STATE OF CALIFORNIA

DEPARTMENT OF WATER RESOURCES

BULLETIN NO. 91-4

DATA ON WATER WELLS IN THE WILLOW SPRINGS, GLOSTER, AND CHAFFEE AREAS, KERN COUNTY, CALIFORNIA

PREPARED BY

UNITED STATES DEPARTMENT OF INTERIOR
GEOLOGICAL SURVEY

FEDERAL-STATE
COOPERATIVE GROUND WATER INVESTIGATIONS

SEPTEMBER 1960

STATE OF CALIFORNIA

DEPARTMENT OF WATER RESOURCES

BULLETIN NO. 91-4

DATA ON WATER WELLS IN THE WILLOW SPRINGS, GLOSTER, AND CHAFFEE AREAS, KERN COUNTY, CALIFORNIA

PREPARED BY

UNITED STATES DEPARTMENT OF INTERIOR
GEOLOGICAL SURVEY

FEDERAL-STATE
COOPERATIVE GROUND WATER INVESTIGATIONS

SEPTEMBER 1960

This report is one of a series of open file reports prepared by the United States Department of Interior Geological Survey, Ground Water Branch, which present basic data on wells obtained from reconnaissance surveys of desert areas. These investigations are conducted by the Geological Survey under a cooperative agreement whereby funds are furnished equally by the United States and the State of California. The reports in this Bulletin No. 91 series are being published by the Department of Water Resources in order to make sufficient copies available for use of all interested agencies and the public at large.

29817 11-60 400 SPO

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Water Resources Division
Ground Water Branch
2929 Fulton Avenue
Sacramento 21, California

September 15, 1960

Mr. Harvey O. Banks, Director
California Department of Water Resources
P. O. Box 388
Sacramento 2, California

Dear Mr. Banks:

We have the pleasure to transmit herewith, for publication by the Department of Water Resources, U. S. Geological Survey report "Data on Water Wells in the Willow Springs, Gloster, and Chaffee Areas, Kern County, California," by Fred Kunkel and L. C. Dutcher. This investigation was conducted and the report prepared in accordance with the cooperative agreement between the State of California and the Geological Survey.

This report, one of a series for the Mojave Desert region prepared by the Long Beach subdistrict office, tabulates all available data on wells in the areas and shows reconnaissance geology with special reference to the water-yielding deposits.

Sincerely yours,

Harry D. Wilson, Jr.

Harry D. Wilson, Jr.
District Engineer

CONTENTS

ILLUSTRATIONS

TABLES

DATA ON WATER WELLS IN THE WILLOW SPRINGS, GLOSTER, AND CHAFFEE AREAS, KERN COUNTY, CALIFORNIA

By Fred Kunkel and L. C. Dutcher

PURPOSE AND SCOPE OF THE WORK AND REPORT

The data presented in this report were collected by the U.S. Geological Survey in connection with an investigation of water wells and general hydrologic conditions throughout much of the desert region of southern California. The geologic mapping was financed by Federal funds for arid-regions studies, and the canvass of wells and compilation of data were financed under a cooperative agreement with the California Department of Water Resources.

The desert regions of California are characterized by barren mountain ranges and isolated hills surrounding broad valleys, or basins, which are underlain by alluvial debris derived from the surrounding highlands. These basins generally contain ground water which has a wide range in chemical quality and which can be and in some areas has been developed for beneficial use.

The general objective of the cooperative investigation is to collect and to tabulate all available hydrologic data for the individual desert basins in order to provide public agencies and the general public with data for use in planning water utilization and management and for use in subsequent ground-water investigations.

Accordingly, the scope of the work carried out by the Geological Survey in each area has included (1) brief reconnaissance mapping of major geologic features to define the extent and general character of the deposits that contain the ground water; (2) visiting and examining virtually all the water wells in the area; determining and recording their locations in relation to geographic and cultural features and the public-land net, wherever possible; and recording well depths and sizes, types and capacities of installed equipment, uses of the water, and other pertinent information available at the well site; (3) measurement of the depth to the water surface below an established and described measuring point at or near the land surface; (4) selection of representative wells to be measured periodically in order to detect and record changes of water levels; and (5) collection and assembly of well records, including well logs, water-level measurements, and chemical analyses.

The work has been carried on by the U.S. Geological Survey under the general supervision of Harry D. Wilson, Jr., district engineer in charge of ground-water investigations in California, and under the immediate supervision of Fred Kunkel, geologist in charge of the Long Beach subdistrict office. The fieldwork was carried on principally by L. C. Dutcher, Fred Kunkel, W. J. Hiltgen, and F. S. Riley intermittently between April 1951 and March 1959 from the southern California subdistrict office of the Ground Water Branch at Long Beach.

LOCATION AND GENERAL FEATURES OF THE AREAS

The Willow Springs, Gloster, and Chaffee areas cover about 500 square miles and include part of Fremont Valley and the northwestern part of Antelope Valley as defined by Thompson (1929, pls. 16 and 19). The locations and some of the general features are shown on figure 1. The areas of this study lie in the southwestern part of the Mojave Desert region between long 117°57' and 118°30' W. and about lat 34°52' and 35°10' N., near the town of Mojave. The northeastern boundary of the area coincides with the Muroc fault, Bissell Hills, and Edwards Air Force Base; the southern boundary is Edwards Air Force Base and the Rosamond fault; the western boundary is the Tehachapi Mountains.

The area mapped is shown on figure 2 and includes one large ground-water subbasin northeast of Mojave, called the Chaffee area, a relatively large subbasin north of the Rosamond fault near Willow Springs, and several minor basins or subbasins in Antelope Valley in the area east of Willow Springs and north of the Rosamond Hills. The largest of these is the so-called Gloster area between Soledad Mountain and the Rosamond Hills.

Both the Muroc fault and the Rosamond fault are well defined and are barriers to the movement of ground water. The altitude of the water surface on the south side of the Muroc fault is as much as 320 feet higher than it is on the north side. The altitude of the water surface on the north side of the Rosamond fault is as much as 100 feet higher than the altitude of the water surface on the south side of the fault.

Topographically the area southwest of the Muroc fault consists principally of steep alluvial fans and gently sloping alluvial plains built out from the southeastern slopes of the Tehachapi Mountains. In the central and southeastern parts of the area isolated buttes and mountains rise above the alluvial plain. Low, gently rolling hills of granitic rocks limit the alluvial plain on the east.

The Willow Springs, Gloster, and Chaffee areas are shown on parts of the following U.S. Geological Survey topographic quadrangle maps: Castle Butte, Mojave, Rogers Lake, Rosamond, Tehachapi, and Willow Springs, all at a scale of 1:62,500.

Access to the area is provided by U.S. Highways 6 and 466 and several paved and many unpaved roads. The principal town in the area is Mojave, at the intersection of U.S. Highways 6 and 466 and the junction of the Southern Pacific and Santa Fe Railroads.

In the area extending from the Muroc fault to Willow Springs (fig. 2) the economy is based mainly on commerce with travelers using U.S. Highways 6 and 466 and the railroad yards at Mojave. Except for several small fields of alfalfa northeast of Rosamond and in the Gloster area, the only significant irrigation during the period 1954-58 was that in the vicinity of Willow Springs. In this area 10 wells reportedly supplied irrigation water to about 2,000 acres of alfalfa.

PREVIOUS INVESTIGATIONS AND ACKNOWLEDGMENTS

Data on ground water in the Willow Springs, Gloster, and Chaffee areas are contained in two reports: U.S. Geological Survey Water-Supply Paper 578, "The Mohave Desert Region, California" (Thompson, 1929, p. 201-223, 289-371), includes data obtained in 1918 on wells in the area of the present investigation; and a private report (Williams, 1930) contains information collected in 1929 and 1930 on wells in the area. The data on wells from these reports are included herein.

Approximately 95 square miles of the southeastern part of the area of this report lies within Edwards Air Force Base and is closed to civilian development. Data on wells within the military reservation are not included in this report but are contained in a Geological Survey open-file report (Dutcher and Hiltgen, 1955) prepared in cooperation with the U.S. Air Force.

The geology shown on figure 2 was compiled and generalized from the geologic maps of the Castle Butte (Dibblee, 1958) and Mojave (Dibblee, 1959) quadrangles, from unpublished mapping by the junior author, and from unpublished maps of the Rosamond, Tehachapi, and Willow Springs quadrangles by T. W. Dibblee of the U.S. Geological Survey.

The California Department of Water Resources provided access to all pertinent information in its files, including numerous well logs and chemical analyses. In addition, many well owners and drillers provided data from their files. The cooperation and assistance given by these people and agencies contributed materially to the completeness of the data presented in this report and are acknowledged.

GEOLOGIC FEATURES OF THE AREA

The geologic units in the Willow Springs, Gloster, and Chaffee areas can be grouped into two broad categories: Consolidated rocks and unconsolidated deposits. The consolidated rocks are for the most part impervious and, except for minor amounts of water in cracks and weathered zones, yield little or no water. The consolidated rocks comprise the old crystalline, metamorphic, and consolidated sedimentary rocks of pre-Tertiary age which collectively form the basement complex, the consolidated sedimentary rocks of Tertiary age, and the volcanic rocks of Tertiary age.

The consolidated sedimentary and volcanic rocks of Tertiary age are part of the Witnet, Gem Hill, Kinnick, Bopesta, and Horned Toad formations mapped by Dibblee (1959) in the Mojave quadrangle and the Tropico group mapped by Dibblee (1958) in the Castle Butte quadrangle. In the Rosamond, Willow Springs, Tehachapi, and Rogers Lake quadrangles the consolidated sedimentary and volcanic rocks have not been named. Presumably these rocks also are of Tertiary age. They consist mainly of gray and red conglomerate, arkose, cobble gravel, tuff, sandstone, chert, limestone, gravel, sand, silt, and clay. For the most part these rocks are poorly permeable, but locally where penetrated by deep wells they yield small amounts of water to domestic wells.

Volcanic rocks of acidic composition, mainly quartz latite, some andesite, rhyolite, and dacite of Miocene to Pliocene age, also occur in the area. Locally these rocks are part of the Tropico group mapped by Dibblee (1958) in the Castle Butte quadrangle, the Bobtail quartz latite member of the Gem Hill formation mapped by Dibblee (1958) in the Rosamond quadrangle, and the Gem Hill formation mapped by Dibblee (1959) in the Mojave quadrangle.

Extrusive and intrusive basalts of Miocene(?) to Pliocene age also occur in the area. Locally these rocks are part of the Tropico group mapped by Dibblee (1958) in the Castle Butte quadrangle.

The unconsolidated older alluvium of late Pleistocene age consists of compact arkosic gravel, sand, silt, and clay. The deposits are weathered, and locally the feldspar has been altered to clay. Near the hills the unit is predominantly gravel but beneath the valley areas it is finer grained and better sorted. Because the older alluvium and the older fan deposits overlie the Tertiary continental rocks on which an erosional surface of considerable local relief is present, the thickness of the older deposits varies greatly from place to place. Where saturated the older alluvium contains the main aquifers in the area.

The older fan deposits of Pleistocene age consist of poorly consolidated fanglomerate or unsorted, unbedded boulder gravel occurring as isolated erosional remnants. The materials are mainly of granitic origin but fragments of basalt, andesite, dacite, and metamorphic rocks are common. The unit is nearly everywhere above the water level in wells and therefore is unsaturated. However, the attitude of this unit suggests that locally it extends beneath the younger alluvium in the valley and where saturated may yield small quantities of water to deep wells.

The younger alluvium of Recent age is mostly gravel, sand, and silt, and overlies the older units beneath the central parts of the valleys. These deposits are generally above the water table except in the lower parts of the valley, where they may yield small amounts of water to shallow wells.

The younger fan deposits of Recent age are mostly poorly sorted boulders, arkosic gravel, sand, silt, and clay derived from nearby hills or mountains. The materials have been transported only a short distance and mainly represent mudflow or slope-wash debris. Near the hills and mountains the younger fan deposits are coarse grained, but they become finer with increasing distance from the areas of active erosion. These deposits are poorly sorted and poorly permeable, are generally above the water table, and are believed to be unpromising sources of water.

Unconsolidated coarse to fine dune sand occurs in the lower parts of the valleys. The dunes are, in part at least, actively drifting; locally some small interdune playas are included in the area shown as dune sand on figure 2.

HYDROLOGIC FEATURES OF THE AREA

The surface drainage basins of the region are of the closed type, and infrequent runoff reaches one or another of the small playas, shown on figure 1, or reaches the larger playas known as Koehn Lake, in the northeastern part of Fremont Valley, and Rogers Lake or Rosamond Lake in Antelope Valley. Two principal drainage systems, those of Cache and Oak Creeks (fig. 2) carry occasional surface runoff from the mountains onto the alluvial slopes of the desert floor.

In 1958 the water levels in wells ranged from a few feet below the land surface in the Willow Springs area to more than 300 feet below the land surface beneath the higher alluvial slopes.

Recharge to the area southwest of the Muroc fault occurs by percolation of water from Cache and Oak Creeks and minor streams draining the Tehachapi Mountains and in very minor amounts by deep percolation of rain during infrequent periods of heavy precipitation.

A considerable part of the ground-water recharge from Cache Creek moves generally eastward and discharges across the Muroc fault into the ground-water basin to the north. The remainder of the ground-water flow from Cache Creek moves eastward and southeastward into the central part of the Chaffee area, where the movement is northeastward toward the Muroc fault. Recharge from the Oak Creek drainage system moves generally southeastward toward Soledad Mountain into the Chaffee area, and part moves southward along the west side of the mountain. Of the water that moves southward along the west side of Soledad Mountain, most eventually moves eastward along the south edge of the mountain into the Gloster area and thence into the Chaffee area. Some of the water may move southward and southwestward into the Willow Springs area and eventually discharges across the Rosamond fault into another ground-water basin to the south.

The ground water in the Willow Springs, Gloster, and Chaffee areas is moderately mineralized. The highest concentration of dissolved solids, about 900 ppm (parts per million), occurs in wells drilled near the Muroc fault in the northeastern part of the Chaffee area. The water of best quality comes from wells drilled in the alluvial materials underlying the higher slopes of the younger alluvium in the southern and southwestern parts of the area, where the dissolved-solids content is only about 220 to 500 ppm.

WELL-NUMBERING SYSTEM

The well-numbering system used in this report conforms to that used in virtually all ground-water investigations made by the Geological Survey in California since 1940. It has been adopted as official by the California Department of Water Resources and by the California Water Pollution Control Board for use throughout the State.

Wells are assigned numbers according to their location in the rectangular system for the subdivision of public land. For example, in the number 11/14-36A1, assigned to a well shown on figure 2, the part of the number preceding the slash indicates the township (T. 11 N.), the part between the slash and the hyphen indicates the range (R. 14 W.), the number between the hyphen and the letter indicates the section (sec. 36), and the letter indicates the 40-acre subdivision of the section as shown in the accompanying diagram.

D	C	B	A
E	F	G	H
M	L	K	J
N	P	Q	R

Within the 40-acre tract the wells are numbered serially as indicated by the final digit. Thus, well 11/14-36A1 is the first well to be listed in the NE$\frac{1}{4}$NE$\frac{1}{4}$ sec. 36, T. 11 N., R. 14 W. (San Bernardino base and meridian).

Similarly, well 32/36-22N1 is in the $SW\frac{1}{4}SW\frac{1}{4}$ sec. 22, T. 32 S., R. 36 E., Mt. Diablo base and meridian. Because all the wells are either in the northwest quadrant of the San Bernardino base and merician lines or in the southeast quadrant of the Mt. Diablo base and meridian lines, the foregoing abbreviations of the township and range are sufficient.

For well numbers where a Z has been substituted for the letter designating the 40-acre tract, the Z indicates that the well is plotted from unverified location descriptions; the indicated sites of such wells were visited but no evidence of a well could be found.

REFERENCES CITED

Dibblee, T. W., Jr., 1958, Geologic map of the Castle Butte quadrangle, Kern County, Calif.: U.S. Geol. Survey Mineral Inv. Map MF-170.

_____1959, Preliminary geologic map of the Mojave quadrangle, California: U.S. Geol. Survey Mineral Inv. Map MF-219.

Dutcher, L. C., and Hiltgen, W. J., 1955, Appendix A, Tables of basic data for wells on Edwards Air Force Base: U.S. Geol. Survey open-file rept., 84 p.

Jenkins, O. P., 1938, Geologic map of California: Calif. Div. Mines.

Thompson, D. G., 1929, The Mohave Desert region, California: U.S. Geol. Survey Water-Supply Paper 578, 759 p.

Williams, Cyril, Jr., consulting engineer, San Francisco, Calif., 1930, Supply investigation in the vicinity of Mojave, Calif.: Prepared for Pacific Portland Cement Co.

Table 1.- Descriptions of wells in the Willow Spring, Gloster, and Chaffee areas, California

USGS number: The number given is the Geological Survey number assigned to the well according to the system described in the section on the well-numbering system.

