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GROUND WATER IN SANTA CLARA VALLEY CALIFORNIA

BY

WILLIAM O. CLARK

Prepared in cooperation with the
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GROUND WATER IN SANTA CLARA VALLEY, CALIFORNIA.

By William O. Clark.

INTRODUCTION.

Location and area.—Santa Clara Valley extends southeastward from San Francisco, lying between the Diablo Range on the northeast and the Santa Cruz and Gabilan ranges on the southwest. (See Pl. I.) Its north end is occupied by the southern part of San Francisco Bay. Toward the south it rises gradually and becomes increasingly rough until it ceases to be a valley. Its trend is approximately parallel to the Pacific coast and to the main structural trend of the Coast Ranges. The drainage basin of Santa Clara Valley is about 140 miles long and has a maximum width of about 45 miles; the area tributary to the valley south of latitude 37° 40′ is about 3,100 square miles.[1] The valley itself has a length of about 100 miles, of which 70 miles is south of San Francisco Bay, a maximum width of about 15 miles, and an area, exclusive of the part occupied by the bay, of about 590 square miles, or about 380,000 acres. This report covers only that part of Santa Clara Valley lying south of latitude 37° 40′, but there is some land north of this line on the east side of San Francisco Bay that may properly be considered a part of the valley.

Climate.—In Santa Clara Valley the year is divided into two well-marked seasons—a wet season and a dry season. The wet season may be regarded as extending from about November to April, inclusive. Each of the six months in the wet season has an average of more than 1 inch of rainfall, whereas for most parts of the valley each of the other six months (May to October, inclusive) has an average of less than 1 inch of rainfall, and four have averages of less than half an inch, July and August being almost rainless. (See precipitation data, pp. 47–50.)

The temperature of Santa Clara Valley is very mild. In winter it falls but little below the freezing point, and in summer it does not go extremely high. In the region around San Jose and farther north

[1] Most of the areal measurements in this report have been obtained by planimeter from maps or plates.

summer temperatures are usually between 75° and 85°F. at midday. Only five times within a period of 23 years has the temperature at San Jose reached 100° F.[2] Winter temperatures in this region rarely go below about 25°, the lowest recorded being 18° at San Jose, 20° at Menlo Park, and 25° at San Mateo.[3] South of San Jose the extremes are somewhat greater. High summer temperatures are more persistent, as perhaps also are the lower winter temperatures.

From the following table it is seen that the valley has a long growing season, which is necessary for some of the crops grown and which makes it possible to harvest several crops of the more quickly growing kinds during the season.

Average dates of latest and earliest killing frosts and length of growing season in or near Santa Clara Valley.[a]

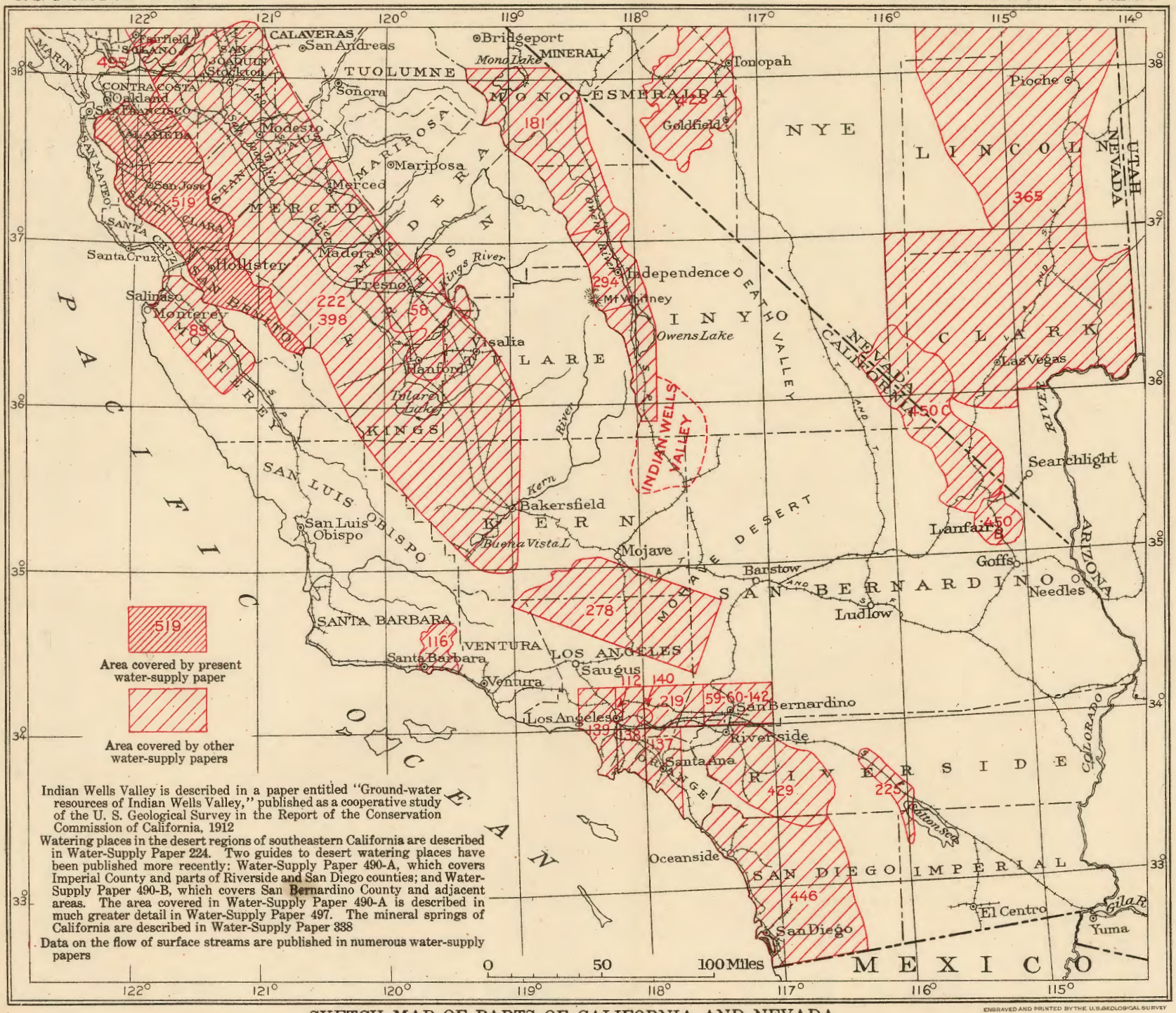
Station.	Length of record.	Average date of latest frost.	Average date of earliest frost.	Average length of growing season.
	Years.			*Days.*
Berkeley	15	Jan. 28	Dec. 15	320
Campbell	15	Mar. 28	Nov. 22	243
Gilroy	15	Feb. 25	Nov. 5	252
Los Gatos	15	Jan. 22	Dec. 14	325
Menlo Park	15	....do...	Dec. 24	335
Niles	12	Feb. 11	Nov. 30	290
Oakland	15	Jan. 7	Dec. 20	346
San Francisco	40	Jan. 25	Dec. 10	318
San Jose	15	Feb. 6	Nov. 27	292
Santa Clara	12	Feb. 27	Nov. 25	269

[a] U. S. Weather Bureau records.

Some snow falls on the bordering mountains in winter, but it does not last long. The nights are always cool and refreshing; even in the middle of summer it is necessary to sleep under blankets. During the summer the winds are generally light, and northwesterly winds are so prevalent that they are locally called the "trade winds." In winter the winds are more influenced by cyclonic storms, and they are more variable and have greater velocities. In summer the humidity of the air is relatively low, but in winter it is near the saturation point a large part of the time.

Agricultural development.—Santa Clara Valley as a whole is a region of intensive development. It is one of the richest valleys in California, and a large part of it is used for growing fruit. There are thousands of acres of orchard trees, including prunes, apricots, peaches, cherries, pears, and some apples and walnuts. Prunes are the leading crop, this valley being the home of the famous Santa Clara prune. The prune crop of Santa Clara Valley controls the prune market of the United States and has a large influence on that of the world.

[2] McAdie, A. G., Climatology of California: U. S. Weather Bureau Bull. L, p. 117, 1903.
[3] Idem, pp. 112, 115, 117.



SKETCH MAP OF PARTS OF CALIFORNIA AND NEVADA

Showing areas treated in the present report and in other water-supply papers of the U. S. Geological Survey relating to ground water

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This condition makes for a prosperous community, because when the prune crop is short in Santa Clara Valley the market price is higher, so that the orchardist gets almost as much money for half a crop as he does for a full one. A great many apricots also are grown, and the market conditions are nearly as favorable for the apricot grower as for the prune grower. These crops are almost wholly dependent on ground water for irrigation. In a few sections of the valley ground-water conditions are so unfavorable that both prunes and apricots are grown without irrigation, but the fruit is inferior and the trees are less vigorous. Most of the orchards are divided into holdings of 5 to 40 acres; individual holdings of 100 acres or more are rare.

There are still a few large farms covering hundreds of acres, but these are mostly devoted to raising barley and oat hay. These crops are usually grown without irrigation and are therefore cheap crops to raise, but they are also relatively unprofitable. Considerable areas are devoted to raising alfalfa. This crop is always irrigated, and five or six cuttings are obtained in a year. The hay is generally fed to dairy cattle on the ranch on which it is grown.

The valley also produces a large amount of garden seeds. The seed crops can be successfully grown without irrigation, although most of the farms have pumping plants.

Lately a considerable acreage has been planted to sugar beets, but this industry is still in the experimental stage, as it requires a large amount of cheap labor, and under present conditions this is difficult to obtain.

Large quantities of tomatoes of excellent quality are grown, and the long harvesting season contributes to a large annual yield. The tomatoes continue to ripen from the first of August until there is a killing frost, which does not usually occur before the later part of November or the first of December. (See table, p. 2.)

Importance of ground water.— Without irrigation the valley would of necessity be given over largely to the production of oat and barley hay and such other crops as could be matured on the moisture from the winter rains. Frequently there is a winter, or even two or three consecutive winters, in which the rainfall is very light, and in the next following summers much of the grain perishes long before harvest time for want of moisture. Without irrigation these conditions would cause very great reductions in land value and in the ability of the valley to support a large population.

All except a small part of the irrigation in the valley is done with water from wells. There is a little irrigation from surface water by spreading the winter floods over the land. Surface water is never available for irrigation in summer, and frequently there are no winter floods, hence this source of supply is very uncertain and of little

benefit. However, the winter floodings are of some value in adding to the ground water, which can be made available for irrigation during the growing season.

As the valley is almost wholly dependent upon ground water for irrigation, it would be difficult to overestimate the value of the supply. Unlike most other mineral products taken from the ground, the ground water is replenished at intervals, so that even if the draft is heavy there is no danger of permanently exhausting the supply. However, it should be distinctly understood that a ground-water supply can easily be overdeveloped. The value of the ground water in Santa Clara Valley is much greater than that of the land beneath which it lies—that is, the supply of ground water makes the land from three to six times as valuable as it would be without the water.

Purpose and methods of this investigation.—The chief purpose of the present investigation has been to estimate the quantity of ground water that is available each year in different parts of the valley and to determine how the supply can be best conserved and utilized. Two methods have been used for arriving at these estimates—the water-table method and the absorption method. The water-table method consists in determining by measurements of depth to water in wells, made at convenient intervals during a series of years, the amount the water table fluctuates, calculating from well logs the available pore space in the material in which the fluctuation occurs, and from these data estimating the quantity of ground water gained and lost in the fluctuation. The result expresses the annual replenishment or recharge to the ground-water supply and hence determines more or less closely the amount available for use. The absorption method consists in determining by measurements of stream flow at different places the amount of seepage losses from the stream between these places, which expresses the amount of water absorbed by the alluvium and approximates the amount of annual recharge.

Acknowledgments.—This investigation was made in financial cooperation with the California State Department of Engineering and was under the direction of O. E. Meinzer, chief of the division of ground water of the United States Geological Survey. Acknowledgment is due to the large number of residents of the valley who have voluntarily observed their own wells and sent the results of these observations to the Geological Survey. Without this voluntary assistance much of the detail of the investigation could not have been made. The assistance thus rendered is of great value, but the list is far too long to permit acknowledgment by personal mention. The late Dr. J. C. Branner aided the investigation by advice on many subjects. Acknowledgments are also due to Dr. J. P. Smith, Mr. H. L. Haehl, the Spring Valley Water Co., the People's Water Co., the Bay Cities Water Co., the Alameda Sugar Co., and the San Jose and Palo

Alto water departments. Levels were run in parts of the valley by L. F. Biggs, of the topographic branch of the Geological Survey. Well logs were obtained from a number of local drillers. G. W. LaPeire, jr., assisted in collecting well data in the vicinity of Hollister, and E. L. Elliott made measurements of water levels in wells in 1920.

SURFACE FEATURES.

GENERAL OUTLINE.

The region lying southeast of San Francisco between the Pacific Ocean and San Joaquin Valley contains a number of parallel mountain ranges that have a general southeast trend. Different portions of these mountains have received different names, as the Diablo Range, the Santa Cruz Mountains, the Gabilan Range, and the Santa Lucia Range. Some of these ranges are subdivided and locally bear other names, as the Contra Costa Mountains and the Mount Hamilton Range.

Lying between the Diablo Range on one side and the Santa Cruz and Gabilan ranges on the other is Santa Clara Valley. (See Pl. II.) The valley widens toward the north, where it includes the southern part of San Francisco Bay. It is divided into two drainage basins, one of which discharges into San Francisco Bay and the other into Monterey Bay. Several miles north of the drainage divide and about a mile north of Coyote station it is almost cut in two by hills projecting into it from the west. There are also a number of detached hills in different parts of the valley, some composed of hard rock and some of unconsolidated materials.

As the surface of the valley has been fashioned largely by the streams that flow from the adjacent mountains, it is most convenient and logical to describe first the mountains and their drainage systems and then the resultant valleys.

MOUNTAIN BORDERS.

MOUNTAINS EAST OF THE VALLEY.

General features.—The mountains east of Santa Clara Valley belong to the Diablo Range, which extends far south of this valley and has a length of about 275 miles, a maximum width of about 45 miles, and an average altitude of perhaps 3,000 feet above sea level. At its north end the range is split by Ygnacio Valley, and the portion west of this valley is known locally as the Contra Costa Mountains. The middle portion of the Diablo Range is locally known as the Mount Hamilton Range. It is separated from the Contra Costa Mountains by Alameda Canyon, Livermore Valley, and Altamont Pass (Pl. III), and may be regarded as terminated on the south by Pacheco Pass (Pl. II).

The mountains north of Altamont Pass reach their greatest elevation in Mount Diablo, which has an altitude of 3,849 feet above sea level, although it is only 10 miles from tidewater. Altamont Pass, 17 miles southeast of Mount Diablo, is less than 800 feet above sea level and is the lowest pass leading from San Joaquin Valley to the coast except the tidewater pass of Carquinez Strait. About 4 miles east of the south end of San Francisco Bay are Mission Peak and Monument Peak, respectively, 2,508 feet and 2,591 feet above sea level. About 2 miles east of these peaks lie the Sunol and Calaveras valleys, at altitudes of only about 250 and 700 feet, respectively. Farther south, about 14 miles directly east of San Jose, is Mount Hamilton, the seat of Lick Observatory, with an altitude of 4,209 feet above sea level, and Copernicus Peak, a part of the same mountain mass, with an altitude of 4,372 feet. (See Pl. III.) About 20 miles east of Gilroy is Pacheco Pass, about 1,470 feet above sea level. At the headwaters of San Benito River is San Benito Mountain, which is 5,258 feet above the sea. (See Pl. III.)

Intermontane valleys.—Within the Diablo Range and more or less completely surrounded by the mountains are a number of valleys ranging in size from less than 1 square mile to 50 or 60 square miles. (See Pls. II and III.) The most northerly of these valleys is Ygnacio Valley, which lies between the Contra Costa Mountains and the main mass of the Diablo Range and opens to Suisun Bay. It is about 8 miles long and has a maximum width of about 4 miles, and its altitude ranges from sea level to about 200 feet.

Southeastward from Ygnacio Valley stretch the narrow San Ramon and Amador valleys, which have a combined length of about 16 miles and an average width of less than half a mile. At its south end Amador Valley opens into Livermore Valley. The long, narrow trough of lowland comprising the two valleys represents an old drainage line through which the surface waters of Livermore Valley were formerly discharged into Suisun Bay.[4] At present there is a low divide between San Ramon and Amador valleys formed by the alluvial fan of San Ramon Creek.

Livermore Valley, in which are the towns of Livermore and Pleasanton, is the largest of the intermontane valleys. It is about 14 miles long from east to west, and its average width is about 3½ miles. The valley floor ranges in altitude from about 300 feet to about 600 feet above sea level.

Sunol Valley, which stretches southward from Sunol, is about 5 miles long and has a maximum width of a little more than a mile. Its floor stands at an average altitude of about 250 feet. In this valley are the large infiltration galleries of the Spring Valley Water

[4] Lawson, A. C., U. S. Geol. Survey Geol. Atlas, San Francisco folio (No. 193), p. 20, 1914. The future water-supply of San Francisco from the conservation and use of its present resources, p. 227, Oct. 31, 1912.

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TOPOGRAPHIC MAP OF DRAINAGE BASINS OF SANTA CLARA VALLEY, CALIF.

Showing areas covered by detailed maps

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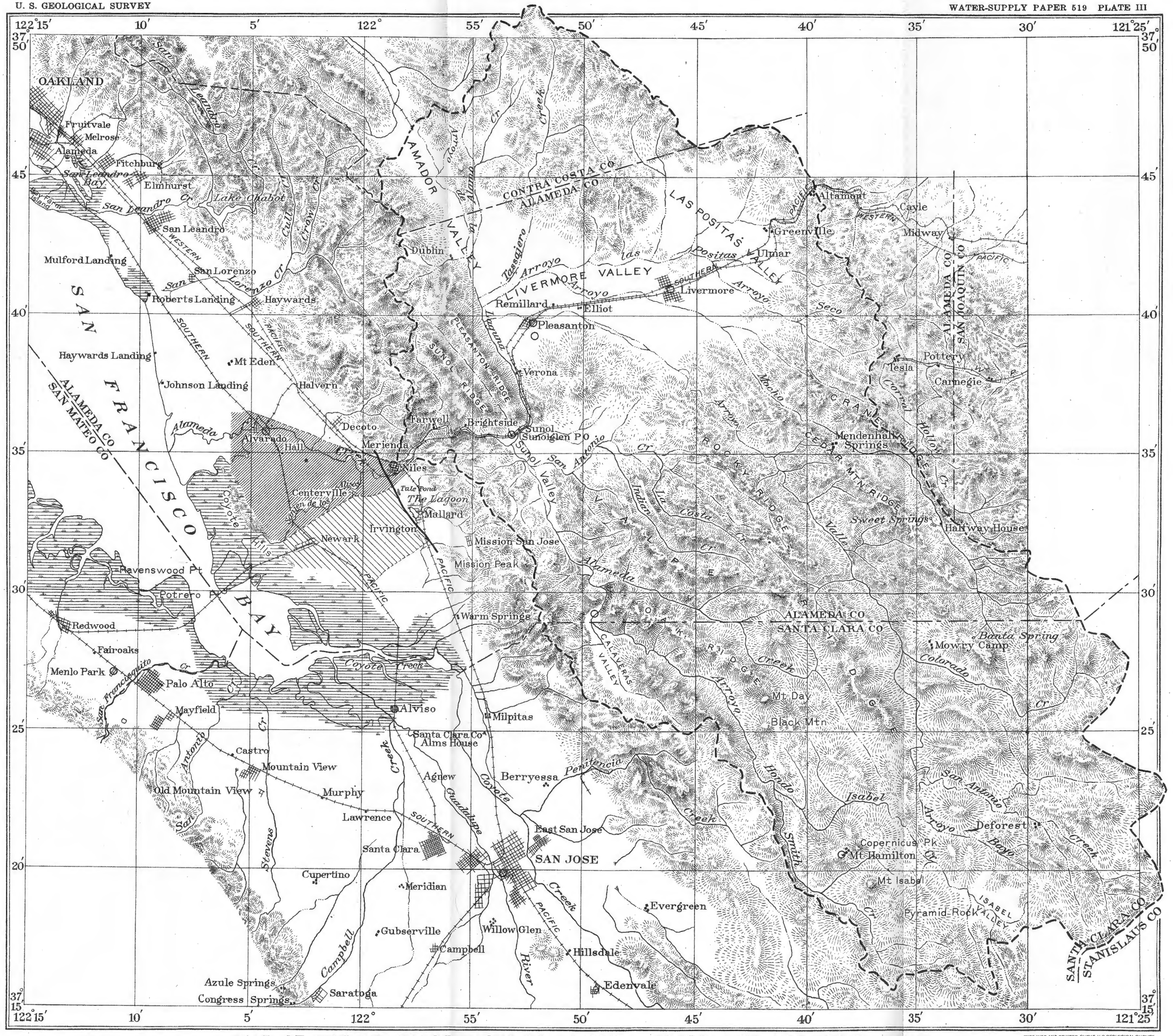

EXPLANATION

Niles-Irvington fault

Niles cone
(The alluvial cone built by Alameda Creek)
Ground water supplied by Alameda Creek

Tract west of the Niles-Irvington fault not belonging to the Niles cone but receiving its ground-water supply from Alameda Creek

Boundary of the drainage basin of Alameda Creek, which discharges upon the Niles cone

MAP OF THE DRAINAGE BASIN OF ALAMEDA CREEK AND ADJACENT AREAS

Scale 1 : 250,000

5 0 5 10 Miles

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Co. The ground water collected in them forms a considerable part of the water supply of San Francisco.

Calaveras Valley, 9 miles east of north from San Jose, is about 3 miles long, and its maximum width is somewhat less than a mile; its floor has an average altitude of about 700 feet and is surrounded on every side by mountain walls. It forms an ideal site for a reservoir, and the Spring Valley Water Co. has made use of it by building a hydraulic-fill earth dam across the upper end of the gorge through which the valley is drained. This dam will have a crest length of 1,300 feet, a base width of 1,300 feet, a height of 240 feet, and a volume of 3,100,000 cubic yards. It will impound 163,000 acre-feet of water, which will have a maximum depth of about 225 feet.[5]

At least some of these valleys owe their origin to the extensive faulting or other earth movements by which the region has been affected in recent geologic time. Livermore Valley doubtless in part at least owes its origin to the Calaveras fault,[6] which runs along its western border. Sunol and Calaveras valleys were formed by the same fault. Castro Valley, just north of the town of Haywards, doubtless also originated in faulting.[7]

Farther south are a number of small valleys, such as Halls Valley, San Felipe Valley, and Isabel Valley. One of these small valleys, in the drainage basin of Coyote Creek, is the site of a proposed reservoir for irrigating the Morgan Hill district. Still farther south are others, such as the Santa Ana, in the drainage basin of Pajaro River. Several intermontane valleys that do not belong to the drainage basin of Santa Clara Valley also lie in the Diablo Range, as Panoche Valley, Little Panoche Valley, Priest Valley, Peachtree Valley, and Bitterwater Valley.

Mountain lakes and ponds.—Many small sheets of water are scattered throughout the Diablo Range. Most of these are mere ponds, but all are significant in that, like the valleys, they seem to follow structural lines. Many of them are now represented only by little meadows, others are wet-weather ponds, and still others are permanent lakes. The largest of the permanent lakes, however, have been artificially made by closing the mouths of valleys. Lake Chabot, lying about 2 miles east of San Leandro, is the largest of these lakes. It is about 3 miles long and a quarter of a mile wide. Although it is artificial it undoubtedly owes its position to a fault[8] which crosses San Leandro Creek and which has its downthrow on the east or upstream side. The fault crosses the creek near its junction with Grass Creek, and the lake occupies parts of the valleys of both

[5] Elliott, G. A., engineer for Spring Valley Water Co., address read before the San Francisco members of the American Society of Civil Engineers, Oct. 17, 1917.

[6] California State Earthquake Comm. Rept., 1908.

[7] Lawson, A. C., op. cit., structure sheet.

[8] Idem.

streams. There are a number of small lakes or ponds, such as Twin Lakes, in the drainage basin of Coyote River and some small ponds east of Gilroy and northeast of Hollister. At least some of these owe their existence to earth movements.

MOUNTAINS WEST OF THE VALLEY.

General features.—The mountain area west of Santa Clara Valley comprises the Santa Cruz Mountains and the Gabilan Range. The Santa Cruz Mountains extend from the Golden Gate to Pajaro Gap, a distance of about 85 miles, and their maximum width is about 20 miles. The narrowest and lowest part of the range occupies the north end of the San Francisco Peninsula; the widest and highest part lies only a few miles north of Santa Cruz. South of this point the range rapidly narrows until it is only about 6 miles wide at Pajaro Gap. About two-thirds of the mountain area lies west of the crest of the range.

The Gabilan Range extends southeastward from Pajaro Gap. Its lowest and narrowest part is just south of this gap. South of Chalone Peak it ceases to be a prominent topographic feature. If this peak is regarded as its limit, the range has a length of about 40 miles and a maximum width of about 15 miles.

The northern portion of the Santa Cruz Mountains is more or less distinctly set off from the rest of the range by Merced Valley. This valley is a troughlike depression with a southeast trend. Near its north end is Merced Lake. The highest point in this valley, at the town of Colma, is only about 190 feet above sea level.[9] The highest point in the block north of the valley is on San Bruno Mountain, 1,315 feet above sea level. In the main portion of the Santa Cruz Mountains, lying south of Merced Valley, there are several peaks that rise more than 2,500 feet above sea level. Castle Rock Ridge reaches an elevation of 3,000 feet; the highest point in the range is Loma Prieta, 3,806 feet above sea level, situated at the headwaters of Guadalupe Slough, Llagas Creek, and Uvas Creek, which flow into Santa Clara Valley, and of Soquel Creek, which flows directly into Monterey Bay.

A most significant topographic feature of the Santa Cruz Mountains, particularly well marked in the northern part, is the long chain of valleys that extends, with interruptions, from Mussel Rock to Pajaro Gap. These valleys lie along the San Andreas fault, which extends many miles beyond the area here under consideration. At the time of the San Francisco earthquake of April 18, 1906, there was movement along this fault for about 300 miles.[10]

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[9] Holway, R. S., Physiographic unfinished entrances to San Francisco Bay: California Univ. Pub. in Geography, vol. 1, No. 3, p. 100, Apr. 4, 1914.

[10] California Earthquake Comm. Rept., 1908. Lawson, A. C., op. cit., p. 2.

Branner, Newsom, and Arnold[11] make the following statement:

The most important structural feature of the Santa Cruz quadrangle is the great fault passing through Portola. This fault, which extends many miles beyond this quadrangle and is known throughout its length as the San Andreas fault, enters the north side of the quadrangle in the valley occupied by Crystal Springs Lake and passes southeastward across the area to the center of the eastern boundary about 5 miles southeast of Saratoga. It is locally referred to as the Portola and Stevens Creek fault. At some places it is made up of two or more parallel fractures; at other places it forms a highly crushed zone half a mile wide. A series of northwest-southeast valleys has been formed along the fault line. Crystal Springs Lake lies in the San Andreas fault valley, and the valleys of West Union Creek, Corte de Madera Creek, and Stevens Creek all follow the fault. Its effect on the topography is very marked for many miles both to the northwest and to the southeast of the Santa Cruz quadrangle.

Lawson[12] says:

The most remarkable linear feature is the valley in which lie San Andreas and Crystal Springs lakes, a short segment of the San Andreas rift valley, a feature due to repeated faulting in recent geologic time. The trace of the fault of 1906 follows this rift for about 300 miles. The valley is due in part directly to earth movement but in large measure also to the mashing of the rock in the fault zone and its consequent easy erosion.

Sea terraces form another conspicuous topographic feature of the Santa Cruz Mountains. These terraces are best developed near Santa Cruz, where there are five, but are well defined at other places. The lowest and youngest of them is very recent, being very little affected by erosion. The streams crossing it are only slightly incised, the smaller ones flowing in ditchlike trenches only a few feet deep. The higher and older terraces are successively more and more dissected by erosion, and their features less and less distinctive.[13]

In general the topography of the Santa Cruz Mountains is rugged. As the crest of the range is nowhere more than 15 miles from the coast, the streams on the west side have short, steep courses and cut narrow and steep-walled canyons. The crest is much nearer to the eastern foot of the mountains than to the sea, so that the streams on the east side are even more precipitous than those on the west.

