	190
	Gravel (water strata)	2	192
	Sandy soil	16	208
	Gravel (water strata)	2	210
	Light sandy soil	10	220
	TOTAL DEPTH		220
(D-22-22)6daa			
Flood-plain alluvium	Topsoil	7	7
	Red clay	14	21
	Medium water sand. First water (weak)	6	27
Valley-fill deposits	Red clay	63	90
	Red clay with streaks of water gravel	20	110
	Red clay with some gravel	83	193
	Red clay	177	370
	Dark-red mudstone	5	375
	Red clay with some gravel	66	441
	Water sand and gravel	4	445
	Recent conglomerate	270	715
	TOTAL DEPTH		715
(D-22-22)7dad			
Flood-plain alluvium	Topsoil	2	2
	Sandy silt	13	15
	Bentonitic clay	5	20
	Large water gravel—first water	5	25
Valley-fill deposits	Red clay	10	35
	Fine red sand	5	40
	Bentonitic clay	25	65
	Red clay	10	75
	Bentonitic clay	15	90
	Large water gravel—second water	5	95
	Red clay	35	130
	Water sand and gravel—third water	8	138
	Red clay	47	185
UPPER SAN PEDRO BASIN—Continued			
(D-22-22)7dad—Continued			
Valley-fill deposits—continued	White conglomerate	5	190
	Red clay	270	460
	Red clay	25	485
	Fine sandy red clay	10	495
	Red clay	85	580
	Fine-grained conglomerate	135	715
	Coarse conglomerate	70	785
	Fine gravel and sand	5	790
	Coarse gravelly conglomerate	65	855
	TOTAL DEPTH		855
(D-22-22)17bcd			
Flood-plain alluvium	White clay	8	8
	Sand	4	12
	Tan clay	8	20
	Gravel	5	25
Valley-fill deposits	Green and white streaks, lakebed	5	30
	Light-red clay	30	60
	Bentonite	23	83
	Pink sandy clay	22	105
	Light-brown clay	10	115
	Tan clay	50	165
	Red clay	8	173
	White clay	7	180
	Firm light-brown clay	40	220
	Good gravel, high pressure water	10	230
	Red clay	50	280
	Sand	5	285
	Red clay	105	390
	Light-brown clay	30	420
	Tan clay	30	450
	Light-brown clay	10	460
	Sticky red clay	200	660
	Recent conglomerate	202	862
	Boulders and red clay	13	875
	Black lava boulders	13	888
Crystalline and consolidated sedimentary rocks	Solid black lava	20	908
	TOTAL DEPTH		908
(D-23-20)1aaa			
Valley-fill deposits	Conglomerate	50	50
	Clay	5	55
	Clay with gravel	10	65
	Conglomerate with large rocks	20	85
	Muddy sand and gravel—water	5	90
	Clay	15	105
	Conglomerate	35	140
Crystalline and consolidated sedimentary rocks(?)	Granite	263	403
	TOTAL DEPTH		403
(D-23-21)35adb			
Valley-fill deposits	Topsoil	2	2
	Red clay	4	6
	Sandy clay	23	29
	Sandy clay and gravel	31	60
	Rock	9	69
	Sand and gravel	66	135
	Sand and gravel and brown clay	76	211
	Water sand and gravel	24	235
	TOTAL DEPTH		235
(D-23-22)10cab			
Flood-plain alluvium	Soil and gravel mixed	28	28
	Gravel showing little water at 36 feet	8	36
Valley-fill deposits	Sandy clay	60	96
	Water sand	6	102
	Gypsum	16	118
	Sandy clay	26	144
	Gypsum	10	154
	Red clay	4	158
	Water sand	8	166
	Sandy clay	10	176
	Water gravel and sand	14	190
	Red clay	4	194

Table 3.--Modified drillers' logs of selected wells in the San Pedro River valley—Continued