Source of data and other numbers: The source of data on each line is indicated by the following symbols: GS, observations and measurements made by the Geological Survey on the dates indicated as well as information reported to the Geological Survey by owners, drillers, or others; CW, from Cyril Williams, Jr. (1930); DGT, from Thompson (1929); DWR, from California Department of Water Resources; Owner, from owner. A number following the letters is the well number used in the reports by Thompson (1929) or Williams (1930).

Date of observation: Data for each well are given in reverse chronological order, with the most recent information summarized on the top line, opposite the well number.

Owner or user: The name given is the owner or user of the well on the date indicated. If more than one set of data are given for a well the name is not repeated unless it is known to be different.

Year completed: The completion date was obtained from the driller's log or reported by the owner or others.

Depth: Depths of wells given in whole feet were reported by owners, drillers, or others; depths given in feet and tenths were measured below land-surface datum by the Geological Survey.

Type of well and diameter: The type of well construction is indicated by symbols as follows: A auger, C cable tool, D dug, DC dug and deepened by cable tool, R rotary, G gravel packed, RG rotary gravel-packed well. The number following the letter is the diameter of the casing or pit, in inches, and where no casing was installed the symbol N is used.

Pump type and power: The type of pump or method of lift is indicated as follows: A airlift, B bucket, C centrifugal, J jet, L lift, N none, S submersible, T turbine. The type of power is indicated as follows: D diesel engine, E electric motor of undetermined horsepower (where a number appears in this column it indicates the rated horsepower of an electric motor), G gasoline engine, H hand operated, N none, W windmill.

Yield: The yield of the well in gallons per minute generally is reported by the driller or owner and is not necessarily the maximum capacity of the well.

Specific capacity: The specific capacity of a well is its rate of yield per unit of drawdown of the water level in the well. It is determined by dividing the figure in the Yield column by the drawdown resulting from sustained pumping at that rate; the result is expressed in terms of gallons per minute per foot of drawdown. The yield and drawdown data are principally from tests performed by the California Electric Power Company and reported by well owners and drillers.

Use: Dm domestic, Ds destroyed or dry, In industrial, Ir irrigation, P poultry raising, Ps public supply, S stock, T test hole, Un unused.

Measuring point: The point from which the water-level measurement(s) by the Geological Survey are made is described as follows:

Bpb bottom edge of pump base	Ls land surface	Tcc top of casing cover
Bhc bottom of hole in casing	Na no access	Tdp top of discharge pipe
Bnc bottom of notch in casing	Tap top of access pipe	Tmc top of masonry curb
Hcc hole in casing cover	Tbc top of board cover	Tpb top of pump base
Hpb hole in pump base	Tc top of casing	Twc top of wooden curb

The suffix letters N, S, E, and W, indicate the side (north, south, east, or west) where used. The distance of the measuring point above or below(-) land-surface datum is given in feet and tenths and sometimes hundredths. All measurements of water level are from the same measuring point unless otherwise indicated; however, the measuring points used by Thompson (1929), owners, drillers, and California Department of Water Resources are not known.

Altitude: The altitude given is the altitude of land-surface datum, the plane of reference approximately at ground surface, at the well. Altitudes given to the nearest foot were interpolated from Geological Survey topographic maps, those given in feet and tenths were determined by spirit leveling by Cyril Williams, Jr., (1930), C. F. Hostrup, consulting engineer, Westwood, Calif., the well owner, or the Geological Survey.

Depth to water: Measured depths to water level are given in feet, tenths, and hundredths, or feet and tenths; reported or approximate depths to water level are given in whole feet. The water-level measurements are below or above(+) land-surface datum. For the measurements made by the Geological Survey (GS) and Williams (CW, 1930), the difference in altitude between land-surface datum and the measuring point has been subtracted from or added to the measured water level below the measuring point. The measurement given is the depth to water level below or above land-surface datum.

Other data: B well reported to have penetrated bedrock (basement complex) at bottom, C chemical analysis of water is given in table 5, E electric log for well in the files of the Geological Survey, L driller's log of well is given in table 4, R automatic water-level recorder, installed and maintained by the owner, was operating in the well at the time of the Geological Survey field canvass, W records of water levels in wells are given in table 3; all known records of water levels in wells in the area are given in either table 1 or 3.

USGS number	Source of data and other numbers	Date of observation	Owner or user	Well data: Year completed	Depth (ft.)	Type, diameter (in.)	Pump type and power	Yield (gpm)	Specific Capacity	Use	Measuring point (feet)		Altitude of lsd (feet)	Water level: Depth below lsd (feet)	Other data
			T. 9 N., R. 12 W.												
9/12-16D1	GS	3-29-51	R. E. Payne	1949	85	G 6	L 2	30		Dm	Tmc	1.2	2,390	26.75	B
16E1	GS	5-24-56	Clara Koch	1950						Ds			2,404		
	GS	3-29-51	-Gettys		150	N	N N			Un	Ls	0		48.4	
16E2	GS	5-23-56	Clara Koch	1951		8	T			Dm	Tap	1.65	2,375	94.15	W
	GS	9-21-51	-Gettys		182.4		L W			S	TcE	1.0		92.94	
16E3	GS	5-24-56	Clara Koch	1955	503	C 8	L			Dm			2,390	36	
16J1	GS	5-24-56	A. C. Scruggs	1951	200	RG 12	T 25			Ir	TcS	.4	2,340	65.75	B,C,L
	GS	11-5-52												74.94	
	GS	4-17-51												60.86	
16K1		4-17-51	R. J. Rubees	1945	204	RG 12	T 20			Ir	Na		2,360		L
16L1	GS	5-24-56	Frank Miske	1917		14	T 15	450		Ir	Tc	0	2,365	89.72	L
	Owner	2-9-51												79.5	
	Owner	2-9-51						281						a111.3	
	DWR	2-1-47	Mitchell, Erickson Johnson											70	
	DGT-22A	6-13-17			254			450						35	

16Q1	GS	4-17-51	Peter Thomas		250		14	T 25		Ir	Na		2,335		
16Q2	GS	4-17-51	Peter Thomas				10	T 10		Ir	Na		2,335		
17M1	GS	5-22-56	C. G. Spencer	1936			6	N N		Un	Tc	.3	2,370	87.14	
	GS	4-9-51			135.0			L W		Dm	Na				
17M2	GS	5-22-56	C. G. Spencer			R	8	J 1		Dm	Tc	.4	2,370	93.15	
18C1	GS	5-21-56			15.0	D				Ds			2,422	Dry	
	GS	4-12-51			45.0	N		N N		Un	Ls	0		19.9	
18E1	GS	5-22-56	Dale Randleman	1949	354	D	12	L W		Un	Tc	1.0	2,423	17.25	B,L
	GS	3-2-52								Dm				b61.58	
	GS	11-15-51												b61.74	
	GS	4-9-51												a55.60	
	Owner	10- -50												17	
18E2	GS	5-22-56			27.0			N N		Ds				Dry	
	CW-18A	10-8-29						L W		Dm		.65	2,408.7	35.95	
18E3	GS	5-22-56			19.5		12	N N		Ds				Dry	
	CW-18B	12-7-29								Un	Tc	.17	2,396.0	26.13	
18F1	GS	5-23-56	Dale Randleman	1956	233	C	8	L W		Dm	TcE	1.0	2,415	63.74	

a. Well being pumped.
b. Well pumped recently.

USGS number	Source of data and other numbers	Date of observation	Owner or user	Well data: Year completed	Well data: Depth (ft.)	Well data: Type, diameter (in.)	Well data: Pump type and power	Well data: Yield (gpm)	Well data: Sp. cap.	Well data: Use	Measuring point (feet)		Altitude of lsd (feet)	Water level: Depth below lsd (feet)	Other data
			T. 9 N., R. 13 W.												
9/13- 1M1	GS	5-22-56			93.5	RG 8	N N			Un	TcS	0.5	2,480	59.16	
1N1	GS	5-22-56			67.2	8	N N			Un	Tc	1.0		63.45	
	GS	2-9-54												61.85	
	GS	3-4-52												62.24	
	GS	11-15-51												62.10	
	GS	4-18-51												61.56	
	CW-1A	10-10-29	R. Kirk		400		L W				Tbc	1.3	2,486.6	69.60	
1Q1	GS	5-23-56	Edward Starr	1950	242	R 6	N N			S	Ls	0	2,463	Flowing	L
	GS	2-10-54												Flowing	
	GS	4-18-51												Flowing	
4A1	GS	2-10-54	O. S. Hatcher		282	12	S E			Dm	Tc	0		71.39	W
	CW-4A	11-15-29	B. L. Neiswinder				N N			Un			2,636.8	69.70	
5M1	GS	5-21-56	Curtis			16	T 125			Ir	Tc	0	2,645	102.82	
		11-19-54												90	
	GS	2-8-54												76.03	
	GS	1-20-53												71.65	
5Z1	CW-5A	11-10-29	B. Bellows			7				Ds	Tc	.8	2,643.0	59.85	
7A1	GS	5-23-56			10.0	D 60	N N			Ds				Dry	
	CW-7H	11-10-29	G. Frye		100						Ls	0	2,622.3	37.60	

7Q1	GS	2-10-53	Willow Springs Co.	38.1					Dm	Hcc	0		2.86	W
	CW-7F	11-14-29	F. M. Hamilton							Tap	.7	2,566.0	3.10	
7Q2	GS	2-8-54	Willow Springs Co.	50.6		12	C	2	Dm	Tc	0	2,560	a5.60	C
	GS	2-10-53											a.83	
7Q3	GS	5-23-56	Willow Springs Co.	185	R	8	S	E	Dm	Tap	0		c20.90	
	CW-7G	11-14-29	F. M. Hamilton									2,564.3	.31	
7Q4	GS	5-23-56	Willow Springs Co.	1.0	D		N	N	Ds				Dry	
	CW-7D	11-14-29	F. M. Hamilton							Tpb	.1	2,561.0	2.01	
7Q5	GS	5-23-56	Willow Springs Co.	3.0	D		N	N	Ds				Dry	
	CW-7E	11-14-29	F. M. Hamilton							Tpb	.1	2,564.0	20.26	
7R1	GS	5-23-56	Willow Springs Co.				L	N	Un	Tdp	2.4		18.80	
	CW-7C	11-14-29	F. M. Hamilton				L	W	Dm	Tc	.4	2,564.0	9.45	
7R2	GS	5-23-56	Willow Springs Co.	37.1		12	N	N	Un	Tc	0		23.20	
	GS	2-8-54											16.32	
	GS	2-10-53											15.19	
	DW-7B	11-14-29	F. M. Hamilton					G		Tc	3.0	2,567.7	13.08	
7R3	GS	5-23-56	Willow Springs Co.				N	N	Un	Bhc	-.3		26.71	
	CW-7A1	11-14-29	F. M. Hamilton	100			L	W	Dm	Tc	.5	2,568.2	24.94	B,L
8D1	GS	2-10-53		4.0					Ds	Ls	0		Dry	
	CW-8A	11-16-29	J. Maquin				N	N	Un	Tc	.325	2,618.0	44.06	
	DGT-16A		Naquin			12							47	
10A1	GS	5-23-56		38.0	D	60			Ds	Ls	0		Dry	
	CW-10A	12-8-29	W. S. Webb						Un			2,540.5	54.3	

a. Well being pumped.
c. Nearby well being pumped.

USGS number	Source of data and other numbers	Date of observation	Owner or user	Well data: Year completed	Depth (ft.)	Type, diameter (in.)	Pump type and power	Yield (gpm)	Sp. cap.	Use	Measuring point (feet)		Altitude of lsd (feet)	Water level: Depth below lsd (feet)	Other data
			T. 9 N., R. 13 W., Continued												
9/13-12B1	GS	5-22-56	Wm. Fousek	1954	266	R 6	L W			Dm	Tc	0.5	2,460	18.14	
12B2	GS	5-22-56	-Stemwedel	1947	178	12	S ½			Dm	Bhc	1.0	2,475	71.36	
12D1	GS	5-22-56				12	N N			Un	TcE	.8	2,495	77.8	
	GS	2-9-54			102.7									76.94	
	GS	4-18-51												76.75	
13D1	GS	5-23-56	R. William			12	S 30			Ir	Hcc	.3	2,475	88.74	
	GS	5-22-56												a127.5	
14A1	GS	5-23-56	C. W. Norton		37.1		N N			Ds	Ls	0		Dry	
	CW-14B	10-10-29	C. Graves				L N			Un	Bpb	.1	2,447.0	70.10	
14E1	GS	5-23-56	C. W. Norton		43.0	D 48	N N			Ds	Ls	0		Dry	
	CW-14C	12-8-29	C. Graves							Un			2,415.5	54.67	
14E2	GS	5-23-56	A. G. Burton		139		T 10			Ir			2,435		B
	Owner	1950												55	

	14F1	GS	5-23-56	Clifford Burton		108.4	12	L	5	Ps	TcN	-5.6	2,455	87.45	
	14F2	GS Owner	5-23-56 1955	Clifford Burton				T	20	Ps			2,450	62 62	
	14H1	GS Owner	5-23-56 1953	J. Jones	1953	190	RG 8	L	W	Dm	Hcc	.5	2,470	82.14 70	
	14H2	GS	5-23-56	C. O. McLennan	1936	200	12	L	W	Dm	Hcc	0	2,455	73.30	
				T. 9 N., R. 14 W.											
9/14-	1H1	GS	5-23-56	Jess Butler	1950	945	RG 18	N	N	Un	Tc	0	2,700	115.00	L
	1P1	GS	5-21-56 1946	E. Jordan	1946	221	C 8	L	G	Dm	Tc	.9	2,680	81.80 74	
25	1Q1	GS	5-21-56 2-10-54 1-30-53	Miss Ball	1950	170	8	L	W	Un	TcN	1.5	2,675	69.86 a68.46 67.79	
	1R1	GS	1-30-53	Wagon Wheel Ranch	1936	210	7	J	1	Dm			2,670		
	1R2	GS GS GS DGT-15A	5-23-56 2-10-54 1-30-53	Fred Hamilton F. M. Hamilton	1912	170 186	12	L	W	Dm	Tc	1.0	2,670	63.46 60.15 59.14 57	
	2J1	GS	1-30-53	S. L. Henson	1926	250	12	S	E	Dm	Tc	2.0	2,735	124.63	W
	2Z1	CW-2A DGT-14A	11-4-29			164 155	7 7			Ds	Tc	2.1	2,746.3	148.70	

a. Well being pumped.

USGS number	Source of data and other numbers	Date of observation	Owner or user	Well data: Year completed	Depth (ft.)	Type, diameter (in.)	Pump type and power	Yield (gpm)	Sp. cap.	Use	Measuring point (feet)		Altitude of lsd (feet)	Water level: Depth below lsd (feet)	Other data
			T. 9 N., R. 14 W., Continued												
9/14- 4B1	GS	5-21-56			242.5	12	N N			Ds	Ls	0	2,925	Dry	
	DGT-13A		John Lane		550									250	
			T. 10 N., R. 11 W.												
10/11-7A1	GS	9-11-52		1910	59.9	12	N N			Ds			2,515	Dry	
8E1	GS	11-2-55	Robert Fetters	1952	200	10	L G	90		Dm,S	Tbc	.78	2,497.5	54.96	C,L,B
	GS	12-2-52									TcE	.5		54.36	
	GS	9-18-52												46.86	
8M1	GS	11-4-55		1910	65.2	12	N N			Un	TcN	0	2,505.1	62.29	
	GS	9-11-52												62.56	
	CW-8A	2-18-30					T			Ir	Bpb	.3	2,504.0	62.3	
	CW-8A	10-4-29												62.6	
			T. 10 N., R. 12 W.												
10/12-2B1	GS	10-27-55	C. W. Roberts		215	C 14	L G			Dm,S	Tcc	.4	2,575.1	134.87	
4B1	GS	9-21-51	Southern Pacific Co.				N N			Un	Na		2,630		C

4B2	GS	11-3-55	Southern Pacific Co.	1952	200			L	E		Dm	Tcc	0.4	2,626.0	b182.98	C
9A1	GS	2-9-53	Dorothy McAllister	1951	208		8	J	E	8	Dm	Tap	1.28	2,594	150.17	B,L
	GS	12-5-52						N	N		Un	Tc	1.0		150.17	
10N1	GS	9-12-52			74.5		10	N	N		Ds	TcE	2.2	2,565	Dry	
10P1	GS	11-3-55	Seay		225	C	6	L	1		Dm	Hcc	.5	2,559.3	101.59	
10R1	GS	10-27-55	Dr. LeRoy Schultz		300		12	T	7½	200	Un	Hpb	.1	2,552.4	94.27	C
	GS	1-19-53	Golden Queen Mine								Dm					
	CW-10B	2-18-30	M. Hirschoen		253			N	N		Un	Tcc	0	2,552.3	93.91	
	CW-10B	10-29-29													94.00	
10Z1	CW-10A	2-18-30	J. A. Jungquist		166		12	N	N		Ds	Tc	0	2,560.5	104.77	
	CW-10A	10-29-29													104.90	
12H1	GS	11-25-52			73.8		7	N	N		Ds	Tc			Dry	
	CW-12C	2-18-30	H. M. Callecod								Un	Tc	.3	2,520.8	70.62	
	CW-12C	9-25-29													69.72	
12K1	GS	9-18-52			249.4		14	N	N		Un	TcW	0		72.67	
	CW-12A	2-18-30	J. Kearman		294			L	G	270	Dm	Bpb	0	2,523.6	73.14	
	CW-12A	9-25-29													73.22	
12L1	GS	10-27-55	Pasadena Rocket Soc.		78.5		7	B	H		Ds	TcN	1.5	2,520	Dry	
	GS	9-18-52			107.3						Dm				78.26	
15C1	GS	5-22-56	George Cox	1955	260	RG	6	J	1	6	Dm	Tc	.3	2,556.8	61.10	
	GS	11-3-55													61.28	

b. Well pumped recently.