A considerable part of the western slope of the Santa Cruz Mountains is covered by a dense redwood forest. A notable forest area is found in the Big Basin country, in which lies California Redwood Park. This park has been set aside by the State and fitted up for a camp ground and has become a notable resort, being visited by thousands of persons each summer.

In the southeastern part of the Santa Cruz Mountains and near-by regions the topography suggests a recent sinking of the land. This

[11] Branner, J. C., Newsom, J. F., and Arnold, Ralph, U. S. Geol. Survey Geol. Atlas, Santa Cruz folio (No. 163), p. 9, 1909.

[12] Lawson, A. C., op. cit., p. 2.

[13] Branner, J. C., Newsom, J. F., and Arnold, Ralph, op. cit., p. 6.

is seen in such features as San Felipe or Soap Lake, on the eastern border of Santa Clara Valley, the Bolsa, the more or less detached hills along the borders of Santa Clara Valley, particularly between Morgan Hill and Gilroy, the prolongation westward of that part of the valley along lower San Benito River, the eastward extension of Pajaro Valley and other small valleys in the northern part of the Gabilan Range and the numerous swamps in the vicinity of Salinas.

Intermontane valleys.—Valleys are not so striking a feature of the mountains on the west side of Santa Clara Valley as of those on the east side, but they are by no means lacking. The most notable of these valleys is the long, narrow valley or series of valleys following the San Andreas fault, which forms a very pronounced topographic feature from Mussel Rock, on the ocean shore, to a point beyond Portola, a distance of about 26 miles. Throughout this distance the valleys have a remarkably straight trend, about 35° W. About 9½ miles of this trough is occupied by San Andreas and Crystal Springs lakes, which are artificial reservoirs contributing to the water supply of San Francisco. There are other lesser valleys and flats in the Santa Cruz Mountains. These are most abundant along the western border of Santa Clara Valley between Morgan Hill and Gilroy, though not entirely confined to this region. Notable among them is Paradise Valley, near Morgan Hill.

Mountain lakes and ponds.—There are a number of lakes in the Santa Cruz Mountains, most of them artificial, but the location of some of these reservoirs is as significant as if they were natural lakes. A chain of lakes and reservoirs extends southeastward from Mussel Rock for about 40 miles along the line of the great San Andreas fault In the vicinity of San Andreas and Crystal Springs lakes the fault is composed of two more or less parallel fractures, the intermediate block being dropped down to form the rift valley in which the lakes are situated.[14] There are a number of small lakes farther south, such as Soda Lake, about 1½ miles east of Pajaro Gap. The water of this lake, as indicated by its name, is strongly alkaline.

Along the ocean shore there are a number of small lakes and lagoons formed by the beach sands damming the mouths of streams. The largest of these is Merced Lake, near San Francisco.

DRAINAGE.

San Lorenzo Creek.—Cull Creek and Palomares Creek come together at the southern edge of Castro Valley and form San Lorenzo Creek (Pl. X), which enters Santa Clara Valley at the town of Haywards and crosses the valley to San Francisco Bay. The headwaters of Cull Creek are just across the Alameda County line in Contra Costa

[14] Branner, J. C., Newsom, J. F., and Arnold, Ralph, op. cit., p. 9.

County, at an elevation of about 1,900 feet. Crow Creek, almost as large as Cull Creek, joins it just above its confluence with Palomares Creek. San Lorenzo Creek drains an area of about 46 square miles which has an average altitude of 1,000 to 1,200 feet above sea level.

Alameda Creek.—Alameda Creek has a drainage area of 620 square miles above Sunol dam and about 13½ square miles between Sunol dam and the mouth of Alameda Canyon, giving a total mountain drainage area of about 634 square miles. The drainage system comprises two main branches which, flowing almost directly toward each other, join in the vicinity of Sunol and discharge their united waters through a canyon about 6 miles long, which has its outlet at Niles. (See Pl. III.) The south branch, called Alameda Creek, rises on the northern slopes of Packard Ridge a few miles north of Mount Hamilton and just east of Rattlesnake Butte, which has an altitude of 3,444 feet above sea level, flows west and north to Sunol, and thence west to the bay. It receives the waters of Calaveras Creek, San Antonio Creek, and several smaller streams.

The north branch, known as Arroyo de la Laguna, is the outlet of Amador Valley and of Livermore Valley, which receives the waters of several streams, the largest of which are Arroyo Valle, Arroyo Mocho, and Arroyo Las Positas.

Calaveras Creek has a drainage area of approximately 100 square miles. Its principal tributary, Arroyo Hondo, is formed by the junction of Isabel and Smith creeks. Isabel Creek rises near the boundary line between Santa Clara and Stanislaus counties, flows through Isabel Valley, passes round Mount Hamilton on the east and north, and joins Smith Creek about 4 miles northwest of Mount Hamilton. Smith Creek rises on the western slopes of Pine Ridge at an altitude of about 3,400 feet and passes west of Mount Hamilton to its junction with Isabel Creek. From the junction of these streams Arroyo Hondo leads to the lower end of Calaveras Valley, where it discharges into Calaveras Creek. The united waters then pass through about a mile of steep-walled canyon and discharge into Alameda Creek. Calaveras Creek carries little water above its confluence with Arroyo Hondo.

San Antonio Creek, which discharges into Alameda Creek from the east a short distance above Sunol, has a drainage area of about 35 square miles and lies at altitudes ranging from 500 to 3,600 feet above sea level.

Arroyo Valle, which discharges through the southern part of Livermore Valley into Arroyo de la Laguna, receives the drainage of about 150 square miles—the largest single unit in the Alameda drainage basin. Its headwaters are on the borders of Santa Clara and Stanislaus counties, 2,500 to 3,000 feet above sea level.

Arroyo Mocho, which also discharges into Livermore Valley, has a drainage area of approximately 50 square miles. It has its source near the common corner of Alameda, San Joaquin, Stanislaus, and Santa Clara counties. For most of its course it flows through a region that is from 2,500 to 3,000 feet above sea level.

Among the other streams discharging into Livermore Valley the two largest are Arroyo Las Positas and Arroyo Seco. Arroyo Las Positas has a drainage area of perhaps 80 square miles above its junction with Arroyo Mocho. Most of this area is comparatively low, but a few of the peaks included in it reach considerable altitudes, as Windy Peak, at the headwaters of Tassajero Creek, 2,158 feet above sea level, and another peak about 9 miles north of Livermore, at 2,589 feet.

Coyote Creek.—The mountain portion of the drainage basin of Coyote Creek has an area of 193 square miles.[15] (See fig. 4, p. 38.) The surface is rough, and considerable parts of the area stand at altitudes of more than 2,000 feet above sea level. About the headwaters of this creek in Pine Ridge the altitude reaches 3,626 feet. The slopes of the mountains are practically barren of timber, and very little brush grows on them, so that the run-off is unobstructed and floods are frequent. The course of the Coyote is peculiar in that three times on its way out of the mountains it doubles on itself by sharp turns. After leaving the mountains it hugs the east side of Santa Clara Valley for 7 or 8 miles and then passes through what is known as the lower gorge, about a mile below Coyote station. Here the Santa Clara Valley narrows to only about 1,200 feet. Between 4 and 5 miles farther downstream the creek passes behind a point of a projecting hill through what is known as The Narrows. Here the stream flows over bedrock. Below The Narrows the valley recedes eastward, leaving the Coyote 3 or 4 miles from its border. The stream continues its course through the broad level floor of the valley for about 18 miles and then enters the south end of San Francisco Bay.

Pajaro River.—The mountain drainage of the Pajaro River may be divided into three parts—(1) that above San Felipe Lake and east of it, or the mountainous part lying east of Santa Clara Valley, which is drained by Pacheco Creek and other small streams; (2) that on the west side of Santa Clara Valley and north of the Pajaro, drained chiefly by Llagas and Carnadero creeks; and (3) the mountain borders on both sides of the valley south of the Pajaro drained by San Benito River, which joins the Pajaro just as it is entering the canyon west of the valley. (See Pl. II.) The Pajaro has a larger drainage area than any other stream entering Santa Clara Valley. Its drainage area east of Pajaro Gap is about 37 per cent of the

[15] McGlashan, H. D., and Stevens, G. C., Surface water supply of the United States, 1912, pt. 11, Pacific coast basins in California: U. S. Geol. Survey Water-Supply Paper 331, p. 102, 1914.

entire drainage basin of Santa Clara Valley exclusive of that portion occupied by San Francisco Bay. Practically every stream south of Madrone is tributary to this river.

The total area tributary to the Pajaro above Pajaro Canyon is about 1,150 square miles, that of the San Benito alone being about 530 square miles. About one-sixth of the Pajaro drainage basin east of the caynon is in Santa Clara Valley, the other five-sixths lies on the mountains. The highest peaks of the Diablo Range are around the headwaters of San Benito River. The highest peak in the Santa Cruz Mountains is on the headwaters of Llagas and Carnadero creeks, hence Pajaro River receives water from the highest peaks of both the Diablo and Santa Cruz ranges.

Guadalupe Slough.—Guadalupe Slough drains approximately 100 square miles of the Santa Cruz Mountains, including the mountain drainage of Los Gatos Creek, which joins the Guadalupe after they reach Santa Clara Valley. (See Pls. IX and XIV.) From the vicinity of San Jose to San Francisco Bay the Guadalupe is practically a perennial stream. In this stretch it runs nearly parallel to Coyote River, generally at a distance of less than 2 miles. Both the Guadalupe and Los Gatos Creek receive water from Loma Prieta.

Stevens Creek.—Stevens Creek rises northwest of Black Mountain, at an altitude of about 2,300 feet. As it receives the drainage from the western or rainy side of Black Mountain it is a relatively good water producer. (See Pls. IX and XIV.) It has a mountain drainage area of 21 square miles. In its upper course it follows the San Andreas fault for about 6½ miles; then it makes a semicircular turn, leaves the Mountains, flows almost due north to San Francisco Bay.

San Mateo Creek.—San Mateo Creek rises about a mile west of San Andreas Lake, at an elevation of about 1,100 feet. (See Pl. XII.) It has a mountain drainage area of about 33 square miles. Nearly 15 miles of the San Andreas fault valley is tributary to this creek. It flows for about 6½ miles almost parallel to the valley, at no place being more than about a mile distant. Then it swings across the valley, and receives the waters of the valley from both directions. Breaking through the eastern valley wall in a sharply incised canyon, it passes into San Francisco Bay. At the upper end of this canyon is the Crystal Springs dam, a concrete structure 283 feet high, behind which can be stored 23,000 million gallons, or about 70,000 acre-feet of water. A large part of the water of this drainage basin is impounded and used to supply San Francisco.

Other reservoirs of the Spring Valley Water Co. on San Francisco Peninsula are San Andreas Lake, with a capacity of 6,000 million gallons, or about 18,000 acre-feet; Pilarcitos Reservoir, with a capacity of 1,000 millon gallons, or about 3,000 acre-feet; and Merced Lake with a capacity of 2,500 million gallons, or about 7,672 acre-feet.

The total storage capacity of the reservoirs of the company's peninsula system is thus about 98,600 acre-feet.

VALLEY AREA.

GENERAL FEATURES.

Santa Clara Valley is a long troughlike depression (Pl. II), whose axis trends about N. 40° W. The valley floor gradually rises southward to the divide in the vicinity of Madrone and Morgan Hill, where, at the lowest point of the divide, it has an altitude of 353 feet above sea level. South of the divide the surface gradually descends to Pajaro River, Sargent, on the river, being only 139 feet above sea level. South of the Pajaro the surface rises again toward the head of the valley. The altitude given on the Southern Pacific Co.'s station at Hollister is 285 feet, that at Tres Pinos is 515 feet. The borders of the valley are in most places higher than the middle portion, but there are notable exceptions to this rule.

HILLS IN THE VALLEY.

Coyote Hills.—East of San Francisco Bay, on the edge of the salt marsh near the town of Newark, are two groups of rock hills known as the Coyote Hills and Little Coyote Hills. (See Pls. X and XI.) The mud flats of San Francisco Bay extend up to the western base of the Coyote Hills, and at the north end of the chain there are two small hills separated from each other and from the main mass by salt-water sloughs and salt marsh. The Coyote Hills reach an altitude of a little more than 390 feet above sea level and appear to be the tops of mountains whose bases are buried beneath the valley alluvium. They are separated from the Little Coyote Hills by about half a mile of salt marsh. The origin of the Little Coyote Hills is no doubt the same as that of the Coyote Hills. They are similar in all respects, but the Little Coyote Hills are only about 50 feet high.

Coyote Knolls.—On the west side of San Francisco Bay, near San Mateo, are two rock hills separated from each other by about 3½ miles of salt marsh. (See Pl. XII.) Big Coyote Knoll lies about 1½ miles north of San Mateo, and its base is washed by the waters of the bay. It is about 100 feet high, is of the same formation as the Coyote Hills east of the bay, and doubtless has a similar origin. Little Coyote Knoll is nearly on the water's edge and lies about 2½ miles east of the west edge of the salt marsh.

Edenvale Hills.—East of the Edenvale station the rock hills bordering the valley project into it in the form of a peninsula, and a spur or westward prolongation of this peninsula is cut off from the main portion by Coyote Creek. Here the creek flows through a rock gorge locally known as The Narrows and is apparently a superimposed stream, though no remnant of valley alluvium has been found on these hills. (See Pls. XIV, XV.)

Lick Hills.—Immediately west of the station at Lick (Hillsdale) is a group of completely detached rock hills (Pls. XIV, XV), which are separated from the Edenvale group by about a mile of valley alluvium of unknown depth. They reach an altitude of about 450 feet above sea level, or about 300 feet above the valley floor. This group of hills is almost divided into three groups, the lowest pass between them being less than 25 feet above the valley floor. There are two or three quicksilver prospects in this group of hills.

Bailey Avenue Hills.—Southwest of Coyote and about three-fourths of a mile west of the State highway, on Bailey Avenue, San Jose, are two small detached rock hills completely surrounded by fresh-water swamp, with Laguna Seca lying between them and the valley wall. The higher of these hills is 384 feet above sea level and about 125 feet above the swamp at its base. (See Pls. XVI, XVII.)

Hill at lower gorge.—About a mile north of Coyote station the valley is abruptly narrowed by a tongue of rock extending out from the western border to Tulare Hill, within about 1,200 feet of the eastern wall. (See Pls. XVI, XVII.) Through this narrow pass flows Coyote Creek. North of this projecting tongue of rock the valley abruptly expands again to a width of several miles.

Gilroy Hills.—Besides the fringe of more or less detached hills on the western border of the valley between Morgan Hill and Gilroy there are two completely detached rock hills 2 or 3 miles northwest of Gilroy. The higher of these is 400 feet above sea level and about 150 feet above the valley floor. (See Pls. XVI, XVII.)

Lomerias Muertas.—The next group of hills to the south is the Lomerias Muertas, which lies immediately above the junction of San Benito and Pajaro rivers. (See Pl. XVIII.) This group of hills covers a larger area and reaches a greater altitude than any other group in the valley. Their highest point is 1,137 feet above sea level and about 1,065 feet above the mouth of San Benito River. The hills are composed of only partly consolidated materials, a part of which, at least, is of marine origin. Some of the slopes are steep, and in places the sides of the hills are marked by well-defined terraces.

Hollister and Bolsa hills.—There is a group of hills at the northern edge of the town of Hollister and another group about 3 miles farther north, on the edge of the low swampy plain which is called the Bolsa de San Felipe. (See Pl. XVIII.) These hills appear to be of alluvial origin, and those near Hollister contain considerable gravel, which has been used for road metal. The gravel is largely granitic, and many of the boulders are so much decomposed that they can be crumbled in the hands. They represent an older alluvium than the main valley floor and no doubt correspond to the terraces that are well defined at the south end of the valley.

ALLUVIAL FANS.

General features.—Alluvial fans or cones are common features of arid and semiarid countries. They result from abrupt changes in the gradients of streams and commonly extend into valleys from the points where streams emerge from the mountains. The term fan is more properly applied to features of low gradient and cone to those of steeper slopes, but this rule is not always followed. The fans with gentle slopes are formed by streams, most of them perennial, that carry an abundance of water in proportion to their loads of débris; those with steeper slopes are formed by streams, generally intermittent, in which the load of débris is large in proportion to the amount of water.

There are many alluvial fans on the borders of Santa Clara Valley, and they range from very small ones up to those covering thousands of acres. Most of them are low and wide and do not form conspicuous features. In many parts of the valley the fans have run together, forming compound fans or alluvial slopes. The Penitencia fan, east and northeast of San Jose, may be considered as a compound fan made up of deposits from Penitencia Creek, Berryessa Creek, and several smaller streams, though its form has been imposed upon it by the largest stream. (See Pl. XII.) The most prominent fans are found on the east side of the valley. This is due mainly to the fact that the streams of largest drainage area rise in the mountains east of the valley and in part to the fact that the slopes of these mountains are more sparsely wooded than those on the west, a condition which tends to make the streams more torrential than those issuing from the mountains west of the valley.

San Lorenzo fan.—The San Lorenzo fan has been formed from materials brought down from the mountains by San Lorenzo Creek. (See Pl. X.) It has a gradient of about 25 feet to the mile and an area of about 20 square miles, including a considerable extent of salt marsh. The mountain drainage tributary to this fan is 46 square miles. (See p. 11.)

Niles cone.—The so-called Niles cone is an alluvial fan that was built by Alameda Creek. (See Pls. IV and X.) It has a gradient of only 10 or 12 feet to the mile, which is the lowest gradient among all the fans in Santa Clara Valley. Its area, exclusive of the salt marsh, is about 18 square miles, and the area of the drainage basin tributary to it is 634 square miles. (See p. 11.) Compared with other alluvial fans in this vicinity, the Niles cone is small in proportion to its drainage basin. Its size has been restricted largely by the fact that little material for the cone came from above the 13½ square miles of the Alameda Creek drainage basin lying southwest of Livermore Valley, most of the alluvial material derived from the

upper 620 square miles of the basin being left behind in Livermore, Sunol, and other valleys. Its low gradient is due to the fact that Alameda Creek has a large flow relative to its load of detritus.

Penitencia fan.—The Penitencia fan lies northeast of San Jose and occupies an area of 10 or 12 square miles. Its slope is about 50 feet to the mile.

Coyote fan.—The Coyote fan extends entirely across the valley, which is here only about 2½ miles wide. It has a slope of about 25 feet to the mile and an area of about 14 square miles. The drainage basin tributary to it covers about 193 square miles. The Coyote fan forms a drainage divide. The streams that enter the valley north of it discharge into San Francisco Bay, and those that enter the valley south of it discharge into Monterey Bay. Coyote Creek at present discharges into San Francisco Bay, but in the process of building the fan it doubtless at times discharged into Monterey Bay.

LAKES AND SWAMPS IN THE VALLEY.

Marine marshes.—Along the shore of San Francisco Bay is a considerable area of salt marsh. None of this land is more than a few feet above sea level, and it is much cut up by sloughs through which the tides flow. (See Pls. X–XV.)

Lakes and inland swamps.—A number of small inland swamps are found in Santa Clara Valley; these owe their existence to certain geologic and topographic features that cause the ground water to rise to the surface. Where the supply of water is sufficient a fresh-water swamp is formed, and where the supply is meager an alkali flat or swamp results.

Tule Pond and The Lagoon, between Niles and Irvington, and the adjacent swampy tracts (Pl. X) originated from faulting. (See p. 18.)

The swamp east of San Jose (Pl. XIV) probably owes its origin to the building of the alluvial fans of Coyote Creek and Penitencia Creek on opposite sides of it. The finer materials deposited on the margin of the Penitencia fan probably tend to obstruct the movement of the ground water percolating from Dry Creek and thus bring it to the surface in the swamp.

Laguna Seca, situated southwest of Coyote (Pls. XVI, XVII), and the swampy lands adjoining owe their origin to the fact that the area occupied by them is lower than the land nearer Coyote Creek and to the fact that the projection of hard rock nearly across the valley west of them stops the progress of ground water and forces it to rise. A small intermittent stream discharges into this swampy tract, but its flow is probably not sufficient during the dry season to supply more than a part of the water that evaporates from the lake and swamp. However, the stream that discharges from the swamp into Coyote Creek is perennial except in the very driest seasons, as in

1914. For these reasons it is believed that most of the water of the lake and swamp is ground water supplied by percolation from Coyote Creek farther up the fan.

A large salt marsh, or alkali flat, known as the Bolsa de San Felipe, lies between Pajaro River and Hollister (Pl. XVIII), at an altitude of about 150 to 200 feet above sea level. Much of it is covered with a rather sparse growth of salt grass, and its soil is too alkaline to be used for anything except pasture. The limits of the Bolsa are indefinite, as it grades into tillable land. Attempts have been made to utilize this land for agriculture, but they have met with little success.

San Felipe or Soap Lake lies on the northern border of the Bolsa and receives the drainage of Pacheco Creek and other streams. (See Pl. XVIII.) At high-water stages this lake may overflow into Pajaro River, but more of the time it has no outlet, and therefore its waters contain considerable alkali, which by its action on the vegetable matter present gives them a decidedly brownish color, particularly at the low-water stage.

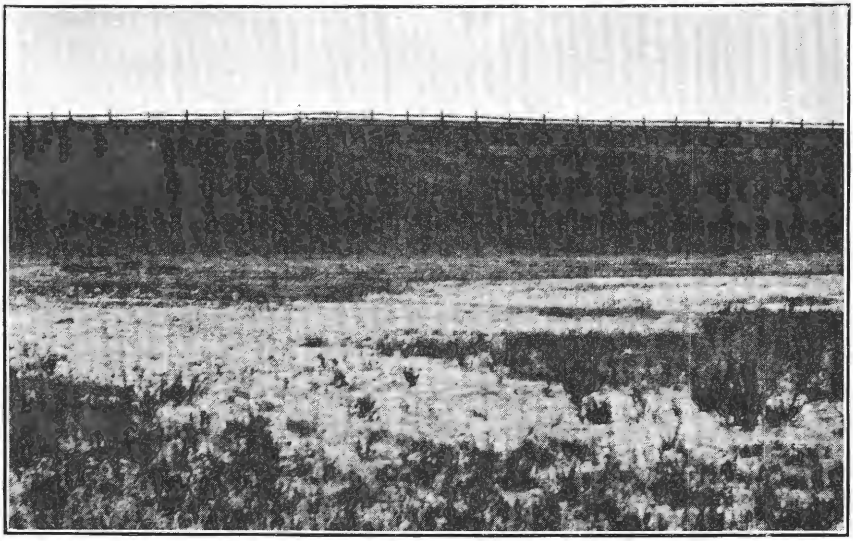
FAULT SCARPS.

Just how much of the lake and swamp area of Santa Clara Valley may be due to earth movements is not certain. Tule Pond and The Lagoon, between Niles and Irvington, clearly owe their existence to recent faulting, which has produced a conspicuous escarpment in this otherwise nearly flat area. The escarpment, which faces the mountains and trends N. 35° W., crosses a reentrant of the valley and cuts off the apex of the Niles cone together with some of the flat land to the south. It begins near Tule Pond and extends past The Lagoon to the town of Irvington. It ranges in height from only a few feet to 20 or 25 feet at its highest point at The Lagoon. (See Pl. IV, *B*.) A distinct ridge approaches this escarpment from the west in the vicinity of The Lagoon, as if there had been some thrusting force that caused a slight buckling at the time of faulting. Southwest of the ponds rises the abrupt fault scarp, but on the northeast side there is no perceptible bank except at the north shore of Tule Pond, where there is a small cliff that is probably due partly to erosion by water entering at that end and partly to wave action. On the side toward the mountains the land rises very gradually to the steep front of the mountains. This faulting has produced important changes in the movement of both surface and ground waters.

STREAM CHANNELS.

Modern stream channels.—The present stream channels in Santa Clara Valley are in general well incised into the valley floor, except the lower ends of those leading into San Francisco Bay. In the past the streams have built natural levees, but in the upper parts of their

A. NILES CONE.



B. NILES-IRVINGTON FAULT ESCARPMENT.

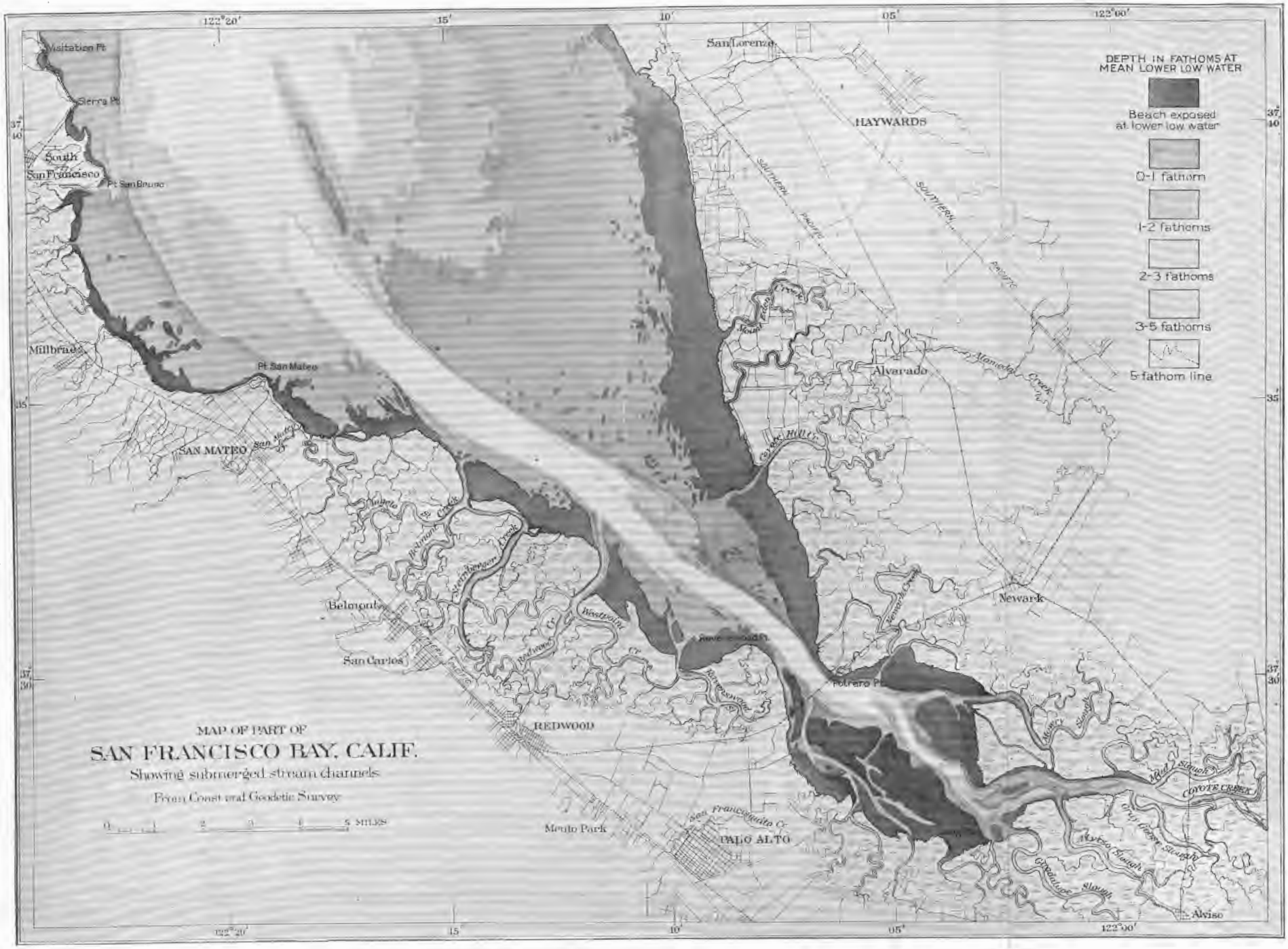
NATURAL LEVEE ON SAN FRANCISQUITO CREEK AT PALO ALTO.

NOTCH IN FAULT SCARP AT TULE POND, REPRESENTING ANCIENT STREAM CHANNEL CUT OFF BY THE DISPLACEMENT.

A.

B.

ANCIENT DRAINAGE CHANNEL BROKEN BY DISPLACEMENT ALONG NILES-IRVINGTON FAULT.