Stratigraphic unit	Description	Thickness (feet)	Depth (feet)
UPPER SAN PEDRO BASIN—Continued			
(D-23-22)10cab—Continued			
Valley-fill deposits—continued	Water gravel	6	200
	Sandy clay	14	214
	Water gravel and sand, well mixed	8	222
	Sandy clay	22	244
	Water gravel and fine sand	4	248
	Sandy clay	4	252
	Sand and gravel heaves up from bottom two and three feet	16	268
	Sandy clay	6	274
	Sand and gravel heaves up from bottom two and three feet	10	284
	Sandy clay	44	328
	Gravel and sand mixed with heavy clay	12	340
	Sand	8	348
	Sandy clay	36	384
	TOTAL DEPTH		384
(D-23-22)20ddb			
Valley-fill deposits	Soil	2	2
	White lakebed	23	25
	Red clay	315	340
	Gravel	5	345
	Red clay	25	370
	Gravel and clay mixed	15	385
	Red clay	5	390
	Clay and gravel mixed	12	402
	Soft red clay	5	407
	Good gravel	13	420
	Red clay	10	430
	Gravel	10	440
	Soft clay	5	445
	Gravel	15	460
	TOTAL DEPTH		460
(D-23-22)21ddb			
Valley-fill deposits	Soil	3	3
	Clay	5	8
	Gravel	4	12
	Tan clay	3	15
	Red clay and gravel	80	95
	Soft smooth pink clay	75	170
	Gravel	5	175
	Red clay and gravel	95	270
	Very gravelly	50	320
	Soft red clay	5	325
	Large water-worn gravel	20	345
	Red clay	5	350
	TOTAL DEPTH		350
(D-23-22)22bdd			
Flood-plain alluvium	Gravelly brown clay	24	24
	Water gravel	6	30
	Gravelly buff clay	6	36
	Gravel with small quantity of clay	8	44
?	Sandy buff clay	26	70
Valley-fill deposits	Red clay and gravel	10	80
	Water gravel under pressure	2	82
	Red clay with streaks of green clay and caliche	36	118
	Water gravel	4	122
	Gravel with some red clay	4	126
	Gravelly red clay	4	130
	Sandy red clay	22	152
	Tight gravelly red clay	10	162
	Sandy red clay	6	168
	Water gravel	3	171
	Gravelly red clay	22	193
	Water gravel	4	197
	Gravelly red clay	21	218
	Gravel cemented with little clay (small quantity of water)	10	228
	Gravelly red clay	12	240
	Gravel cemented with little clay (small quantity of water)	2	242
	Gravelly red clay, Sweating small quantity of water	233	475
	TOTAL DEPTH		475
UPPER SAN PEDRO BASIN—Continued			
(D-23-22)29daa			
Valley-fill deposits	Red clay	35	35
	Gray clay	14	49
	Sandy clay and gravel	21	70
	Gravel and clay water	5	75
	Red clay	60	135
	Red clay and gravel	47	182
	Red clay	26	208
	Gravel to 2 inches	12	220
	Clay, sticky	8	228
	Clay—shale	8	236
	Clay, sticky	18	254
	Brown clay	19	273
	Gravel	11	284
	Sticky clay	50	334
	Clay and gravel (tight)	70	404
	Sand and gravel	10	414
	Clay, brown	3	417
	Gravel	7	424
	Clay and gravel	51	475
	Coarse gravel	10	485
	Clay and gravel	23	508
	Gravel	4	512
	Soft clay, layers of sand and gravel	51	563
	TOTAL DEPTH		563
(D-23-22)33adb			
Flood-plain alluvium	Sand and gravel	23	23
Valley-fill deposits	Clay	22	45
	Gravel, water rose to 17 feet	15	60
	Sand and gravel	25	85
	Clay	5	90
	TOTAL DEPTH		90
(D-24-21)4baa			
Valley-fill deposits	Boulders	275	275
	Tight clay	12	287
	Clean gravel	7	294
	Tight clay	24	318
Crystalline and consolidated sedimentary rocks(?)	Decomposed granite	6	324
	TOTAL DEPTH		324
(D-24-21)11acc			
	Soil	7	7
	Clay and gravel	133	140
	Clay, gravel and sand streaks	70	210
	Cement gravel and clay	20	230
	Packed sand and gravel	26	256
	Clay and fine gravel	26	282
	Clay	16	298
	Packed sand and gravel	17	315
	Clay and gravel	83	398
	Loose gravel and rock	10	408
	Clay and gravel (hard)	30	438
	Sandy clay	24	462
	Clay	24	486
	Clay and gravel	12	498
	Packed sand	22	520
	Tough clay	15	535
	Gravelly clay	15	550
	Hard packed sand	22	572
	Tough clay	90	662
	Cement gravel and sand	10	672
	Clay and hard shells	76	748
	Hard packed sand	32	780
	Sticky clay	14	794
	Packed sand	21	815
	Clay and sand streaks	39	854
	Packed sand	41	895
	Clay and sand streaks	53	948
	Clay	29	977
	Hard packed sand	8	985
	Clay	21	1,006
	Packed sand	3	1,009
	Clay	6	1,015
	TOTAL DEPTH		1,015

Table 3.--Modified drillers' logs of selected wells in the San Pedro River valley—Continued

Stratigraphic unit	Description	Thickness (feet)	Depth (feet)
UPPER SAN PEDRO BASIN—Continued			
(D-24-22)5aca			
Valley-fill deposits	Topsoil, sand and clay, dry	57	57
	Sand and gravel—water	7	64
	Clay	4	68
	Gravel—water	3	71
	Clay	17	88
	Clay and gravel—some water	21	109
	Sand (top part quicksand)	12	121
	Lime formation	2	123
	Gravel—water	14	137
	Clay	29	166
UPPER SAN PEDRO BASIN—Continued			
(D-24-22)5aca—Continued			
Valley-fill deposits—continued	Gravel—water	3	169
	Clay	33	202
	Sand and gravel—water	13	215
	Clay	45	260
	Sand and gravel—water	20	280
	Clay	12	292
	Sand and gravel—water	20	312
	Clay	13	325
	TOTAL DEPTH		325

Table 4.--Chemical analyses of water from selected wells and springs, San Pedro River valley

[Analyses by U.S. Geological Survey except as indicated. Analytical results in milligrams per liter except as indicated. A, approximate; T, trace. Dissolved solids represent computed sum of determined constituents using the carbonate equivalent of the bicarbonate ion except in the University of Arizona analyses in which dissolved solids represent sum of determined constituents in solution]