USGS number	Source of data and other numbers	Date of observation	Owner or user	Well data: Year completed	Depth (ft.)	Type	diameter (in.)	Pump type and power	Yield (gpm)	Sp. cap.	Use	Measuring point (feet)		Altitude of lsd (feet)	Water level: Depth below lsd (feet)	Other data
			T. 10 N., R. 12 W., Continued													
10/12-15C2	GS	5-22-56 11-4-55	W. D. McMillan	1955	236.0	R	6	N N			Un	TcS	0.8	2,251.1	55.30 55.33	
15E1	GS	3-5-56	Fred Mushler	1952				J E			Dm	Na		2,560		
15M1	GS	9-11-52	J. Actis	1932	175		10	N N			Un	TcE	0	2,563	49.93	
	GS	3-4-52													49.39	
	GS	11-16-51									Un				49.80	
	GS	9-21-51						L W			Dm				50.00	
15M2	GS CW-16A	9-11-52	J. Actis		275		12	J 3 L W			Dm	Ls	0	2,562.0	65	C
15M3	GS	3-5-56	J. Actis	1955	175.0	C	7½	N N			Un	Tc	1.0	2,560	63.64	
16J1	GS	3-5-56	James Kempu		175	C	8	N N			Un	TcW	1.0	2,570	58.31	
16N1	GS	9-26-51	Norma Moody	1949	154		6	J 1			Dm	Na		2,611	68	
16N2	GS	3-5-56	Mrs. Killain	1955	178	R	8	J 1½			Un	Na		2,610	65	

16P1	GS	11-24-52	Charles Halcomb	1950	200		6	L	H			Dm	Na		2,605	70	
16Q1	GS	3-5-56	Brown				8	J	E			Dm	TcW	1.0	2,680		
16R1	GS	5-22-56	M. White				8	J	1			Dm	Hpb	.5	2,577	65.63	
	GS	9-11-52														66.05	
	GS	11-27-51														65.62	
18P1	GS	5-22-56					5	S	E			Dm	Na		2,735		
19D1	GS	3-5-56	Collender	1954	300		12	T	45	400		Ir			2,777		
20B1	GS	9-21-51	O. J. Backus	1912	117.6		16	N	N			Un	TcW	1.0		89.92	L,W
	CW-20A	9-27-29	R. M. Sopp		200										2,638.6	90.60	
20C1	GS	11-13-52	O. J. Backus	1917	107.8	DC	12	T	5			Dm					L
	CW-20D	2-19-30			161			T	G			Ir	Tmc	0	2,650.5	99.28	C
	CW-20D	12-13-29								75						a128	
	CW-20D	12-13-29														98.89	
	CW-20D	12-8-29														98.30	
20C2	GS	11-24-52	O. J. Backus	1918	107.8	DC						Un	Na		2,650.5		
20C3	GS	3-9-59	O. J. Backus	1914	128		8	J	E	35		Dm	Bpb	0	2,645	93.50	
	GS	11-4-58														93.86	
	GS	3-4-58														93.12	
	GS	11-13-52														93.32	
20C4	GS	3-5-56	O. J. Backus	1954	625	G	12	T	30	90		Ir			2,660		
20N1	GS	11-13-52			82.6		10	N	N			Ds	TcN	0	2,660	Dry	

a. Well being pumped.

USGS number	Source of data and other numbers	Date of observation	Owner or user	Well data: Year completed	Depth (ft.)	Type, diameter (in.)	Pump type and power	Yield (gpm)	Sp. cap.	Use	Measuring point (feet)		Altitude of lsd (feet)	Water level: Depth below lsd (feet)	Other data
			T. 10 N., R. 12 W., Continued												
10/12-20P1	GS	11-13-52			82.0	10	N N			Ds	Tc	0.7		Dry	
	CW-20B	2-18-30	G. H. Buckley		97					Un			2,632.2	84.72	L
	CW-20B	10-5-29												84.80	
21R1	GS	9-11-52	L. Wiggenton	1951	150	6	L G			Dm	Na		2,570		C,L
21R2	GS	5-22-56	Cole Investment Co.		125	R 8	J 3			Un	TcE	1.0	2,575	47.5	
	GS	3-2-56												45.41	
22C1	GS	11-24-52	Pittman and Kemper		4.3	8	N N			Ds				Dry	
	CW-22E	2-18-30	E. E. Warren							Un	Tc	.4	2,539.0	37.12	
	CW-22E	9-27-29												37.05	
22D1	GS	5-24-56			57.7	7	N N			Un	TcW	1.0	2,550	36.70	
	GS	9-12-52												36.29	
22E1	GS	5-24-56			41.0	10	N N			Un	Tc	0		38.15	
	GS	11-24-52												38.86	
	CW-22A	2-18-30	A. L. Kemper		41.0					Un	Tc	1.0	2,552.3	40.20	L
	CW-22A	9-27-29			240			270		In				38.90	
22F1	GS	3-2-56	Cole Investment Co.	1953	125	R 6	J 1			Dm	Na		2,540	40	
	GS	3-2-56						1.6						a69	

22F2	GS	3-2-56	Cole Investment Co.	1924	125	C	6	N	N		Un	Tc	.5	2,540	38.95	
	GS									1.5					a64	
22F3	GS	3-2-56	Cole Investment Co.	1924	500	C	12	T	15		Ir	Bpb	.5	2,540	38.13	
	GS	3-2-56								390					a98	
22N1	GS	5-22-56	Mrs. Leitch	1919	60.8		10	N	N		Un	TcN	.5	2,563	48.96	
	GS	5-5-54													50.56	
	GS	9-11-52			125										49.60	
22N2	GS	5-22-56	Mrs. Leitch	1919	125		12	T	5		Dm	Bpb	.8		49.31	C
	GS	9-11-52													50.62	
	GS	9-21-51													54.01	
	CW-22B	9-27-29	J. Kawall		100			T	G		Ir	Tc	0	2,561.0	49.43	
27L1	GS	11-24-52			42.2	D	48	N	N		Ds	Ls	0		Dry	
	CW-27A	2-19-30	W. Fusek		66							Tmc	.2	2,540.5	57.20	B,L
	CW-27A	11-4-29													57.20	
28C1	GS	5-24-56			79.6		10	N	N		Un	TcS	0		58.61	
	GS	1-20-53													58.25	
	GS	11-13-52													58.32	
	CW-28A	2-18-30	W. D. Miller										1.7	2,585.0	61.69	B
	CW-28A	10-5-29													61.90	
28J1	GS	5-22-56	E. Faires	1920	105.0		9	L	W		Un	TcS	1.0		63.34	W
	CW-28B	2-19-30	J. D. Faires		120									2,549.2	b63.32	B
28Z1	CW-28C	2-18-30	F. A. Jungquist				12				Ds	Tc	0	2,560.0	54.55	
	CW-28C	12-19-29													54.76	

a. Well being pumped.
b. Well pumped recently.

USGS number	Source of data and other numbers	Date of observation	Owner or user	Well data: Year completed	Depth (ft.)	Type, diameter (in.)	Pump type and power	Yield (gpm)	Sp. cap.	Use	Measuring point (feet)		Altitude of lsd (feet)	Water level: Depth below lsd (feet)	Other data
			T. 10 N., R. 12 W., Continued												
10/12-30A1	GS	11-13-52			94.3	10				Ds	Ls	0		Dry	
	CW-30A	2-18-30	R. M. Freeman								Tc	.7	2,664.1	99.70	B,L
	CW-30A	11-2-29												98.70	
			T. 10 N., R. 13 W.												
10/13- 4D1	GS	11-13-52			285.5	8	N N			Ds	Tc	1.5	3,140	Dry	
	CW-4A	10-19-29	M. D. Schmidt				L W			Un			3,070.5	290.5	
14Q1	GS	11-24-52	Seaton	1952	463	R 12	S E			Dm	Tc	.5	2,840	d253	C,L
	GS	11-24-52						360						a340	
18P1	GS	1-20-53	Cactus Mine				T E			In			2,960	306	
19M1	GS	1-20-53	Dewey Butler	1952	770	RG 16	N N			Un	Bhc	1.0	2,905	291.61	L,W
	Owner	1-20-53						450						a460	
22D1	GS	1-20-53	Marsh	1953	300+	C 6				Dm	Na		2,875	282	L
24B1	GS	11-13-52			171.4	7	N N			Ds				Dry	
	CW-24B	2-19-30	R. Livingstone				? G			Dm	Tap	.9	2,762.6	185.65	
	CW-24B	12-8-29												186.20	

24C1	GS	3-4-52	Mrs. DeBoard		252		6	L	1		Dm	TcW	.7	2,775	184.23	C
	GS	11-16-51													184.14	
	GS	9-26-51													184.17	
24F1	GS	9-26-51	Montmorency				12	S	E		Dm	Tc	1.1		184.7	
	CW-24A	2-19-30	C. E. Patterson		600			L	W		S	Tc	2.5	2,757.6	b180.90	C
	CW-24A	11-2-29													179.40	
29M1	GS	2-8-54	Paul Adler	1953	1250	RG	16	T	200	2200	Ir	TcW	0	2,800	218.34	
30B1	GS	2-8-54	M and P Ranch	1952	750	G	16	T	150		Ir	TcW	.5	2,860	255.65	
	GS	1-20-53													247.78	
30D1	GS	11-29-54	M and P Ranch	1952	834	G	16	T	200		Ir	TcE	.5	2,880	282.74	L
	GS	2-8-54													282.74	
	GS	1-20-53													275.26	
30K1	GS	1-20-53	M and P Ranch	1952	407	G	16	T	200		Ir			2,825		L
31E1	GS	2-10-54	CCC Ranch	1952	1000	RG	16	T	150		Ir	TcE	0	2,795	186.34	
		1-30-53													181.49	
31M1	GS	1-30-53	CCC Ranch					T	50		Ir	Na		2,780		
32D1	GS	1-20-53	Lombardi and Frew	1949	1345	R	16	T	200		Ir	Na		2,775		L
32M1	GS	5-21-56	Lombardi and Frew	1951	805	R	16	T	200		Ir	Tc	.5	2,740	162.30	B,C,L,W

a. Well being pumped.
b. Well pumped recently.
d. Tape smeared.

USGS number	Source of data and other numbers	Date of observation	Owner or user	Well data: Year completed	Depth (ft.)	Type, diameter (in.)	Pump type and power	Yield (gpm)	Sp. cap.	Use	Measuring point (feet)		Altitude of lsd (feet)	Water level: Depth below lsd (feet)	Other data
			T. 10 N., R. 14 W.												
10/14-36A1	GS	2-10-54	CCC Ranch	1950	986	RG 16	T 150	1500		Ir	TcS	0.5	2,855	241.92	C,L
	GS	1-30-53												237.29	
	Owner	7-5-50												a336	
	Owner	6-21-50												a336	
	Owner	5-31-50												a332	
	Owner	5-2-50												a330	
			T. 11 N., R. 11 W.												
11/11-1Q1	GS	11-1-55	A. H. Kent		761.5	R 6	N N			T	Tc	1.5	2,450	33.25	C,W
2N1	GS	11-1-55	H. L. Miller			12	N N			Un	TcS	.7		90.19	C
	GS	10-21-55			e303.5									90.24	
	GS	9-10-52			f81.1									Dry	
	CW-2A	2-27-30					N N			Un			2,512.0	91.29	
	CW-2A	10-15-29												91.30	
	DGT-51	1918												92	
5D1	GS	2-3-58	Southern Pacific Land Co.	1957	670	C 14	N N	390		Un	Tap	.78	2,630.9	204.22	C,L,W

6D1	GS	9-30-55	Glenn Ward		257.1		12	N	N			Un	TcW	1.7		254.28	
	GS	3-15-54														254.42	
	GS	1-21-53			256.3											255.0	
	GS	12-3-52														254.97	
	CW-6A	2-27-30	F. Ward					N	N			Un			2,681.0	258.30	
	CW-6A	9-28-29														258.20	
6M1	GS	3-2-55			245.8		12	N	N			Ds			2,680	Dry	
7A1	GS	2-3-58	Southern Pacific Land Co.	1956	414.0	C	14	N	N	96		Un	Tap	.85	2,627.9	201.63	C,L,W
8D1	GS	10-21-55	Zetta Thorning		e275.0		12	N	N			Un	Bhc	1.0		198.43	C,W
	GS	9-29-55			f204.0											198.32	
	CW-8A	2-27-30	A. T. Thorning					N	N			Un	Tc	1.5	2,624.5	218.30	
	DGT-49	1918								450						205	
9A1	GS	2-3-58	Southern Pacific Land Co.	1956	421	C	14	N	N	230		Un	Tap	1.19	2,549.6	124.73	C,L,W
18D1	GS	12-2-52	B. Hammett		220	C	12	N	N			Un	TcN	.5		213.02	
	CW-18A	2-28-30	Natl. Bank of Italy Co.						G			Un	Bpb	1.3	2,639.5	220.6	
	CW-18A	9-28-29														217.9	
20Q1	GS	12-5-52			76.2		12	N	N			Ds	Tc	2.8		Dry	
	CW-20A	2-19-30	A. E. Morse												2,561.0	131.10	
	CW-20A	9-27-29														131.29	
23J1	GS	12-5-52			1512							Ds					L
	CW-23A	12-15-29	Southern Pacific Land Co.	1929								T	Bpb	.1	2,763.0	310.60	
		10-15-29														314.50	

a. Well being pumped.
e. Well cleaned to bottom.
f. Depth of obstruction in well.

USGS number	Source of data and other numbers	Date of observation	Owner or user	Well data: Year completed	Depth (ft.)	Type, diameter (in.)	Pump type and power	Yield (gpm)	Sp. cap.	Use	Measuring point (feet)		Altitude of lsd (feet)	Water level: Depth below lsd (feet)	Other data
			T. 11 N., R. 11 W., Continued												
11/11-30C1	GS	12-2-52			21.2	7	N N			Ds			2,585	Dry	
30K1	GS	9-27-55			146.2	8	L W			Un	Tbc	0.5		124.20	
	GS	9-15-52												124.34	
	CW-30A	2-19-30	F. H. Forbes		140		N N				Tc	.3	2,560.0	124.9	
	CW-30A	9-25-29												125.2	
32N1	GS	9-27-55			112.0	D 60	N N			Ds				Dry	
	CW-32A	2-19-30	B. N. Peterson							Un	Tmc	.2	2,550.5	113.52	
	CW-32A	11-26-29												113.58	
33P1	GS	11-4-55								Ds			2,501.4	Dry	
	GS	9-28-51								Un	Tc	0		69.60	
	CW-33A	2-19-30	Mission Sisters of Sacred Heart		190						Tc	2.5	2,501.7	70.8	
	CW-33A	11-26-29												70.8	
	DGT-8A		Rathbun		200					Dm				70	

34M1	GS	9-27-55			282.3	10	N	N		Un	Na					
	GS	11-11-52					L	G		Un	TcW	.5			78.25	
	GS	9-15-52													78.15	
	GS	3-4-52													78.32	
	GS	11-16-51													78.44	
	GS	9-26-51													78.30	
	DGT-7A		Rathbun		300		L	H		Dm					70	
			T. 11 N., R. 12 W.													
11/12-12D1	GS	9-10-52		1912	261.0	D 48	N	N		Ds					Dry	
	CW-12A	11-12-29	G. A. Arper				L			Dm,P	Tdp	2.2	2,718.0		291.30	
	DGT-53	1918	G. A. Arper													
12M1	GS	11-1-55				8	N	N		Un	TcN	1.5	2,695.0		267.57	C
	GS	10-21-55													f270.18	
	GS	10-20-55			e318.5										267.39	
	GS	12-2-52			f39.5										Dry	
	CW-12B	2-27-30	J. W. Johnson				N	N		Un	Tc	1.5	2,695.0		270.00	
	CW-12B	1929													270.30	
14D1	GS	9-17-52			262.8	12	L	N		Ds					Dry	L
	CW-14A	2-28-30	H. S. Knowles				N	N		Un	Tc	2.0	2,705.4		268.20	
	CW-14A	12-12-29													267.50	
14N1	GS	9-17-52	J. Carr		185.8	8	N	N		Ds			2,665		Dry	
14N2	GS	9-17-52			109.1	12	N	N		Ds			2,670		Dry	
18B1	GS	9-17-52	A. Capello		300	6	L	1		Dm						C

e. Well cleaned to bottom.
f. Depth of obstruction in well which is above water table.