MAP OF PART OF
SAN FRANCISCO BAY, CALIF.
Showing submerged stream channels
From Coast and Geodetic Survey
0 1 2 3 4 5 MILES
DEPTH IN FATHOMS AT MEAN LOWER LOW WATER
Beach exposed at lower low water
0-1 fathom
1-2 fathoms
2-3 fathoms
3-5 fathoms
5-fathom line
122°20'
15'
10'
05'
122°00'
37° 40'
35'
37° 30'
Visitation Pt
Sierra Pt
South San Francisco
Pt. San Bruno
Millbrae
Pt. San Mateo
SAN MATEO
San Mateo
Belmont
San Carlos
REDWOOD
Menlo Park
PALO ALTO
San Francisquito Cr.
San Lorenzo
HAYWARDS
Mount Eden Creek
Alvarado
Mowry Creek
Coyote Hills
Newark
Newark Creek
Dumbarton
Westpoint Cr.
Redwood Cr.
Sterling Creek
Belmont Creek
Pulgas Cr.
Pulgas Creek
Pulgas Pt.
Pulgas Reservoir
Pulgas Pt.
Potrero Pt.
Mowry Slough
Mud Slough
COYOTE CREEK
Coyote Slough
Mallard Slough
Greco Slough
Alviso
SOUTHERN PACIFIC

courses they have now cut deep enough to be permanently fixed. Natural levees may be seen along Coyote Creek, Alameda Creek, and Stevens Creek; they are particularly well developed on San Francisquito Creek at Palo Alto. (See Pl. V.) Along the lower courses of most of the streams entering San Francisco Bay aggradation is still actively going on. Here the stream channels become clogged by sediment and a growth of brush and frequently shift their courses. How rapidly this building-up process is going on may be inferred from the fact that fences in this area have been partly or wholly buried. At the place where San Francisquito Creek enters the salt marsh is a fence which in some places is wholly buried and in other places shows only a foot or so of the tops of the posts. Advantage is taken of this rapid sedimentation both here and on Alameda Creek for reclaiming the salt marsh. The reclamation work is accomplished by building a levee around a certain portion and allowing the flood waters to spread over it and thus drop the sediment at the desired place.

Some of the stream channels have been cut down to the normal ground-water level in the lower lands and hence have practically perennial streams in their lower courses. Thus the lower stretches of Coyote Creek, Guadalupe Slough, Stevens Creek, and others carry water except in the very driest seasons. Coyote Creek and Guadalupe Slough may be considered perennial streams from San Jose to the bay. There is usually water flowing at the mouth of the upper gorge of Coyote Creek which disappears almost immediately on reaching the valley, but water reappears in the vicinity of San Jose.

The channels of Coyote Creek, San Benito River, and Alameda Creek have especially wide gravelly bottoms, which offer opportunity for rapid percolation of their waters into the ground.

Ancient stream channels.—Perhaps all the streams in Santa Clara Valley have shifted their positions from time to time. Moreover there have been changes in the courses of the streams in the tributary mountains, the most important in its bearing on the water supply of Santa Clara Valley being the capture of the Livermore Valley drainage by Alameda Creek. This valley formerly discharged northward through San Ramon and Ygnacio valleys to Suisun Bay, but its drainage system was captured by Arroyo de la Laguna and diverted to Alameda Creek, thus more than doubling the drainage basin of that creek. For other particulars of changes in drainage in the mountains east of the valley and north of Niles the reader is referred to Folio 193 of the Geologic Atlas.

The fault scarp mentioned on page 18 has caused considerable change in drainage in the vicinity of Niles. (See Pls. IV, *B*, VI, VII.) The so-called Laguna drainage basin (which should not be confused with the Arroyo de la Laguna that forms the outlet of the Livermore Valley) comprises several small units tributary to The Lagoon. (See

Pls. III, X.) This drainage basin is now limited on the west by the fault scarp, but before the recent movement along the fault its waters discharged over the flat land west of the fault and south of the Niles cone and supplied the sediments underlying this land. Mission Creek, coming from the hills, flows northwestward into The Lagoon, but the stream that forms the outlet of The Lagoon has a southeasterly course and makes an angle of only about 60° with Mission Creek. A notch in the escarpment, shown in Plate VI, represents an abandoned stream channel which is distinctly marked from this point to the place where it enters the salt marsh just south of the Little Coyote Hills. East of Centerville this channel divides and the other branch enters the salt marsh near Jarvis Landing, a short distance east of Sanjen de los Alisos. In Plate VII is shown a similar ancient stream channel, which is not so sharply defined as this one but is nevertheless distinct. It starts at a notch in the escarpment near the north end of The Lagoon and can be traced to a point about a mile southwest of Newark, beyond which it has been artificially straightened. Both these ancient drainage lines are shown on Plate X.

In the salt-marsh gap separating the Coyote Hills and Little Coyote Hills is the junction of Sanjen de los Alisos with Newark Creek, which at no remote date was the main Alameda Creek. Its old channel is traceable for some distance beneath the waters of the bay. (See Pl. VIII.) Coyote Hill Creek, at the north end of the Coyote Hills, is also an ancient distributary of Alameda Creek, and its channel is distinctly traceable for a mile or more beneath the bay. The channel of Coyote Creek has been traced beneath the waters of the bay to a point east of San Bruno, a distance of 17 miles. The channels of a number of smaller creeks on the west side of the bay are also distinctly marked beneath its waters.

There is abundant physiographic evidence that Coyote Creek has not always flowed northward to San Francisco Bay but in former times flowed southward and found its outlet through Pajaro Canyon into Monterey Bay. (See Pl. XVI.) It is highly probable that the outlet has alternated many times between San Francisco Bay and Monterey Bay. An alluvial fan of the form of that at the mouth of the Coyote Canyon could have been built only by the shifting of the stream from side to side of the fan during its upbuilding; moreover, this is the habit of streams flowing over alluvial fans.

Biologic evidence of a geologically recent fresh-water connection between the streams flowing into Monterey Bay and those flowing into San Francisco Bay is afforded by the striking resemblance of the fish faunas of these two drainage basins, which are now separated by salt water.[16] This connection could have been effected, according

[16] Branner, J. C., A drainage peculiarity of the Santa Clara Valley affecting fresh-water fauna: Jour. Geology, vol. 15, No. 1, pp. 1-9, 1907.

to Branner, by the alternating of the Coyote drainage between San Francisco Bay and Monterey Bay. It is also thoroughly established that the whole coast region from San Francisco to San Diego formerly stood at a much higher level than it does now. This conclusion is based on such evidence as the submerged stream channels in San Francisco, Monterey, and Carmel bays (Pls. II, VIII) and the fact, as shown by well logs of the Morgan Oyster Co., that gravel occurs as much as 400 feet below the surface of the present San Francisco Bay. The opinion has been advanced, first by Le Conte,[17] that the whole drainage of Sacramento and San Joaquin valleys formerly passed southward through Santa Clara Valley and the Pajaro Canyon to Monterey Bay. However, the evidence is not believed to be sufficiently complete to warrant this conclusion. It has also been suggested that there was formerly an axial stream flowing the entire length of Santa Clara Valley and discharging into San Francisco Bay. The data at hand, however, are not believed to be sufficient to warrant any conclusion on this point. The present valley floor at the lower gorge of Coyote Creek is about 250 feet above sea level and the greatest depth to bedrock in this gorge is only 170 feet[18]; the rock floor of the gorge is therefore about 80 feet above sea level. The altitude of the valley floor a mile northeast of Sargent, on Pajaro River, is about 125 feet. Hence if the lower gorge were stripped to bedrock and a uniform grade were established between it and the present surface near Sargent, 25 miles distant, the average slope would be somewhat less than 2 feet to the mile. This would be a much more gentle slope than the valley now has and, moreover, does not allow for any filling of the valley in the area around Sargent while the 170 feet of alluvium was accumulating in the lower gorge. Furthermore the present rock floor of Pajaro Gap is only about 75 feet above sea level, which is lower than that of the lower gorge of Coyote Creek. However, erosion is now active in Pajaro Gap, whereas the rock floor of the lower gorge has been protected from erosion in recent times by the overlying alluvium. These facts may easily account for the small difference in altitude of the rock floors of the two gorges and even make it reasonable to suppose that the Pajaro Gap at no remote time may have stood even higher than the lower gorge of the Coyote. The known facts of present altitude certainly do not point to a former discharge of the waters of Sacramento and San Joaquin valleys southward through Santa Clara Valley and the Pajaro Gap to Monterey Bay.

The considerations above set forth also make the probability of an axial stream flowing northward the entire length of the valley seem remote unless differential movement is invoked. Differential move-

[17] Le Conte, Joseph, Tertiary and post-Tertiary changes of the Atlantic and Pacific coasts: Geol. Soc. America Bull., vol. 2, p. 326, 1891.

[18] California Supreme Court, Charles Miller v. Bay Cities Water Co., brief of appellant, p. 20.

ment in geologically recent time is well established on the coast north of Santa Cruz by the fact that the lowest sea terrace ranges from only a few feet to 100 feet above sea level.[19]

Equally convincing evidence of such movement has been found in the immediate area under consideration. The rock floor of the lower gorge of Coyote Creek is about 80 feet above sea level, the rock floor of the Pajaro Gap is about 75 feet above sea level, the bottom of well No. 321, which did not strike bedrock, is only about 15 feet above sea level, and the bottom of well No. 231 is 90 or 100 feet below sea level; hence it is certain that here is a rock basin without outlet, which of course could not have been formed by water erosion and therefore must have resulted from differential movement. When all these facts are taken into consideration it does not seem possible to reach any conclusion regarding a former axial stream.

This rock basin may have been formed in any one of three ways or by a combination of all of them. It has been suggested by Lawson[20] that the drainage divide at Madrone may be the result of differential movement of the valley floor. If so (1) this movement may have brought the bedrock to the surface at the lower gorge and reversed the drainage causing it to discharge through Pajaro Gap; or (2) it is possible that the drainage of the southern part of the valley originally flowed through Pajaro Gap and that after the valley was filled this gap was raised, though so slowly that the stream was able to maintain an open course across the rising barrier; or (3) the rock basin may have been formed by the sinking of a portion of the valley while the lower gorge and Pajaro Gap remained stationary or sank more slowly. Evidence that part of the valley has sunk recently is afforded by the more or less detached hills, by the existence of San Felipe Lake and the swampy lands, and by the well-intrenched Pajaro in the western part of the valley, together with the absence of trenching in the eastern part.

GEOLOGIC SKETCH.

HARD-ROCK FORMATIONS.

The geologic formations of the Santa Clara Valley are of two kinds—the hard rocks of the mountain borders and the unconsolidated materials of the valley fill. The hard-rock formations concern this investigation chiefly because they form a relatively impervious basin holding the water-bearing alluvium and because they are the source of the materials composing this alluvium. These formations com-

[19] Branner, J. C., Newsom, J. F., and Arnold, Ralph, U. S. Geol. Survey Geol. Atlas, Santa Cruz folio (No. 163), p. 11, 1909.

[20] Lawson, A. C., The post-Pliocene diastrophism of the coast of southern California: California Univ. Dept. Geology Bull., vol. 1, pp. 153, 154, 1893.

prise igneous, metamorphic, and sedimentary rocks and are known to range in age from Franciscan (Jurassic?) to Pliocene. The largest group of rocks bordering Santa Clara Valley is sedimentary, and most of this group is of marine origin. The rocks of fresh-water origin include alluvial and lacustrine deposits and are largely confined to the valley borders, but some are well up in the mountains.[21]

Character.—The sedimentary rocks cover much the largest areas and include all the common kinds. Most of these rocks are fairly well indurated, especially those of Miocene age or older. Two groups deserve special mention because of their peculiar lithologic characteristics. These are the Franciscan and the Monterey. The Franciscan rocks are everywhere much shattered by earth movements and contain a great number of quartz seams. In this group are also found the very characteristic beds of chert and jasper. The Monterey group contains a large amount of white siliceous shale. So abundant and so persistent is this shale that when it is seen anywhere in this region it at once suggests the assignment of the formation to the Monterey. The Monterey is the great oil-producing group of California.

The igneous rocks are of many kinds, including pyroxenite, peridotite, serpentine, gabbro, diabase, basalt, diorite, quartz diorite, granite, and rhyolite. Serpentine occurs at many places and in large masses. The famous New Almaden quicksilver mine is in and about one of these large serpentine masses on the western border of Santa Clara Valley. Associated with the serpentine are many quicksilver prospects as well as a number of small magnesite mines and prospects.

Metamorphic rocks also occur in considerable variety and are widely distributed throughout the mountains on either side of the valley. They include crystalline limestone, mica schist, amphibole schist, gneiss, greenstone, and the glaucophane-bearing rocks. Crystalline limestone occurs in the Santa Cruz Mountains but, so far as known, not in the drainage area of Santa Clara Valley. The abundant glaucophane-bearing rocks are lithologically interesting.[22] Both the igneous and the metamorphic rocks are likely to form rugged topographic features.

Structure.—The structure of the drainage basin of Santa Clara Valley is complex. It is determined chiefly by faulting and to a minor extent by intrusion of igneous rock and by folding. Most of the faults have a general southeast trend, and blocks have been vari-

[21] Branner, J. C., Newsom, J. F., and Arnold, Ralph, op. cit. Lawson, A. C., U. S. Geol. Survey Geol. Atlas, San Francisco folio (No. 193), 1914.

[22] Smith, J. P., The paragenesis of the minerals of the glaucophane-bearing rocks of California: Am. Philos. Soc. Proc., vol. 45, pp. 183–242, 1907. U. S. Geol. Survey Geol. Atlas, folios 101, 163, and 193. Washington, H. S., A chemical study of the glaucophane schists: Am. Jour. Sci., 4th ser., vol. 11, pp. 35-59, Jan., 1901. Holway, R. S., Eclogites in California: Jour. Geology, vol. 12, pp. 344-358, 1904. Nutter, E. H., and Barber, W. B., On some glaucophane and associated schists in the Coast Ranges of California: Jour. Geology, vol. 10, pp. 738-744, 1902.

ously tilted, uplifted, and depressed, forming ridges and valleys. The northern part of Santa Clara Valley is probably a sunken fault block, and the more constricted southern part follows a fault zone. Livermore Valley is likewise of structural origin, as are many of the other intermontane valleys.

Many of the streams have adjusted themselves to the structure and flow in valleys parallel to the major fault lines. In some places where the streams pass through the ridges they follow faults transverse to the general southeast trend; in other places the stream courses are antecedent, the uplift of the ridges having been sufficiently slow to permit the streams to maintain their courses. The influence of the rock structure upon the courses of the streams is well illustrated by both the Alameda and the Coyote drainage systems. (See Pls. III and IX.)

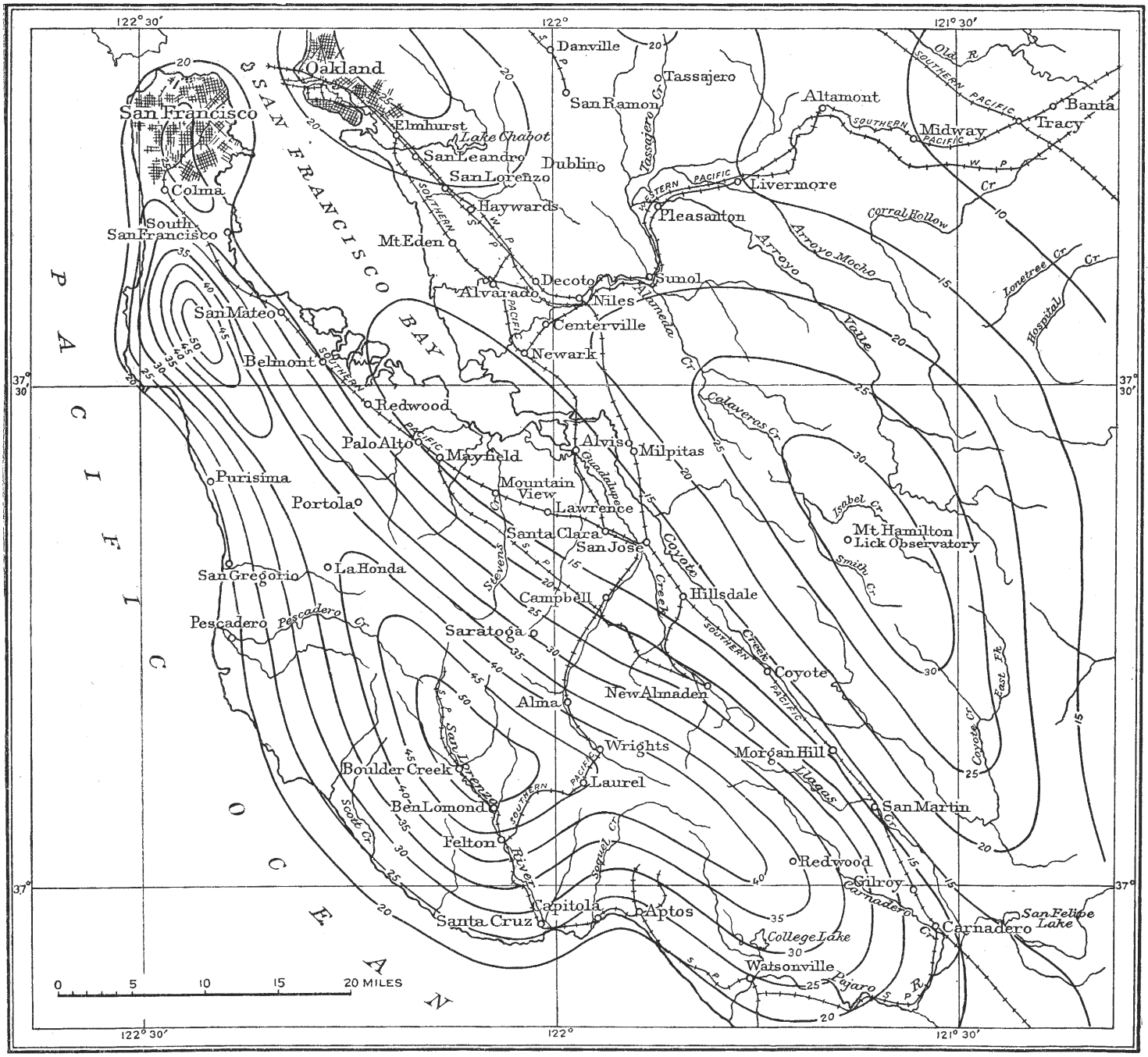
ALLUVIUM AND RELATED DEPOSITS.

Older alluvium.—Alluvium of two ages occurs in Santa Clara Valley. The older alluvium is found chiefly at the southern or upper end, also in patches along the borders of the valley throughout its length. This formation, so far as its distribution is known, is shown on the accompanying maps (Pls. X, XII, XIV, XVI, XVIII). In some places the beds of older alluvium lie horizontal; in others they dip at angles of 15° to 30° or more. South of the area covered by this report the older alluvium is faulted and thrown into vertical and nearly vertical positions.[23] A portion of this older alluvium has been mapped under the name Santa Clara formation.[24] In the Santa Cruz folio it is stated that at least the greater part of the formation is the equivalent of the Paso Robles formation described in the San Luis folio (No. 101). The Santa Clara formation was deposited partly by streams and partly in fresh-water lakes and is of Pliocene and Pleistocene age. The deposits of the two classes are closely associated, and no attempt is here made to separate them. The term "older alluvium" as herein used includes the Santa Clara formation, but whether all the material so designated belongs to that formation has not been determined, and as shown on the maps it includes some lake deposits.

On the whole there is a smaller percentage of gravel in this formation than in the younger alluvium, presently to be described. Much of the material is somewhat indurated, and some is very hard. Wells penetrating this formation are likely to be of low yield, and the water of many, especially those that penetrate lake deposits, contains considerable alkali. The line separating this formation from the younger alluvium is in many places indefinite.

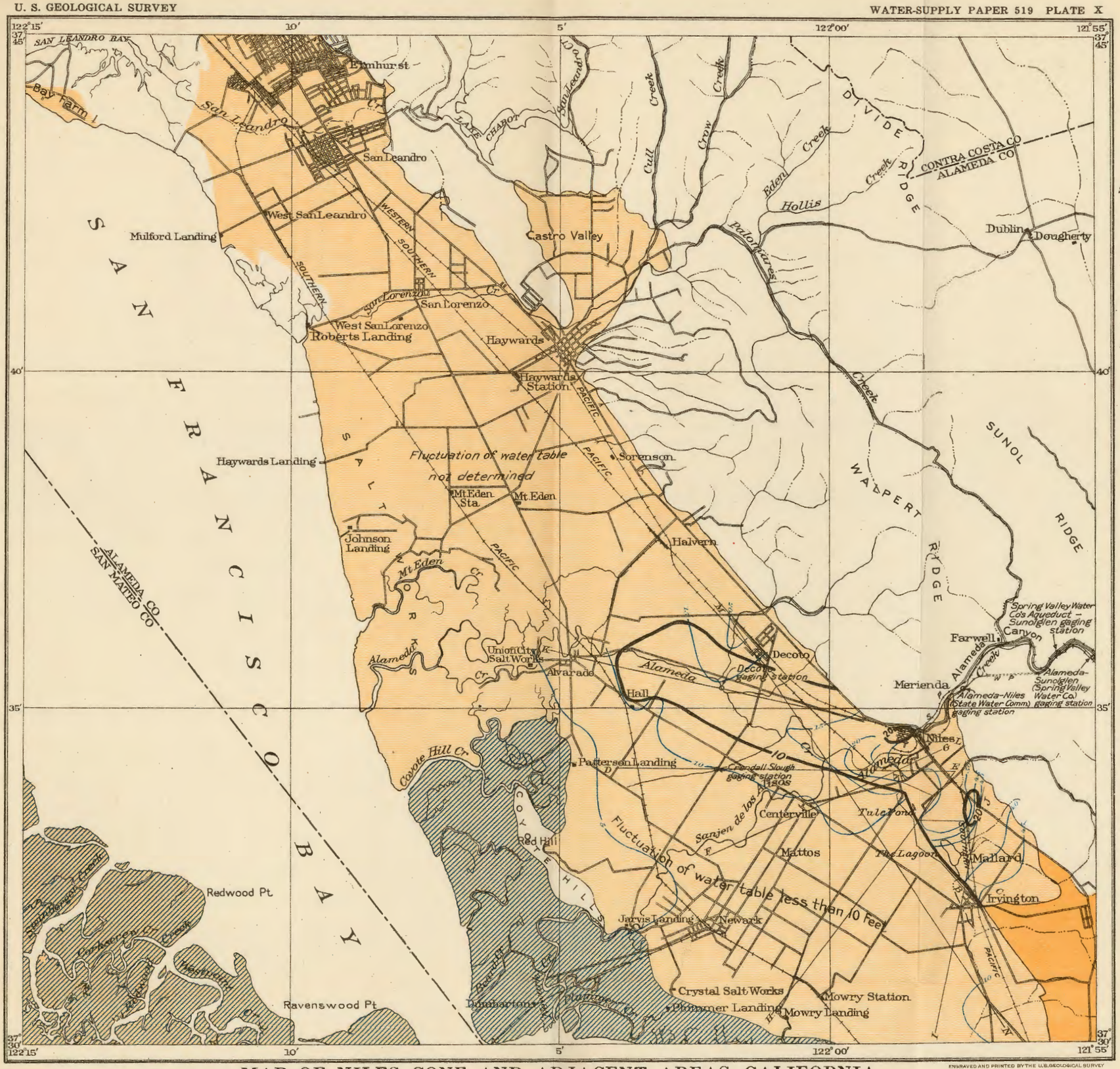
[23] Lawson, A. C., Post-Pliocene diastrophism of the coast of California: California Univ. Dept. Geology Bull., vol. 1, p. 152, 1893.

[24] Branner, J. C., Newsom, J. F., and Arnold, Ralph, U. S. Geol. Survey Geol. Atlas, Santa Cruz folio (No. 163), 1909. Lawson, A. C., idem, San Francisco folio (No. 193), 1914.



ISOHYETOSE MAP OF DRAINAGE BASIN OF SANTA CLARA VALLEY AND ADJACENT AREAS.

After Grunsky.



MAP OF NILES CONE AND ADJACENT AREAS, CALIFORNIA

Showing ground-water conditions

Scale $\frac{1}{125,000}$

1 ½ 0 1 2 3 4 Miles

1 ½ 0 1 2 3 4 5 Kilometers

1924

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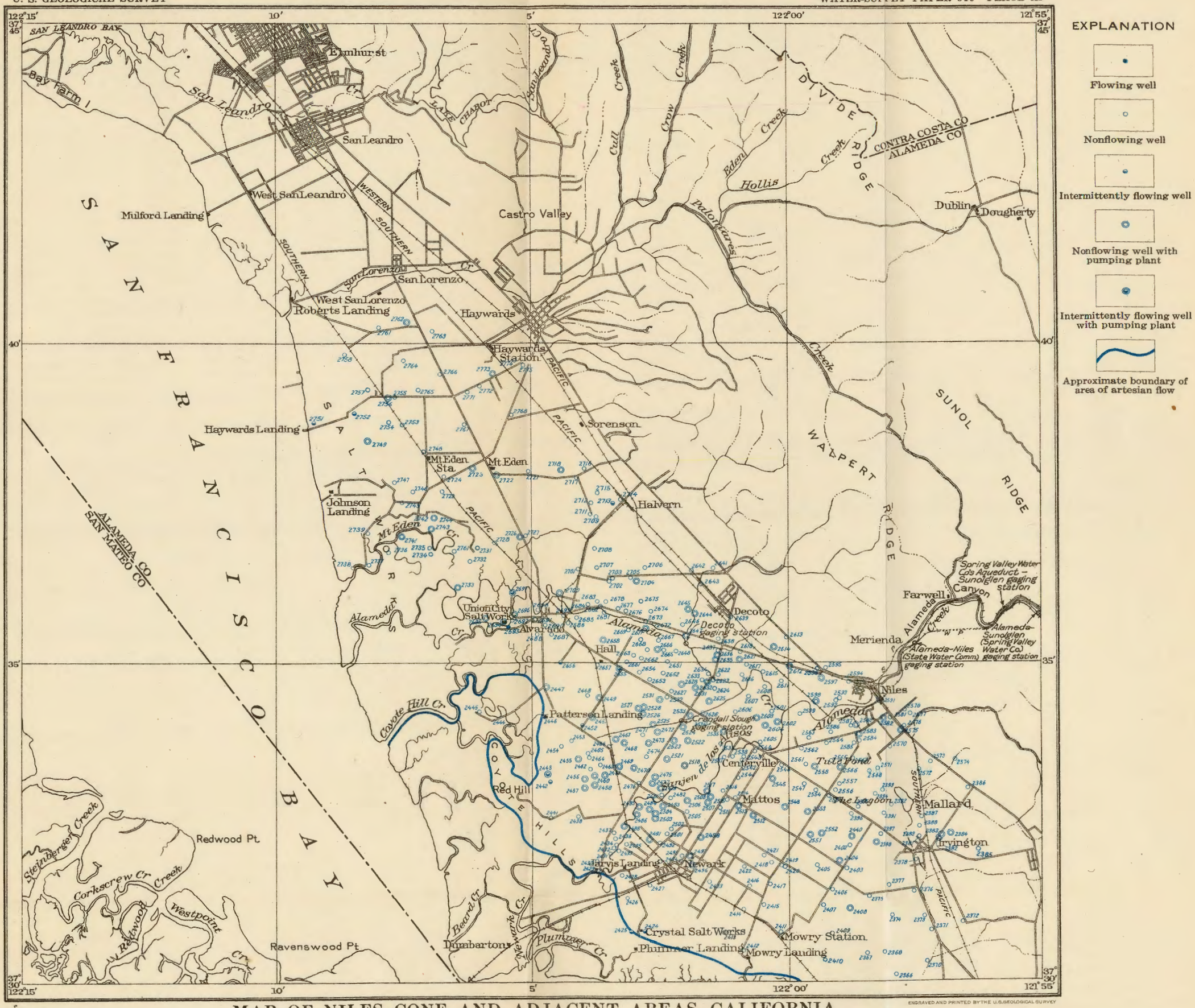