Location	Date of collection	Depth of well (feet)	Temperature (°C)	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: Milligrams per liter	Dissolved solids: Tons per acre-foot	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Percent sodium	Sodium-adsorption ratio (SAR)	Specific conductance (micromhos at 25° C)	pH	Remarks
LOWER SAN PEDRO BASIN																							
(D-5-15)24cac	9/26/50	33	29	38	79	28	234		355	0	378	92	2.3	0.3	1,030	1.40	312	21	62	5.8	1,540	---	
	9/ 7/55	33	-----	44	98	32	225		360	0	391	111	2.3	.5	1,080	1.47	376	81	57	5.1	1,590	7.2	
	6/ 2/58	33	-----	-----	-------	------	-------		347	0	------	230	-----	-----	------	-----	580	296	----	-------	2,270	7.3	
	1/ 5/65	33	17	-----	142	38	-------		340	0	510	175	2.6	-----	------	-----	512	233	----	-------	2,000	7.7	
(D-6-16)8cbb	10/ 9/50	106	21	39	84	18	100		287	0	209	29	2.4	1.2	624	.85	284	48	43	2.6	928	---	
17dbd	8/26/52	-------	22	41	70	15	113		290	0	178	32	3.6	5.2	601	.82	236	0	51	3.2	906	---	Leroy Springs. Estimated flow, 150 gpm.
	9/22/54	-------	22	-----	-------	------	-------		296	0	------	32	-----	-----	------	-----	--------	-----	----	-------	901	---	Estimated flow, 1,200 gpm.
	5/28/56	-------	21	-----	-------	------	-------		296	0	------	37	-----	-----	------	-----	266	24	----	-------	974	7.4	Iron, 0.02 mg/l.
	5/14/57	-------	22	-----	-------	------	-------		316	0	------	44	-----	-----	------	-----	282	23	----	-------	1,080	7.4	
33cac	9/28/50	85	19	-----	-------	------	-------		267	0	------	17	-----	-----	------	-----	--------	-----	----	-------	689	---	
33ccd	9/ 9/51	-------	-----	33	84	16	34		250	0	116	13	1.0	2.3	422	.57	276	70	21	.9	643	---	Cooks Lake Spring. Estimated flow, 50-100 gpm.
(D-7-15)4baa	4/18/51	420	24	26	54	23	69		293	0	21	66	.4	30	433	.59	229	0	40	2.0	735	---	
(D-7-16)4bca	9/28/50	52	19	-----	-------	------	-------		264	0	98	14	.8	-----	------	-----	--------	-----	----	-------	636	---	
9dac	9/28/50	87	19	50	96	17	118		271	0	305	11	4.4	.9	735	1.00	310	88	45	2.9	1,110	---	
11adc	10/10/50	87	19	40	70	13	25		269	0	41	10	1.2	3.6	337	.46	228	8	19	.7	518	---	
26ddc1	9/28/50	116	23	-----	-------	------	-------		266	0	249	28	6.0	-----	------	-----	--------	-----	----	-------	997	---	
(D-7-17)23dbc2	5/ 9/51	76	-----	29	92	42	95		367	0	218	55	.6	4.0	717	.98	402	102	34	2.1	1,100	---	
(D-8-17)19dad1	9/28/50	46	-----	34	51	12	81		248	0	109	18	3.0	2.2	432	.59	176	0	50	2.6	665	---	
	5/28/56	46	-----	-----	-------	------	-------		262	0	------	21	-----	-----	------	-----	204	0	----	-------	769	7.2	
	8/24/59	46	-----	-----	-------	------	-------		283	------	------	24	-----	-----	------	-----	238	6	----	-------	863	7.4	
	1/ 6/65	46	11	-----	58	14	-------		246	0	147	27	2.4	-----	------	-----	201	0	----	-------	776	7.2	
29dda	9/28/50	100	23	49	78	13	109		256	0	218	26	4.0	.9	624	.85	248	38	49	3.0	901	---	Iron, 0.01 mg/l.
32daa	9/28/50	1,485	42	38	12	1.6	133		114	0	152	42	5.6	1.1	441	.60	36	0	89	9.6	683	---	Estimated flow, 20 gpm.
36acd	2/ 7/51	425	24	47	1.5	1.6	109		145	22	9.1	7.0	30	16	314	.43	10	0	96	15.0	498	---	
	11/13/54	-------	-----	55	.8	.2	120		96	47	7.6	6.0	30	15	328	-----	3	0	98	30.1	504	9.5	Iron, 1.1 mg/l.
(D-9-16)2bab	5/29/51	1,300	38	31	69	21	60		349	0	39	32	2.6	13	440	.60	258	0	34	1.6	718	---	
(D-9-17)10dcb	9/28/50	85	32	-----	-------	------	-------		235	------	------	42	-----	-----	------	-----	--------	-----	----	-------	1,240	---	
14cdb	9/28/50	54	31	47	48	4.9	140		176	0	212	44	6.0	1.2	590	.80	140	0	68	5.1	877	---	
14cdd	9/28/50	-------	31	35	5.5	.9	76		173	0	20	7	2.8	1.4	234	.32	17	0	91	8.0	337	---	Estimated artesian flow, 30 gpm.

Table 4.--Chemical analyses of water from selected wells and springs, San Pedro River valley—Continued