USGS number	Source of data and other numbers	Date of observation	Owner or user	Well data: Year completed	Depth (ft.)	Type, diameter (in.)	Pump type and power	Yield (gpm)	Sp. cap.	Use	Measuring point (feet)		Altitude of lsd (feet)	Water level: Depth below lsd (feet)	Other data
			T. 11 N., R. 12 W., Continued												
11/12-18B2	GS	9-28-55	E. A. Koch		300	12	N N			Un	TcN	1.0	2,825	241.82	
22D1	GS	9-15-52	Mojave Public Utility, Dist., 1	1914	d206.3	14	N N			Ds			2,687.4	Dry	L
	CW-22A	2-19-30	M. Cuthbert							Un	Tc	4.1	2,687.7	249.9	
	CW-22A	12-10-29												250.00	
24D1	GS	12-16-55			199.8	14	N N			Ds			2,650	Dry	
26J1	GS	9-27-55	Monolith Portland Cement Co.		225.0	14	N N			Un	TcS	1.0	2,594.0	156.37	C,L,W
	CW-26A	3-1-30	I. M. Jameson				L W	200+		S	Twc	.6	2,594.6	158.2	
	DGT-50	1918	F. H. Forbes		250			270		S				155	
26J2	GS	12-4-52	Monolith Portland Cement Co.	1948	321	RG 14	T G	800		Ir	TcS	1.0	2,595	156.97	L
29D1	GS	9-30-55		1952		G 12	N N			Un	Na		2,765		
	GS	11-25-52			283.0						TcS	1.0		176.95	

32E1	GS	11-25-52	Dr. L. Schultz		300		10	T 15	40	Ps			2,770		
32E2	GS	12-4-52	Goodwin Knight	1922	265		10	T 7½	40	Dm	Hpb	.5	2,765	179.95	C
32E3	GS	10-4-55	Miehl	1955		C	5	J 1		Dm	Tcc	1.0	2,765	176.43	
32R1	GS	10-4-55	Verdi Development Co.	1955	245.0	R	5	N N		Un	TcS	1.0	2,690	187.76	B
			T. 11 N., R. 13 W.												
11/13-19C1	GS	5-24-56	California Portland Cement Co., well 1	1953	430	C	16	N N	58	Un	Tcc	1.0	3,610	279.65	L
	DWR	3-19-56												275.77	
	GS	10-6-55												268.19	
	Owner	12-10-53												a327	
	Owner	12-10-53												217	
19C2	Owner	3- -54	California Portland Cement Co., well 4	1954	375	C	16		65	Un			3,600	a277	L
	Owner	3- -54												147	
19C3	Owner	3- -54	California Portland Cement Co., well 3	1954	388	C	16		90	Un			3,600	a337	C,L
	Owner	3- -54												145	
19Z1	Owner	1956	California Portland Cement Co.	1953	430	C		N N		Ds			3,600		L
	Owner	11- -53												246	
24A1	GS	12-5-52	Spicer and Silvestro	1948	h357		8	T G		Dm	Tc	1.0	2,840	d250	B,C

a. Well being pumped.
d. Tape smeared.

USGS number	Source of data and other numbers	Date of observation	Owner or user	Well data: Year completed	Depth (ft.)	Type, diameter (in.)	Pump type and power	Yield (gpm)	Sp. cap.	Use	Measuring point (feet)		Altitude of lsd (feet)	Water level: Depth below lsd (feet)	Other data
			T. 11 N., R. 13 W., Continued												
11/13-29M1	GS	10-6-55	California Portland Cement Co., 2	1954	749	C 16	N N	73		Un	Tcc	1.0	3,350	321.24	L,W
31A1	GS	10-6-55	Tull	1954	600	RG 16	N N	500		Ds			3,300	f450	L
31A2	GS	10-6-55	Tull	1954	600	RG 16	N N	500		Ds			3,300		
36B1	GS	9-28-55	Dr. James Gillis	1953	580	RG 16	N N			Un	Tcc	1.3	2,900	295.03	L
36C1	GS	9-28-55	Dr. James Gillis	1953	611	RG 14	N N			Un	Tcc	.4	2,910	301.80	L
36K1	GS	9-28-55	Dr. James Gillis	1954	630	RG 16	N N	900		Un	Tcc	.5	2,888	281.79	L
36L1	GS	9-28-55	Dr. James Gillis	1954	585	RG 14	T N	900		Un	Hpb	.2	2,913	302.70	
			T. 11 N., R. 14 W.												
11/14-14B1	DWR	3-19-56	California Portland Cement Co., well 5	1954	84	C 16				In	Tc	.8	4,000	24.97	B,L
	Owner	1954						350						a50	
	Owner	1954												25	
14B2	Owner	1954	California Portland Cement Co., well 6	1954	64	C 16		500		In			3,990	a28	L
	Owner	1954												12	

			T. 12 N., R. 11 W.													
12/11-34L1	GS	9-10-52				95.4	8	N	N		Ds			2,550	Dry	
			T. 12 N., R. 12 W.													
12/12-35R1	GS	2-3-58	Southern Pacific Land Co.	1957	640	C	14	N	N	980	Un	Tc	1.02	2,743.3	316.12	C,L,W
			T. 32 S., R. 36 E.													
32/36-20M1	GS	9-30-55					12	N	N		T	Tc	0	2,930	485.70	
21Q1	GS	11-3-55	J. J. Wonders	1949	j805	RG	10	T	G	263	Ps	TapW	1.0	2,798.9	372.88	B,C,L,W
22N1	GS	9-18-52	W. M. Kinkade	1947	370		6	L	G	16	Dm			2,760		C
28N1	GS	7-17-57	R. Gannt		406.1	C	12	N	N		Ds	Tc	1.0	2,832	Dry	
	CW-28A	1929	R. Gannt		407						T	Ls	0		Dry	
34E1	GS	12-2-52	Maddock					N	N		Ds			2,760		
	CW-34A	1930										Tc	.8	2,745.5	332.0	
34E2	GS	10-18-57	Mojave Public Utility District	1957	800	RG	16	N	N	1650	Un	Bnc	2.0	2,760	325.53	
	GS	12-20-57													325.52	
	GS	2-3-58													325.44	
35D1	GS	7-17-57	Southern Pacific Land Co.	1956	800	C	14	N	N	895	Un	Bnc	.25	2,692.0	263.93	C,L,W

a. Well being pumped.
f. Depth of obstruction in well which is above water table.
j. Well drilled to 1,356 feet. Demented off at 805 feet.

USGS number	Source of data and other numbers	Date of observation	Owner or user	Well data							Measuring point		Altitude of lsd (feet)	Water level		Other data
				Year completed	Depth (ft.)	Type, diameter (in.)	Pump type and power	Yield (gpm)	Sp. cap.	Use		(feet)		Depth below lsd (feet)		
			T. 32 S., R. 36 E., Continued													
32/36-35R1	GS	7-17-57	Southern Pacific Land Co.	1956	800	C 14	N N	1900		Un	Tap	2.51	2,631.9	206.52		C,L,W
35R2	GS	7-17-57	Southern Pacific Land Co.	1956	720	R 8	N N			Un	Tc	3.42	2,634.5	207.99		L,W

Table 2.--Cross index of other well numbers and U. S. Geological Survey numbers

The first column shows the number assigned to the well by others and the second column shows the Geological Survey number assigned to e same well. The numbers in the first column are listed consecutively. .mbers missing in the consecutive listings are for wells outside the .ea or for wells for which data are not available.

Part 1. Numbers used by Thompson (1929)

Other number	USGS number	Other number	USGS number	Other number	USGS number
7A	11/11-34M1	15A	9/14- 1R2	50	11/12-26J1
8A	11/11-33P1	16A	9/13- 8D1	51	11/11- 2N1
13A	9/14- 4B1	22A	9/12-16L1	52	12/10-31Z1
14A	9/14- 2Z1	49	11/11- 8D1	53	11/12-12D1

Part 2. Numbers used by Cyril Williams, Jr., (1930)

9/12-18A	9/12-18E2	10/12-16A	10/12-15M2	11/11-33A	11/11-33P1
18B	18E3	20A	20B1	11/12-12A	11/12-12D1
9/13- 1A	9/13- 1N1	20B	20P1	12B	12M1
4A	4A1	20D	20C1	14A	14D1
5A	5Z1	22A	22E1	22A	22D1
7A1	7R3	22B	22N2	26A	26J1
7B	7R2	22E	22C1	30/37-24A	30/37-34B1
7C	7R1	27A	27L1	24B	24M1
7D	7Q4	28A	28C1	24C	24R2
7E	7Q5	28B	28J1	26A	26Z1
7F	7Q1	28C	28Z1	36A	36G1
7G	7Q3	30A	30A1	30/38-30A	30/38-30E1
7H	7A1	10/13- 4A	10/13- 4D1	30B	30B1
8A	8D1	24A	24F1	32A	32G1
10A	10A1	24B	24B1	31/37-14A	31/37-14L1
14B	14A1	11/11- 2A	11/11- 2N1	22A	22Q1
14C	14E1	6A	6D1	26A	26K1
9/14- 2A	9/14- 2Z1	8A	8D1	30A	30F1
10/11- 8A	10/11- 8M1	18A	18D1	32B	32A1
10/12-10A	10/12-10Z1	20A	20Q1	33A	33Z1
10B	10R1	23A	23J1	34A	34A1
12A	12K1	30A	30K1	32/36-28A	32/36-28N1
12C	12H1	32A	32N1	34A	34E1

Table 3.--Records of water levels in wells

Included are all known records of water-level measurements in wells where six or more measurements have been made; records for wells where less than six measurements have been made are shown in table 1.

Altitudes given are in feet above mean sea level for the land-surface datum at the well. Land-surface datum is a plane of reference which approximates land surface. Altitudes given in whole feet are interpolated from topographic maps. Altitudes given in whole feet are interpolated from topographic maps. Altitudes given in feet and tenths were determined by spirit leveling /from records by Cyril Williams, Jr. (1930); C. F. Hostrup, consulting engineer, Westwood, Calif.; or the Geological Survey/.

Measurements. All measurements of water level have been adjusted to depth below land-surface datum. That is, the altitudes of the measuring points as reported above land-surface datum have been subtracted from the water-level measurements below the described measuring point.

All measurements are by the Geological Survey unless otherwise indicated.

9/12-16E2 (CW-18A). Clara Koch. Depth 182.4 ft. Altitude about 2,375 ft. Measuring point: Top of casing 1.0 ft above lsd prior to May 23, 1956; top of access pipe 1.65 ft above lsd after that date.

Date	Water level	Date	Water level	Date	Water level
Sep. 21, 1951	92.94	Mar. 5, 1952	a95.09	Mar. 13, 1953	89.20
Nov. 15	90.89	Nov. 6	92.24	May 23, 1956	94.15

9/13-4A1 (CW-4A). O. S. Hatcher. Depth about 282 ft. Altitude 2,636.8 ft. Measuring point: Top of casing at lsd.

Nov. 15, 1929	b69.70	Nov. 14, 1955	74.49	Nov. 15, 1957	c79.09
Feb. 10, 1954	71.39	Mar. 21, 1956	74.75	Mar. 4, 1958	78.43
Nov. 29	75.50	Oct. 15	75.90	Nov. 4	79.79
Mar. 1, 1955	72.90	Mar. 5, 1957	76.59		

9/13-7Q1 (CW-7F). Willow Springs Co. Depth 38.1 ft. Altitude 2,566.0 ft. Measuring point: Hole in casing cover at lsd.

Nov. 14, 1929	b3.10	Nov. 14, 1955	12.24	Nov. 15, 1957	16.40
Feb. 10, 1953	2.86	Mar. 21, 1956	12.39	Mar. 4, 1958	a15.01
Feb. 8, 1954	4.86	May 23	17.95	Nov. 4	27.56
Nov. 29	13.76	Sep. 26	21.52	Mar. 9, 1959	20.58
Mar. 1, 1955	8.72	Mar. 5, 1957	11.58		

9/14-2J1. S. L. Henson. Depth about 250 ft. Altitude about 2,735 ft. Measuring point: Top of casing, 2.0 ft above lsd.

Jan. 30, 1953	124.63	Mar. 21, 1956	132.31	Nov. 15, 1957	130.34
Feb. 10, 1954	119.12	May 21	130.76	Mar. 4, 1958	131.22
Nov. 29	127.11	Sep. 26	130.62	Nov. 4	133.34
Mar. 1, 1955	127.09	Mar. 5, 1957	130.11	Mar. 9, 1959	136.59
Nov. 14	128.78				

10/12-20B1 (CW-20A). O. J. Backus. Depth 117.6 ft. Altitude 2,638.6 ft.

Sep. 27, 1929	b90.60	Mar. 4, 1952	89.69	May 22, 1956	89.98
Feb. 19, 1930	b90.19	Nov. 13	89.63	Sep. 26	91.17
Sep. 21, 1951	89.92	Jan. 20, 1953	89.82	Mar. 5, 1957	90.00
Nov. 16	89.95	May 5, 1954	89.63	Nov. 15	Dry

a. Well being pumped.
b. Measurement by Williams (1930).
c. Well pumped recently.

10/12-28J1 (CW-28B). E. Faires. Depth 105.0 ft. Altitude 2,549.2 ft. Measuring point: Top of casing 1.0 ft above lsd.

Date	Water level	Date	Water level	Date	Water level
Oct. 31, 1929	b62.10	Sep. 21, 1951	65.80	Mar. 3, 1952	60.68
Feb. 19, 1930	bc63.32	Nov. 16	64.09	Nov. 2	61.64
				May 22, 1956	63.34

10/13-19M1. Dewey Butler. Depth about 770 ft. Altitude about 2,905 ft. Measuring point: Hole in casing 1.0 ft above lsd.

Jan. 20, 1953	291.61	Mar. 21, 1956	302.34	Nov. 15, 1957	304.11
Feb. 8, 1954	295.76	May 21	304.10	Mar. 4, 1958	305.60
Nov. 29	299.20	Sep. 26	304.12	Nov. 4	307.32
Mar. 1, 1955	299.12	Mar. 5, 1957	303.97	Mar. 9, 1959	306.61

10/13-32M1. Lombardi and Frew. Depth about 805 ft. Altitude about 2,740 ft. Measuring point: Top of casing 0.5 ft above lsd.

Jan. 20, 1953	131.95	May 21, 1956	162.30	Nov. 4, 1958	165.67
Mar. 1, 1954	143.82	Nov. 15, 1957	162.99	Mar. 9, 1959	170.14
Nov. 14, 1955	156.19	Mar. 4, 1958	164.77		

11/11-1Q1. A. H. Kent. Depth 761.5 ft. Altitude about 2,450 ft. Measuring point: Top of casing, 1.5 ft above lsd prior to August 14, 1957; top of extension on casing 1.98 ft above lsd thereafter.

Dec. 11, 1952	31.88	Aug. 14, 1957	31.52	Oct. 15, 1957	31.48
Sep. 29, 1955	32.10	Sep. 24	31.57	Nov. 19	31.50
Nov. 1	33.25				

11/11-5D1. Southern Pacific Land Co. Depth about 670 ft. Altitude 2,630.9 ft. Measuring point: Top of access pipe 0.78 ft above lsd.

July 17, 1957	204.22	Oct. 15, 1957	204.22	Dec. 20, 1957	204.24
Aug. 14	204.23	Nov. 19	204.23	Feb. 3, 1958	204.22
Sep. 24	204.23				

11/11-7A1. Southern Pacific Land Co. Depth 414.0 ft. Altitude 2,627.9 ft. Measuring point: Top of access pipe 0.85 ft above lsd.

July 17, 1957	201.66	Oct. 15, 1957	201.65	Dec. 20, 1957	201.67
Aug. 14	201.65	Nov. 19	201.66	Feb. 3, 1958	201.63
Sep. 24	201.69				

b. Measurement by Williams (1930).
c. Well pumped recently.

11/11-8D1 (CW-8A). Zetta Thorning. Depth 204.0 ft prior to October 21, 1955; 275.0 ft thereafter. Altitude 2,624.5 ft. Measuring point: Bottom of hole in casing 1.0 ft above lsd.

Date	Water level	Date	Water level	Date	Water level
1918	205	Oct. 21, 1955	198.43	Oct. 15, 1957	198.71
Sep. 28, 1929	b218.60	Mar. 21, 1956	198.11	Nov. 19	198.73
Feb. 27, 1930	b218.30	Oct. 19	199.95	Dec. 20	198.74
Sep. 10, 1952	198.79	Mar. 6, 1957	198.19	Feb. 3, 1958	198.70
Mar. 15, 1954	198.50	June 17	198.73	Nov. 4	198.97
Mar. 2, 1955	198.47	Aug. 14	198.75	Mar. 10, 1959	198.09
Sep. 29	198.32	Sep. 24	198.71		

11/11-9A1. Southern Pacific Land Co. Depth about 422 ft. Altitude 2,549.6 ft. Measuring point: Top of access pipe 1.19 ft above lsd.

Oct. 17, 1956	124.59	Sep. 24, 1957	124.75	Dec. 20, 1957	124.77
July 17, 1957	124.75	Oct. 15	124.73	Feb. 3, 1958	124.73
Aug. 14	124.75	Nov. 19	124.74		

11/12-26J1 (CW-26A). Monolith Portland Cement Co. Depth 225.0 ft. Altitude 2,594.0 ft. Measuring point: Top of casing 1.0 ft above lsd.