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MAP OF NILES CONE AND ADJACENT AREAS, CALIFORNIA

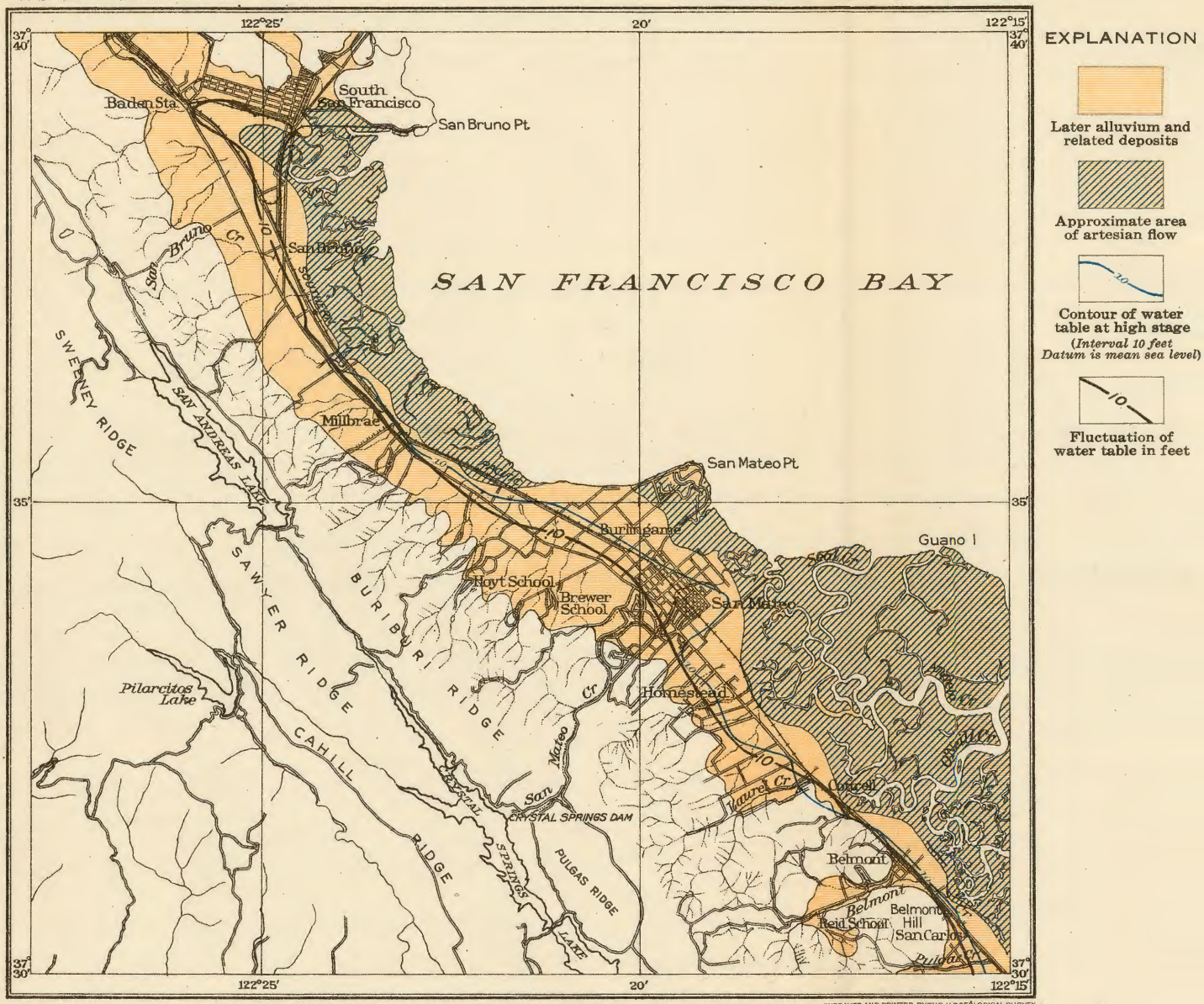
Showing location and kinds of wells

Scale $\frac{1}{125,000}$

1 ½ 0 1 2 3 4 Miles

1 ½ 0 1 2 3 4 5 Kilometers

1924



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MAP OF SAN MATEO AREA, CALIFORNIA

Showing ground-water conditions

Scale $\frac{1}{125,000}$

1 ½ 0 1 2 3 Miles

1 ½ 0 1 2 3 Kilometers

1924

EXPLANATION

Flowing well

Nonflowing well

Intermittently flowing well

Approximate boundary of area of artesian flow

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MAP OF SAN MATEO AREA, CALIFORNIA

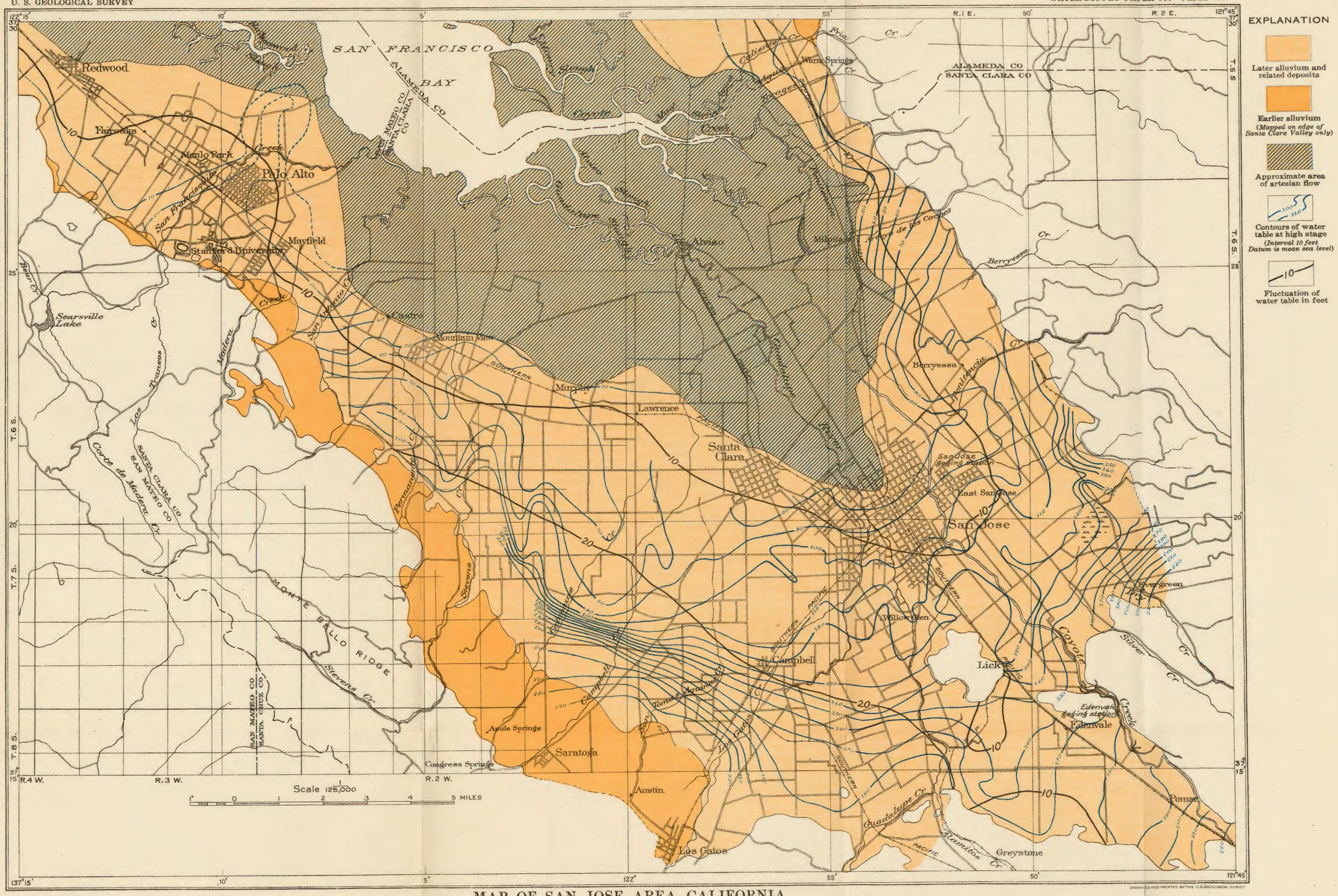
Showing location and kinds of wells

Scale $\frac{1}{125,000}$

1 ½ 0 1 2 3 Miles

1 ½ 0 1 2 3 Kilometers

1924

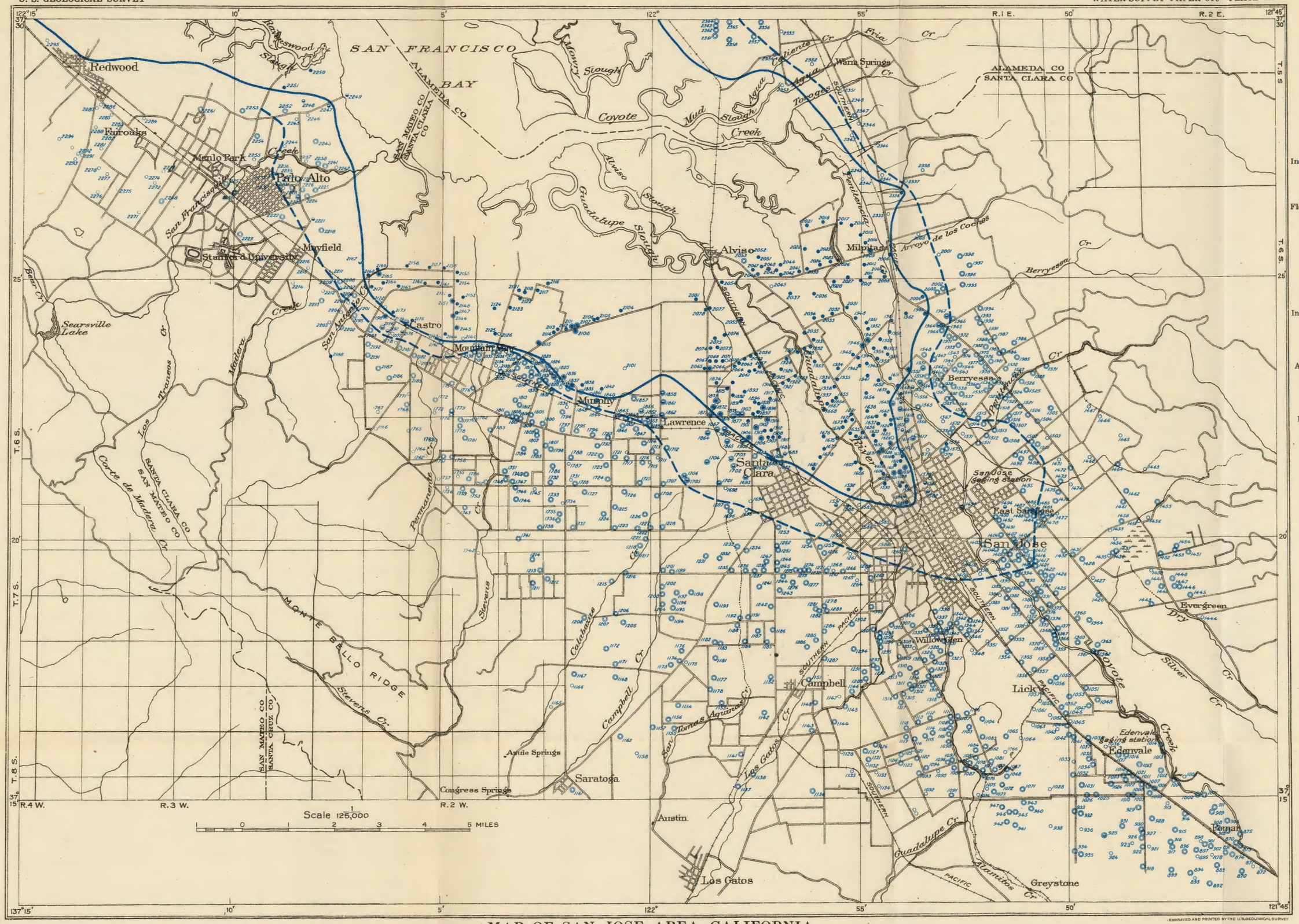


MAP OF SAN JOSE AREA, CALIFORNIA

Showing ground-water conditions

1924

ENGRAVED AND PRINTED BY THE U.S. GEOLOGICAL SURVEY

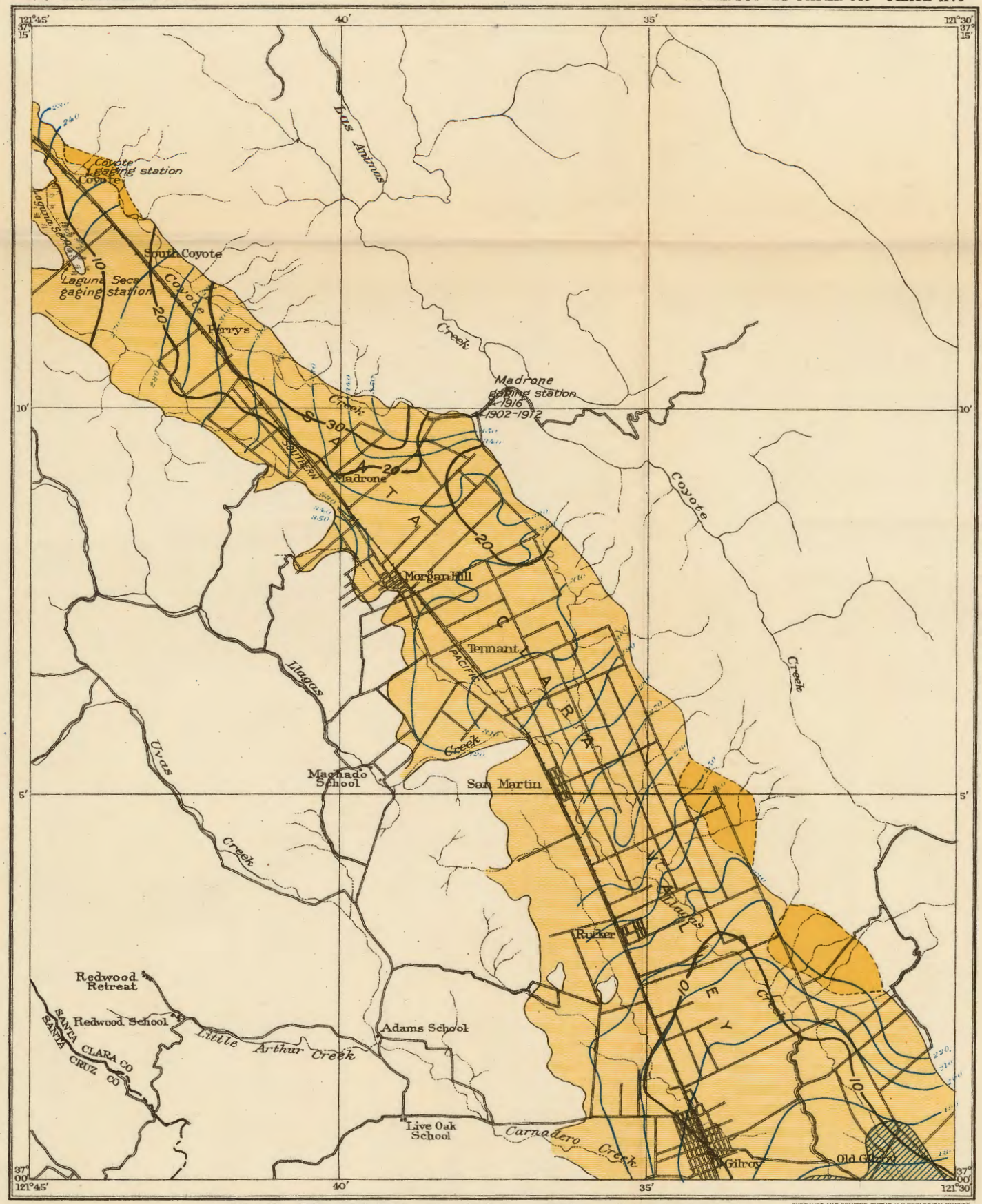


ENGRAVED AND PRINTED BY THE U.S. GEOLOGICAL SURVEY

MAP OF SAN JOSE AREA, CALIFORNIA

Showing location and kinds of wells

1924



EXPLANATION

Later alluvium and related deposits

Earlier alluvium
(Mapped on edge of Santa Clara Valley only)

Approximate area of artesian flow

Contour of water table at high stage
(Interval 10 feet Datum is mean sea level)

Fluctuation of water table in feet

ENGRAVED AND PRINTED BY THE U.S. GEOLOGICAL SURVEY

MAP OF MORGAN HILL AREA, CALIFORNIA

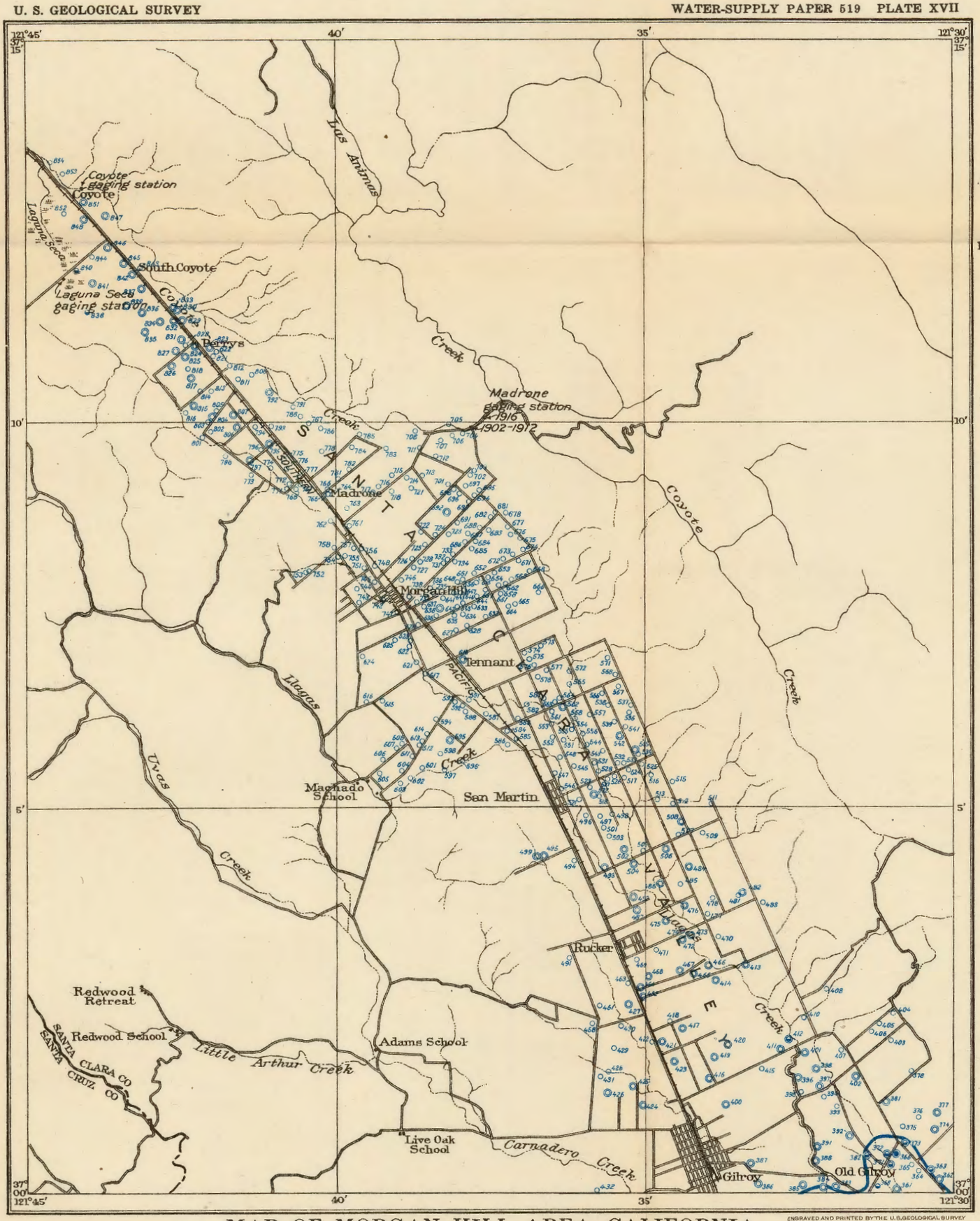
Showing ground-water conditions

Scale $\frac{1}{125,000}$

1 ½ 0 1 2 3 4 Miles

1 ½ 0 1 2 3 4 5 Kilometers

1924



EXPLANATION

- Nonflowing well
- Intermittently flowing well
- Flowing well with pumping plant
- Nonflowing well with pumping plant
- Intermittently flowing well with pumping plant
- Approximate boundary of area of artesian flow

ENGRAVED AND PRINTED BY THE U.S. GEOLOGICAL SURVEY

MAP OF MORGAN HILL AREA, CALIFORNIA

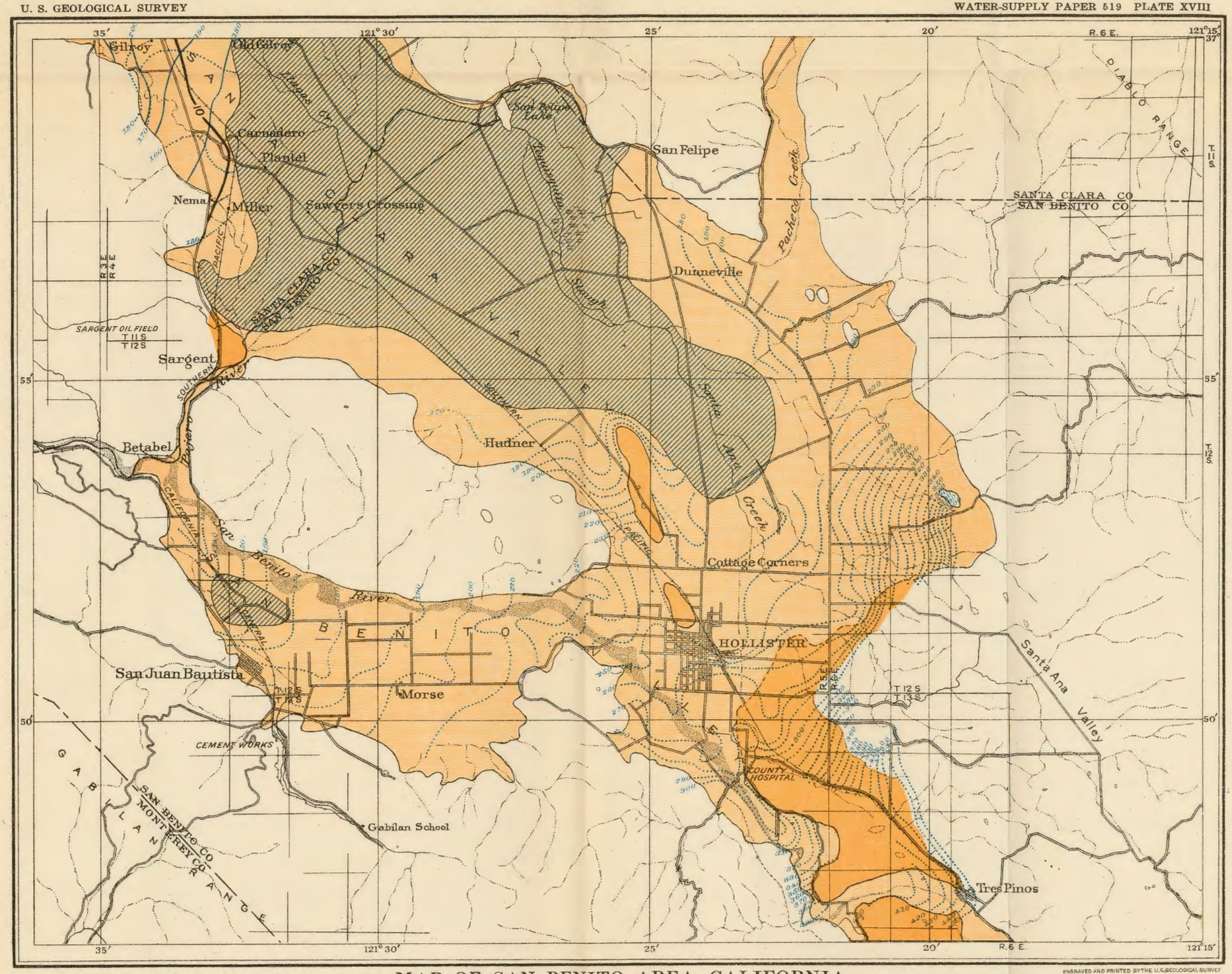
Showing location and kinds of wells

Scale $\frac{1}{125,000}$

1 ½ 0 1 2 3 4 Miles

1 ½ 0 1 2 3 4 5 Kilometers

1924



EXPLANATION

Later alluvium and related deposits

Earlier alluvium
(Mapped on edge of Santa Clara Valley only)

Approximate area of artesian flow

Contours of water table at high stage
(Interval 10 feet
Datum is mean sea level)

Contours of water table at low stage
(Interval 10 feet
Datum is mean sea level)

Fluctuation of water table in feet
(Shown only for northwestern part of area)

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MAP OF SAN BENITO AREA, CALIFORNIA

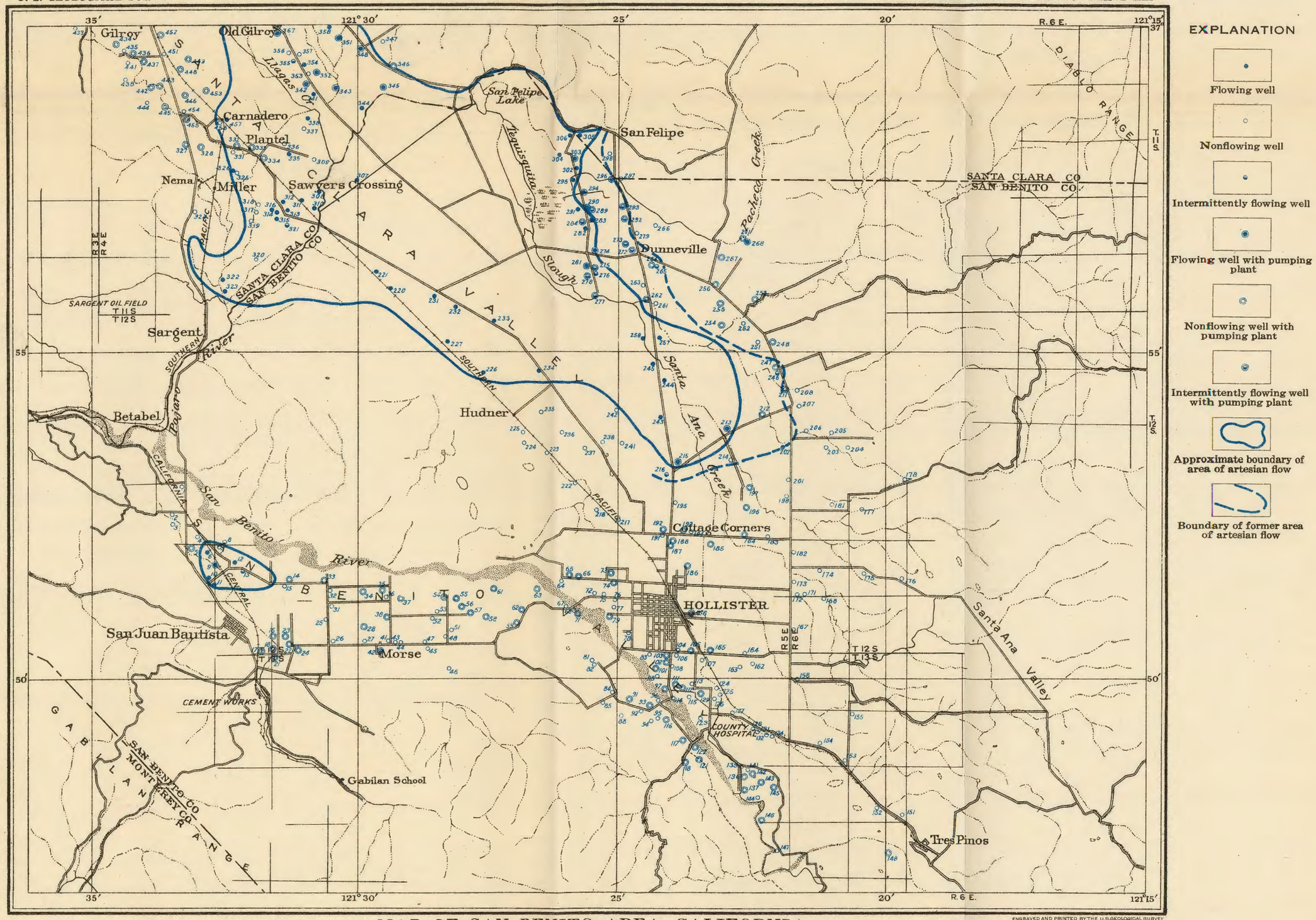
Showing ground-water conditions

Scale $\frac{1}{125,000}$

1 ½ 0 1 2 3 4 Miles

1 ½ 0 1 2 3 4 5 Kilometers

1924



ENGRAVED AND PRINTED BY THE U.S. GEOLOGICAL SURVEY

MAP OF SAN BENITO AREA, CALIFORNIA

Showing location and kinds of wells

Scale $\frac{1}{125,000}$

1 ½ 0 1 2 3 4 Miles

1 ½ 0 1 2 3 4 5 Kilometers

1924

Marine deposits equivalent to the older alluvium.—Beginning about 6 miles south of the Golden Gate and occupying the structural trough in the north end of which Merced Lake is situated is a thick deposit of marine materials which is believed to be contemporaneous with at least a part of the older alluvium,[25] described above. To these marine sediments Lawson[26] has given the name Merced formation, and he estimates its thickness at about 5,800 feet.[27] This is the type section of the Merced, and it is best developed here, but it occurs at other places on the borders of Santa Clara Valley, notably in the vicinity of Chittenden and the Pajaro Valley.[28] The alluvium that occurs on the borders of Santa Clara Valley in this vicinity and that about the south end of the valley are undoubtedly equivalent to that farther north, which is mapped as Santa Clara.[29] Jones[30] also expresses this opinion and states further that during the deposition of the alluvium the sea transgressed at least twice into Santa Clara Valley. The Lomerias Muertas hills, lying within Santa Clara Valley at the junction of Pajaro and San Benito rivers, consist, at least in part, of this formation.