Location	Date of collection	Depth of well (feet)	Temperature (°C)	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: Milligrams per liter	Dissolved solids: Tons per acre-foot	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Percent sodium	Sodium-adsorption ratio (SAR)	Specific conductance (micromhos at 25° C)	pH	Remarks
LOWER SAN PEDRO BASIN—Continued																							
(D-9-17)22abb2	3/24/54	1,007	28	-----	-------	------	-------		178	0	------	10	-----	-----	------	-----	--------	-----	----	-------	339	---	Artesian.
23ddd	10/ 9/54	1,005	23	33	15	0.9	75		184	0	34	8	2.2	0.9	259	0.35	41	0	80	5.1	374	---	Estimated artesian flow, 20 gpm. Well deepened to 1,305 feet in 1961.
24ddc	8/21/47	870	31	-----	12	1.9	87		157	0	58	16	5.7	1.4	259	.35	38	0	----	5.2	--------	---	Artesian flow, 400 gpm.
	9/28/50	870	31	40	-------	1.4	-------		140	0	70	19	4.4	1.3	------	-----	--------	-----	----	-------	457	---	Artesian flow, 300 gpm.
	8/26/52	870	31	40	8.2	1.9	94		138	0	73	21	4.8	2.0	313	.43	28	0	88	7.7	470	---	Artesian flow, 350 gpm.
	8/17/54	870	31	-----	-------	------	-------		142	0	------	23	-----	-----	------	-----	--------	-----	----	-------	478	---	
	5/28/56	870	-----	-----	-------	------	-------		136	0	------	24	-----	-----	------	-----	23	0	----	-------	493	7.8	Iron, 0.02 mg/l.
	5/13/57	870	31	-----	-------	------	-------		118	0	------	25	-----	-----	------	-----	22	0	----	-------	496	7.3	
	1/ 6/65	870	31	-----	8.8	1.5	-------		115	16	87	25	4.5	-----	------	-----	28	0	----	-------	526	8.7	
25bdc	12/30/47	967	23	34	12	1.7	64		167	0	23	7	2.0	.9	227	.31	37	0	----	4.6	320	---	Artesian flow, 540 gpm.
	10/ 9/54	967	22	36	51	5.7	83		189	0	145	12	2.0	1.7	429	.58	150	0	54	2.9	637	---	Estimated artesian flow, 600 gpm.
25dbb	10/ 9/54	1,006	22	37	13	2.9	55		162	0	17	7	1.4	.7	214	.29	44	0	73	3.6	306	---	Estimated artesian flow, 100 gpm.
(D-10-17)5bca	3/24/54	700	26	28	46	12	29		228	0	4.5	21	.8	6.4	260	.35	164	0	28	1.0	429	---	
15bbb	6/15/51	285	22	28	42	16	21		235	0	6.0	10	.4	3.2	243	.33	171	0	21	.7	396	---	
27dca	8/12/49	462	-----	36	21	9.7	12		117	0	14	6	.2	.3	157	.21	92	0	23	.5	223	---	
(D-10-18)3bad2	3/30/54	277	41	41	28	2.3	120		129	0	150	42	7.0	.9	454	.62	80	0	77	5.8	698	---	
(D-10-19)30bda	6/15/51	490	-----	44	12	2.8	77		194	0	28	11	1.8	.4	273	.37	42	0	80	5.2	396	---	
(D-11-17)24cac	7/ 8/52	160	27	26	45	11	9.0		188	0	15	4	.4	1.4	205	.28	158	4	9	.3	338	---	
30aaa	7/10/52	-------	21	11	90	14	3.7		327	0	15	4	.1	.9	300	.41	282	14	3	.1	519	---	Davis Spring.
(D-11-18)18bbd	7/ 9/52	-------	27	32	54	11	20		245	0	12	6	.2	2.1	258	.35	180	0	20	.6	407	---	Peck Spring. Flow, 1 gpm.
(D-11-19)10dca	6/15/51	300	23	-----	56	9.9	19		232	0	18	9	-----	-----	226	.31	180	0	19	.6	437	---	
31ccd	11/ 2/50	-------	21	45	30	9.3	21		145	0	22	7	.6	7.7	214	.29	113	0	29	.8	297	---	
(D-12-18)3aaa	7/ 2/46	122	19	-----	56	16	67		292	0	87	11	1.2	2.7	385	.52	206	0	----	2.0	635	---	
	8/26/54	122	19	37	57	13	73		304	0	80	12	1.2	2.9	425	.58	196	0	45	2.3	634	---	
	7/16/56	122	19	-----	-------	------	-------		273	0	------	11	-----	-----	------	-----	--------	-----	----	-------	582	7.2	
	5/15/57	122	-----	-----	-------	------	-------		251	0	------	11	-----	-----	------	-----	168	0	----	-------	569	7.3	
	9/14/59	122	19	-----	-------	------	-------		282	------	------	11	-----	-----	------	-----	166	0	----	-------	622	7.5	
	7/14/60	122	-----	-----	-------	------	-------		261	------	------	12	-----	-----	------	-----	169	-----	----	-------	599	7.5	Water had been standing in tank about a week.
	9/11/63	122	19	-----	-------	------	-------		329	0	------	16	1.1	-----	------	-----	265	0	----	-------	776	7.6	

Table 4.--Chemical analyses of water from selected wells and springs, San Pedro River valley—Continued