1918	155	Sep. 27, 1955	156.37	Nov. 15, 1957	156.19
Sep. 26, 1929	b161.2	Mar. 21, 1956	156.24	Dec. 20	156.20
Mar. 1, 1930	b158.2	Oct. 19	156.22	Feb. 3, 1958	156.16
Sep. 15, 1952	156.46	Mar. 5, 1957	156.25	Mar. 12	156.15
Dec. 4	156.40	July 17	156.16	Nov. 4	156.06
Mar. 15, 1954	156.60	Aug. 14	156.23	Mar. 10, 1959	156.10
Nov. 29	156.49	Sep. 24	156.23		
Mar. 2, 1955	156.46	Oct. 15	156.19		

11/13-29M1. California Portland Cement Co., well 2. Depth about 749 ft. Altitude about 3,350 ft. Measuring point: Top of casing cover 1.0 ft above lsd.

Feb. 4, 1954	d300	Oct. 6, 1955	321.24	Mar. 19, 1956	e322.27
Feb. 4	ad517	Feb. 1, 1956	d317		
Feb. 6, 1955	d322	Mar. 5	d324		

a. Well being pumped.
b. Measurement by Williams (1930).
d. Measurement reported by owner.
e. Measurement by California Department of Water Resources.

12/12-35R1. Southern Pacific Land Co. Depth about 640 ft. Altitude 2,743.3 ft. Measuring point: Top of casing 1.02 ft above lsd.

Date	Water level	Date	Water level	Date	Water level
July 17, 1957	316.11	Oct. 15, 1957	316.13	Dec. 20, 1957	316.14
Aug. 14	316.11	Nov. 19	316.16	Feb. 3, 1958	316.12
Sep. 24	316.18				

32/36-21Q1. J. J. Wonders. Depth about 805 ft. Altitude 2,798.9 ft. Measuring point: Top of access pipe 1.0 ft above lsd.

Dec. 3, 1950	371.20	Mar. 21, 1956	370.89	Nov. 19, 1957	372.90
Mar. 2, 1955	370.88	Mar. 7, 1957	371.26	Mar. 12, 1958	372.29
Nov. 3	372.88				

32/36-35D1. Southern Pacific Land Co. Depth about 800 ft. Altitude 2,692.0 ft. Measuring point: Bottom of notch in casing 0.25 ft above lsd.

July 17, 1957	263.93	Oct. 15, 1957	264.98	Feb. 3, 1958	264.87
Aug. 14	263.93	Nov. 19	264.96	Nov. 4	264.94
Sep. 24	264.96	Dec. 20	264.96	Mar. 10, 1959	265.01

32/36-35R1. Southern Pacific Land Co. Depth about 800 ft. Altitude 2,631.9 ft. Measuring point: Top of access pipe 2.51 ft above lsd.

July 17, 1957	206.52	Oct. 15, 1957	206.55	Dec. 20, 1957	206.58
Aug. 14	206.53	Nov. 19	206.57	Feb. 3, 1958	206.48
Sep. 24	206.56				

32/36-35R2. Southern Pacific Land Co. Depth about 720 ft. Altitude 2,634.5 ft. Measuring point: Top of casing 3.42 ft above lsd.

Dec. 10, 1956	207.89	Mar. 7, 1957	208.19	Oct. 24, 1957	208.05
15	208.07	July 17	207.99	Nov. 19	208.10
19	f209.18	Aug. 14	208.01	Dec. 20	208.08
26	208.16	Sep. 24	208.04	Feb. 3, 1958	208.03
29	208.08				

f. Nearby well being pumped.

Table 4.--Logs of wells

9/12-16J1. A. C. Scruggs. Altitude about 2,340 ft. Drilled by Frank Rottman. 12-inch casing.

	Thickness (feet)	Depth (feet)
Sand	50	50
Gravel and sand	20	70
Clay and gravel	20	90
Clay	20	110
Rock and gravel	40	150
Boulders	20	170
Gravel	10	180
Rock	20	200

9/12-16K1. R. J. Rubees. Altitude about 2,360 ft. Drilled by Frank Rottman. 12-inch casing, perforated from 72 to 204 ft.

Clay	10	10
Clay and boulders	20	30
Sand	10	40
Clay and boulders	20	60
Sand and gravel	5	65
Sand; hard, boulders and clay	25	90
Rock and clay	20	110
Boulders and clay	20	130
Sand and boulders	28	158
Clay and rock	12	170
Sand	5	175
Clay	29	204

9/12-16L1 (DGT, Antelope Valley 22). Frank Miske. Altitude about 2,365 ft. Drilled by R. H. Orr. 14-inch casing, perforated 71-251 ft.

Soil	32	32
Sand	1	33
Clay	27	60
Sand	1	61
Clay	17	78
Sand	2	80
Clay	10	90
Sand	3	93
Clay	47	140
Sand	3	143
Clay	17	160

Continued

9/12-16L1.--Continued

	Thickness (feet)	Depth (feet)
Sand	3	163
Clay	7	170
Sand	3	173
Clay	7	180
Sand	2	182
Clay	38	220
Sand	2	222
Clay	10	232
Sand	2	234
Clay	20	254

9/12-18B1. Dale Randleman. Altitude about 2,423 ft. Drilled by Frank Pottmeyer. 12-inch casing, perforated from 140 to 354 ft.

Surface	10	10
Gravel	130	140
Sand and gravel	150	290
Sand and gravel; hard, and some clay	64	354
Rock	-	354+

9/13-1Q1. Edward Starr. Altitude about 2,463 ft. Drilled by Pengilley. 6-inch casing.

Alluvium	69	69
Rock	135	204
"Ore", red	5	209
Rock	33	242

9/13-7R3 (CW-7A1). Willow Springs Co., old Willow Springs school. Altitude 2,568.2 ft.

Sand and clay in alternating beds	76	76
Water sand	14	90
Clay	10	100
Limestone, hard	-	100
(Heavy clay just above water sand. Water rose to 30 feet)		

9/14-1H1. Jess Butler. Altitude about 2,700 ft. Drilled by Frank Rottman. 18-inch casing.

	Thickness (feet)	Depth (feet)
Surface soil	20	20
Sand and gravel, fine	30	50
Gravel	32	82
Clay and sand	38	120
Clay	47	167
Sand and gravel, fine	28	195
Clay and gravel	20	215
Gravel	20	235
Clay	43	278
Clay and gravel	22	300
Clay, sand, and gravel	40	340
Gravel, and a few boulders	20	360
Sand, clay streaks	10	370
Clay, sand, boulders	10	380
Clay streaks and boulders	20	400
Sand and gravel	25	425
Sand, clay and gravel	25	450
Sand, boulders, gravel	20	470
Clay	25	495
Gravel	12	507
Gravel, streaks of clay	16	523
Sand and boulders, hard	42	565
Sand, hard	15	580
Sand; hard and bentonite	20	600
Sand and rock	32	632
Sand, hard	23	655
Sand and gravel, hard	22	677
Sand and clay, hard	23	700
Sand and clay streaks	22	722
Rock and boulders	18	740
Sand and boulders	25	765
Sand and rock	45	810
Gravel, fine	92	902
Not logged	43	945

10/11-8E1. Robert Fetters. Altitude 2,497.5 ft. Drilled by AV Pump and Drilling Co. 10-inch casing.

	Thickness (feet)	Depth (feet)
Sand	112	112
Rock	5	117
Gravel	70	187
Bottomed in rock (red)	-	200

10/12-9A1. Mrs. Dorothy McAllister. Altitude 2,594 ft. Drilled by Pengilley Bros. 8-inch casing, perforated from 158 to 208 ft.

Clay, sand, etc.	198	198
Sand and gravel, coarse	10	208
Rock, solid	-	208+

10/12-20D1 (CW-20A). O. J. Backus. Altitude 2,638.6 ft. 16-inch casing.

Alternating beds of clay and sand	125	125
Gravel	5	130
Clay	2	132
Quicksand	3	135

10/12-20C1 (CW-20D). O. J. Backus. Altitude 2,650.5 ft. Drilled by O. J. Backus. 12-inch casing.

Shaft (no data)	-	93
Clay, blue, stiff	62	155
Water gravel	6	161

10/12-20P1 (CW-20B). G. H. Buckley. Altitude 2,632.2 ft. 10-inch casing.

Alternate clay and sand in alternating beds	50	50
Sandstone, red	7	57
Clay and sand in alternating beds	40	97

10/12-21R1. Wiggenton. Altitude about 2,570 ft. Drilled by Pengilley Bros. 6-inch casing.

	Thickness (feet)	Depth (feet)
Sand; coarse, rather tight, one slightly harder streak	150	150

10/12-22E1 (CW-22A). A. L. Kemper. Altitude 2,552.3 ft. 10-inch casing. Uncased hole below 241 ft.

Sand and clay in alternate streaks	169	169
Gravel, fine	19	188
Clay and some sand streaks	53	241
Boulders; rounded, and sand	59	300

10/12-27L1 (CW-27A). W. Fusek. Altitude 2,540.5 ft. 48-inch dug well.

Sand	61	61
Granite, rotten	5	66

10/12-30A1 (CW-30A). Freeman. Altitude 2,664.1 ft. 10-inch casing.

Soil, gravelly	60	60
Granite, rotten	34	94
Granite	?	?

10/13-14Q1. Seaton. Altitude about 2,840 ft. Drilled by Frank Rottman. 12-inch casing.

	Thickness (feet)	Depth (feet)
Sand, hard	50	50
Sand and boulders	50	100
Sand, hard	50	150
Boulders and clay	50	200
Sand; coarse, little	20	220
Boulders and sand	30	250
Boulders	30	280
Sand and clay	20	300
Boulders and clay	50	350
Sand	20	370
Boulders and sand	30	400
Sand and clay	30	430
Boulders and clay	20	450
Clay	13	463

10/13-19M1. Dewey Butler. Altitude about 2,905 ft. Drilled by Frank Rottman. 16-inch casing.

Sand and boulders	90	90
Boulders and hard sand	22	112
Boulders and sand	22	134
Gravel; fine, and sand	23	157
Sand and boulders, hard	22	179
Rock, sandy	23	202
Clay, sandy	22	224
Clay streaks, sand, some boulders	23	247
Clay and fine gravel	22	269
Clay; sandy, hard	23	292
Clay and gravel	23	315
Clay, fine sand	21	336
Clay and boulders	24	360
Clay and gravel	44	404
Clay, coarse rock	23	427
Clay, fine sand	22	449
Gravel and clay	45	494
Clay, fine sand	23	517
Gravel and clay	67	584
Clay; red, and rock	23	607
Clay and gravel	22	629
Clay and boulders	45	674
Clay and shale	23	697
Clay, red, and rocks	23	720
Clay and gravel	22	742
Not logged	28	770

10/13-22D1. Marsh. Altitude about 2,875 ft. Drilled by G. Montmorency. 6-inch casing.

	Thickness (feet)	Depth (feet)
Sand	70	70
Clay	50	120
Sand	10	130
Clay	157	287
Sand, water	13	300
Clay	-	?

10/13-30D1. M and P Ranch. Altitude about 2,880 ft. Drilled by Frank Rottman. 16-inch casing.

Surface sand and gravel	73	73
Not logged	23	96
Sand; hard, and gravel	43	139
Sand and small gravel	22	161
Clay and fine sand	22	183
Sand; hard, and clay	22	205
Gravel and clay	68	273
Sand and gravel	23	296
Sand; hard, clay	44	340
Sand, hard	23	363
Sand, clay, small gravel	22	385
Sand and gravel with clay streaks	23	408
Sand streaks; hard, and clay streaks	22	430
Clay and sand	22	452
Clay, fine sand	23	475
Clay	22	497
Clay sand	22	519
Clay and sand streaks	68	587
Clay and gravel	22	609
Sand, gravel, few boulders	22	631
Sand and gravel	22	653
Clay; red, streaks of sand	23	676
Clay, sand	22	698
Sand; hard, and red clay streaks	23	721
Shale; blue, hard	23	744
Shale; blue, clay	22	766
Shale and clay, red	22	788
Not logged	46	834

10/13-30K1. M. and P Ranch. Altitude about 2,825 ft. Drilled by Frank Rottman. 16-inch casing, perforated from 200 to 400 ft.

	Thickness (feet)	Depth (feet)
Surface	50	50
Clay	28	78
Gravel	24	102
Clay and gravel	16	118
Clay and sand	22	140
Clay and gravel	23	163
Sand and gravel	22	185
Clay and boulders	22	207
Clay and gravel	23	230
Not logged	22	252
Gravel	15	267
Clay	14	281
Gravel and boulders	24	305
Clay and boulders	27	332
Gravel	25	357
Clay	15	372
Gravel and boulders	23	395
Gravel and clay	12	407

10/13-32D1. Lombardi and Frew. Altitude about 2,775 ft. Drilled by Frank Rottman. 16-inch casing.

Surface soil	30	30
Clay	65	95
Clay with sand	61	156
Sand, fine	22	178
Sand, fine, and gravel	23	201
Clay and boulders	21	222
Clay and gravel	23	245
Clay and sand and gravel	23	268
Clay, sand, gravel and boulders	22	290
Clay, sand and boulders	38	328
Sand, fine	23	351
Gravel, fine	135	486
Gravel and clay	20	506
Tufa and some gravel	23	529
Clay and gravel	112	641
Gravel, fine	23	664
Clay and gravel	67	731

Continued

10/13-32D1.--Continued

	Thickness (feet)	Depth (feet)
Gravel	66	797
Gravel, red	23	820
Boulders and clay	45	865
Clay and gravel	23	888
Clay and gravel, some boulders	22	910
Sand and clay	46	956
Very hard	44	1,000
Gravel; fine, and boulders	22	1,022
Clay, fine sand, and boulders	24	1,046
Clay, gravel, and boulders	22	1,068
Rock cuttings	112	1,180
Clay and gravel	142	1,322
Gravel, fine	23	1,345

10/13-32M1. Lombardi and Frew. Altitude about 2,740 ft. Drilled by Frank Rottman. 16-inch casing.

Surface	89	89
Clay	23	112
Boulders and clay	22	134
Clay and fine sand	23	157
Shale, hard	43	200
Boulders and clay	44	244
Gravel and boulders	23	267
Clay and boulders	44	311
Clay and gravel	23	334
Gravel, fine	23	357
Gravel	44	401
Boulders and clay	23	424
Rock	44	468
Sand; packed, hard	112	580
Clay, boulders and fine sand	23	603
Gravel	22	625
Gravel and fine sand	23	648
Gravel	22	670
Sand; packed, hard	135	805
Rock bottom	-	805+

10/14-36A1. CCC Ranch. Altitude about 2,855 ft. Drilled by Frank Rottman. 16-inch casing.

	Thickness (feet)	Depth (feet)
Sand and gravel	64	64
Clay and streaks of fine sand	88	152
Clay and streaks of sand and boulders	148	300
Clay and streaks of sand and shale	50	350
Sand; fine, and streaks of clay and gravel	117	467
Sand, gravel and shale streaks	44	511
Clay, gravel, sand and few boulders	45	556
Sand, gravel, few boulders	44	600
Gravel; coarse, and sand	45	645
Gumbo clay, fine sand	67	712
Clay and heavy streaks of gravel and sand	202	914
Sand; fine, small gravel	72	986

11/7-32E1. Boron Community Services District, well 8. Altitude about 2,455 ft. Drilled by Rottman Drilling Co. in July 1956. 10-inch casing zero to 502 ft, perforated 262 to 502 ft.

Clay and sand	50	50
Clay and gravel	22	72
Clay and sand	22	94
Sand, coarse	22	116
Sand; coarse, and clay	24	140
Sand and clay	44	184
Sand and clay streaks	26	210
Clay, hard	22	232
Clay and gravel	24	256
Clay and sand streaks	22	278
Gravel and clay streaks	22	300
Gravel	23	323
Boulders, clay, and sand	22	345
Gravel and boulders	26	371
Gravel; packed hard	21	392
Clay; packed hard, and gravel	23	415
Clay; hard, and gravel	66	481
Gravel and hard clay	21	502

11/7-32G2. Franklin. Altitude about 2,460 ft. Drilled by owner in 1954. 5-inch casing. (Log not complete.)

	Thickness (feet)	Depth (feet)
Overburden	8	8
Caliche, hard	102	110
Clay, brown, sticky	20	130
Caliche and brown calcareous sandy silt	80	210

11/11-5D1. Southern Pacific Land Co. Altitude 2,630.9 ft. Drilled by Roscoe Moss Co. 14-inch casing, perforated at intervals between 270 and 514 ft.