Younger alluvium.—The younger alluvium is made up chiefly of materials brought down from the mountains, though in certain localities it is probably derived largely from the working over of the older alluvium.

It is made up of silt, sand, gravel, and a small amount of clay. Because of the large proportion of siliceous and other well-indurated rocks in the bordering mountains much of the alluvium consists of coarse materials that do not readily disintegrate. The coarseness of these materials makes them highly permeable to water, a property which is one of the most vital factors concerning the water supply of the valley. Most of the material called "clay" by the well drillers is not true clay but rather an argillaceous silt or perhaps even a fine sandy silt. The name "clay" will be used for it in this report, though allowance will be made for its true character in the discussions on porosity and permeability.

CHARACTER OF THE ALLUVIUM IN RELATION TO GROUND WATER.

A part of the water-table method of determining the quantity of water annually available is to determine the available pore space in the materials in which the fluctuation of the water-table occurs.

[25] Branner, J. C., Newsom, J. F., and Arnold, Ralph, op. cit.
[26] Lawson, A. C., California Univ. Dept. Geology Bull., vol. 1, p. 14, 1893.
[27] Lawson, A. C., U. S. Geol. Survey Geol. Atlas, San Francisco folio (No. 193), 1914.
[28] Jones, W. F., Geology of the Chittenden oil fields: California Univ. Dept. Geology Bull., vol. 6, p. 71, 1911.
[29] Branner, J. C., Newsom, J. F., and Arnold, Ralph, op. cit.
[30] Op. cit., p. 74.

The following data on the character of the alluvium serve in the determination of the porosity and water-yielding capacity of the alluvium, and the figures obtained are used as bases for the estimates of quantity of water given later in this report.

Structure.—Santa Clara Valley is a region of aggradation; it is built up by deposits from streams that are very irregular in their flow (see tables of stream flow, pp. 98–128) and from time to time change their courses. For this reason the nature of the deposits changes rapidly from time to time and from place to place. There are no large continuous sheets or beds except near San Francisco Bay, where at present only the finer materials are being deposited. Even beneath the bay the deep-lying deposits contain a considerable proportion of coarse materials (see p. 21), laid down when the bay was either much smaller than at present or did not exist.

The great and rapid fluctuations, which change the flow of the streams within a few hours from almost nothing to floods of several thousand second-feet (see tables, pp. 98–128), result in coarse materials being borne much farther downstream at some times than at others. Therefore the coarse materials borne far toward the bay in times of flood will be buried beneath fine sediment later, when the streams are at only a moderate stage. Shifting of stream courses results in channel gravel being distributed over areas of some width, thus giving rise to lenses of gravel, and the later burial of old channels, which is a common occurrence in a region of aggradation, gives rise to stringers or pipes of gravel. These become incased in finer sediments and eventually are found one above another and crossing one another at various angles. Thus the whole deposit becomes a heterogeneous mass of irregular bodies of different kinds of materials.

Composition.—The average composition of the alluvium of Santa Clara Valley, as determined from 515 well logs, is about 69 per cent clay, 25 per cent gravel, and 6 per cent sand. These percentages were obtained by adding together the thicknesses of like materials shown in the well logs and determining what part each constitutes of the total thickness reported. The portions of the well logs above the highest known position of the water table were not used, because they are not a factor in calculations of storage of water. The composition of the younger alluvium varies somewhat from place to place. In the vicinity of Morgan Hill 72 logs show about 69 per cent of clay, 29 per cent of gravel, and 2 per cent of sand. In the area between the lower gorge of Coyote Creek and the Niles cone 333 logs show about 75 per cent of clay, 21 per cent of gravel, and 4 per cent of sand. In the vicinity of Niles 110 logs show about 54 per cent of clay, 35 per cent of gravel, and 11 per cent of sand. Some of the logs that were used in these calculations are given on pages 89–98, and some have already

been published.[31] Many other logs that were used have not been published.[31a]

Porosity.—Perhaps the most practical method of estimating the porosity of the water-bearing beds is to collect a large number of well logs, to calculate from these the relative proportions of the different kinds of materials composing the beds, and then to determine the porosity of each kind of material. If sufficient time and proper equipment are at hand the porosity of the different materials is best determined from samples taken from the area under investigation. Otherwise the results of careful laboratory experiments that have been made on similar materials collected elsewhere must be used. The latter method has been adopted in the present investigation. Either method should yield results that are reliable within reasonable limits of error. It is desirable though not essential to know the exact location of each well whose log is used in the calculation. However, it is believed that more reliable results will be obtained by using a large number of well logs whose approximate locations only are known than by using a small number whose exact locations are known. The wells should, of course, be fairly equally distributed over the area under investigation.

In arriving at the following conclusions relative to the porosity of the valley alluvium all the well logs found in the tables on pages 89–94, and a large number that are not published were used. The wells near Oakland whose logs are given on pages 95–98 lie outside the area covered and therefore were omitted from the calculations. The upper portions of the logs were not used as the beds recorded in these portions lie above the zone of saturation. The amount discarded from each log was determined by the depth to water in that general locality during the period of highest water for which records are available. The materials were all grouped into three classes—clay, sand, and gravel. "Sandy clay" and "gravelly clay" reported in the logs were considered clay; "sand and gravel" was classified as half sand and half gravel. The percentages of clay, sand, and gravel determined as stated on page 26 are based upon a total thickness of materials penetrated of nearly 9 miles. The results show clay 69 per cent, gravel 24, sand 7.

According to Buckley[32] the porosity of sandstone may be as high as 28.28 per cent by volume. King[33] gives the water capacity of

[31] U. S. Geol. Survey Water-Supply Paper 400, pp. 87–92, 1917.

[31a] Some of the unpublished logs are in the files of the United States Geological Survey at Washington or in the district office at San Francisco.

[32] Buckley, E. R., On the building and ornamental stones of Wisconsin; Wisconsin Geol. and Nat. Hist. Survey Bull. 4, Econ. ser., No. 2, pp. 402–403, 1898.

[33] King, F. H., Principles and conditions of the movements of ground water: U. S. Geol. Survey Nineteenth Ann. Rept., pt. 2, p. 70, 1899.

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undisturbed soil as 17.4 to 41.3 per cent by weight, which is equivalent to 31.3 to 49 per cent by volume. King's table is given below with the addition of the percentage by volume, calculated from other data in the table.

Water capacity of undisturbed materials lying below the water table.

Kind of soil.	Depth of layer (inches).	Percentage of water.		Inches of water.
		By weight.	By volume.	
Marly loam	0-12	41.3	49.0	5.88
Reddish clay	12-24	28.1	41.9	5.03
Do	24-36	28.4	42.2	5.07
Clay with sand	36-48	24.8	38.9	4.67
Very fine sand	48-60	17.4	31.3	3.76
				24.41

Slichter[34] says that the porosity of quartz sand will usually vary between 30 and 40 per cent, and that of clay loams between 40 and 50 per cent, depending upon the variety of sizes in the mixture and the manner of packing the "particles." The following table, taken from King,[35] shows the porosity and the rate of percolation of water from sands of five degrees of coarseness, contained in cylinders 8 feet long and 5 inches in diameter.

Porosity of sands and rate of percolation from sands under the gravitational head of the inclosed water.

Effective diameter of sand grains (millimeter).	Percentage of pore space by volume.	Weight of sand (pounds).	Amount of water percolating.			
			First 30 minutes.		Second 30 minutes.	
			Pounds.	Inches.	Pounds.	Inches.
0.4745	48.86	809.28	53.33	10.25	24.36	4.683
.1848	40.07	792.28	39.27	7.549	27.35	5.258
.1551	40.76	784.00	29.99	5.674	23.52	4.522
.1183	40.57	786.60	7.86	1.512	6.73	1.294
.0826	39.73	796.76	6.31	1.213	4.40	.845

According to Ries[36] the porosity of nine clays ranged from 17.3 to 30.1 per cent by volume. As quoted by Warington,[37] Meister gives the porosity of clay as 50 per cent, and Schwarz gives it as 52.7 per cent and that of coarse sand as 39.4 per cent.

[34] Slichter, C. S., The motions of underground waters: U. S. Geol. Survey Water-Supply Paper 67, p. 17, 1902.

[35] King, F. H., op. cit., p. 91.

[36] Ries, Heinrich, Clays: Their occurrence, properties, and uses, p. 163, New York, John Wiley & Sons, 1906.

[37] Warington, Robert, Physical properties of soils, p. 67, Oxford, Clarendon Press, 1900.

The porosity of materials such as the alluvium under consideration does not depend on the size of the grains or particles of which it is composed; it is influenced by a number of other factors, among the most important of which is uniformity of size of the particles. Any mixture of coarse and fine materials greatly reduces the porosity of the mass. The shape of the particles, if they are not decidedly angular, has relatively little effect on porosity. The porosity of materials at and near the surface is almost always greater than that of the deeper materials, largely on account of the humus contained in the soils. Alluvial materials are not usually well assorted. Those of the Santa Clara Valley are no exception, and their porosity is, of course, less than that of well-assorted materials. The average porosity of all the sands noted above is approximately 38 per cent. King, however, states that the five sands used in his percolation tests were artificially sorted. No statement is made as to whether the sand whose porosity is given by Schwarz was sorted, but from its high percentage of porosity it was probably also well sorted either artificially or by nature. The sand that King cites in his table of undisturbed soils has a porosity considerably lower than any of the others. For these reasons it is believed that the average porosity of these other sands is somewhat higher than that of the sand and gravel of the Santa Clara Valley, which is assumed to be about 35 per cent by volume. The average porosity of all the materials noted above that are called clays is about 32 per cent. Some of these materials, like many of the so-called clays of Santa Clara Valley, are not true clays. Their porosity is less than that of true clays. If the porosity of the sand and gravel is 35 per cent of its volume and that of the clay 32 per cent, the porosity of the alluvium as a whole is about 33 per cent.

Water-yielding capacity.—The most practical question concerning available water supply relates not to the total porosity of the materials nor to total quantity of ground water present but to the quantity of water that these materials will yield to wells. Different materials by no means give up water to wells in proportion to the total water they contain. Fine materials are usually better sorted than coarser materials and therefore when saturated they may contain even more water than the coarser materials, but they permanently retain a large percentage of this water, whereas the coarser materials readily part with a large percentage of the water they contain. The fine materials are therefore of comparatively little value as water producers, and the coarse materials are the important water bearers.

The following table shows the relative amounts of water given up and retained by sands of different degrees of fineness, according to the experiments by King.[38]

[38] King, F. H., op. cit., pp. 90, 91.

Quantity of water retained and given up by sands after draining for 2½ years.

Effective diameter of sand grains (millimeter).	Porosity of sands, in percentage of total volume.	Quantity of water retained, in percentage of total volume of the sands.	Quantity of water given up.	
			Percentage of total volume of the sands.	Percentage of total water content.
0.47	38.86	6.57	32.29	83.09
.18	40.07	7.37	32.70	80.03
.16	40.76	10.35	30.41	74.61
.12	40.57	12.49	28.08	69.21
.08	39.73	14.09	25.64	64.53

It will be seen from this table that the coarsest of the five sands tested gives up a quantity of water equal to 32.29 per cent of the total volume of the sand, or somewhat more than 83 per cent of the water it contains. The gravel and sand of Santa Clara Valley are on the whole considerably coarser than this sand and would give up a larger proportion of their water. It is believed therefore that they would give up about 90 per cent of their total water content. If their porosity is 35 per cent of their volume, they will therefore yield a quantity of water equal to 31.5 per cent of their volume. The gravel comprises 25 per cent and the sand 6 per cent of the total saturated alluvium, and the two together 31 per cent. Therefore these materials will yield a quantity of water equal to 9.7 per cent of the total volume of the saturated alluvium.

The clays form 69 per cent of the alluvium, and their average porosity is about 32 per cent of their total volume. Clays give up only a very small part of the water they contain when saturated. King[39] states that clays of fine texture may retain water amounting to as much as 32 per cent of their dry weight. The materials called clay in Santa Clara Valley are not true clays but perhaps more nearly clay loams, so that the quantity of water they retain is considerably less than that retained by fine clay. It is thought that 90 per cent of the amount required for saturation is a liberal estimate for the quantity of water retained by the clays of this area—that is, if they are saturated and then allowed to drain they will give up 10 per cent of their water. If the porosity of these clays is 32 per cent of their volume, and if they give up 10 per cent of the water required for saturation, they will yield a quantity of water equal to 3.2 per cent of their volume. As 69 per cent of the alluvium is classed as clay, the clay will yield a quantity of water equal to 2.2 per cent of the total volume of the saturated alluvium.

The total water that the saturated alluvium will give up is therefore estimated to be about 12 per cent.

[39] King, F. H., op. cit., p. 71.

Estimate of available pore space based on pumping test.—The results above given may be checked in another way. In 1904–5 the Bay Cities Water Co. conducted a pumping test at the lower gorge of Coyote Creek. The approximate storage capacity of the alluvium may be determined by making use of two curves that were prepared by H. L. Haehl, hydraulic engineer for the company, on the basis of data obtained from this test. One curve, not reproduced in this paper, shows the quantity of water pumped; the other (Exhibit B in the case of Charles Miller *v.* Bay Cities Water Co.), reproduced in simplified form in Figure 1, shows the lowering of the water table by pumping. The pumpage ranged between 8,000,000 and 20,000,000 gallons a day, and from November 8, 1904, to January 16, 1905, amounted to 535,372,000 gallons, or 1,643 acre-feet. The following table gives the estimated area, depth, and volume of alluvium drained by the pumping. No lowering of the water table due to the pumping was observed at distances more than 5 miles from the pump.

Area, depth, and volume of alluvium drained by pumping test of Bay Cities Water Co., November 8, 1904, to January 16, 1905.

	Area underlain by alluvium.[a]	Average lowering of water table by pumping.[b]	Volume of material drained.
	Acres.	*Feet.*	*Acre-feet.*
Within a radius of half a mile south of pump	125	17.5	2,187
Between half a mile and 1 mile south of pump	347	7.7	2,672
Between 1 and 1½ miles south of pump	486	4.7	2,284
Between 1½ and 5 miles south of pump	4,340	1.8	7,812
	.....	.....	14,955

[a] Based on planimeter measurements. [b] Based on Figure 1.

If the volume of materials drained was 14,955 acre-feet and the quantity of water pumped 1,643 acre-feet, the available pore space was 10.9 per cent.[40] This result is in fairly close agreement with the 12 per cent found by means of the well-log method. (See p. 30.)

While this test was being made practically no water was artificially withdrawn from the area above the lower gorge except small amounts for domestic purposes, and only a small addition was being made to the ground water from stream flow. (See table on p. 99.) The lower gorge is a peculiarly favorable place for making such a test, and the data are correspondingly valuable. Even here, however, there are certain unknown factors that lay the conclusions open to criticism. Probably the most valid criticism that can be made regarding the pumping test is that the point at which the pumpage was turned

[40] In Water-Supply Paper 400 (p. 86) this test is described, and the conclusion is reached that the available pore space was 11.6 per cent. Since the publication of that paper somewhat more accurate base data have been obtained, which gave an available pore space of 10.9 per cent.

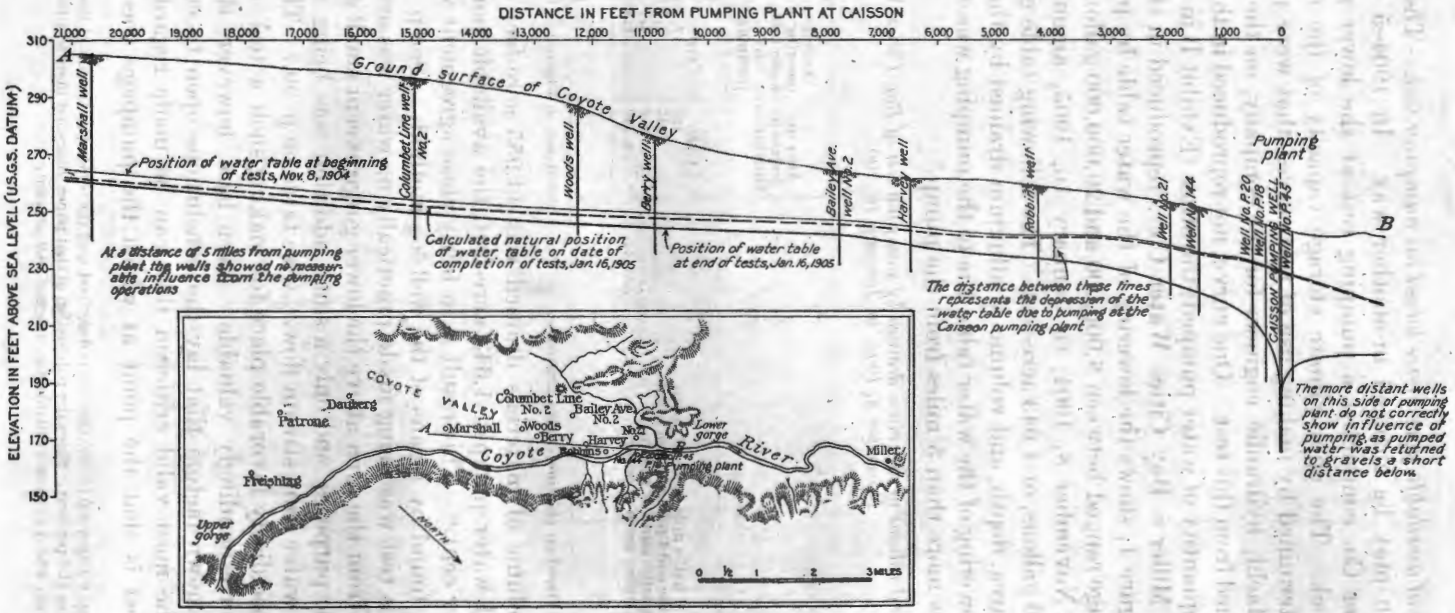

FIGURE 1.—Section and sketch map showing effect on water table produced by pumping test of Bay Cities Water Co. at lower gorge of Coyote Creek, November 8, 1904, to January 16, 1905.

back into the creek may not have been at a great enough distance to make it impossible for any of the water to find its way back to the pump and thus to be pumped over again and again. This was not believed to be possible by those in charge of the test, but definite data on the point seem to be lacking.

Permeability.—Ground water is not ordinarily stationary but moves with a relatively slow though measurable velocity. Where it has an unconfined upper surface it moves in the direction of downward slope of that surface. Like surface streams, it flows downhill, and as in them the movement is due to gravity. Where confined beneath impervious beds, ground water acts like the water in the supply pipes of a system of waterworks and moves for the same reason—that is, because the pressure varies from point to point—the movement taking place in the direction of lessened pressure. The pressure of ground water, even where confined beneath impervious beds, is almost always ultimately due to gravity. The rate of movement varies greatly, depending on conditions. In discussing the rate of movement of ground water, Slichter[41] says:

> The rate of movement of ground water through a porous rock depends upon several important elements, which may be enumerated as follows: (1) The size of the pores in the water-bearing medium, the capacity to transmit water being enormously greater for large pores than for small pores; (2) the porosity of the material, the flow being much greater for high porosity than for low porosity, other things being equal; (3) the pressure gradient or the change in the pressure or head per unit of length measured in the direction of motion, the flow being greater, of course, for high gradients than for low gradients; (4) the temperature of the water, the flow being noticeably greater at high temperatures than at low temperatures.

He states further[42] that the quantity of water transmitted through a column of sand not only depends upon the length of the column and the head of the water but varies as the square of the effective size of the soil particles—that is, if the effective size of the particles is doubled the quantity of water transmitted would be four times as great. He also states that an increase of temperature of the water from about 32° to 70° F. practically doubles the amount of water transmitted. The arrangement of the particles is also of great importance. Slichter[43] says that if two samples of the same sand are packed so that their porosity is respectively 26 and 47 per cent of their volume, the flow through the sample having a porosity of 47 per cent will be more than seven times as great as the flow through the one having a porosity of 26 per cent. If the samples are packed so that they have a porosity of 30 and 40 per cent, respectively, the transmission of the latter will be 2.6 times that of the former.

[41] Slichter, C. S., The motions of underground waters: U. S. Geol. Survey Water-Supply Paper 67; pp. 17–18, 1902.

[42] Idem, p. 25.

[43] Idem, pp. 25–26.

The rate of movement of course differs greatly with differences in the rocks and in pressure gradient. According to experiments and calculations by Slichter, with a pressure gradient of 10 feet to the mile the rate is 53 feet a year in fine sand, 845 feet a year in coarse sand, and 5,386 feet (about a mile) a year in fine gravel. In tests made by the United States Geological Survey in gravelly valley deposits in California, Kansas, and Nebraska the velocity was found to range from about 1 foot to about 50 feet a day, and in sandy and gravelly deposits on Long Island from practically zero to about 100 feet a day. In tests in gravelly deposits in Arizona the maximum velocity was found to be 420 feet a day. The average velocity is doubtless much smaller in the deeper and less pervious aquifers than in the surface deposits that have been tested.

PRECIPITATION.

CONDITIONS GOVERNING PRECIPITATION.

Santa Clara Valley lies at a distance ranging from only a few miles to about 20 miles from the ocean and has in its northern part about 450 square miles of the waters of San Francisco Bay. The position of the valley relative to the sea, the prevailing westerly winds, the relative temperature of land and sea, and the topography of the valley are important factors in determining its climate. The general drift of the air is from the ocean to the land. Air coming from the ocean is heavily laden with moisture, and except when the land temperature is considerably higher than that of the sea only slight cooling is required to cause precipitation.

The topography of the region has a profound effect upon the climate, and particularly upon precipitation and winds. McAdie[44] says, "The general movement of the air in California is decidedly modified and certainly in the lowermost strata almost entirely controlled by the topography."

The features that exert effective control over the climate of a large portion of the State are the Pacific Ocean, the Golden Gate, San Francisco Bay, the Great Valley of California, the smaller interior valleys, the Sierra Nevada, and the Coast Ranges.

Through the Golden Gate rushes a strong westerly current of air, a portion of which passes through the Straits of Carquinez, over Suisun Bay, and enters the Great Valley of California, where it is deflected by the mountains, part to the north and part to the south.[45] This air movement is particularly well developed in summer. The air that enters through the Golden Gate often makes its influence felt

[44] McAdie, A. G., Climatology of California: U. S. Weather Bureau Bull. L, p. 17, 1903.
[45] McAdie, A. G., The rainfall of California: California Univ. Pub. Geography, vol. 1, p. 149, 1914.

as far north as Red Bluff,[46] at the upper end of Sacramento Valley. In San Joaquin Valley the prevailing winds are from the north.

Another portion of the air that rushes in through the Golden Gate is deflected before passing the Straits of Carquinez, likewise in part to the north and in part to the south. The part which is deflected southward moves up Santa Clara Valley and produces prevailing northerly winds.[47] These winds are very persistent in the northern part of the valley, especially during the summer.

South of the Golden Gate there are three other gaps through which the ocean wind enters. The first of these is Merced Valley, the highest point of which is at Colma, about 190 feet above sea level[48] and 10 miles south of the Golden Gate. Merced Valley is a structural troughlike depression leading from the ocean to Santa Clara Valley. The second gap is at Los Gatos, where a comparatively low gap in the Santa Cruz Mountains, trends northeast. Its highest point is about 1,600 feet above sea level. The third is Pajaro Gap and the relatively low hills between it and San Juan Pass, where the State highway has been built connecting Santa Clara Valley with Salinas Valley and the coast. Pajaro Gap has an altitude of only about 75 feet above sea level, and San Juan Pass about 1,000 feet.

Merced Valley does little more perhaps than to accentuate the effect of the Golden Gate and to give South San Francisco, San Bruno, and Millbrae a very windy and foggy climate.

The chief effect of the Los Gatos gap is to produce a comparatively heavy rainfall around Los Gatos, although it also has some influence both on the direction and the velocity of the winds. Rainfall in Los Gatos and vicinity when other parts of the valley are receiving none is a very common occurrence, and often clouds or fog hang over this area while the rest of the valley is clear. The precipitation is higher at Los Gatos than at any other point of record in Santa Clara Valley. (See precipitation tables, pp. 47–50.) The town is on the very border of the valley, at an altitude of about 400 feet above sea level. Southeast of Los Gatos is a chain of peaks some of which within 5 miles of the town reach an altitude of 3,000 feet. This chain directs the movement of wind and cloud down the canyon of Los Gatos Creek and condenses the moisture that they carry, thus causing the high precipitation shown by the Los Gatos records.

At Pajaro Gap the mountains are only about 6 miles wide. This gap is only about 75 feet above sea level, and Pajaro River passes through it on its way to Monterey Bay. For 6 miles south of Pajaro Gap the mountains are comparatively low. Within the first 3 miles

[46] McAdie, A. G., Climatology of California: U. S. Weather Bureau Bull. L, p. 93, 1903; The rainfall of California: California Univ. Pub. Geography, vol. 1, p. 149, 1914.

[47] McAdie, A. G., Climatology of California: U. S. Weather Bureau Bull. L, p. 111, 1903.

[48] Holway R. S., Physiographically unfinished entrances to San Francisco Bay: California Univ. Pub. Geography, vol. 1 p. 100, 1914.

the highest peak is only 796 feet above sea level and most of the peaks do not exceed 500 feet. The highest peak within 6 miles south of the gap is 1,350 feet above sea level and most of those between 3 and 6 miles are under 1,200 feet.

Pajaro Gap, together with the low hills south of it, affords an effective gateway for the wind. Almost any summer afternoon a gale blows from the ocean across this low area. When these winds reach Santa Clara Valley they are deflected to the north and to the south. Those blowing northward give that portion of the valley immediately north of Pajaro Gap its persistent southerly winds. These currents continue to the vicinity of Gilroy, where they meet the northerly winds from the north end of the valley, and the Gilroy region is consequently one of lighter and more variable winds. Hollister, being nearly due east of the Pajaro wind gap, has prevailingly westerly winds.

In summer the winds are generally much stronger in the afternoon than in the forenoon, and they usually cease to blow about the time the sun goes down, the nights being very calm. In winter the winds are very much more variable, both in direction and in velocity, because they are dominated by cyclonic storms.

The general eastward drift of the air, the nearness of the valleys to the ocean, and the presence of mountain ranges lying at right angles to the course of the winds are the most influential factors in determining the precipitation of the region. The moisture-laden air from the ocean, except the part that passes through the gaps, is forced over the cold tops of the mountain ranges and is thereby cooled so as to produce precipitation.