Location	Date of collection	Depth of well (feet)	Temperature (°C)	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: Milligrams per liter	Dissolved solids: Tons per acre-foot	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Percent sodium	Sodium-adsorption ratio (SAR)	Specific conductance (micromhos at 25° C)	pH	Remarks
LOWER SAN PEDRO BASIN—Continued																							
(D-13-18)1aaa	1/26/51	180	18	19	66	9.4	13		234	0	23	6	0.2	8.2	260	0.35	203	0	12	0.4	428	---	
11aad	1/26/51	220	20	-----	-------	------	-------		266	0	------	5	-----	-----	------	-----	--------	-----	----	-------	457	---	
(D-13-19)4cda	10/11/50	133	19	-----	-------	------	-------		269	0	------	10	-----	-----	------	-----	--------	-----	----	-------	548	---	
10dbd	10/13/50	27	21	-----	-------	------	-------		292	0	------	9	-----	-----	------	-----	--------	-----	----	-------	499	---	
10dcb	7/ 1/46	102	19	-----	-------	------	-------		269	0	------	8	-----	-----	------	-----	--------	-----	----	-------	--------	---	
24ccc	10/11/50	70	22	31	53	22	89		298	0	137	17	1.8	1.3	499	.68	222	0	47	2.6	769	---	
(D-13-20)7ddd	6/ 2/53	440	31	37	40	12	45		273	0	8.4	9	1.0	.8	287	.39	150	0	40	1.6	456	---	
23dcc	5/27/52	-------	29	28	169	74	2,840		264	0	4,620	1,340	1.6	1.9	9,200	12.5	728	510	89	45.7	11,700	---	
(D-14-20)8bdd	6/ /62	140	-----	-----	60	20	68		240	0	142	24	-----	-----	554	-----	--------	-----	39	2.0	800	---	Analysis by University of Arizona.
8cba	10/11/50	125	24	32	50	15	61		246	0	94	11	1.4	.9	386	.52	186	0	42	1.9	596	---	
33aad	5/ /62	-------	-----	-----	43	17	62		228	0	102	14	-----	-----	466	-----	--------	-----	43	2.0	600	---	Analysis by University of Arizona.
34bbc	4/ 1/54	246	28	29	29	7.8	61		208	0	43	12	1.0	1.7	286	.39	104	0	56	2.6	440	---	
34caa	10/11/50	145	26	28	33	16	29		204	0	20	12	.8	4.6	243	.33	148	0	29	1.0	387	---	
	9/24/64	145	24	-----	33	16	-------		220	0	20	12	.9	-----	------	-----	148	0	----	-------	430	7.2	
(D-14-21)19cad	11/30/50	644	-----	22	33	33	132		373	0	80	73	4.4	.7	562	.76	218	0	57	3.9	923	---	
(D-15-20)8cbd	5/31/51	515	29	29	20	4.9	85		191	0	71	12	2.2	.9	319	.43	70	0	72	4.4	487	---	
UPPER SAN PEDRO BASIN																							
(D-14-21)25adb	11/30/50	300	20	26	42	9.9	16		175	0	10	13	.2	9.9	213	.29	146	2	20	.6	346	---	
(D-14-22)31abc	7/ 5/51	160	22	-----	-------	------	-------		171	0	------	5	-----	-----	------	-----	--------	-----	----	-------	310	---	
(D-15-21)35baa	7/27/51	660	-----	20	47	20	25		266	0	12	13	.4	4.7	273	.37	200	0	21	.8	463	---	
(D-16-19)11dbb	2/23/34	-------	17	-----	38	9.8	18		180	0	6	11	.6	3.5	176	-----	135	-----	----	.7	--------	---	Pacheco Spring. Flow, 4 gpm.
	10/12/50	-------	18	-----	46	10	22		216	0	5.8	12	.4	3.2	240	.33	156	0	23	.8	382	---	Flow, 0.4 gpm.
17aba	5/17/51	150	21	41	12	3.2	18		73	0	5.1	11	.2	1.8	128	.17	43	0	48	1.2	152	---	
(D-16-20)6acc2	3/ /62	130	23	-----	-------	------	-------		122	0	2,360	5	-----	-----	3,010	-----	1,540	1,440	----	-------	3,220	7.8	Sampled during drilling.
	---------	875	-----	-----	-------	------	-------		105	0	1,000	6	-----	-----	1,280	-----	428	342	----	-------	1,770	7.7	Water is probably a mixture from several horizons.
7cdb	10/12/50	-------	26	40	307	25	51		140	0	819	4	2.4	1.9	1,320	1.80	869	754	11	.8	1,590	---	Spring.

Table 4.--Chemical analyses of water from selected wells and springs, San Pedro River valley—Continued