Sand, loose	2	2
Clay; brown, sandy, few hard streaks	210	212
Sand, coarse	2	214
Silt and sand, fine	14	228
Clay; red, sticky	8	236
Clay, sandy with gravel streaks	34	270
Sand and gravel	6	276
Clay, sandy	8	284
Gravel, $\frac{1}{4}$ to 3/4-inch	16	300
Clay, sandy	20	320
Sand, muddy	20	340
Sand, muddy with clay streaks	40	380
Sand; coarse $\frac{1}{4}$- to 1-inch gravel	4	384
Clay, sandy	52	436
Sand and gravel, $\frac{1}{4}$ to 1-inch	26	462
Clay; yellow, sticky	36	498
Sand and gravel, cemented	16	514
Clay, sandy, hard	6	520
Clay; sandy, streaks hard and soft	40	560
Clay; sandy, hard	20	580
Sand, loose	2	582
Clay; sandy, packed	50	632
Clay; sandy, with small gravel	10	642
Clay; sandy, hard, quartz gravel	4	646
Granite; red and brown, decomposed	4	650
Conglomerate, very hard	12	662
Granite; decomposed, very hard	8	670

11/11-7A1. Southern Pacific Land Co. Altitude 2,627.9 ft. Drilled by Roscoe Moss Co. 14-inch casing, perforated 305 to 356 ft. Materials classified by U. S. Geological Survey.

	Thickness (feet)	Depth (feet)
Silt, sandy, clayey; yellowish-brown; 3 to 5 percent subangular to angular coarse sand consisting mainly of quartz and feldspar but some volcanic material is present	298	298
Silt, sandy, clayey; yellowish-brown; 3 to 5 percent subangular to subrounded, fairly well-sorted sand	34	332
Coarse sand, silty, clayey; yellowish-brown; 3 to 4 percent subangular to subrounded granules, 2 to 3 percent angular pebbles; quartz and feldspar predominate but contains some volcanic ash, metamorphic, and dark minerals	24	356
Clay and coarse sand; yellowish-brown; clastics: 3 to 5 percent; quartz, feldspar, some ash, and dark minerals; very adhesive	10	366
Quartz monzonite showing weathering effects and limonite stains	46	412

11/11-9A1. Southern Pacific Land Co. Altitude 2,549.6 ft. Drilled by Roscoe Moss Co. 14-inch casing, perforated 262 to 295 and 352 to 362 ft. Materials classified by U. S. Geological Survey.

Sand and silt; streaky	50	50
Clay, sandy, silty; yellowish-brown; 5 to 10 percent clastics; some small pebbles; quartz and feldspar predominate but some volcanics are present	100	150
Silt, sandy, clayey; yellowish-brown; 10 to 20 percent clastics: very coarse sand and subangular pebbles; quartz and feldspar predominate, some volcanics	100	250
Silt, sandy, clayey; yellowish-brown; 5 to 10 percent clastics: very coarse subangular sand	12	262
Very coarse sand, silty; yellowish-brown; subangular, fair sorting; 5 to 10 percent granules; predominantly quartz, feldspar, green tuff or ash, some volcanics, muscovite and pyrite	26	288
Weathered boulder; grayish-white (salt and pepper appearance); 30 to 40 percent clastics: angular; quartz, feldspar, biotite	2	290

Continued

11/11-9A1--Continued.

	Thickness (feet)	Depth (feet)
Very coarse sand; yellowish-brown; subangular, fair sorting; 5 to 10 percent granule size; predominantly quartz, feldspar, green tuff or ash, some volcanics --	5	295
Sand, silty, clayey; yellowish-brown; 10 to 20 percent coarse clastics; subrounded quartz and feldspar ----------	55	350
Sand, medium to coarse; reddish-brown; grains of quartz, feldspar and mica; angular to subangular granules and sand grains. Some chips up to 1.4 cm. long ----------	12	362
Granite or quartz monzonite; decomposed, becoming progressively harder ----------	59	421

11/11-23J1 (CW-23A). Southern Pacific Land Co., oil-well test. Altitude 2,763.0 ft.

Surface sands, gravel, lime shells ----------	570	570
Sand, buff ----------	20	590
Shale; brown, sandy ----------	20	610
Not logged ----------	710	1,320
Sand, brown ----------	10	1,330
Not logged ----------	129	1,459
Lime; gray-blue, hard ----------	8	1,467
Sand and shale, gray-blue ----------	45	1,512

11/12-14D1 (CW-14A). H. S. Knowles, oil-well test. Altitude 2,705.4 ft. 12-inch casing.

	Thickness (feet)	Depth (feet)
Gravel and clay	270	270
Gravel, water	80	350
Sand and gravel	5	355
Clay, yellow	45	400
Conglomerate	150	550
Lime, blue	220	770
Not logged	100	870
Shale, brown	10	880
Conglomerate, medium hard	10	890
Shale, dark	5	895
Hard capping	5	900
Shale, dark	5	905
Shale, brown	40	945
Shale, dark	5	950
Shale; blue, and hard shells	25	975
Shale; brown, and hard shells	20	995
Shells; hard, and water	15	1,010
Shell, hard	30	1,040

11/12-22D1 (CW-22A). Mojave Public Utility District, well 1. Altitude 2,687.4 ft. 14-inch casing.

Gravel and adobe	3	3
Gravel, decomposed	42	45
Adobe, sandy	20	65
Sand and gravel	25	90
Adobe, sandy	15	105
Gravel, fine	55	160
Adobe, fine sandy, and hardpan	57	217
Sand, loose, coarse	13	230
Hardpan	30	260
Sand, soft, fine	10	270
Sand, fine; water	7	277
Sand, coarse, or gravel, fine	3	280
Hardpan	31	311
Sand, fine	14	325
Gravel, coarse	10	335
Hardpan, sandy	13	348

11/12-26J1 (DGT-50, CW-26A). Monolith Portland Cement Co. Altitude 2,594.0 ft. 14-inch casing.

	Thickness (feet)	Depth (feet)
Clay and sand streaks	125	125
Sand, water	10	135
Clay; heavy, and packed sand	15	150
Sand and fine gravel, water	10	160
Clay and packed sand	70	230
Gravel, up to 2 inches in diameter; water	20	250

11/12-26J2. Monolith Portland Cement Co. Altitude about 2,595 ft. Drilled by Frank Rottman. 14-inch casing.

Surface soil and clay	20	20
Shale and boulders; hard	15	35
Sand, clay, and boulders; hard	55	90
Clay, hard	20	110
Clay and boulders	55	165
Clay, gravel, and boulders	35	200
Clay and gravel	40	240
Gravel	5	245
Clay and sand	25	270
Clay	30	300
Clay, sand, and boulders	21	321

11/13-19C1. California Portland Cement Co., well 1. Altitude about 3,610 ft. Drilled by Roscoe Moss Co. 16-inch casing, perforated from 230 to 358 ft and from 376 to 430 ft.

Sand and gravel, 3-inch	6	6
Clay and boulders	42	48
Sand and gravel, 4-inch	2	50
Granite boulders	70	120
Clay and gravel, 1-inch	44	164
Clay and boulders	36	200
Clay and gravel, 1-inch	10	210
Clay and coarse sand, $\frac{1}{4}$-inch	145	355
Granite, decomposed	13	368
Clay, red	12	380
Granite	50	430

11/13-19C2. California Portland Cement Co., well 4. Altitude about 3,600 ft. Drilled by Roscoe Moss Co. 16-inch casing, perforated from 160 to 354 ft.

	Thickness (feet)	Depth (feet)
Sand and boulders	105	105
Clay and gravel, 2-inch	70	175
Clay and gravel, ¼-inch	23	198
Clay and boulders	82	280
Clay; red, and gravel	70	350
Quartz	25	375

11/13-19C3. California Portland Cement Co., well 3. Altitude about 3,600 ft. Drilled by Roscoe Moss Co. 16-inch casing, perforated from 150 to 366 ft.

Sand	48	48
Clay and boulders	102	150
Gravel, 2-inch	18	168
Clay and boulders	24	192
Clay and gravel, 1-inch	91	283
Clay and boulders	57	340
Clay and gravel, ¼-inch	40	380
Quartz, sharp	8	388

11/13-19Z1. California Portland Cement Co. Altitude about 3,600 ft. Drilled by Roscoe Moss Co. Bailed dry, casing pulled.

Sand	40	40
Sand and clay	45	85
Sand and granite boulders	40	125
Clay and boulders	55	180
Clay	55	235
Clay; sandy, with small gravel	13	248
Gravel, 1-inch	2	250
Clay; sandy, and gravel, ¼-inch	130	380
Sand and gravel, ¼-inch	4	384
Clay; sandy, hard	6	390
Quartzite	40	430

11/13-29M1. California Portland Cement Co., well 2. Altitude about 3,350 ft. Drilled by Roscoe Moss Co. 16-inch casing, perforated from 520 to 724 ft.

	Thickness (feet)	Depth (feet)
Top soil	5	5
Sand, cemented	20	25
Clay and boulders	73	98
Clay and gravel, 2-inch	60	158
Granite boulders	120	278
Clay and gravel, 1-inch	242	520
Gravel, 2-inch; water-bearing	5	525
Clay and gravel, 1-inch	45	570
Clay, sticky	20	590
Gravel, 5-inch; clean	14	604
Clay and gravel, $\frac{1}{4}$-inch	24	628
Sand and gravel, 3-inch; cemented	4	632
Granite, decomposed	76	708
"Hill top" (bedrock?)	27	735
Quartzite	14	749

11/13-31A1. Tull. Drilled by J. M. Scoggin. Altitude about 3,300 ft. Log reported by George Marsh. 16-inch casing.

Shale	40	40
Sand and gravel, dirty	350	390
Shale	10	400
Sand, water	100	500
Beach sand, white	40	540
Sand, red and white	60	600
Sandstone	-	600+

11/13-36B1. Dr. James Gillis. Drilled by J. M. Scoggin. Altitude about 2,900 ft. Log reported by George Marsh. 16-inch casing, perforated from 400 to 580 ft.

	Thickness (feet)	Depth (feet)
No data	395	395
Sand, water	85	480
Shale	10	490
Sand, water	40	530
Lime	10	540
Sand, water	40	580
Shale, green	-	580+

11/13-36C1. Dr. James Gillis. Altitude about 2,910 ft. Drilled by J. M. Scoggin. Log reported by George Marsh. 14-inch casing.

No data	400	400
Sand, water	100	500
Conglomerate	10	510
Sand, water	50	560
Shale	10	570
Sand, water	40	610
Lime	1	611
Shale, green	-	611+

11/13-36K1. Dr. James Gillis. Altitude about 2,888 ft. Drilled by J. M. Scoggin. Log reported by George Marsh. 16-inch casing, perforated from 380 to 630 ft.

Gravel	20	20
Shale	180	200
Sand and pea-gravel	125	325
Loam, black	55	380
Sand, good water	120	500
Shale, gray	10	510
Sand, water	50	560
Lime	10	570
Sand, water	60	630
Shale, green	-	630+

11/14-14B1. California Portland Cement Co., well 5. Altitude about 4,000 ft. Drilled by Roscoe Moss Co. 16-inch casing, perforated from 30-60 ft.

	Thickness (feet)	Depth (feet)
Top soil	8	8
Sand and gravel	54	62
Clay, blue	18	80
Granite	4	84

11/14-14B2. California Portland Cement Co., well 6. Altitude about 3,990 ft. Drilled by Roscoe Moss Co. 16-inch casing, perforated from 20 to 46 ft.

Sand	5	5
Sand and boulders	20	25
Sand and gravel, 6-inch	25	50
Limestone	14	64

12/12-35R1. Southern Pacific Land Co. Altitude 2,743.3 ft. Drilled by Roscoe Moss Co. 14-inch casing, perforated at intervals between 373 and 560 ft.

	Thickness (feet)	Depth (feet)
Dirt and gravel	30	30
Clay and gravel	250	280
Sand and gravel, 3/4-inch	5	285
Clay, sandy	18	303
Sand and gravel, $\frac{1}{2}$-inch	8	311
Clay, sandy	35	346
Sand and gravel, to 2 inches	14	360
Clay and gravel	10	370
Sand and gravel, 2 inches	10	380
Clay with sand streaks	15	395
Sand and gravel, 3/8-inch	7	402
Clay with sand streaks	18	420
Sand and gravel, 3/4-inch	14	434
Clay, sandy	16	450
Sand and gravel, 1-inch	22	472
Clay with some gravel	8	480
Sand and gravel, 1-inch	34	514
Clay, sandy	16	530
Sand and gravel, $\frac{1}{4}$-inch	14	544
Sand and gravel, to 2 inches	16	560
Clay with some gravel	75	635
Conglomerate (consolidated rock)	5	640

32/36-21Q1. J. J. Wonders. Altitude 2,798.9 ft. Drilled by Frank Rottman. 10-inch casing to 805 feet, uncased and cemented off below 805 ft.

	Thickness (feet)	Depth (feet)
No data	340	-
Gravel and coarse sand	-	340
No data	200	540
Gravel, very fine, well sorted	21	561
Sand, medium to coarse, unweathered	22	583
Sand, fine to coarse, very silty	23	606
Sand, fine to coarse, some fine gravel	20	626
Sand, fine to coarse, considerable fine gravel	23	649
No data	44	693
Sand, coarse; and gravel, fine; silty	22	715
Sand, fine to medium, and silt; tight	22	737
No data	73	-
Silt and clay, tight	-	810
No data	35	845
Gravel, fine, silty	71	916
Sand, coarse, and fine gravel	55	971
No data	271	-
Sand, fine to medium	-	1,242
No data	22	-
Sand, fine to medium	-	1,264
No data	21	-
Silt, sandy	-	1,285
No data	5	-
Silt, sandy	-	1,290
No data	33	1,323
Rock; granitic, somewhat decomposed	33	1,356

Material below 800 feet reported to be poorly water bearing, and may be Tertiary continental deposits.

32/36-35D1. Southern Pacific Land Co. Altitude 2,692.0 ft. Drilled by Roscoe Moss Co. 14-inch casing, perforated at intervals between 339 and 725 ft.

	Thickness (feet)	Depth (feet)
Soil	10	10
Sand and gravel to 2 inches	30	40
Clay, sandy	248	288
Sand and gravel	19	307
Clay, sand, and gravel	31	338
Sand and gravel, ½-inch, some cement	22	360
Clay with sand streaks	18	378
Clay	15	393
Sand and gravel; coarse, ½-inch	18	411
Clay	13	424
Sand and gravel, ½-inch	42	466
Clay with sand streaks	14	480
Sand and gravel, ½-inch	14	494
Clay, sandy	26	520
Sand and gravel, ½-inch	10	530
Clay, sandy	10	540
Sand and gravel, 3/4-inch	10	550
Clay, sandy	12	562
Sand and gravel, ½-inch	8	570
Clay, sandy	6	576
Sand and gravel, ½-inch, some clay	30	606
Clay, sandy	4	610
Sand and gravel, 3/4-inch	19	629
Clay, sandy	11	640
Sand with clay streaks	35	675
Clay; hard, sandy	41	716
Sand and gravel, 3/4-inch	9	725
Clay; sandy, hard	75	800

32/36-35R1. Southern Pacific Land Co. Altitude 2,631.9 ft. Drilled by Roscoe Moss Co. 14-inch casing, perforated at intervals between 333 and 694 ft. Materials classified by U. S. Geological Survey.

	Thickness (feet)	Depth (feet)
Silt, sandy, clayey; yellowish-brown; 5 to 10 percent clastics: sand to pebble size is predominantly quartz, feldspar, dark minerals ----	80	80
Silt, clayey, sandy; yellowish-brown; 10 to 20 percent grains of granule to pebble size but granules predominate; quartz, feldspar, olivine, and dark minerals; moderately well sorted. Some pyrite in quarts ----------	5	85
Silt, clayey, sandy; same as above but the percentage of granule to pebble-size material is reduced to about 5 ----------	5	90
Silt, sandy, clayey; yellowish-brown; 10 to 20 percent of the clastics are of granule to pebble size and are predominantly quartz and feldspars, olivine and dark minerals are present as is some pyrite ----------	10	100
Silt, sandy, clayey; same as above, but the percentage of clastics is reduced to about 5 --------	10	110
Silt, sandy, clayey; yellowish-brown; about 10 percent clastics of granule to pebble size which are mainly quartz and feldspars, but olivine and some hematite are present ----------	70	180
Silt, sandy, clayey; yellowish-brown; about 5 percent of the grains are of granule to pebble size and are moderately well sorted; quartz and feldspars predominate ----------	10	190
Silt, sandy, clayey; yellowish-brown; 10 to 15 percent clastics of granule to pebble size which are moderately well sorted quartz and feldspar crystals ----------	17	207
Silt, clayey, sandy; yellowish-brown; 20 to 30 percent of the clastics are granule to pebble size, moderately well sorted; no even gradation between grains; quartz, feldspar, and dark minerals ----------	3	210
Silt, clayey, sandy; yellowish-brown; 5 to 10 percent clastics: (80 percent granule size; 20 percent pebble size), moderately well sorted, angular to subrounded ----------	43	253

Continued

32/36-35R1--Continued.