There is a somewhat irregular increase in precipitation with increase in altitude. McAdie[49] says that from records of sections across the Sierra Nevada at four places between Sacramento and Fresno the precipitation appears to increase up to an altitude of about 5,000 feet at an average rate of 8.5 inches to the 1,000 feet, but that above this altitude the precipitation steadily decreases. He states also[50] that between Sacramento and Summit the maximum precipitation occurs at an altitude of about 6,500 feet. Three of the four sections from which McAdie draws these conclusions are taken from a paper by Lee,[51] and two of three are here reproduced. Figure 2 is made from data collected at Weather Bureau stations from Sacramento, Calif., to Wadsworth, Nev., between 1888–89 and 1909–10.[52] Figure 3 is made from data collected at Weather Bureau stations between Stockton, Calif., and Carson Lake, Nev. (See table, p. 47.)

[49] McAdie, A. G., The rainfall of California: California Univ. Pub. Geography, vol. 1, p. 151, 1914.

[50] Idem, p. 150.

[51] Lee, C. H., An intensive study of the water resources of a part of Owens Valley, Calif.: U.S. Geol. Survey Water-Supply Paper 294, p. 28, pl. 8, diagrams 1 and 4, 1912.

[52] The climatic records discussed in this paper cover fiscal years from July 1 to June 30.

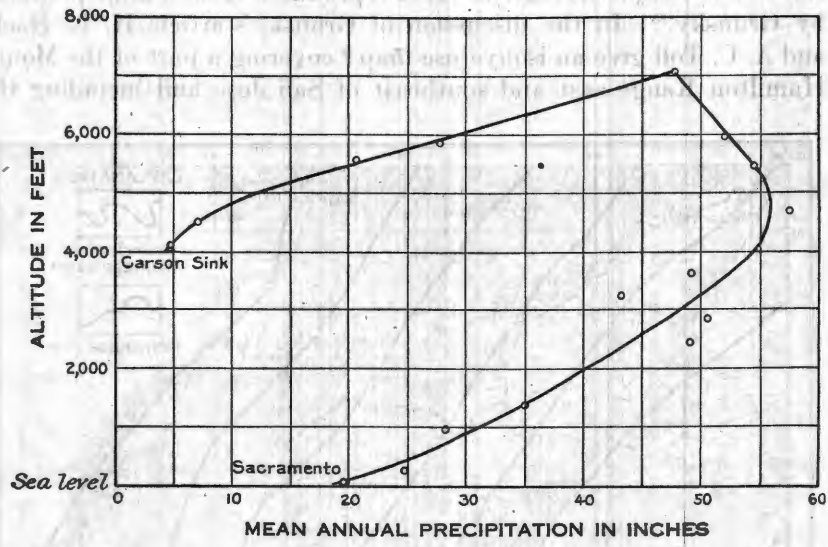

FIGURE 2.—Diagram showing relation of precipitation to altitude along Southern Pacific Railroad between Sacramento, Calif., and Carson Sink, Nev. (After Charles H. Lee.)

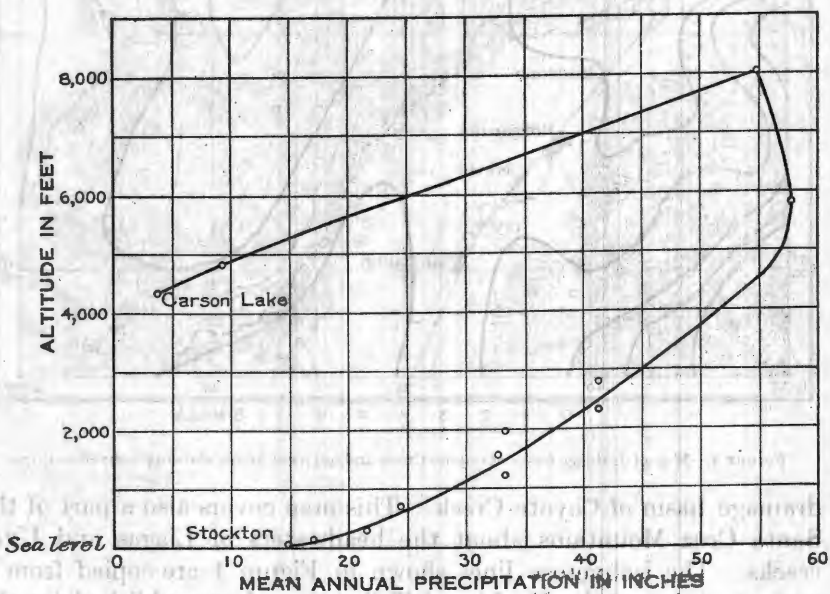

FIGURE 3.—Diagram showing relation of precipitation to altitude between Stockton, Calif., and Carson Lake, Nev. (After Charles H. Lee.)

Plate IX shows the mean annual precipitation in Santa Clara Valley and the adjacent region. It is reproduced from a map prepared by Grunsky.[53] In the discussion of Grunsky's article H. L. Haehl and A. C. Toll give an isohyetose map[54] covering a part of the Mount Hamilton Range east and southeast of San Jose and including the

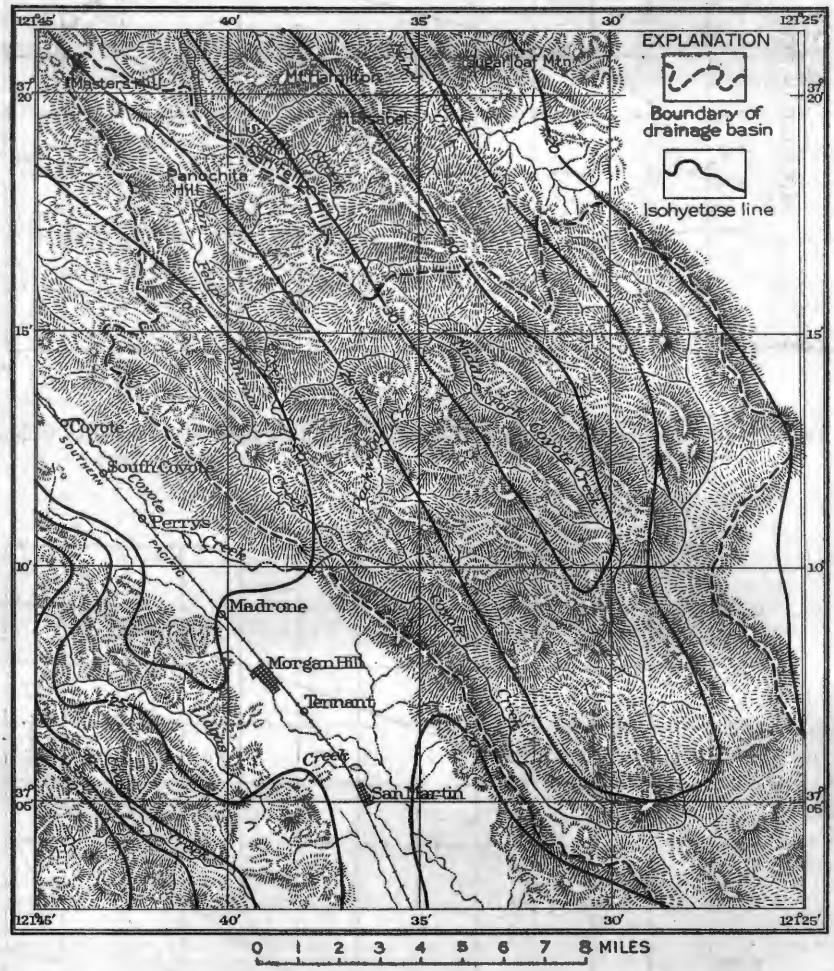

FIGURE 4.—Map of drainage basin of Coyote Creek and adjacent areas, showing isohyetose lines.

drainage basin of Coyote Creek. This map covers also a part of the Santa Cruz Mountains about the headwaters of Llagas and Uvas creeks. The isohyetose lines shown in Figure 4 are copied from a revised edition of the Haehl and Toll map and are published by the

[53] Grunsky, C. E., Rainfall and run-off near San Francisco: Am. Soc. Civil Eng. Trans., vol. 61, pp. 496-543, pl. 59, December, 1908.

[54] Idem, pl. 60.

courtesy of Edwin Duryea, jr.[55] Although based on later and fuller data than the original map by Haehl and Toll, this map can be used in connection with the discussion by these engineers. Both the Grunsky map and the Duryea, Haehl & Gillman map are in very considerable part constructed from projected data representing long-period rainfall, but they are believed to be of value in the absence of more complete data. They clearly indicate the influence of topography upon rainfall, though they appear to place the heaviest precipitation just west of the mountain crest. McAdie[56] believes that at altitudes below 5,000 feet the heaviest precipitation occurs just east of the crest.

DISTRIBUTION OF PRECIPITATION.

Distribution from year to year.—The distribution of precipitation from year to year in Santa Clara Valley and the mountain area tributary thereto (see precipitation tables, pp. 47–50) is very irregular. Besides large differences in single years there frequently occurs a series of wet years or a series of dry years. A series of wet years is usually a period of more than ordinary prosperity for this region, but in a series of dry years the region is likely to be less prosperous than usual. Fortunately, the periods when the precipitation is much below the normal seldom exceed three years, but even such a three-year period brings about a critical condition in the water supply.

The record of precipitation at San Francisco extends from 1849–50 to 1919–20, a period of 71 years. During this period the average annual precipitation was 22.10 inches; the highest precipitation in any one year was 49.27 inches, in 1850–51; and the lowest was 7.42 inches, in 1861–62. There were 30 years in which the precipitation was above the average and 41 years in which it was below the average. There were 20 years in which the precipitation was above 25 inches, 29 years in which it was below 20 inches, 10 years in which it was below 15 inches, and 2 years in which it was below 10 inches.

The record for Oakland extends from 1864–65 to 1919–20, a period of 56 years. During this period the average annual precipitation was 24.35 inches. For the period 1874–75 to 1919–20 the highest annual precipitation was 45 inches, in 1889–90, and the lowest was 11.58 inches, in 1911–12. During this period there were 23 years in which the precipitation was above the average and 23 years in which it was below the average. There were 7 years in which the precipitation was above 30 inches, 14 years in which it was below 20 inches, and 6 years in which it was below 15 inches.

The record for Niles extends from 1870–71 to 1918–19, a period of 49 years. During this period the average annual precipitation was

[55] From the office files of Duryea, Haehl & Gillman, civil engineers, San Francisco.

[56] McAdie, A. G., The rainfall of California: California Univ. Pub. Geography, vol. 1, pp. 150–154, 1914.

18.39 inches; the highest was 35.91 inches, in 1889–90; the lowest was 9.34 inches, in 1876–77. There were 22 years when the precipitation was above the average and 27 years when it was below the average. There were 5 years when the precipitation was above 25 inches, 18 years when it was below 15 inches, and 2 years when it was below 10 inches.

The record for Los Gatos extends from 1885–86 to 1919–20, a period of 35 years. During this period the average annual precipitation was 32.49 inches; the highest was 67.22 inches, in 1889–90; and the lowest was 15.18 inches, in 1897–98. There were 16 years when the precipitation was above the average, 18 years when it was below the average, and 1 year when it was average. There were 9 years when the precipitation was above 40 inches, 12 years when it was below 25 inches, and 4 years when it was below 20 inches.

The record for San Jose extends from 1874–75 to 1919–20, a period of 46 years. During this period the average annual precipitation was 16.58 inches; the highest was 30.30 inches, in 1889–90; and the lowest was 4.83 inches, in 1876–77. There were 21 years when the precipitation was above the average and 25 years when it was below the average. There were 8 years when the precipitation was above 20 inches, and 6 years when it was below 10 inches.

The record for Morgan Hill extends from 1900–1901 to 1914–15; a period of 15 years. During this period the average annual precipitation was 23.57 inches; the highest was 37.69 inches, in 1913–14, and the lowest was 10.36 inches, in 1912–13. There were 7 years when the precipitation was above the average and 8 years when it was below the average. There were 6 years when the precipitation was above 25 inches, 5 years when it was below 20 inches, and 1 year when it was below 15 inches.

The record for Gilroy extends from 1874–75 to 1914–15, a period of 41 years. During this period the average annual precipitation was 20.53 inches; the highest was 37.75 inches, in 1889–90; and the lowest was 6.53 inches, in 1876–77. There were 18 years when the precipitation was above the average and 23 years when it was below the average. There were 8 years when the precipitation was above 25 inches, 11 years when it was below 15 inches, and 2 years when it was below 10 inches.

The record for Hollister extends from 1874–75 to 1919–20, a period of 46 years. During this period the average annual precipitation was 13.04 inches; the highest was 23.80 inches, in 1906–7; and the lowest was 4.69 inches, in 1876–77. There were 22 years when the precipitation was above the average and 24 years when it was below the average. There were 3 years when the precipitation was above 20 inches, 17 years when it was above 15 inches, and 10 years when it was below 10 inches.

Distribution within the year.—Nowhere else in the United States are the wet and dry seasons so sharply marked as they are in most parts of California. January is usually the wettest month, and March, December, and February follow in the order named. The precipitation is so much concentrated in the winter that the summer is often referred to as rainless. This is not quite true, but for three or four months the rainfall is so slight as to be practically negligible. In Santa Clara Valley less than 1 per cent of the rain falls during the driest three months, whereas 56 per cent falls during the wettest three months and 82 per cent during the wettest five months.

At San Francisco only 0.9 per cent of the rain falls during the driest three months, only 5 per cent during the driest four months, and only 17 per cent during the driest six months. At the same place 58 per cent falls during the wettest three months and 83 per cent during the wettest five months. During a period of 69 years July had a measurable precipitation in 23 years, the highest July precipitation was 0.23 inch, and the total precipitation in this month during the 69 years was 1.10 inches. During the same period August had a measurable amount of precipitation in 22 years, the highest record was 0.29 inch, and the total in the period was 1.31 inches.

At Oakland during the driest three months about 1.5 per cent of the annual rainfall occurs, in four months about 3 per cent, and in six months about 13 per cent. During the wettest three months about 54 per cent of the total occurs, and in five months about 80 per cent. During a period of 44 years July had a measurable rainfall in 11 years, the highest on record was 0.18 inch, and the total for the period was 0.86 inch. During the same period August had a measurable rainfall in 5 years, the highest on record was 1.11 inches and the total for the period was 2.09 inches.

At San Mateo during the driest three months about 0.8 per cent of the total annual rainfall occurs, in four months about 2.5 per cent, and in six months about 10 per cent. During the wettest three months about 56 per cent of the total occurs, and in five months about 82 per cent. During a period of 44 years July had a measurable rainfall only twice, in one year 0.13 inch and in the other 0.07 inch. During the same period August had a measurable rainfall three times, the highest record was 0.70 inch, and the total for the period was 1.18 inches.

At Niles during the driest three months about 1 per cent of the total annual rainfall occurs, in four months about 2.7 per cent, and in six months about 12 per cent. During the wettest three months about 54 per cent of the total occurs, and in five months about 81 per cent. During a period of 47 years July had a measurable rainfall four times, the highest record was 0.10 inch, and the total for the

period was 0.16 inch. During the same period August had a measurable rainfall five times, the highest record was 0.83 inch, and the total for the period was 2.13 inches.

At Los Gatos during the driest three months about 0.5 per cent of the total annual rainfall occurs, in four months about 2 per cent, and in six months about 12 per cent. During the wettest three months about 57 per cent of the total occurs, and in five months about 82 per cent. During a period of 33 years July had a measurable rainfall only twice, in one year 0.17 inch and in the other 0.04 inch. During the same period August had a measurable rainfall three times, the highest was 0.77 inch, and the total for the period was 1.37 inches.

At San Jose during the driest three months about 1 per cent of the total annual rainfall occurs, in four months about 2.6 per cent, and in six months about 14 per cent. During the wettest three months about 56 per cent of the total occurs, and in five months about 80 per cent. During a period of 45 years July had a measurable rainfall five times, the highest record was 0.09 inch, and the total for the period was 0.17 inch. During the same period August had a measurable rainfall five times, the highest was 0.74 inch, and the total for the period was 1.12 inches.

At Morgan Hill during the driest three months about 0.6 per cent of the total annual rainfall occurs, in four months about 1.5 per cent and in six months about 8 per cent. During the wettest three months about 63 per cent of the total occurs, and in five months about 87 per cent. During a period of 19 years July had a measurable rainfall only once, when it was 0.35 inch. During the same period August had a measurable precipitation twice, in one year 0.15 inch and in the other 0.05 inch.

At Gilroy during the driest three months about 1 per cent of the total annual rainfall occurs, in four months 4.5 per cent, and in six months about 12.5 per cent. During the wettest three months about 54 per cent of the total occurs and in five months about 80 per cent. During a period of 44 years July had a measurable rainfall three times; the highest was 0.66 inch, and the total for the period was 1.08 inches. During the same period August had a measurable rainfall three times; the highest was 1 inch, and the total for the period was 1.19 inches.

At Hollister during the driest three months about 1 per cent of the total annual rainfall occurs, in four months about 2 per cent, and in six months about 11 per cent. During the wettest three months about 58 per cent of the total occurs, and in five months about 81 per cent. During a period of 44 years July had a measurable rainfall four times; the highest was 1.08 inches, and the total for the period was 1.43 inches. During the same period August had a measurable rainfall five times; the highest was 1.10 inches, and the total for the period was 1.43 inches.

The above-named stations are representative of all portions of Santa Clara Valley, The distribution of rainfall in the mountain area is very similar to that in the valley, though the precipitation is considerably higher, and the dry months are not quite so nearly rainless. The precipitation in each month in the mountains expressed in percentage of the annual precipitation is probably very similar to that of the valley.

Distribution during the rainy season.—A little oftener than any other one month January is the month of heaviest precipitation, but it holds this rank only about 25 per cent of the time. March follows very closely and is the month of heaviest precipitation in about 23 per cent of the years; December is next, about 22 per cent; and February is next, about 18 per cent. The remaining 12 per cent is distributed among September, October, November, and April.

The following table shows the distribution of the heaviest monthly precipitation at nine stations in Santa Clara Valley, including San Francisco and Oakland.

Distribution of heaviest monthly precipitation in or near Santa Clara Valley.

Station.	Period of record in years.[a]	Number of times month had heaviest precipitation in the year.								
		Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.
San Francisco	69	1	.....	[b] 5	17	19	14	[b] 12	2	.....
Oakland	44	.....	2	5	9	10	7	10	1	.....
Niles	47	.....	2	4	10	9	8	12	1	1
San Mateo	44	.....	.....	4	8	13	7	11	1	.....
Los Gatos	33	.....	1	1	7	9	8	7	.....	.....
San Jose	44	.....	1	2	8	10	10	12	1	.....
Morgan Hill	13	.....	.....	.....	3	5	1	4	.....	.....
Gilroy	41	.....	4	6	13	8	8	.....	.....	.....
Hollister	44	.....	.....	4	8	10	7	13	2	.....

[a] Only the years having complete records are used.
[b] November, 1896, and March, 1897, both had 4.56 inches.

The above table shows that once in 69 years (in 1904) at San Francisco September had a heavier precipitation than any other month. However, the records of precipitation for San Francisco show that this was a very unusual month. The largest precipitation for September in any other year was 1.25 inches (1912), and the total in September for 68 years, omitting that of 1904, was only 15.79 inches. That of 1904 was 5.07 inches—that is, almost one-third of the total for 68 years.

It happens not infrequently that nearly half of the precipitation for a year is concentrated into a single month. This concentration was especially notable in 1910–11, in which more than half of the rain fell in January, much of it in two storms. At Lick Observatory, on Mount Hamilton, during one of these storms 9.19 inches of rain fell in 24

hours, and during the other 5.56 inches fell in a like period.[57] The total for the month was 15.76 inches. McAdie gives the following as the heaviest rainfall for a 24-hour period in the same month: Los Gatos 6.15 inches, Ben Lomond 7.15 inches, and Laurel 7.5 inches. In January, 1909, the heaviest precipitation in 24 hours at Ben Lomond was 5.45 inches and at Lick Observatory 6.37 inches; in March, 1907, at Ben Lomond 6.02 inches, at Boulder Creek 5.39 inches, and at Laurel 5 inches; in December, 1906, at Ben Lomond 7.08 inches, at Boulder Creek 6.2 inches, and at Laurel 5.65 inches; in January, 1906, at Ben Lomond 5.08 inches, at Boulder Creek 5.18 inches, and at Laurel 6.35 inches; in March, 1904, at Ben Lomond 7.02 inches; in February, 1904, at Laurel 5.9 inches; in November, 1903, at Ben Lomond 6.7 inches at Boulder Creek 5.18 inches, at Felton 5.59 inches, and at Laurel 5.05 inches; in February, 1902, at Ben Lomond 5.54 inches and at Laurel 5.05 inches.[58] These stations are all in or near the drainage basin of Santa Clara Valley.

Geographic distribution.—There is a marked difference between Santa Clara Valley and the adjacent mountain areas in the amount of precipitation received, the mountain areas almost invariably receiving more than the valley. This difference may be shown by comparing the record for San Jose, in the heart of the valley, with that for the Lick Observatory, in the mountains, about 14 miles east of San Jose. At San Jose, 95 feet above sea level, the average annual precipitation is 16.58 inches, and at the Lick Observatory, 4,209 feet above sea level, it is 32.01 inches. At Los Gatos the average annual precipitation is 32.49 inches. This town is at the base of the mountains, at the mouth of the canyon of Los Gatos Creek, and only 600 feet above sea level, but there are special topographic features that cause a notably heavy precipitation here. (See p. 35.)

There is also a marked difference in the amount of precipitation from place to place in the valley. The average annual precipitation at San Francisco is 22.10 inches, at Oakland 24.35 inches, at San Leandro[59] 23.83 inches, at Niles 18.39 inches, at San Mateo 23.14 inches, at Menlo Park 18.60 inches, at Mountain View 15.55 inches, at Santa Clara 16.42 inches, at San Jose 16.58 inches, at Morgan Hill 23.57 inches, at Gilroy 20.53 inches, and at Hollister 13.04 inches.

In general these records show a falling off in the amount of precipitation from San Francisco southward to Mountain View, thence apparently an increase to Morgan Hill, and another falling off through Gilroy to Hollister. There is an apparent decrease of about

[57] McAdie, A. G., The rainfall of California: California Univ. Pub. Geography, vol. 1, p. 179, 1914.
[58] Idem, pp. 174-179.
[59] Records not published by the U. S. Weather Bureau or given in this report are taken from McAdie, A. G., op. cit., pp. 215-224.

6 inches from San Francisco to San Jose, a distance of about 47 miles and an apparent increase of nearly 7 inches from San Jose to Morgan Hill, a distance of about 24 miles. However, the period of record at Morgan Hill is 15 years only, and the record kept there is probably less accurate than that of either San Jose or San Francisco, which are regular United States Weather Bureau stations. Southward from Morgan Hill the decrease is rapid, being about 3 inches from Morgan Hill to Gilroy, a distance of about 10 miles, and about 11 inches from Morgan Hill to Hollister, a distance of about 30 miles.

RELATION OF PRECIPITATION TO AGRICULTURE.

Direct relation.—Considerable grain is raised in Santa Clara Valley without irrigation, most of the vineyards are not irrigated, and even many orchards are not irrigated, especially in the Morgan Hill district and in the district around Cupertino and Los Gatos. In 1913 the grain crop was almost a complete failure, owing to the very light rainfall of that year, the grape and other fruit crops were very small, and considerable damage to fruit trees resulted. Other dry periods are on record in which considerable losses were sustained from crop failure and damage to orchards.

Indirect relation.—The supply of ground water for irrigation is, of course, dependent upon precipitation, though not so directly as the soil moisture utilized in dry farming or as the surface-water supplies of many irrigation projects. As a rule one dry year has no serious consequence beyond adding to the cost of pumping by lowering the level of ground water. Two or three consecutive dry years, however, result in lowering the ground water so far that with the equipment adequate for normal years it is not possible to raise sufficient water properly to mature crops or even in some places to avert injury to trees. A little irrigation is done with flood waters, and, of course this can not be done when there are no floods.

DISPOSITION OF PRECIPITATION.

The water that falls as rain or snow is disposed of in four ways—by evaporation, transpiration, direct run-off, and percolation into the soil and rocks. What proportion will follow each of these ways is determined by the relative influence of a number of factors, including rate of rainfall, rate of melting of snow, character and condition of soil, character of soil cover, topography, depth of ground water, relative humidity of the atmosphere, and velocity of the winds.

Evaporation.—In Santa Clara Valley the rainfall occurs chiefly during the winter, when the capacity of the atmosphere for evaporation is at a minimum. The average annual evaporativity, or

evaporation from a free water surface, in this region is estimated by Duryea[60] at 56.7 inches. This estimate is based on the mean of the monthly means of groups of evaporating pans placed near the mouth of Coyote Canyon, about 25 miles south of San Jose, and at Laguna Seca, about 12 miles south of San Jose. Only about 22 per cent of the annual evaporation from evaporation pans occurs during the rainy season, from November to April. The other 78 per cent occurs from May to October, but during the summer the soil becomes very dry, and therefore there is but little moisture available for evaporation. Consequently, a smaller proportion of the precipitation is evaporated than would be if the precipitation were more equally distributed throughout the year or occurred during the summer. The mean annual temperature in Santa Clara Valley is 58.2° F. For the period November to April, the mean temperature is 52.3° F. and the evaporation from pans is only about 12.5 inches. For the period May to October, the mean temperature is 64.1° F. and the evaporation from pans is about 44.2 inches. That is, between these two halves of the year there is a difference in temperature of 11.8° F. and a difference in evaporativity of 31.7 inches.

Transpiration.—Plants absorb water from the soil through their roots and discharge it into the air through their leaves. The quantity thus absorbed and discharged differs with different plants and with the same plant under different conditions of growth and soil moisture. It may be larger than the loss by evaporation from a free water surface. However, in Santa Clara Valley most of the native annual plants ripen and die down to the ground early in the summer, and no new growth springs up until the rains come again. This condition is due to a lack of soil moisture, and therefore loss by plant transpiration is much less than it would be if the rains occurred during the summer or were equally distributed throughout the year. With the data at hand it is not possible to give more than a very general idea of the quantity of water lost through transpiration.

Run-off.—Part of the precipitation is carried off directly by streams or after entering the ground is discharged through springs into the streams and is then carried away. The portion that is thus removed depends upon a number of factors, chief among which are amount and distribution of rainfall, character of topography, character of soil and soil covering, and depth to ground water. It is estimated that the run-off from the mountainous part of the drainage basin of Coyote Creek is about 34 per cent of the total precipitation on that area.

This estimate is based upon Duryea's data and the discharge of Coyote Creek near Madrone. (See pp. 98–109.) The run-off from

[60] Duryea, Edwin, jr., California evaporation records: Eng. News, vol. 67, p. 382, February 29, 1912.

the mountainous part of the drainage basin of Alameda Creek is estimated to be about 16 per cent of the total precipitation on the area. This estimate is based on the assumption that the average precipitation on the area is the same as that given for the mountain drainage of Coyote Creek and on the discharge of Alameda Creek as given on pages 120–127. The average run-off from the total mountain area tributary to Santa Clara Valley is not known, but it is believed that the estimates for Coyote Creek would be too high and those for Alameda Creek too low for the entire mountain area tributary to Santa Clara Valley. The run-off of Alameda Creek is below normal on account of the water taken from the ground by the Spring Valley Water Co., which keeps the creek abnormally low. But if the largest amount pumped by this company in any one year were added to the run-off of Alameda Creek the total would still be only about 19 per cent of the precipitation.

Percolation.—Like the portions of the precipitation disposed of in other ways, that which is absorbed into the soil and rocks, depends upon a number of factors, including rate and distribution of rainfall, topography, porosity, depth of soil, soil cover, and depth to ground water. Very little has been done in the United States toward determining the proportion of precipitation that is absorbed. Most of the absorbed water is eventually disposed of, either by evaporation and transpiration or as run-off.

PRECIPITATION DATA.

Average annual precipitation at certain stations outside the drainage basin of Santa Clara Valley.

[From records of U. S. Weather Bureau.]

	Years of record.	Average annual precipitation.		Years of record.	Average annual precipitation.
		Inches.			*Inches.*
Davis	47	17.41	Stockton	48	14.63
Sacramento	69	20.09	Tracy	34	10.37
Newcastle	20	33.42	Lodi	25	19.23
Colfax	48	48.29	Farmington	36	16.20
Iowa Hill	31	53.63	Mokelumne Hill	25	32.55
Nevada City	48	54.35	Valley Springs	25	23.89
Bowmans Dam	43	73.73	Tamarack	12	59.37
Cisco	47	51.01	Ben Lomond	14	56.10
Summit	48	47.03	Boulder Creek	24	55.81
Truckee	48	26.75	Laurel	24	51.87
Boca	44	20.58	Felton	24	47.59
Reno, Nev	31	10.43	Santa Cruz	40	28.06
Fernley, Nev.[a]	46	4.73			

[a] Name of station changed from Wadsworth, February, 1907.