Location	Date of collection	Depth of well (feet)	Temperature (°C)	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: Milligrams per liter	Dissolved solids: Tons per acre-foot	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Percent sodium	Sodium-adsorption ratio (SAR)	Specific conductance (micromhos at 25° C)	pH	Remarks
UPPER SAN PEDRO BASIN—Continued																							
(D-16-20)27dcc2	9/ 7/55	72	20	37	114	44	375		441	0	775	58	2.3	31	1,650	2.24	466	104	64	7.6	2,090	7.2	Increase in specific conductance probably results from percolation of irrigation water.
	7/14/60	72	20	-----	-------	------	-------		274	------	------	151	-----	-----	------	-----	660	435	----	7.2	3,080	7.2	
	11/ 2/64	72	20	-----	254	89	-------		490	0	1,460	165	4.1	-----	------	-----	1,000	598	----	--------	3,830	7.0	
28cba	10/12/50	-------	26	26	244	13	227		128	0	994	9	1.1	1.0	1,580	2.15	662	558	43	3.8	1,990	---	
34dab	5/25/56	1,000	30	-----	-------	------	-------		221	0	------	6.0	-----	-----	------	-----	--------	-----	----	--------	388	7.7	
	5/15/57	1,000	-----	-----	-------	------	-------		236	0	14	5.0	-----	-----	------	-----	98	0	----	--------	384	7.5	
(D-17-20)9adc	11/30/50	1,000	28	42	37	12	31		235	0	9.9	2	.6	1.3	252	.34	142	0	32	1.1	384	---	
9cbc	10/ 3/46	355	-----	-----	388	31	471		53	0	1,950	26	3.4	.4	2,900	3.94	1,100	1,050	----	6.2	3,380	---	Sampled during drilling.
	10/18/46	856	-----	-----	-------	------	-------		57	0	------	15	-----	-----	------	-----	--------	-----	----	--------	1,830	---	
	---------	900	-----	-----	-------	------	-------		137	0	------	48	-----	-----	------	-----	--------	-----	----	--------	2,230	---	
	---------	926	-----	-----	-------	------	-------		217	0	------	88	-----	-----	------	-----	--------	-----	----	--------	2,050	---	
	10/29/46	1,088	-----	-----	182	24	223		111	0	850	38	2.7	.2	1,370	1.86	552	462	----	4.1	1,820	---	
14ccc	10/ 1/46	640	27	-----	36	8.8	51		235	0	25	4	4.4	1.4	246	.33	126	0	----	2.0	430	---	
(D-17-21)32bab	7/29/53	520	24	25	15	.9	52		133	0	20	6	5.0	1.8	191	.26	41	0	73	3.5	293	---	
	9/10/54	520	-----	28	12	2.4	79		169	0	47	7	5.2	.3	264	.36	40	0	81	5.4	412	---	
	8/17/55	520	24	-----	-------	------	-------		136	0	------	6	-----	-----	------	-----	--------	-----	----	--------	264	7.0	
	5/29/56	520	27	23	19	.5	54		136	0	29	10	4.4	.7	208	.28	50	0	70	3.4	325	7.2	
	5/16/57	520	-----	-----	-------	------	-------		134	0	------	8.5	-----	-----	------	-----	50	0	----	--------	313	7.2	
	9/24/64	520	24	-----	17	1.8	-------		133	0	26	9.0	5.0	-----	------	-----	50	0	----	--------	327	7.5	
32dad	3/ /57	180	-----	-----	29	4	41		171	0	T	24	-----	-----	269	-----	--------	-----	51	1.8	400	---	Analysis by University of Arizona.
32ddc1	3/30/46	200	20	-----	29	1.6	39		169	0	5.6	9	2.0	1.6	171	.23	79	0	----	1.9	292	---	
(D-18-21)5bb	12/30/20	270	-----	-----	-------	------	-------		116	0	9.4	-------	-----	-----	176	-----	--------	-----	----	--------	--------	---	
	2/24/34	270	22	-----	20	------	34		107	7	6	1.0	6.4	2.0	127	-----	51	-----	----	--------	--------	---	Artesian flow, 2 gpm.
6aaa2	9/15/52	60	20	25	66	17	179		561	0	86	18	2.6	53	723	.98	234	0	62	5.1	1,130	---	
	9/ 9/53	60	22	-----	-------	------	-------		585	0	------	21	-----	-----	------	-----	--------	-----	----	--------	1,160	---	
	8/26/54	60	-----	-----	-------	------	-------		461	0	------	18	4.4	8.5	------	-----	116	0	----	--------	910	---	
	8/24/55	60	26	-----	-------	------	-------		464	0	------	20	-----	-----	------	-----	--------	-----	----	--------	904	8.2	
	5/29/56	60	-----	-----	-------	------	-------		629	0	------	24	-----	-----	------	-----	--------	-----	----	--------	1,220	7.7	
	5/16/57	60	-----	-----	-------	------	-------		575	0	101	22	-----	-----	------	-----	184	0	----	--------	1,120	7.6	
	6/ 3/58	60	27	-----	-------	------	-------		552	0	------	20	-----	-----	------	-----	141	0	----	--------	1,060	7.7	
	8/24/59	60	-----	-----	-------	------	-------		591	------	------	20	-----	-----	------	-----	125	0	----	--------	1,080	7.6	
	10/ 6/61	60	-----	-----	-------	------	-------		641	------	------	28	-----	-----	------	-----	130	0	----	--------	1,280	7.8	
33da	12/31/20	470	-----	27	14	.6	25		88	0	8.1	4.5	-----	1.6	128	-----	--------	-----	----	--------	--------	---	
	2/24/34	470	26	-----	14	------	22		61	7.9	10	5.0	2.2	1.7	93	-----	39	-----	----	1.5	--------	---	Artesian flow, 4 gpm.
(D-20-18)3dca	5/12/61	200	19	23	47	10	12		204	0	5.6	3.8	.4	7.6	209	.28	160	0	14	.4	343	7.6	
(D-20-20)7bbd	6/ /63	367	-----	-----	224	70	16		128	------	750	7	1	1	1,130	-----	850	-----	----	.2	1,460	---	Analysis by Arizona State Health Laboratory.

Table 4.--Chemical analyses of water from selected wells and springs, San Pedro River valley—Continued