	Thickness (feet)	Depth (feet)
Clay; yellowish-brown; very few clastics, very adhesive	7	260
Silt, sandy, clayey; greenish, yellowish, and brown; 5 to 10 percent grains of granule to pebble size, moderately well sorted; quartz and feldspar predominate but dark minerals are present; clay lenses are present in this interval	10	270
Silt; same as above; dark minerals not as abundant as in above samples	10	280
Gravel, sandy, silty, clayey; yellowish-brown; clasts are fairly well sorted, angular to subrounded; quartz predominates but feldspars, olivine, and dark minerals are present. Grains are granule to pebble size (70 percent granules, 30 percent medium pebbles). Overall the material is about 60 to 70 percent gravel and sand, 30 to 40 percent silty clay	10	290
Very coarse sand, silty, clayey; yellowish-brown; poorly sorted, angular to subrounded; (silt and clay 30 to 40 percent, pebbles 10 to 20 percent, cobbles 3 to 5 percent). Quartz and feldspar with rhyolite and other volcanic clasts	14	304
Silt, sandy, clayey; medium brown; about 5 to 10 percent clastics; sandstone spheres 2 to 3 inches in diameter are present	26	330
Very coarse sand, silty; yellowish-brown; fair sorting; angular to subrounded; about 30 percent coarse sand, 5 to 10 percent granules, 2 to 3 percent pebbles, and 3 percent cobbles of granite, basalt, or marble	5	335
Sand; yellowish-brown; fine to very coarse; subangular to subrounded, fairly well sorted; 5 to 10 percent granules (orthoclase, granite, diorite), 5 percent pebbles, 3 to 5 percent cobbles of orthoclase granite which are subrounded. A few pebbles are flat and subrounded	21	356
Sand, silty; fine to very coarse, fair sorting, subangular to subrounded, quartz and feldspar predominate, no cobbles as above	7	363

Continued

32/36-35R1--Continued.

	Thickness (feet)	Depth (feet)
Silt, clayey, sandy; yellowish-brown; 10 to 20 percent fine to very coarse sand, fair sorting, subangular to subrounded; quartz and feldspars	15	378
Silt, sandy, clayey; yellowish-brown; 10 to 20 percent pebbles	10	388
Silt, sandy, clayey; yellowish-brown; no material larger than coarse sand size	2	390
Silt, clayey, sandy; yellowish-brown; sand is very fine to coarse, 10 to 20 percent very coarse sand, 3 to 5 percent pebbles	29	419
Sand, silty, clayey; yellowish-brown; sand is mainly very coarse, fairly well sorted, subangular to subrounded but mostly subangular. 10 to 20 percent granule size (quartz and metamorphics) 2 to 3 percent pebbles (light green volcanic ash)	12	431
Silt, coarse sandy, clayey; yellowish-brown; 2 to 3 percent granules which are subangular to subrounded, 2 to 3 percent pebbles of granite or felsite	13	444
Sand, silty, clayey; yellowish-brown; very coarse, fairly well sorted, subangular to subrounded; quartz and feldspar predominate, granitic origin; granules and pebbles are present	16	460
Silt, sandy, clayey; yellowish-brown; sand is very coarse, 2 to 3 percent granules, 2 to 3 percent subrounded pebbles; clay has sand stringers	18	478
Sand, coarse, silty, clayey; yellowish-brown; fair sorting, subangular to subrounded; 30 to 40 percent granules showing fair sorting, 5 to 10 percent pebbles which are subangular to subrounded but mostly are subrounded	16	494
Clay, sandy, silty; yellowish-brown; 5 to 10 percent granules	6	500
Sand, very coarse, silty, clayey; yellowish, greenish, brown; fair sorting, subangular to subrounded, granules 5 to 10 percent, pebbles 3 to 5 percent, cobbles 3 percent; light green volcanic ash is present. Thin clay lenses in above sample	8	508

Continued

32/36-35R1--Continued.

	Thickness (feet)	Depth (feet)
Clay, silty; very adhesive, very few clastics, few grains of coarse sand and granules, quartz and feldspar	65	573
Sand, coarse, silty, clayey; yellowish-brown; fair sorting, subrounded to subangular, mostly subangular; 5 to 10 percent pebbles; orthoclase, granite, and feldspar predominate	5	578
Silt, clayey; yellowish-brown; very adhesive; 5 percent pebbles and granules	22	600
Sand, coarse, silty, clayey; yellowish-brown; fair sorting but grades from fine sand to coarser clastics, subangular to subrounded; 5 to 10 percent granules, 5 percent pebbles which are metamorphics and volcanics	8	608
Clay, silty; yellowish-brown; scattered granules, subangular to subrounded, very adhesive	40	648
Sand, coarse, silty; fair sorting, subangular to subrounded, granules 5 to 10 percent, quartz predominates; pebbles 5 to 10 percent metamorphics; light green volcanic ash is present	12	660
Clay; yellowish-brown	8	668
Gravel, pebble; silty, sandy; fair sorting, mostly subangular but some subrounded; 20 to 30 percent coarse gravel, pebbles of quartz, chert, orthoclase granite, light green volcanic ash is present	13	681
Sand, coarse, silty; fair sorting, mostly subangular; 20 to 30 percent pebbles; 5 to 10 percent large cobbles to small boulders; boulders of breccia, chert or chalcedony and light green volcanic ash	13	694
Silt, clayey, sandy; medium brown	21	715
Sand, very fine, silty, clayey; fair sorting, subangular to subrounded	3	718
Clay; medium brown; very cohesive, few clastics	6	724
Sand, very coarse, very silty, clayey; poor to fair sorting, mostly subangular, 5 to 10 percent granule size; quartz and feldspar	8	732

Continued

32/36-35R1--Continued.

	Thickness (feet)	Depth (feet)
Clay and volcanic rocks; interbedded; clayey siltstone and mudstone; purplish-brown with streaks of green interbedded; 10 to 15 percent subangular clastics, mostly quartz with a few feldspars; very hard drilling	68	800(±1)

32/36-35R2. Southern Pacific Land Co. Altitude 2,634.5 ft. Drilled by Orange County Pump Co. 8 5/8-inch casing, perforated from 220 to 720 ft.

Top soil, sandy	10	10
Sand; coarse, and ¼-inch gravel	173	183
Sandstone; hard ledge	5	188
Sand and clay, muddy	116	304
Clay, sandy	27	331
Sand and gravel	33	364
Clay; sandy, fine 1/8-inch gravel	61	425
Sand and gravel	33	458
Clay, brown	21	479
Sand and ¼-inch gravel	11	490
Clay, brown	8	498
Sand and ¼-inch gravel	8	506
Clay and sand	76	582
Clay and ½-inch gravel	18	600
Sand and ½-inch gravel	10	610
Clay, brown	40	650
Sand and 3-inch gravel	20	670
Sand and 3- to 4-inch rock	25	695
Clay, brown	13	708
Clay and sand	12	720

Table 5.- Chemical analyses of water from wells

Constituents: Where the value for sodium is preceded by the letter a it indicates sodium and potassium expressed as sodium. The value for dissolved solids is the analytically determined value reported by the laboratory. The sum of determined constituents is the sum of the tabulated constituents minus approximately half (50.8 percent) of the bicarbonate. Because all the major constituents (except silica in many of the analyses) that commonly occur in ground water were analytically determined, the values for dissolved solids and sum of determined constituents should be approximately the same. Constituents shown in parentheses are values calculated by the Geological Survey, Ground Water Branch. All values have been rounded where necessary to conform to the standards of the Geological Survey, Quality of Water Branch.

Temperature: For the Geological Survey analyses (GW, GP, and QW), where the temperature is given the sample was collected from the pump discharge; where the temperature is omitted the samples were collected mainly from a storage facility at the well. For the other analyses the point of collection was mainly from the pump discharge.

Analyzing laboratory: CT, Curtis and Tompkins, San Francisco, California; DWR, State of California, Department of Water Resources; GP, U. S. Geological Survey, Geochemistry and Petrology Branch; GW, U. S. Geological Survey, Ground Water Branch; H, Hornkohl Co.; QW, U. S. Geological Survey, Quality of Water Branch; SE, Smith-Emery Co.; USN U. S. Navy. For analyses for which the analyzing laboratory is not given the agency from which the analysis was collected is given: CW, Cyril Williams, Jr. (1930); DGT, Thompson (1929); SP, Southern Pacific Co.

Well number	9/12-16J1	9/13-7Q2			10/11-8E1
Constituents in parts per million					
Silica (SiO_2)					
Iron (Fe)					
Calcium (Ca)	49	32	37		13
Magnesium (Mg)	16	7.1	2		3
Sodium (Na)	.80	52	47		94
Potassium (K)	3.1	2	1.7		2.5
Bicarbonate (HCO_3)	188	150	140	143	120
Carbonate (CO_3)	0	0			
Sulfate (SO_4)	116	65	65		99
Chloride (Cl)	58	18	12	14	52
Fluoride (F)	1.2	.1	.4		
Nitrate (NO_3)	2.0		3.0		1.2
Boron (B)	.52	.1	.16		.5
Dissolved solids		223	264		
Sum of determined constituents	(419)	(250)	(237)		(32A)
Hardness as $CaCO_3$	(188)	(109)	(101)	103	45
Percent sodium (%Na)	47	50	50		81
Specific conductance (micromhos at 77°F)	730	412	416	430	548
pH	7.2	8.0	7.3	7.4	7.7
Temperature (°F)			70	52	66
Date collected	8-15-53	6-4-53	10-19-54	5-23-56	12-2-52
Depth of well in feet	200	50.6	50.6	50.6	200
Analyzing laboratory (Lab.)	GP	DWR	DWR	DWR	QW
Laboratory number (No.)	B351	P-679	R-404	R-1048	5866

Well number	10/12-4B1	10/12-4B2	10/12-10R1		10/12-15M2
Constituents in parts per million					
SiO_2					30
Fe					
Ca					34
Mg					6
Na					a54
K					
HCO_3					142
CO_3					6
SO_4					70
Cl	25	24	13	28	20
F					
NO_3					0
B					
Dis. S.					
Sum					(290)
Hardness	215	200	160	89	(110)
%Na					55
Micromhos	668	643	529	389	
pH					
^oF					
Date	11-7-51	12-4-52	12-4-52	12-5-52	3-6-30
Depth		200	300	275	275
Lab.	GW	GW	GW	GW	CT
No.					107780

Well number	10/12-20C1			10/12-21R1	10/12-22N2
Constituents in parts per million					
SiO_2	25				
Fe					
Ca	32	36	31	33	
Mg	5	3.3	6	6	
Na	a49	44	38	41	
K		3.1	1.5	1.7	
HCO_3	130	131	125	115	
CO_3	0		0		
SO_4	69	72	65	75	
Cl	21	19	18	16	18
F			.6		
NO_3		2.5	.7	2.9	
B		.03	0	.04	
Dis. S.			270		
Sum	(265)	(245)	(223)	(233)	
Hardness	100	(104)	(102)	107	131
%Na	55	47	47	45	
Micromhos		413	372	387	423
pH		7.2	7.2	8.1	
°F		69		66	
Date	3-6-30	2-4-52	11-1-55	12-5-52	12-4-52
Depth	161	107.8	107.8	150	125
Lab.	CT	QW	DWR	QW	GW
No.	107781	5871	R-906	5880	

Well number	10/13-14Q1		10/13-24C1		10/13-24F1
Constituents in parts per million					
SiO_2					17
Fe					
Ca			27		22
Mg			4		4
Na			45		a53
K			.8		
HCO_3			101		103
CO_3					0
SO_4			64		66
Cl	17	17	16	21	21
F			.3		
NO_3			5.8		0
B			.01		
Dis. S.			236		
Sum			(213)		(234)
Hardness	79	90	(84)	79	(71)
%Na			53		64
Micromhos	366	382	359	365	
pH			7.6		
°F					
Date	12-4-52	11-7-51	10-20-54	12-4-52	3-6-30
Depth	463	252	252	600	600
Lab.	GW	GW	DWR	GW	CT
No.			R-398		107782

Well number	10/13-32M1	10/14-36A1	11/11-1Q1	11/11-2N1	11/11-5D1
Constituents in parts per million					
SiO_2					31
Fe					0
Ca	36	66	1.6	37	44
Mg	9	8.1	.5	8.3	17
Na	49	82	140	47	32
K	1.7	3	5.8	3.5	
HCO_3	149	99	185	192	152
CO_3	0	0	75	0	0
SO_4	78	240	(26)	(47)	86
Cl	24	29	38	15	33
F	.6	11	5.6	.4	.4
NO_3	4.5	.2	.7	6.2	
B	.12	0	1.2	.15	.34
Dis. S.	295				395
Sum	(291)	(488)	(385)	260	(319)
Hardness	(127)	(198)	6	127	180
%Na	(45)	47	96	44	31
Micromhos	412	735	691	459	565
pH	7.7	7.7	9.6	7.7	7.9
°F	74				
Date	3-8-56	6-4-53	10-21-55	10-21-55	2-16-57
Depth	805	986	761.5	303.5	670
Lab.	DWR	DWR	QW	QW	USN
No.	B-6906	P-684	17237	17236	

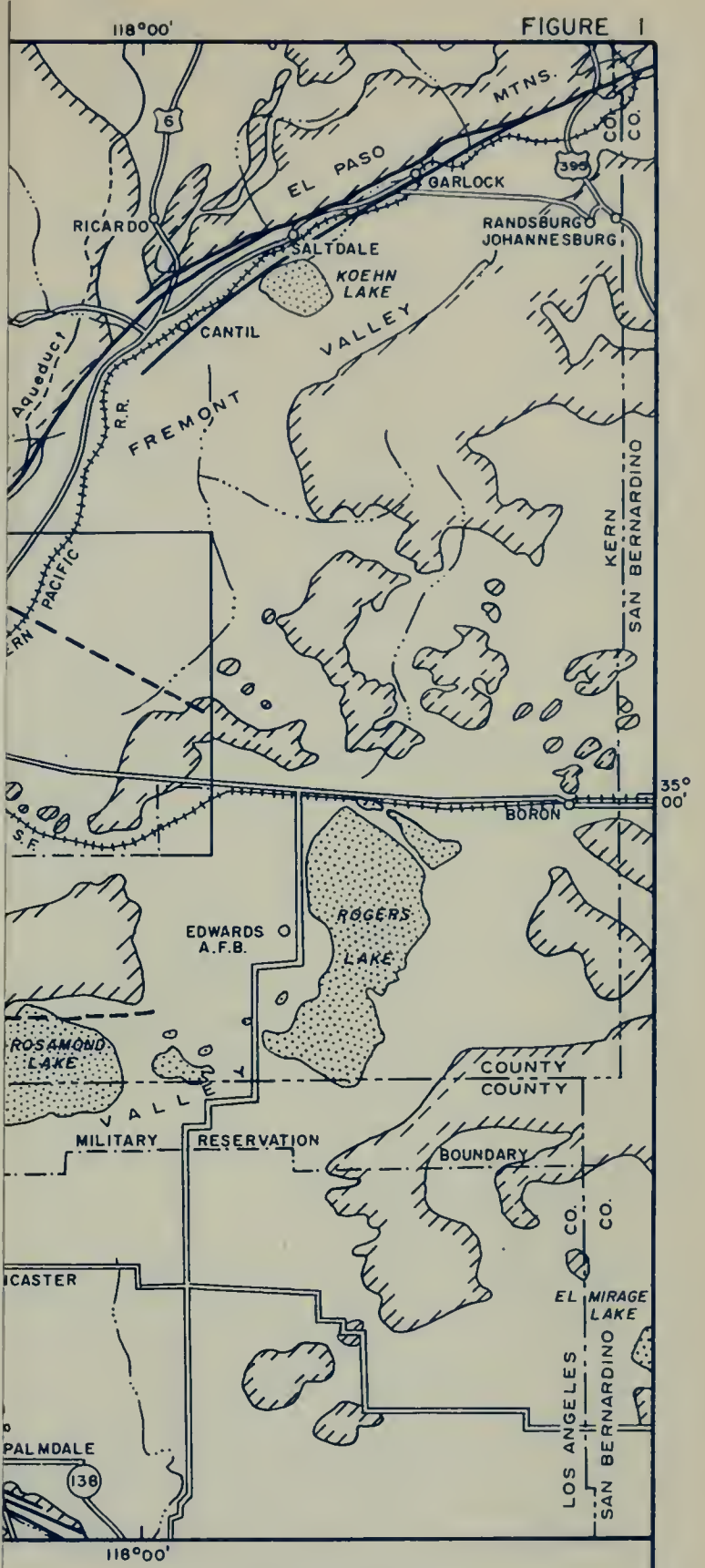
Well number	11/11-7A1	11/11-8D1	11/11-9A1	11/12-12M1	11/12-18B1
Constituents in parts per million					
SiO_2	20		30		
Fe			0		
Ca	22	30	26	17	40
Mg	5	8.1	8.8	2.4	8.1
Na	38	56	37	86	61
K		3.7		8.9	1.5
HCO_3	146	235	178	225	213
CO_3	0	5	0	0	0
SO_4	25	(16)	12	(6.7)	37
Cl	9	11	16	35	29
F	.5	.4	.3	.8	.4
NO_3		.7		97	13
B	.15	.29	.05	.61	.2
Dis. S.	265		308		
Sum	(192)	(247)	(218)	(365)	(295)
Hardness	76	108	100	(52)	(133)
%Na		52	45	75	
Micromhos	373	444	360	547	485
pH	8.3	8.5	8.0	8.2	
°F					
Date	11-2-56	10-21-55	10-19-56	10-20-55	6-4-53
Depth	414.0	275.0	421	318.5	300
Lab.	USN	QW	USN	QW	DWR
No.		17235		17234	P-678