Annual precipitation, in inches, at stations in or near the drainage basin of Santa Clara Valley.[a]

[From records of U. S. Weather Bureau.]

Year.	San Francisco.	Oakland.	Niles.	Los Gatos.	San Jose.	Morgan Hill.	Gilroy.	Hollister.	San Mateo.	Menlo Park.	Lick Observatory.	Alvarado.	Alviso.	Livermore.	Sunol.[b]	Calaveras.[c]
1874–75	20.56	21.57	11.81	.....	7.90	.....	15.12	9.37	12.24	.....	.....	.....	.....	11.67	.....	16.28
1875–76	31.19	28.56	25.88	.....	19.47	.....	31.04	15.57	26.27	.....	.....	.....	.....	19.99	.....	40.50
1876–77	11.04	12.33	9.34	.....	4.83	.....	6.53	4.69	7.34	.....	.....	.....	.....	6.01	.....	12.15
1877–78	35.18	32.33	24.67	.....	19.28	.....	28.03	18.12	27.49	.....	.....	.....	.....	17.66	.....	29.02
1878–79	24.44	23.47	14.54	.....	16.40	.....	16.76	8.81	18.37	12.96	.....	.....	.....	10.11	.....	21.43
1879–80	26.66	23.84	17.70	.....	13.77	.....	22.38	12.38	21.17	18.59	.....	.....	.....	15.98	.....	27.69
1880–81	29.86	31.76	20.06	.....	12.45	.....	23.42	12.48	21.12	18.36	.....	.....	.....	16.45	.....	25.03
1881–82	16.14	18.13	13.55	.....	11.75	.....	14.09	10.44	12.70	9.42	29.15	.....	.....	11.70	.....	22.32
1882–83	20.12	17.22	13.80	.....	10.59	.....	15.19	9.62	15.47	12.54	37.26	.....	.....	13.86	.....	21.40
1883–84	32.38	31.10	26.25	.....	20.08	.....	24.60	16.54	23.58	20.84	58.09	.....	.....	22.75	.....	37.26
1884–85	18.10	17.95	10.60	.....	11.27	.....	14.74	6.95	17.17	11.67	44.67	.....	.....	12.01	.....	19.63
1885–86	33.05	32.21	23.53	43.02	20.63	.....	21.45	14.44	21.77	18.91	31.42	.....	.....	16.17	.....	31.66
1886–87	19.04	18.55	14.85	24.36	11.36	.....	11.11	7.47	16.25	10.05	24.08	.....	.....	11.17	.....	.....
1887–88	16.74	17.10	14.88	24.17	12.17	.....	16.78	10.12	15.78	10.55	30.03	.....	.....	13.13	.....	.....
1888–89	23.86	21.37	16.97	29.87	15.71	.....	14.44	12.81	20.01	16.00	21.85	.....	.....	15.81	.....	19.87
1889–90	45.85	45.71	35.91	67.22	30.30	.....	37.75	22.48	40.82	33.66	45.16	.....	.....	28.66	38.99	45.54
1890–91	17.58	23.91	14.83	31.97	12.88	.....	14.84	10.10	17.89	14.91	24.05	.....	.....	14.16	14.05	20.23
1891–92	18.53	20.87	16.39	23.11	16.51	.....	18.91	11.58	17.68	13.27	27.49	.....	.....	14.25	16.54	25.24
1892–93	21.75	28.07	23.46	56.24	25.17	.....	24.50	17.42	30.24	23.39	37.93	.....	.....	26.29	27.19	39.20
1893–94	18.47	25.41	21.91	21.25	12.92	.....	12.91	12.01	22.58	12.56	35.84	.....	.....	17.16	21.72	30.81
1894–95	25.70	36.89	27.30	47.18	23.32	.....	28.81	18.53	32.38	26.08	36.61	.....	.....	24.37	27.02	38.63
1895–96	21.25	26.65	19.58	34.48	13.69	.....	24.70	14.06	22.25	16.75	29.76	.....	.....	16.35	17.59	25.82
1896–97	23.43	30.16	24.02	32.49	16.56	.....	21.82	14.04	24.45	20.26	32.22	.....	.....	17.28	22.22	31.20
1897–98	9.38	13.58	11.99	15.18	6.87	.....	10.44	7.15	11.97	9.28	17.66	.....	.....	9.11	10.51	13.37
1898–99	16.87	25.02	15.89	24.93	10.02	.....	19.44	9.88	20.28	15.20	25.73	.....	.....	11.54	{16.29 / 20.41}	21.98
1899–1900	18.47	24.81	18.55	24.24	13.87	.....	14.54	10.92	21.54	15.60	29.31	.....	.....	12.93	22.27	25.84
1900–1	21.17	25.02	24.87	41.35	19.88	28.27	23.17	15.76	23.05	19.63	31.64	.....	.....	19.82	25.37	30.66
1901–2	18.98	23.92	17.47	33.23	12.98	23.31	18.41	11.47	21.27	15.31	27.62	.....	.....	12.48	19.54	23.27
1902–3	18.28	21.16	17.17	28.98	13.89	23.13	17.48	12.64	23.85	17.10	30.29	.....	.....	14.25	19.02	24.95
1903–4	20.59	28.99	18.53	29.25	10.47	19.08	18.26	11.79	23.14	16.16	33.78	.....	.....	13.33	22.16	27.49
1904–5	23.45	27.61	23.47	35.88	17.96	23.67	23.25	17.24	26.64	17.66	28.55	.....	.....	15.81	23.29	28.72
1905–6	20.42	23.38	23.89	38.13	15.12	22.71	29.42	20.45	21.76	21.03	38.43	.....	.....	19.32	25.21	28.04
1906–7	26.17	25.97	28.35	43.42	22.71	33.24	28.98	23.80	24.02	21.10	43.34	23.72	20.95	22.99	29.78	32.98
1907–8	17.35	15.75	12.90	22.38	11.69	17.13	14.25	10.94	13.53	14.31	23.92	14.58	8.98	9.93	16.18	17.34
1908–9	25.57	25.78	22.64	44.75	18.31	28.23	27.81	17.63	29.91	24.70	37.42	21.14	20.28	18.58	25.14	.....
1909–10	19.52	19.75	18.33	25.78	14.52	17.71	19.47	14.67	18.62	15.71	26.02	16.36	15.71	14.50	18.53	.....
1910–11	25.49	27.76	20.58	52.63	22.65	26.66	19.41	13.39	27.27	24.77	33.29	21.97	21.48	21.28	28.43	28.12
1911–12	14.06	11.58	12.37	19.46	10.58	15.45	13.87	10.06	14.69	9.28	18.24	13.65	9.47	9.60	15.81	14.79
1912–13	12.24	11.89	9.68	15.53	6.35	10.36	9.75	6.73	11.15	7.82	17.88	8.35	6.77	5.15	.....	.....
1913–14	29.60	27.89	18.91	52.98	19.45	37.69	33.70	19.85	26.15	24.12	35.61	20.35	16.44	17.01	.....	.....
1914–15	27.41	27.98	21.35	36.81	22.71	26.95	21.22	17.20	26.58	.....	27.75	.....	.....	.....	.....	.....
1915–16	27.12	27.28	17.49	38.53	16.31	.....	.....	17.35	25.61	.....	29.48	.....	.....	16.56	.....	.....
1916–17	15.78	19.35	13.19	29.29	12.63	.....	.....	14.18	15.47	.....	24.58	.....	.....	10.58	.....	34.48
1917–18	11.48	14.21	10.27	.....	9.36	.....	.....	19.32	7.31	.....	15.66	.....	.....	8.73	.....	37.89
1918–19	25.64	28.90	20.27	34.55	18.89	.....	.....	15.17	.....	.....	27.40	.....	.....	17.99	.....	35.03
1919–20	10.46	13.64	.....	20.55	8.81	.....	.....	8.38	.....	.....	21.48	.....	.....	8.82	.....	40.13

[a] The records at some places extend farther back, but none earlier than 1874–75 are shown in this table.

[b] The records from 1889–90 to 1898–99 are those of the Southern Pacific Co.; the records from 1898–99 to 1911–12 are those of the Spring Valley Water Co. (Clark, W. O., Ground-water resources of the Niles cone and adjacent areas, Calif.: U. S. Geol. Survey Water-Supply Paper 345, p. 141, 1915).

[c] Records from 1874 to 1912, Clark, W. O., op. cit., p. 136.

Average monthly precipitation at stations in or near the drainage basin of Santa Clara Valley.

[From records of U. S. Weather Bureau.]

Station.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
San Francisco	0.01	.....	0.29	1.29	2.47	4.24	4.33	3.70	3.14	1.82	0.81	0.17
Oakland	.02	0.03	.46	1.55	2.82	3.86	5.05	3.94	4.10	1.56	.85	.30
Niles [a]	.....	.03	.37	.94	2.04	3.11	3.86	3.00	2.94	1.25	.77	.17
Los Gatos	.....	.05	.57	1.87	3.37	5.71	7.09	5.58	5.90	2.03	1.07	.09
San Jose	.....	.04	.34	.90	1.89	3.05	2.88	2.54	2.98	1.41	.68	.08
Morgan Hill	.02	.01	.24	.71	2.14	3.43	7.06	3.78	4.04	1.25	.78	.09
Gilroy	.....	.03	.19	1.05	2.10	3.13	4.56	3.14	3.55	1.50	.76	.08
Hollister	.01	.04	.11	.70	1.49	1.97	2.71	1.99	2.38	1.05	.54	.13
San Mateo	.....	.01	.35	1.22	2.40	3.38	4.50	3.47	3.54	1.57	.58	.16
Menlo Park	.01	.03	.32	.95	1.69	3.03	3.22	2.54	3.01	1.32	.58	.15
Lick Observatory	.....	.02	.36	1.68	2.94	6.31	5.56	4.92	5.67	2.81	1.61	.40
Alvarado [b]	.....	.....	.16	.52	1.19	2.87	6.04	2.40	3.05	.69	.41	.31
Alviso [b]	.01	.....	.23	.17	1.01	2.44	4.92	2.36	2.95	.39	.33	.22
Livermore	.01	.03	.33	.76	1.67	2.89	2.97	2.41	2.58	.60	.60	.15
Sunol [c]	.01	.03	.46	1.20	2.08	3.77	4.50	2.93	4.24	1.42	.87	.11
Calaveras [d]	.....	.04	.32	1.50	2.89	4.31	4.98	4.04	4.68	2.34	1.14	.17

[a] The records used for 1912–13 and 1913–14 were those of the Southern Pacific Co.
[b] Records of the Southern Pacific Co.
[c] Records of the Southern Pacific Co. and the Spring Valley Water Co.
[d] Clark, W. O., Ground-water resources of the Niles cone and adjacent areas, Calif.: U. S. Geol. Survey Water-Supply Paper 345, p. 136, 1915.

Average annual precipitation at stations in or near the drainage basin of Santa Clara Valley.

Station.	Inches.	Years of record.	Station.	Inches.	Years of record.
San Francisco	22.10	71	San Mateo	23.14	44
Oakland	24.35	56	Menlo Park	18.60	36
Niles	18.39	49	Lick Observatory	32.01	40
Los Gatos	32.49	35	Alvarado	17.64	8
San Jose	16.58	46	Alviso	15.01	8
Morgan Hill	23.57	15	Livermore	15.18	48
Gilroy	20.53	41	Sunol	21.61	23
Hollister	13.04	46	Calaveras	27.51	38

Monthly and annual precipitation at San Jose.

[From records of U. S. Weather Bureau.]

	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	Total for year.
1874-75	.....	.....	0.10	1.81	1.91	0.08	2.75	0.41	0.39	Tr.	Tr.	0.45	7.90
1875-76	.....	.....	.....	Tr.	6.10	2.12	4.08	3.41	3.11	0.41	0.25	.....	19.47
1876-77	Tr.	.....	.11	1.17	.01	.....	2.23	.48	.78	.....	.05	.....	4.83
1877-78	.....	.....	.....	.37	.85	1.87	5.53	6.94	2.22	1.48	.02	.....	19.28
1878-79	.....	.....	.48	.80	.76	.97	1.48	3.18	5.85	1.24	1.58	.06	16.40
1879-80	.....	.....	.....	.87	1.79	2.99	1.48	1.35	.96	3.66	.67	.....	13.77
1880-81	.....	.....	.....	.....	.49	5.60	2.12	2.04	.80	1.28	.....	.12	12.45
1881-82	.....	.....	.02	.45	.88	1.83	1.17	1.49	4.26	1.10	.55	.....	11.75
1882-83	.....	.....	.04	.87	1.32	.82	1.06	.94	2.70	.66	2.18	.....	10.59
1883-84	.....	.....	.09	.67	.28	.37	3.18	3.68	6.23	3.38	.05	2.15	20.08
1884-85	.....	.....	.08	1.50	.06	3.90	1.83	.18	.86	2.75	.11	Tr.	11.27
1885-86	.....	.....	.....	.06	7.39	2.11	3.59	1.12	1.89	4.47	.....	.....	20.63
1886-87	0.03	.....	.....	.49	.73	.71	.68	6.81	.63	1.28	.....	.....	11.36
1887-88	.02	.....	.61	.03	.70	2.53	3.06	1.09	3.00	.31	.60	.22	12.17
1888-89	.....	.....	.60	.....	3.88	2.44	.50	.70	5.80	.79	.96	.04	15.71
1889-90	.....	.....	.....	4.48	1.73	10.55	6.52	3.64	2.08	.55	.75	.....	30.30
1890-91	.....	.....	.05	.....	.05	2.40	.55	5.27	2.47	1.79	.26	.05	12.88
1891-92	.....	.....	.37	.08	.46	5.84	1.11	1.60	4.75	.65	1.60	.05	16.51
1892-93	.....	.....	.....	1.00	4.00	7.77	2.95	2.68	5.12	1.35	.30	.....	25.17
1893-94	.....	.....	.....	.....	.81	1.69	4.73	2.61	.69	.63	1.36	.40	12.92
1894-95	.....	.....	1.08	1.32	.55	7.80	6.28	1.42	1.46	2.05	1.36	.....	23.32
1895-96	.....	.....	.05	.83	1.06	.84	5.17	.27	2.22	2.79	.44	.....	13.69
1896-97	.01	0.74	.32	1.03	2.82	2.55	1.68	3.43	2.64	.91	.16	Tr.	16.56
1897-98	.....	.....	.21	1.01	.37	1.20	.93	1.93	.52	.20	.44	.06	6.87
1898-99	.....	.....	1.13	.61	.45	.44	1.88	.21	4.17	.48	.65	Tr.	10.02
1899-1900	.....	.....	.....	3.26	2.70	1.43	2.05	.44	1.36	1.66	.96	.01	13.87
1900-1901	.02	.....	.17	.62	4.36	1.32	3.98	5.47	.75	2.37	.82	Tr.	19.88
1901-2	.....	Tr.	.44	1.00	1.06	.43	.81	4.42	2.65	1.29	.88	.....	12.98
1902-3	.....	.....	.....	.95	2.18	.92	2.74	1.27	4.99	.84	.....	.....	13.89
1903-4	.....	.....	.....	.12	.99	.34	1.28	3.01	2.73	1.74	.26	.....	10.47
1904-5	.....	.25	1.94	1.43	1.20	2.28	2.70	2.65	2.73	1.01	1.77	.....	17.96
1905-6	.....	.....	Tr.	.....	2.17	1.23	2.86	2.31	4.47	.90	.75	.43	15.12
1906-7	.....	.....	.13	.01	.98	6.39	4.61	1.88	7.75	.46	.08	.42	22.71
1907-8	Tr.	.....	.06	.98	.13	3.65	2.63	2.46	1.14	.23	.67	.01	11.69
1908-9	.....	.....	.09	.19	1.11	1.54	7.69	4.87	2.77	.....	.....	.05	18.31
1909-10	.....	.....	.75	.72	1.27	5.37	2.31	.83	2.84	.41	Tr.	.02	14.52
1910-11	Tr.	.....	.09	.20	.28	.68	12.38	2.03	6.26	.45	.21	.07	22.65
1911-12	.....	.....	.....	.80	.18	2.03	1.36	.30	2.80	1.95	.70	.46	10.58
1912-13	Tr.	.....	.71	.21	.29	.43	2.29	.09	1.17	.38	.77	.01	6.35
1913-14	.09	.08	Tr.	.02	4.10	3.00	6.23	3.94	.90	.65	.19	.25	19.45
1914-15	.....	.....	.....	.50	1.36	3.73	4.85	7.02	1.49	1.07	2.69	.....	22.72
1915-16	.....	.04	.....	.....	.19	4.37	8.71	1.83	1.10	.06	.01	Tr.	16.31
1916-17	Tr.	.01	.78	.84	.41	3.48	.98	4.88	.77	.26	.22	.....	12.63
1917-18	Tr.	.....	.01	.....	.54	.55	.70	2.63	4.48	.45	Tr.	.....	9.36
1918-19	.....	.....	6.33	.15	2.26	1.28	1.06	4.87	2.87	.06	.01	Tr.	18.89
1919-20	Tr.	.01	.25	.28	.09	2.48	.....	.....	.....	.....	.....	.....	.....

STREAM FLOW.

Stream-flow data are used as the basis of the absorption method of determining the quantity of ground water available. As explained on page 68, the seepage losses are determined by measuring the discharge of a stream at various places along its course. The differences between the discharges at these places are the losses or the quantities of water absorbed by the alluvium. The results obtained express the annual recharge and hence determine the amount of available ground water.

Gaging stations were operated at the following locations: On Coyote Creek near Madrone (upper gorge), near Coyote (lower gorge), near Edenvale, and at San Jose; on Laguna Seca near Coyote; on

Alameda Creek at Sunolglen, at Spring Valley Water Co.'s aqueduct near Sunolglen, near Niles, and near Decoto; and on Pajaro River at Watsonville. Records for these stations, except those for the one at the upper gorge on Coyote Creek and for the one at Sunolglen on Alameda Creek, are for short periods only. The data are given in detail on pages 98–128.

GENERAL CHARACTER.

All the streams in Santa Clara Valley are intermittent. Their courses through the valley are usually dry from four to eight months of the year, and occasionally water flows throughout their length for only a few days in the year or perhaps not at all. The flow from day to day is also often exceedingly irregular.[61] For instance, the discharge of Coyote Creek was 1.4 second-feet on January 11, 1906, and on the next day it was 1,460 second-feet; on March 22 of the same year the discharge was 275 second-feet, and on the next day it was 2,090 second-feet; on January 12, 1909, the discharge was 98 second-feet, and on the next day 1,980 second-feet; on February 10, 1909, the discharge was 931 second-feet, and on the next day 4,820 second-feet. Some of the floods subside almost as rapidly as they come. On December 30, 1907, the discharge was 98 second-feet; on December 31 it was 1,590 second-feet; and on January 1, 1908, it dropped back to 230 second-feet. On December 8, 1910, the discharge was 15 second-feet; on December 9 it was 1,880 second-feet; and on December 10 it dropped back to 256 second-feet. The discharge of Alameda Creek is also very erratic. On November 20, 1900, the discharge at Sunolglen was 16 second-feet, and on the next day it was 8,260 second-feet; on February 21, 1902, it was 99 second-feet; on February 22 it was 2,760 second-feet; on February 23 it dropped back to 751 second-feet; and on February 24 it rose again to 2,230 second-feet. On January 11, 1911, the discharge was only 0.7 second-foot, the next day it was 2,760 second-feet; on January 14 it reached 9,660 second-feet; and by January 17 it had dropped back to 586 second-feet. Coyote and Alameda creeks are the only streams tributary to Santa Clara Valley on which there are continuous records covering a period of years, but the erratic character of the flow in these two may be taken as typical.

MAXIMUM, MINIMUM, AND AVERAGE STREAM FLOW.

The following tables show the average rate of the discharge of Coyote and Alameda creeks during each month in which measurements were made and the maximum and minimum rates of discharge of Alameda Creek.

[61] See Water-Supply Papers 391, 411, 441, 461, and 481 for daily discharge records.

Mean monthly discharge of Coyote Creek near Madrone (upper gorge), in second-feet, also average of the means.

[Based on tables on pp. 104–106, 109.]

Year.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1902–3	0.75	1.93	2.61	290	153	490	400	20.4	11.4	7.42	4.92	0.66
1903–4	.60	1.20	1.29	2.12	105	384	67.8	17.7	6.16	2.47	.81	2.78
1904–5	2.73	3.20	1.09	2.77	165	252	35.5	49	10.8	4.18	1.82	.61
1905–6	.43	.92	1.49	539	235	778	235	73.1	38.5	14.4	6.68	4.48
1906–7	3.18	6.92	372	932	326	1,380	217	61.9	29.5	13.2	8.32	4.97
1907–8	4.3	14.4	120	195	234	156	27.4	14.7	8.82	4.7	2.33	1.9
1908–9	1.82	2.19	3.07	1,100	1,260	346	173	48.9	28.6	15.6	11.2	9.9
1909–10	10.7	12	105	855	129	139	59.7	17.6	7.7	4.6	3.3	3.1
1910–11	3.4	3.6	4.6	524	292	1,190	45.1	7	3.9	2.5	1.8	1.5
1911–12	1.6	1.8	1.8	2.9	3.2	59.4	23.4	3.6	2.8	1.9	1.4	1.2
1916–17	(a)	(a)	(a)	112	773	114	41.4	17.5	7.14	2.63	1.61	1.19
1917–18	.39	.74	1.45	1.95	11.7	168	9.94	3.47	1.9	.38	.1	(a)
1918–19	(a)	(a)	(a)	8.31	4.55	256	30.4	15	10	4.6	1.49	.51
1919–20	.39	1.02	18.1	5.12	3.95	122	62.2	11.8	4.34	.83	.02	.0
Average	2.52	4.16	52.71	291.23	263.96	416.74	101.99	25.76	12.25	5.67	3.27	2.52

[a] No record.

Mean monthly discharge of Alameda Creek at Sunolglen, the average of the means, and the maximum and minimum for each month, in second-feet.

[Based on table on pp. 121–124.]

Year.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1900–1901	10.9	391	52.1	282	993	161	66	57.3	23.1	9.31	2.57	0
1901–2	0	.52	17.4	7.11	521	685	127	39.3	14.7	5.03	2.29	0
1902–3	0	5.42	.73	267	329	677	519	38.9	3.86	.958	0	0
1903–4	0	23.8	.32	5.83	420	812	273	90.1	9	1.22	.229	.031
1904–5	.01	.02	.103	52.8	166	350	102	79.5	7.88	.106	.039	0
1905–6	.003	.016	.099	898	397	1,400	462	130	57.7	9.18	1.63	.87
1906–7	.03	.03	321	1,440	518	2,780	381	106	41	29.3	11.5	1.86
1907–8	2.07	7.46	74.2	229	241	175	27.2	12.9	.78	.65	.35	.75
1908–9	.20	.44	1.27	1,780	1,830	352	80.9	13.1	5.4	4.68	.020	.229
1909–10	1.61	1.44	155	552	259	276	112	29.4	5.78	3.67	1.32	.72
1910–11	.290	.29	1.09	1,540	756	1,050	103	29.8	5.65	4.40	3.73	2.26
1911–12	1.83	2.72	3.47	67.7	27.5	234	26.6	5.03	.239	.001	0	0
1912–13	0	0	0	89.6	2.15	14.6	.329	0	0	0	0	0
1913–14	0	0	175	1,720	926	131	38.5	2.98	1.08	.17	.03	0
1914–15	0	0	15.8	404	1,960	254	126	355	31.7	3.77	.11	0
1915–16	0	0	64.4	2,440	938	291	55.7	24	17.9	11.4	7.4	2.2
1916–17	3.34	.39	45.3	89.9	979	157	28.9	17.8	15.5	30.4	32.8	49.7
1917–18	68.1	5.41	.52	.0	7.66	82.9	1.09	0	0	16.8	23.5	43.1
1918–19	37.9	3.51	29.6	13.6	795	660	40.1	11.6	14.2	27.8	22	28.9
Average	6.75	23.29	50.39	625.19	635.02	602.24	135.39	54.91	13.42	8.36	5.76	6.87
Maximum	270	8,260	3,730	10,600	7,110	14,700	5,270	939	105	46	180	61
Minimum	0	0	0	0	0.6	1.1	0	0	0	0		0

The monthly and annual discharge of Coyote Creek at the upper gorge is shown on pages 104–105. The maximum monthly discharge was recorded in March, 1907, and was 84,800 acre-feet. The daily discharge is shown on pages 99–103 and 107–108. The maximum daily discharge was on March 7, 1911, and was at the average rate of 10,000 second-feet for the day. The highest peak flood occurred in March, 1911 (presumably on March 7), and according to the record was 25,000 second-feet. (See table on p. 105.)

The monthly and annual discharge of Alameda Creek is given on pages 121–124. The maximum monthly discharge occurred in March, 1907, and was 171,000 acre-feet. According to the daily-discharge records the maximum occurred on March 7, 1911, and was at the average rate of 14,700 second-feet for the day.

RELATION OF RUN-OFF TO PRECIPITATION

Data to indicate the relation of run-off to precipitation are confined to Coyote Creek. According to Duryea[62] the average annual precipitation on the mountain part of the drainage basin of the Creek is 24.8 inches, which would make the total annual precipitation on the 193 square miles of mountain drainage area equal to 255,456 acre-feet.

The average annual precipitation at Lick Observatory is 32.01 inches, at San Jose 16.58 inches, and at Morgan Hill 23.57 inches. (See table on p. 49.) The sum of these three quantities divided by 3 gives 24.05 inches as the average for the three places. The average annual precipitation for these three places for the 10 consecutive years (1902–3 to 1911–12) for which stream-flow records for Coyote Creek are available was, for Lick Observatory 31.33 inches, San Jose 15.79 inches, and Morgan Hill 23.32 inches. The average of these three figures is 23.48 inches, or only 0.57 per cent lower for the 10-year period than for the whole period of record. It would seem, therefore, that the precipitation on the mountain area drained by Coyote Creek during the 10 years of stream-flow record was also probably about the average. On the basis of data on Duryea's isohyetose map the total precipitation on the mountain area for the 10 years was 2,554,560 acre-feet. The total discharge of Coyote Creek at the mouth of the canyon for the same period was 872,680 acre-feet, and this is about 34 per cent of the precipitation on the mountain drainage area, which expresses the relation of run-off to precipitation.

The relation of precipitation to run-off is shown in more detail in the table on page 55 and by the curves in Figures 5 and 6, plotted from the data in the tables on pages 55 and 57. In the following table the column headed "Precipitation at Lick Observatory" is taken from United States Weather Bureau records; the column headed "Ratio of precipitation to average annual precipitation" shows the ratio that the precipitation given in the first column bears to the average annual precipitation at Lick Observatory; the column headed "Estimated precipitation on mountainous part of the drainage basin of Coyote Creek" is obtained by applying the ratio in the preceding column to Duryea's 24.8-inch average for the drainage basin; the column headed "Run-off, in depth on drainage area" is taken from the tables on pages 104–106, 109; and the column headed "Ratio of run-off to precipitation" is based on the two preceding columns.

[62] Unpublished records.

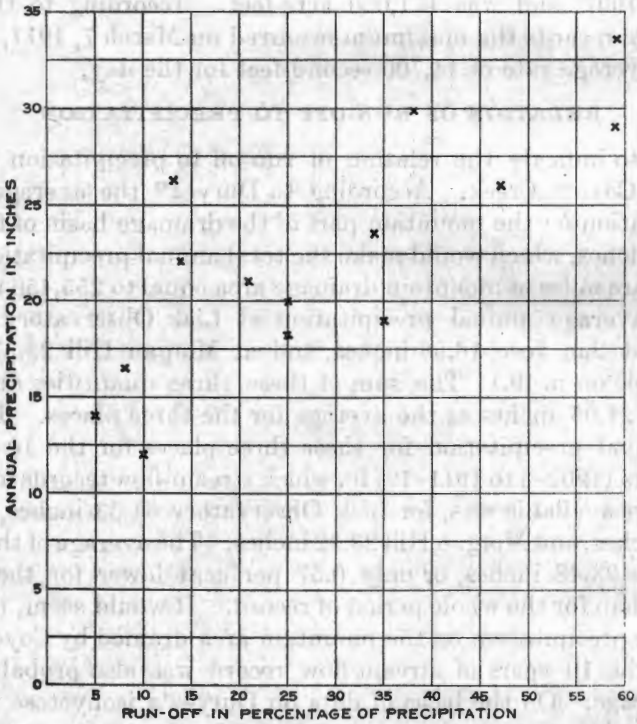

FIGURE 5.—Diagram showing the relation of run-off from the mountainous area of the drainage basin of Coyote Creek to precipitation on this area.