Location	Date of collection	Depth of well (feet)	Temperature (°C)	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: Milligrams per liter	Dissolved solids: Tons per acre-foot	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Percent sodium	Sodium-adsorption ratio (SAR)	Specific conductance (micromhos at 25° C)	pH	Remarks
UPPER SAN PEDRO BASIN—Continued																							
(D-20-20)27cdc	4/ 3/41	127	19	-----	72	9.6	16		283	0	12	7	-----	-----	256	-----	219	-----	----	0.5	448	---	
	4/21/60	127	21	-----	-------	------	-------		279	0	------	6.0	-----	-----	------	-----	218	0	----	-------	457	7.1	
(D-20-22)11aca	11/ 5/52	700	-----	27	64	18	23		220	0	41	27	2.2	21	331	0.45	234	53	18	.6	542	---	
(D-21-19)1ddc	4/ 3/41	180	22	-----	54	9.2	7.0		212	0	4	7	-----	-----	186	-----	173	-----	----	.2	339	---	
	2/ 4/46	180	-----	-----	42	7.9	13		184	0	5.3	7.0	<.4	0	166	.23	138	0	----	.5	304	---	
32cbc	3/30/60	-------	18	19	86	6.2	8.0		285	0	12	6.4	.6	1.5	280	.38	240	6	7	.2	473	7.4	Kino Spring. Flow, 4 gpm.
(D-21-20)5acc	4/21/60	287	22	-----	-------	------	-------		209	0	------	5.6	-----	-----	------	-----	161	0	----	-------	350	7.2	
28cda	8/31/53	800	-----	25	38	7.2	14		172	0	5.1	5.8	.1	.9	180	.25	124	0	20	.5	295	7.6	Fort Huachuca well 5.
	11/ 2/55	800	-----	30	39	7.4	20		183	0	8.9	5.8	.3	3.5	204	.28	128	0	25	.8	317	7.6	
33aca	9/17/51	912	14	33	43	11	17		214	0	5.6	4.8	0	2.6	221	.30	152	0	20	.6	349	7.5	Fort Huachuca well 4.
	8/31/53	912	-----	25	44	10	13		201	0	6.0	4.8	.1	1.2	203	.28	151	0	16	.5	333	7.5	
	9/14/54	912	-----	29	44	10	17		210	0	6.7	5.5	.2	1.0	213	.29	151	0	20	.6	342	7.9	
	11/ 2/55	912	-----	31	42	9.0	17		198	0	7.6	5.0	.3	.9	209	.29	142	0	21	.6	331	7.7	
33adb	4/16/52	802	16	31	44	11	17		213	0	6.6	5.2	.1	2.1	225	.30	155	0	19	.6	350	8.0	Fort Huachuca well 3.
	8/11/52	802	-----	32	44	11	15		208	0	7.2	5.2	.3	2.2	218	.30	155	0	18	.5	345	7.8	
	8/31/53	802	-----	31	45	11	13		208	0	6.3	5.2	.1	1.5	214	.29	158	0	15	.4	343	7.5	
	9/14/54	802	-----	25	59	12	14		248	0	14	5.2	.2	2.2	249	.35	196	0	14	.4	413	7.9	
	11/ 2/55	802	-----	33	39	11	17		197	0	7.6	5.5	.3	2.0	211	.29	142	0	21	.6	331	7.6	
33dbb	10/14/58	1,230	26	-----	-------	------	-------		192	0	------	7.0	-----	-----	------	-----	128	0	----	-------	331	7.2	Fort Huachuca well 6.
(D-21-21)22ddc	4/ 2/41	130	-----	-----	20	14	20		73	29	34	5	-----	-----	158	-----	107	-----	----	.8	250	---	
	2/ 4/46	130	-----	-----	43	14	14		211	0	8.4	8.2	.4	1.6	193	.26	165	0	----	.5	353	---	
	4/22/60	130	22	-----	-------	------	-------		222	0	------	4.6	-----	-----	------	-----	167	0	----	-------	362	7.4	
29cca	4/ 1/41	280	22	-----	47	14	.9		203	0	6	3	-----	-----	171	-----	175	-----	----	.03	318	---	
	2/ 4/46	280	-----	-----	-------	------	26		200	0	8	5	-----	-----	------	-----	123	-----	----	1.0	325	---	
	4/22/60	280	23	-----	-------	------	-------		201	0	------	4.4	-----	-----	------	-----	150	0	----	-------	328	7.3	
(D-22-20)3bbb2	2/ 4/46	701	-----	-----	-------	------	-------		221	0	7	5.0	-----	-----	------	-----	--------	-----	----	-------	350	---	Fort Huachuca well 1.
	10/18/51	701	16	29	45	12	13		213	0	6.7	4.8	.1	1.9	217	.30	162	0	15	.4	347	7.8	
	9/14/54	701	-----	32	45	11	16		214	0	6.4	6.0	.1	1.2	222	.30	158	0	18	.5	361	7.6	
	9/ 8/55	701	24	-----	-------	------	-------		216	0	------	7.0	-----	-----	------	-----	--------	-----	----	-------	354	7.3	
3bbb3	4/18/41	710	-----	-----	49	11	12		214	0	12.0	4.0	-----	-----	193	.26	168	0	13	.4	347	---	Fort Huachuca well 2.
	2/11/46	710	-----	32	43	12	14		212	0	5.8	4.9	0	2.1	213	.30	157	0	16	.5	343	7.9	
	11/ 2/55	710	-----	34	40	11	20		206	0	8.7	5.5	.3	1.8	222	.30	145	0	23	.7	339	7.5	
(D-22-21)35ddd	4/22/60	-------	22	-----	-------	------	-------		168	0	------	4.4	-----	-----	------	-----	126	0	----	-------	283	7.2	
(D-23-22)15acc1	7/23/46	240	21	-----	46	11	16		217	0	9.3	4	.2	1.8	195	.27	160	0	----	.6	365	---	
15bcc	7/23/46	-------	21	-----	23	2.1	50		186	0	13	4	1.0	1.0	186	.25	66	0	----	2.7	315	---	Artesian flow, 210 gpm.

Table 4.--Chemical analyses of water from selected wells and springs, San Pedro River valley—Continued