Well number	11/12-26J1	11/12-32E1		11/12-32E2	
Constituents in parts per million					
SiO_2	23		20		
Fe					
Ca	28	33	50		54
Mg	5	14	10		17
Na	a38	45	50		54
K		1.4	1.9		1.5
HCO_3	124	98	119		115
CO_3	0	10	0		0
SO_4	49	118	155		193
Cl	15	17	17	12	19
F		.5	.4		.4
NO_3	0	0	0		4.0
B		.10	.05		.20
Dis. S.	254	305	318		375
Sum	(219)	(287)	(363)		(400)
Hardness	90	(140)	(166)	212	(205)
%Na	52	(41)	(39)		(36)
Micromhos		451	529	622	630
pH		8.3	7.9		8.1
°F		78			
Date	6-3-30	7-12-55	7-1-57	12-4-52	7-12-55
Depth	225.0	300	300	265	265
Lab.	CT	DWR	DWR		DWR
No.	107783	5937	T-893		5936

Well number	11/12-32E2	11/13-19C3	11/13-24A1	12/12-35R1	32/36-21Q1
Constituents in parts per million					
SiO_2	21			29	
Fe				0	
Ca	45	72	46	44	20
Mg	7	42	4.9	18	63
Na	49	60	74	a52	196
K	1.5	1.8	2.6		7
HCO_3	134	471	177	196	342
CO_3	0	0		0	0
SO_4	113	70	42	85	371
Cl	15	17	45	32	49
F	.8	1.0		.2	.2
NO_3	2.2	8.4	52		12
B	.20	.28	.16	.5	2.0
Dis. S.	390	538		455	
Sum	(321)	(504)	(354)	(358)	(888)
Hardness	(141)	(353)	135	181	(309)
%Na	(43)	27	54	38	
Micromhos	559	902	588	595	1,280
pH	7.8	7.3	7.4	8.0	8.0
°F		59	76		
Date	7-21-57	2-18-55	12-5-52	3-5-57	6-4-53
Depth	265	388	357	640	805
Lab.	DWR	DWR	QW	USN	DWR
No.	T-892	1872	5878		P-677

Well number	32/36-21Q1		32/36-22N1		32/36-35D1	32/36-35R1
Constituents in parts per million						
SiO_2		20			14	31
Fe					.26	0
Ca	55	82	87	31	97	90
Mg	28	30	27	51	59	27
Na	188	191	158	160	102	61
K	6.8	7.4	9.8	6.8		
HCO_3	244	363	276	205	149	191
CO_3	0	0		7	0	0
SO_4	375	370	392	372	376	235
Cl	48	49	46	49	67	50
F	.5	.6		.8	.5	.2
NO_3	4.5	4.9	2.2	5.0		
B	2.4	2.0	1.2	2.7		.47
Dis. S.	836	842		805	824	685
Sum	(828)	(936)	(859)	(786)	(789)	(589)
Hardness	(252)	(328)	328	(287)	378	338
%Na	61	(55)	50	(54)		28
Micromhos	1,260	1,420	1,290	1,260		955
pH	7.8	7.5	7.2	8.2	7.4	7.6
°F			75			78
Date	7-12-55	7-2-57	12-2-52	7-12-55	11-29-56	10-12-56
Depth	805	805	370	370	800	800
Lab.	DWR	DWR	QW	DWR	USN	USN
No.	R-746	T-875	5867	5935		

FIGURE 1

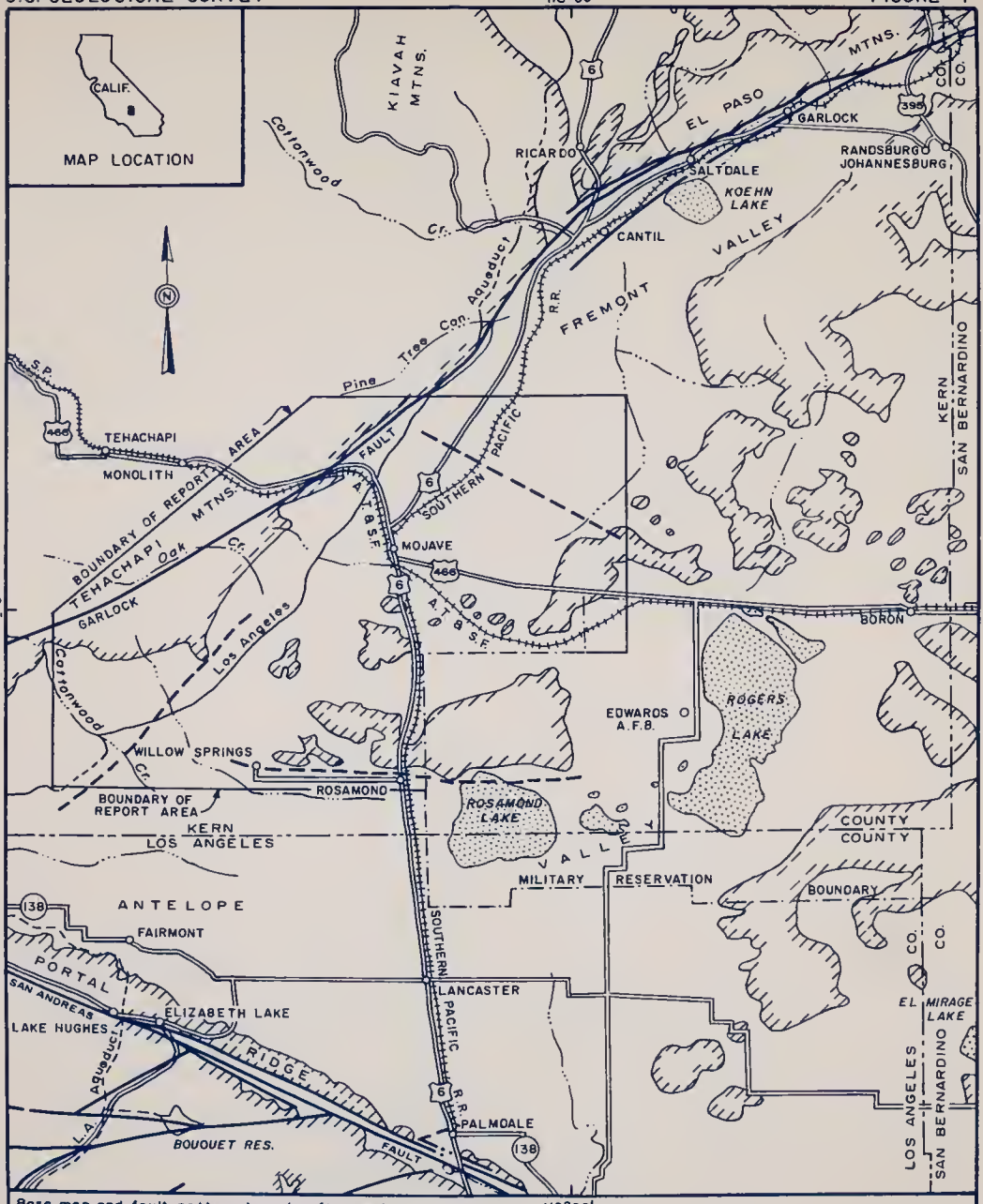


OF PART OF SOUTHERN CALIFORNIA
NG AREA COVERED BY THIS REPORT

SCALE OF MILES
4 0 4 8 12

U.S. GEOLOGICAL SURVEY

FIGURE 1



Base map and fault pattern largely after geologic map of California (Jenkins 1938)

LEGEND

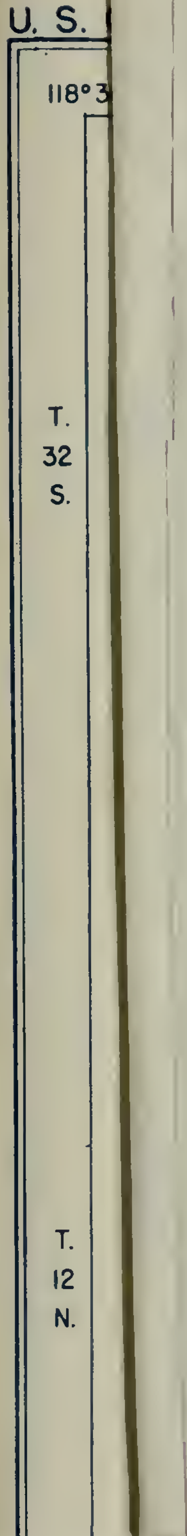
- VALLEY AREA
- MOUNTAIN AREA
- FAULT (DASHED WHERE INFERRED

MAP OF PART OF SOUTHERN CALIFORNIA SHOWING AREA COVERED BY THIS REPORT

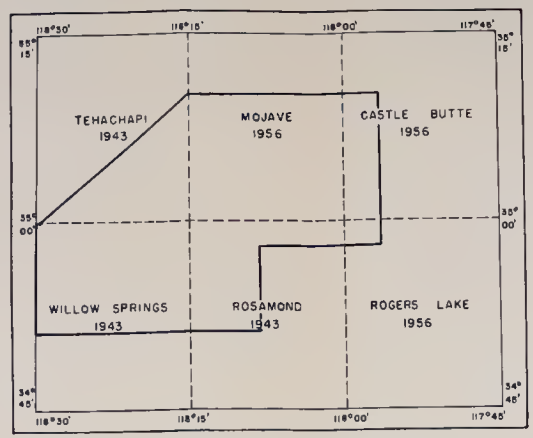
SCALE OF MILES

4 0 4 8 12


U. S.
118°3
T.
32
S.
T.
12
N.


U. S.
118°3
T.
32
S.
T.
12
N.

U. S. GEOLOGICAL SURVEY



INDEX TO TOPOGRAPHIC QUADRANGLE MAPS

LOCATION MAP

FIGURE 2


R. 36 E.
R. 37 E.
118°00'
T. 32 S.
T. 12 N.
T. 11 N.
35° 00'
M. D. B. & M.
S. B. B. & M.
NAVAL RESERVATION
MARINE CORPS AUXILIARY AIR STATION
MOJAVE
California City
Mendiburu Ranch
Horned Toad Hills
Soledad Mountain
Rosamond Hills
BISSELL
MUROC FAULT
SOUTHERN PACIFIC
ATCHISON TOPEKA & SANTA FE
Qoal
Qyf
Qyal
Qof
Qds
Tav
Tc
QTb
pTu
pbo
bc
bcpTu

Base from U S Geological Survey topographic maps, scale 1:62,500, 1959

MAP OF THE WILLOW SPRINGS, GLOSTER, AND CHA

SHOWING RECONNAISSANCE GEOLOGY AND LOCA

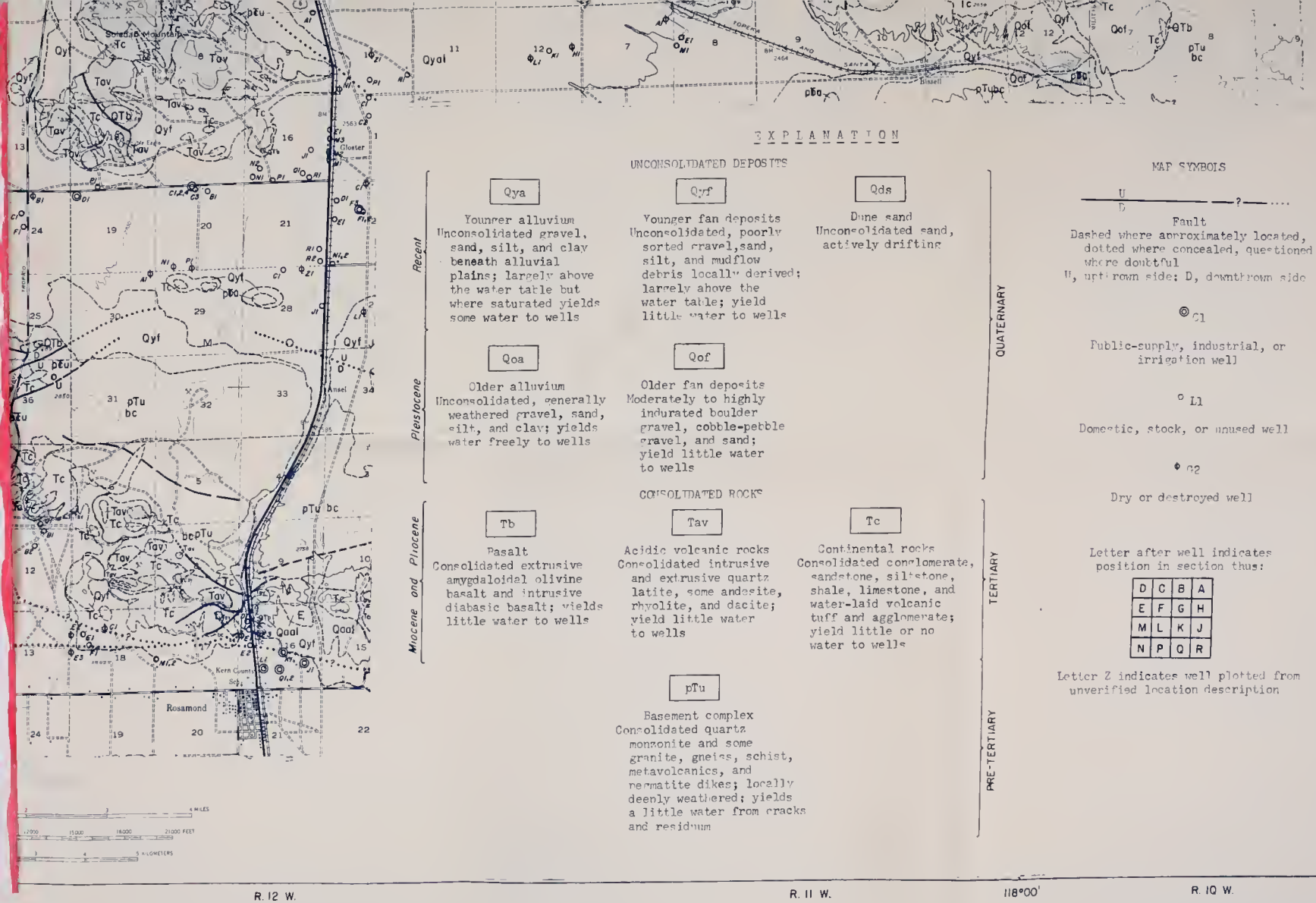
(INCLUDES PART OF ANTELOPE AND FREMONT

STATE OF CALIFORNIA

DEPARTMENT OF WATER RESOURC

FEDERAL-STATE COOPERATIVE GROUND WA

PREPARED BY U. S. GEOLOGICAL SURVE



EXPLANATION

UNCONSOLIDATED DEPOSITS

Recent

Qya — Younger alluvium
Unconsolidated gravel, sand, silt, and clay beneath alluvial plains; largely above the water table but where saturated yields some water to wells

Qyf — Younger fan deposits
Unconsolidated, poorly sorted gravel, sand, silt, and mudflow debris locally derived; largely above the water table; yield little water to wells

Qds — Dune sand
Unconsolidated sand, actively drifting

Pleistocene

Qoa — Older alluvium
Unconsolidated, generally weathered gravel, sand, silt, and clay; yields water freely to wells

Qof — Older fan deposits
Moderately to highly indurated boulder gravel, cobble-pebble gravel, and sand; yield little water to wells

QUATERNARY

CONSOLIDATED ROCKS

Miocene and Pliocene

Tb — Basalt
Consolidated extrusive amygdaloidal olivine basalt and intrusive diabasic basalt; yields little water to wells

Tav — Acidic volcanic rocks
Consolidated intrusive and extrusive quartz latite, some andesite, rhyolite, and dacite; yield little water to wells

Tc — Continental rocks
Consolidated conglomerate, sandstone, siltstone, shale, limestone, and water-laid volcanic tuff and agglomerate; yield little or no water to wells

TERTIARY

pTu — Basement complex
Consolidated quartz monzonite and some granite, gneiss, schist, metavolcanics, and pegmatite dikes; locally deeply weathered; yields a little water from cracks and residuum

PRE-TERTIARY

MAP SYMBOLS

U / D — ? — ....
Fault
Dashed where approximately located, dotted where concealed, questioned where doubtful
U, upthrown side; D, downthrown side

◎ C1
Public-supply, industrial, or irrigation well

° L1
Domestic, stock, or unused well

◆ G2
Dry or destroyed well

Letter after well indicates position in section thus:

D	C	B	A
E	F	G	H
M	L	K	J
N	P	Q	R

Letter Z indicates well plotted from unverified location description

Geology compiled by L. C. Dutcher, 1959, largely generalized after published and unpublished mapping by T. W. Dibblee, Jr. and L. C. Dutcher

R, AND CHAFFEE AREAS, CALIFORNIA

GY AND LOCATIONS OF WELLS

PE AND FREMONT VALLEYS)

ALIFORNIA

ATER RESOURCES

ROUND WATER INVESTIGATIONS

EOLOGICAL SURVEY