Location	Date of collection	Depth of well (feet)	Temperature (°C)	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: Milligrams per liter	Dissolved solids: Tons per acre-foot	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Percent sodium	Sodium-adsorption ratio (SAR)	Specific conductance (micromhos at 25°C)	pH	Remarks
UPPER SAN PEDRO BASIN—Continued																							
(D-23-22)21aac	7/23/46	500	21	-----	-------	------	-------	172	0	------	3	-----	-----	------	-----	--------	-----	----	--------	298	---	Artesian flow, 30 gpm.
	9/16/52	500	22	-----	-------	------	-------	178	0	------	3	-----	-----	------	-----	--------	-----	----	--------	311	---	
	9/ 9/53	500	22	-----	-------	------	-------	168	0	------	4	-----	-----	------	-----	--------	-----	----	--------	286	---	
	8/26/54	500	22	31	24	4.7	36	169	0	10	5	0.6	0.5	195	0.27	80	0	50	1.8	294	---	
	8/29/55	500	22	-----	-------	------	-------	167	0	------	4	-----	-----	------	-----	--------	-----	----	--------	288	7.4	
21acd	4/ /56	264	-----	-----	19	15	60	244	0	T	26	-----	-----	364	-----	--------	-----	55	2.7	500	---	Analysis by University of Arizona.
21cda	9/16/52	55	25	34	58	7.1	22	208	0	17	18	.2	7.3	266	.36	174	3	21	.7	431	---	
	7/12/53	55	21	-----	-------	------	-------	218	0	------	10	-----	-----	------	-----	--------	-----	----	--------	392	---	
	8/26/54	55	-----	-----	-------	------	-------	213	0	------	20	-----	-----	------	-----	--------	-----	----	--------	431	---	
	8/17/55	55	-----	-----	-------	------	-------	225	0	------	19	-----	-----	------	-----	--------	-----	----	--------	433	7.1	
	5/22/56	55	21	-----	-------	------	-------	216	0	------	12	-----	-----	------	-----	--------	-----	----	--------	399	7.6	
	5/27/57	55	20	-----	-------	------	-------	234	0	------	11	-----	-----	------	-----	171	0	----	--------	414	7.9	
22bdd	2/24/55	475	-----	-----	68	.8	28	220	------	50	20	-----	-----	------	-----	--------	-----	23	--------	380	---	Analysis by Soil Conservation Service.
33cbc	7/24/46	400	24	-----	-------	------	-------	183	0	------	3	-----	-----	------	-----	--------	-----	----	--------	303	---	
33ccc	7/24/46	185	21	-----	-------	------	-------	204	0	------	4	-----	-----	------	-----	--------	-----	----	--------	340	---	
34cbd	9/16/52	165	21	-----	-------	------	-------	215	0	------	4	-----	-----	------	-----	--------	-----	----	--------	353	---	
	8/ 8/53	165	21	-----	-------	------	-------	214	0	------	6	-----	-----	------	-----	--------	-----	----	--------	360	---	
	8/26/54	165	-----	34	39	9.1	20	191	0	12	6	.4	.5	215	.29	135	0	25	.8	332	---	
	8/17/55	165	-----	-----	-------	------	-------	224	0	------	8	-----	-----	------	-----	--------	-----	----	--------	388	7.1	
	5/29/56	165	20	34	47	6.4	25	211	0	13	6.0	.6	1.1	238	.32	144	0	27	.9	364	7.5	Boron, 0.8 mg/l.
	5/27/57	165	-----	-----	-------	------	-------	222	0	------	6.5	-----	-----	------	-----	142	0	----	--------	380	7.4	
	6/12/58	165	-----	-----	-------	------	-------	216	0	------	4.2	-----	-----	------	-----	142	0	----	--------	366	7.4	
	8/24/59	165	-----	-----	-------	------	-------	203	------	------	5.5	-----	-----	------	-----	131	0	----	--------	343	7.4	
	9/16/63	165	24	-----	-------	------	-------	213	0	15 A	4.5	.4A	-----	------	-----	144	0	----	--------	374	7.1	
(D-24-22)5aca	3/ /58	325	-----	-----	22	10	71	227	0	0	47	-----	-----	377	-----	--------	-----	62	3.2	500	---	Analysis by University of Arizona.

Table 5.--Chemical analyses of flow in the San Pedro River

[Analyses by U.S. Geological Survey. Analytical results in milligrams per liter except as indicated. Dissolved solids represent computed sum of determined constituents using the carbonate equivalent of the bicarbonate ion]

Location	Date of collection	Temperature (°C)	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: Milligrams per liter	Dissolved solids: Tons per acre-foot	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Percent sodium	Sodium-adsorption ratio (SAR)	Specific conductance (micromhos at 25°C)	Remarks
LOWER SAN PEDRO BASIN																					
(D-5-15)23, 1/4 mile above mouth	3/29/51	24	34	51	12	173		321	0	221	38	2.2	1.3	690	0.94	176	0	68	5.7	1,020	Flow, 8.9 cfs.
(D-5-16)31c, 3 miles above mouth	4/11/51	24	41	87	19	91		307	0	191	26	2.0	1.5	610	.83	295	44	40	2.3	902	Flow, 3.6 cfs.
(D-6-16)17a, 6 miles above mouth	9/27/50	19	42	82	16	106		283	0	220	23	2.0	2.5	632	.86	270	38	46	2.8	924	
	4/10/51	18	38	92	17	84		315	0	183	21	1.8	.6	592	.81	300	42	38	2.1	878	Estimated flow, 50 gpm.
(D-6-16)20a, 5 miles below Aravaipa Creek	4/10/51	23	37	94	21	112		347	0	228	26	2.2	.4	692	.94	321	36	43	2.7	1,020	Estimated flow, 75 gpm.
(D-7-16)4c, 1/2 mile below Aravaipa Creek	4/10/51	23	36	62	13	113		298	0	150	28	3.6	4.7	557	.76	208	0	54	3.4	842	
(D-7-16)5a, 1-1/2 miles below Aravaipa Creek	4/10/51	23	32	67	15	98		310	0	133	29	2.8	1.7	532	.72	228	0	48	2.8	824	
(D-7-16)15c, 2 miles above Aravaipa Creek	4/10/51	28	37	54	13	110		242	0	166	30	4.4	1.5	535	.73	188	0	56	3.5	812	
(D-10-18)8ab, 1 mile below Sacaton Ranch	6/15/51	----	44	40	12	87		207	0	135	16	2.2	.4	439	.60	150	0	56	3.1	648	
(D-12-19)19d, 5 miles above Redington	10/11/50	18	30	55	12	46		246	0	64	11	.8	1.2	341	.46	186	0	35	1.5	530	Estimated flow, 350 gpm.
(D-13-19)5a, spring in river bottom 8 miles above Redington	10/11/50	----	33	61	15	58		291	0	79	11	1.2	.7	402	.55	214	0	37	1.7	619	Estimated flow, 15 gpm.
(D-14-20)6ddc, seep in river 4 miles above Cascabel	10/11/50	31	----	-------	-------	------		295	0	------	13	----	-----	------	----	-------	-----	----	-------	691	
UPPER SAN PEDRO BASIN																					
(D-20-21)3bcd, at Fairbank below mouth of Babocomari River	4/ 4/41	11	----	44	12	27		187	16	28	6	----	-----	225	----	159	-----	----	.9	387	Estimated flow, 25 cfs.
(D-21-22)30abc, at Lewis Springs	4/ 3/41	----	----	41	12	28		175	15	32	7	----	-----	221	----	152	-----	----	1.0	385	Estimated flow, 15 cfs.
(D-23-22)33dcd, at Palominas	4/ 7/41	23	----	50	7	35		194	13	38	6	----	-----	244	----	154	-----	----	1.2	402	Estimated flow, 10 cfs.