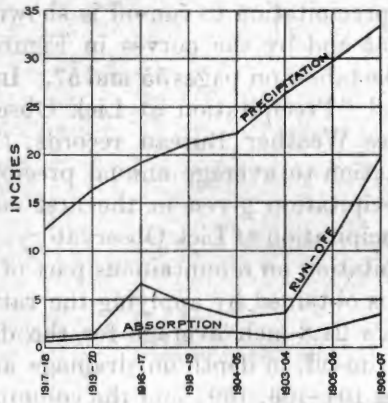

FIGURE 6.—Diagram showing the relation of precipitation on the mountainous area of the drainage basin of Coyote Creek, run-off from this area, and absorption of water that runs off

Relation of precipitation to run-off on the mountainous part of the drainage basin of Coyote Creek.

Year.	Precipitation at Lick Observatory.	Ratio of precipitation to average annual precipitation.	Estimated precipitation on mountainous part of the drainage basin of Coyote Creek.	Run-off, in depth on drainage area.	Ratio of run-off to precipitation.
	Inches.	*Per cent.*	*Inches.*	*Inches.*	*Per cent.*
1902–3	30.29	0.95	23.6	8.10	34
1903–4	33.78	1.06	26.3	3.49	13
1904–5	28.55	.89	22.1	3.11	14
1905–6	38.43	1.20	29.8	11.34	38
1906–7	43.34	1.35	33.5	19.80	59
1907–8	23.92	.75	18.6	4.57	25
1908–9	37.42	1.17	29.0	17.15	59
1909–10	26.02	.81	20.1	4.95	25
1910–11	33.29	1.04	25.8	12.25	47
1911–12	18.24	.57	14.1	.70	5
1916–17	24.58	.77	19.1	6.59	35
1917–18	15.66	.49	12.2	1.19	10
1918–19	27.40	.86	21.3	4.51	21
1919–20	21.48	.67	16.6	1.36	8

EFFECT OF INTERMONTANE VALLEYS ON STREAM FLOW.

Intermontane valleys tend to equalize the flow of streams that pass through them. This is especially true of those valleys that are filled with coarse alluvium such as Livermore and Sunol valleys, through which the waters of the Alameda Creek drainage system pass on their way to Santa Clara Valley. The alluvium acts as a reservoir, absorbing a large quantity of water from the streams during flood seasons and holding it for a time as ground water. Later, during the low-water season, a considerable part of this water is given back to the streams. The effect of this action is to lessen floods on the lower courses of the streams and to increase the flow during low-water stages.

Formerly there was a considerable swamp area in the lower end of Livermore Valley, caused by the coming of ground water to the surface. This water, except the portions evaporated or used by growing plants, was constantly being added to the stream, thus tending to make the flow more constant below the swamp area. It is common knowledge that in earlier days Alameda Creek flowed continuously throughout the year over the Niles cone. Now, however, owing to heavy drafts on the ground water of Livermore and Sunol valleys and on that of Niles cone itself, the streamway is dry below the apex of the cone for a considerable part of the year.

The effect of intermontane valleys on other drainage systems entering Santa Clara Valley is less pronounced, doubtless because the other intermontane valleys are small.

ABSORPTION.

Many rock formations serve more or less as ground-water reservoirs, especially those that are composed of unconsolidated materials. Many factors affect the amount of percolation into these ground-water reservoirs. Among the most vital are the amount and distribution of precipitation, the character and topography of the drainage area tributary to the reservoir, the character of the reservoir itself, the position of the water table with respect to the surface and the stream channels, and the amount and duration of stream flow. If the ground-water surface or the water table is above the bed of the stream water will be fed from the reservoir into the stream and thus escape. If the water table is below the bed of the stream water will be fed from the stream into the reservoir and thus tend to fill the reservoir to the level of the stream. In Santa Clara Valley the water table is generally below the stream beds except in the lower courses of a few of the larger streams, notably Coyote Creek below San Jose. In the lower courses of the streams the alluvium of their beds and banks is fine and transmits water comparatively slowly, so that the quantity of return water from the underground reservoir is relatively small. The water-bearing beds in the area traversed by the lower courses of the streams are usually at some depth below the surface, and the water is confined by overlying fine materials. Over the upper parts of their fans the streams run through coarse material, which rapidly absorbs water and allows it to be transmitted readily to the general body of ground water underlying the valley. (See tables on p. 57.) The absorption of stream water by the valley alluvium is by far the most effective factor in filling the underground reservoir of Santa Clara Valley. To a less extent the reservoir is filled by direct percolation downward to the water table of a portion of the rain water that falls on the valley floor itself. The amount of this percolation is not known but is probably only a small percentage of this precipitation.

The following table shows the measured absorption between the mouth of the canyon of Coyote Creek about 2 miles east of Madrone (known as the uppper gorge) and the narrows near Coyote station (known as the lower gorge). The station on Coyote Creek at Coyote is at some distance above the point known as the lower gorge, where the valley closes in. The stream from Laguna Seca, now a drainage ditch, discharges seepage and storm water from the west side of the valley into Coyote Creek at the lower gorge, below the Coyote station. The absorption between Coyote and Edenvale is therefore somewhat greater than the difference between the discharges at these two stations. Except for one year, however, no records of the flow contributed by the Laguna Seca stream to Coyote Creek are available.

Absorption from Coyote Creek between the upper and lower gorges.

[Length of channel approximately 9 miles.]

Year.	Run-off at Madrone station (near upper gorge).[a]	Run-off at Coyote station (near lower gorge).[b]	Absorption between upper and lower gorges.	Ratio of absorption to discharge at upper gorge.	Absorption, in depth on drainage area above upper gorge.
	Acre-feet.	*Acre-feet.*	*Acre-feet.*	*Per cent.*	*Inches.*
1903–4	35,800	25,300	10,500	29.3	1.02
1904–5	31,800	15,900	15,900	50.0	1.54
1905–6	117,000	95,900	21,100	18.0	2.05
1906–7	204,000	167,900	36,100	17.7	3.50
1916–17	[c]67,900	[c]53,200	14,700	21.6	1.43
1917–18	[c]12,200	[c]4,140	8,060	66.1	.78
1918–19	46,400	27,500	18,900	40.1	1.84
1919–20	14,000	4,000	10,000	71.4	.97

[a] U. S. Geol. Survey Water-Supply Paper 331, pp. 107–109.
[b] Calculated from data in Superior court of Santa Clara County, Calif., No. 15194. Opening brief for defendants; Hays-Chenoweth Co. et al. *v.* Bay Cities Water Co. et al. Appendix, pp. c, xii.
[c] Records of U. S. Geol. Survey.

The relation of absorption to precipitation and run-off is also shown in Figure 6 (p. 54).

The absorption between several points on Coyote Creek is shown in the following table:

Absorption, in acre-feet, between stations on Coyote Creek.

[Measurements by U. S. Geol. Survey.]

	1917	1918	1919	1920
Between Madrone and Coyote	14,700	8,060	18,900	10,000
Between Madrone and Edenvale	16,500	[a]9,766	21,600	11,430
Between Madrone and San Jose	17,300	([b])	([b])	([b])
Between Coyote and Edenvale	1,800	[a]1,706	2,700	1,430
Between Coyote and San Jose	2,600	([b])	([b])	([b])
Between Edenvale and San Jose	800	([b])	([b])	([b])

[a] To obtain these figures the discharge of Laguna Seca (126 second-feet) is added to the flow of Coyote Creek between Coyote and Edenvale. Stream-flow data for Laguna Seca are available for 1918 only.
[b] No record.

Meager information on absorption from Alameda Creek is given in the following table:

Discharge measurements of Alameda Creek, in second-feet.[a]

[Measurements made by W. W. Brier.]

Date.	Discharge.		Loss by absorption.
	Niles dam, about 1½ miles above Niles.	Three miles below Niles.	
Dec. 18, 1896	38.68	7.74	30.94
Dec. 19, 1897	32.49	6.19	26.30
Dec. 20, 1896	30.94	.77	30.17
Jan. 11, 1897	63.44	44.87	18.57
Jan. 12, 1897	57.25	40.23	17.02
Jan. 18, 1897	51.06	34.04	17.02

[a] Lippincott, J. B., California hydrography: U. S. Geol. Survey Water-Supply Paper 31, p. 33, 1903.

GROUND-WATER LEVELS.

Methods of investigation.—A large number of wells were selected for observation, and it was aimed to have them subequally distributed over the area and to include all irrigation wells then in the valley. The depth to water in these wells was measured with a steel tape

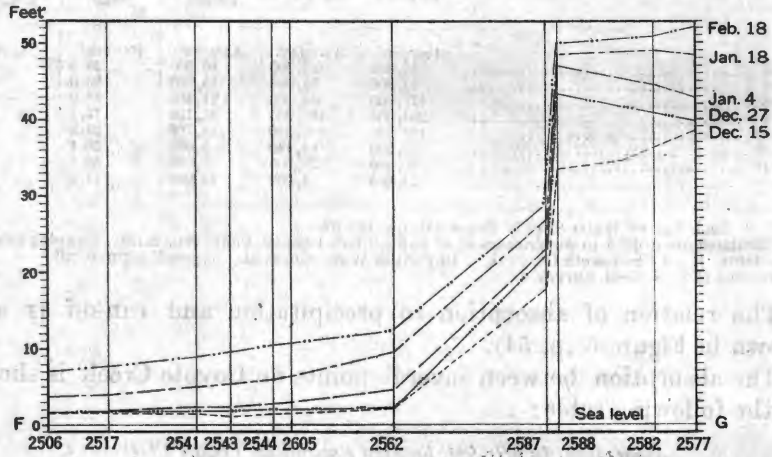

FIGURE 7.—Profiles of water table on different dates along line *F-G*, Plate X.

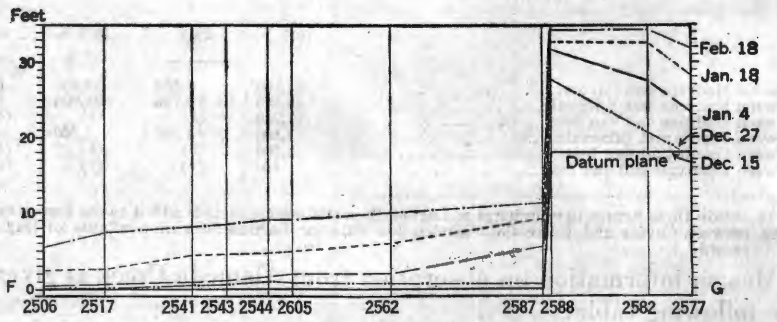

FIGURE 8.—Graph showing fluctuation of water table along line *F-G*, Plate X.

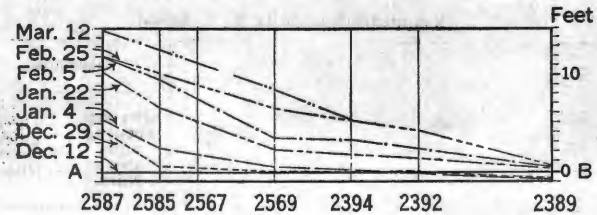

FIGURE 9.—Graph showing fluctuation of water table along line *A-B*, Plate X.

from the top of the casing or other bench mark, such as timbers at the mouth of the well. Where timbers were used as a bench mark three notches were cut in them, so that future measurements could be made from the same level. Many of the observation wells were revis-

ited from time to time, and measurements of depth to water were made covering a period of a few years. In addition to this personal

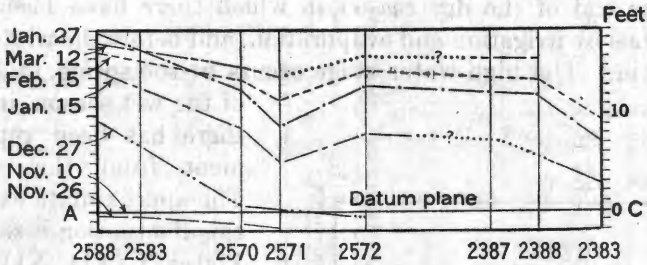

FIGURE 10.—Graph showing fluctuation of water table along line *A–C*, Plate X.

field work cards were mailed periodically to a larger number of well owners and the owners recorded measurements of depth to water on these cards and returned them to the Geological Survey. Much valuable assistance was received in this way. Levels were run to 254 wells in the vicinity of Morgan Hill and Edenvale. The resulting water-level measurements will be found in the tables on pages 129–183.

Relation of water table to areas of intake and discharge.—In a region the ground water of which is supplied from a certain intake area the area of intake generally covers the highest part of the water table and always does during the period of active recharge. In Santa Clara Valley, however, during most of the time the water table is at a greater depth below the surface in the areas of intake than it is in other parts of the valley, and in these areas the annual fluctuation of the water table is greater than elsewhere. Discharge of ground water occurs over areas where the depth to the water table is small. Here the annual fluctuation is least, usually being not more than a few feet whereas in parts of the intake areas it may be more than 30 feet.

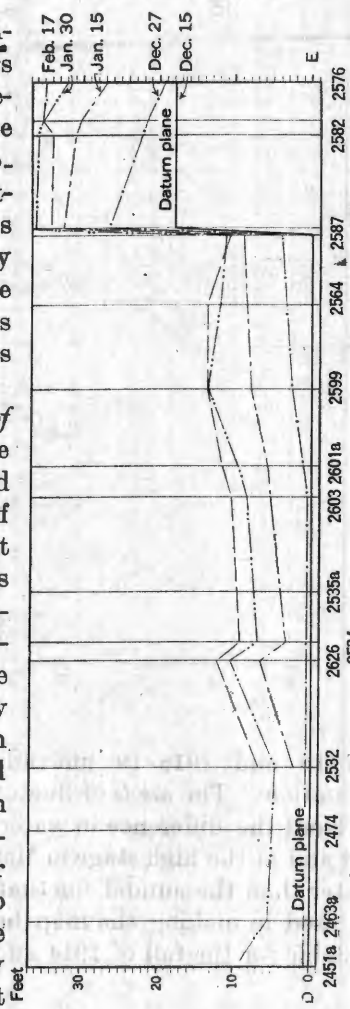

FIGURE 11.—Graph showing fluctuation of water table along line *D–E*, Plate X.

Fluctuation of water table.—In Santa Clara Valley there is an annual fluctuation of the water table. The low-water stage occurs in the fall at the end of the dry season, in which there have been heavy withdrawals by irrigation and evaporation, and before the winter rains have set in. The high-water stage occurs in the spring, at the end of the wet season, in which there has been replenishment from the rainfall. The approximate extent of this fluctuation is shown on Plates X, XII, XIV, XVI, and XVIII, on which the areas of fluctuation have been plotted from data selected from the tables on pages 129–183. The plotting in the Hollister and Gilroy areas is based on water-level data for 1913–14 and 1914–15, in the Morgan Hill area for 1914–16, in the Niles cone area for 1913–14, and in the San Jose area for 1914–15 and 1915–16. Water-level data for 1917–18 were used in small areas near Haywards and San Mateo where other data were not available. Owing to the demands of war work it was impossible to obtain measurements for 1918, and lack of data for this year makes the data for the two seasons 1917–18 and 1918–19 unavailable for determinations of annual fluctuation. The areas of fluctuation shown for the Morgan Hill area represent the difference in water levels at the low stage in the fall of 1914 and at the high stage in March, 1916. This difference is slightly greater than the annual fluctuation for the season of 1914–15, but it was used in making the map because the most abundant data were available for the fall of 1914 and the spring of 1916.

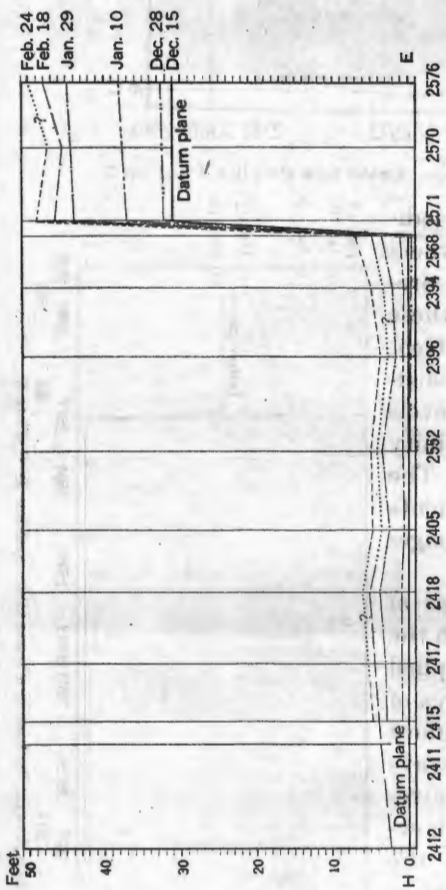

FIGURE 12.—Graph showing fluctuation of water table along line *H-E*, Plate X.

Besides the annual fluctuation there are longer cycles of fluctuation corresponding to series of wet and dry years. In the course of years there has been, on the whole, a gradual lowering of the water table, which is due to extensive irrigation with ground water. This lowering is seen in the contraction of the area of artesian flow and in the fact that the water in wells in general stands lower than it did in former times.

Relation of water table to geologic structure.—The structural and physiographic features of the Coast Ranges of California are controlled in the main by a great system of parallel faults having a southeast trend. One of these faults or a branch of one crosses a reentrant of Santa Clara Valley between the towns of Niles and Irvington and is called the Niles-Irvington fault.[63] Its course across

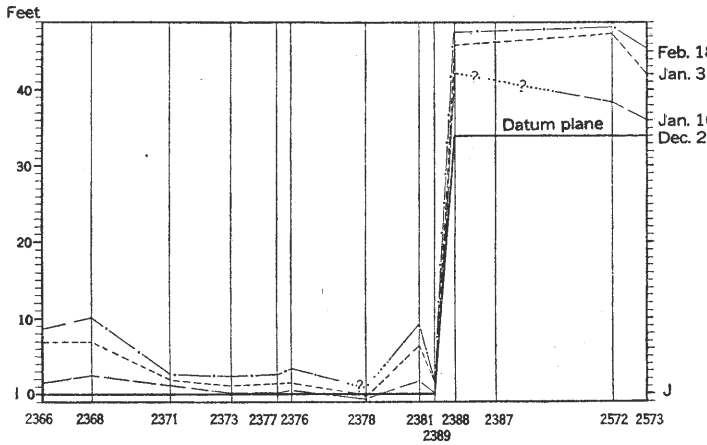

FIGURE 13.—Graph showing fluctuation of water table along line *I-J*, Plate X.

the land is plainly marked by an eastward-facing escarpment somewhat more than a mile from the base of the mountains. (See Pls. IV, *B*, and X.) This escarpment is in loose materials of the valley fill and is therefore geologically very young. In fact, that it is still growing is indicated by the statement of Mr. J. C. Shinn that during the severe earthquake of 1868 his father's house, standing directly on the fault line, was torn in two and the eastern part dropped about a foot below the western part.

This fault has a profound local effect on the circulation of the ground water as well as on the surface drainage. As a result of the

[63] Clark, W. O., Ground-water resources of the Niles cone and adjacent areas, Calif., U. S. Geol. Survey Water-Supply Paper 345, pp. 127-168, 1915.

displacement the buried gravel channels have apparently been blocked by impervious material of the valley fill. Consequently the fault plane acts as a dam, preventing the passage of the ground water, except in small amounts, from the east side of that plane to the west

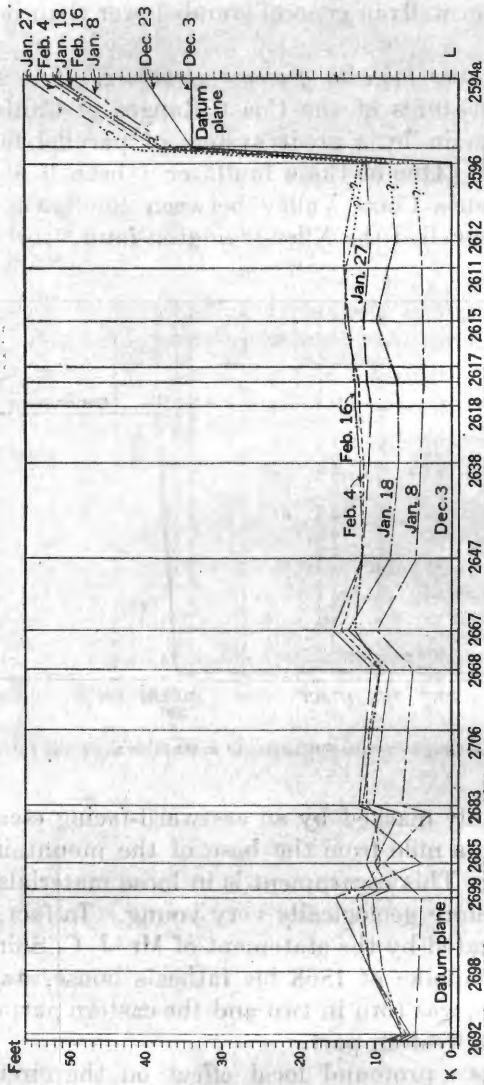

FIGURE 14.—Graph showing fluctuation of water table along line *K-L*, Plate X.

side. The area between the fault scarp and the base of the mountains receives ground water from all the streams that discharge upon this area, but the area west of the fault receives very little ground water except from Alameda Creek, which is the only stream that

drains across the fault in the area under discussion. Where the fault cuts through the large gravel deposits near the apex of the Niles cone it is probably less effective as a dam than where the proportion of fine sediments is greater, and some of the ground water derived from Alameda Creek may therefore cross the fault through underground channels. Even on the Niles cone, however, the ground water is greatly impounded by the fault, as shown by a difference of more than 20 feet in altitude of the water table at the J. C. Shinn wells. (See table, p. 64.)

That the Niles-Irvington fault acts as a dam substantially preventing the ground water east of the fault plane from crossing to the region west of this plane is proved by the abrupt change in the water table, as shown by the data given in tables on pages 64 and 65. This abrupt change is brought out very clearly in the table on page 65, which gives the depth to water in wells arranged in pairs on opposite sides of the fault, also in Plate X and in Figures 7 to 15, inclusive.

In Figures 8 to 14 the position of the water table on the first date indicated is represented by a horizontal line, except at the fault, where the actual difference in level is shown. Later positions of the water table are plotted relatively to this horizontal line. Where sections *D–E*, *F–G*, and *H–E* cross the fault line the relative altitudes of wells on opposite sides were instrumentally determined;[64] where the other sections, *I–J* and *K–L*, cross the fault line the differences in altitude were determined by use of a hand level. The relation of the diagrams to the profiles is shown by Figures 7 and 8, in which the same data for the section *F–G* are plotted by the two methods.

[64] Data from the State Water Commission of California.

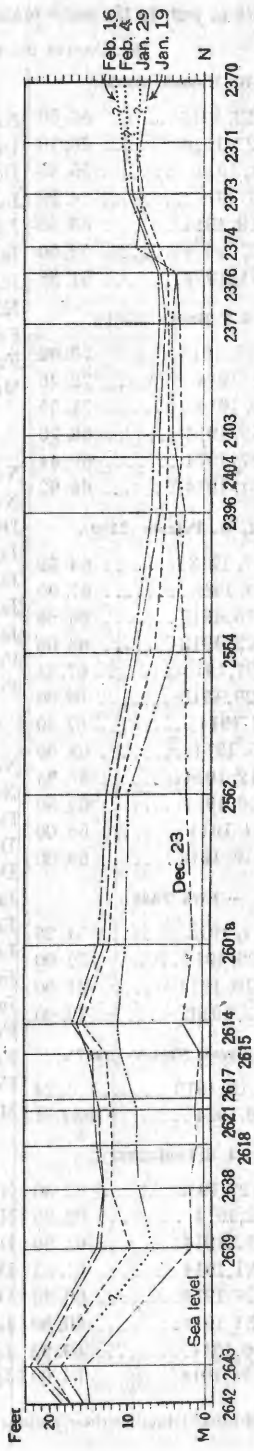

FIGURE 15.—Profiles of water table along line *M–N*, Plate X.

Depth in feet, to the water table in wells in the vicinity of the Niles-Irvington fault.[65]

[Numbers in parentheses correspond to those used on Plate XI.]

W. Hearsh (2383).

Dec. 13, 1913	56.56
Dec. 27, 1913	56.10
Jan. 1, 1914	55.46
Jan. 9, 1914	54.93
Jan. 19, 1914	53.68
Jan. 27, 1914	52.00
Jan. 31, 1914	51.38

J. F. Brown (2381).

Dec. 27, 1913	73.42
Jan. 1, 1914	72.46
Jan. 9, 1914	71.55
Jan. 19, 1914	69.70
Jan. 27, 1914	67.44
Jan. 31, 1914	66.62

M. G. Peixoto (2389).

Nov. 7, 1913	64.69
Dec. 4, 1913	67.00
Dec. 15, 1913	66.66
Dec. 22, 1913	68.00
Dec. 27, 1913	67.33
Dec. 29, 1913	68.00
Jan. 1, 1914	67.50
Jan. 5, 1914	68.00
Jan. 12, 1914	67.83
Jan. 26, 1914	65.50
Feb. 4, 1914	66.00
Feb. 16, 1914	66.00

—— Kirk (2388).

Nov. 7, 1913	34.29
Jan. 28, 1914	22.00
Feb. 10, 1914	21.00
Mar. 2, 1914	19.00

California Nursery (2387).

Nov. 15, 1913	6.24
Jan. 9, 1914	Flooded

J. S. Leal (2392).

Dec. 27, 1913	62.30
Jan. 2, 1914	62.25
Jan. 12, 1914	61.96
Jan. 21, 1914	61.33
Jan. 27, 1914	60.83
Jan. 31, 1914	60.50
Feb. 5, 1914	59.92
Feb. 24, 1914	58.00

A. G. Peixoto (2394).

Nov. 7, 1913	54.77
Dec. 1, 1913	56.00
Dec. 27, 1913	55.20
Jan. 2, 1914	55.00
Jan. 12, 1914	54.50
Jan. 21, 1914	53.75
Jan. 27, 1914	53.12
Jan. 31, 1914	52.70
Feb. 5, 1914	51.92
Feb. 24, 1914	50.00
Mar. 4, 1914	50.00

J. F. Nunes (2396).

Nov. 20, 1913	50.17
Nov. 26, 1913	50.20
Dec. 13, 1913	50.54
Jan. 1, 1914	50.54
Jan. 12, 1914	50.30
Jan. 21, 1914	49.96
Jan. 31, 1914	49.20
Feb. 6, 1914	48.83
Feb. 24, 1914	46.60

J. C. Shinn (2587).

Nov. 20, 1913	51.50
Nov. 26, 1913	50.46
Dec. 13, 1913	50.60
Dec. 23, 1913	50.36
Dec. 29, 1914	46.46
Jan. 4, 1914	45.08
Jan. 8, 1914	42.04
Jan. 15, 1914	41.70
Jan. 22, 1914	40.49
Jan. 27, 1914	39.33
Feb. 5, 1914	38.58
Feb. 17, 1914	39.62
Feb. 24, 1914	38.62
Mar. 12, 1914	36.17

J. C. Shinn (2588).

Nov. 20, 1913	32.43
Nov. 26, 1913	32.43
Dec. 13, 1913	32.63
Dec. 27, 1913	22.70
Dec. 29, 1913	22.00
Jan. 4, 1914	19.02
Jan. 8, 1914	19.25
Jan. 15, 1914	17.96

J. C. Shinn (2588)—Contd.

Jan. 22, 1914	16.22
Jan. 27, 1914	13.80
Feb. 5, 1914	15.66
Feb. 17, 1914	16.33
Feb. 24, 1914	13.66
Mar. 12, 1914	15.25

H. J. Tilden (2583).

Nov. 7, 1913	28.34

H. J. Tilden (2584).

Nov. 17, 1913 (dry)	46.60

Road well (2585).

Nov. 20, 1913	54.20
Nov. 26, 1913	54.20
Dec. 13, 1913	54.30
Dec. 23, 1913	54.40
Dec. 29, 1913	54.00
Jan. 3, 1914	52.20
Jan. 8, 1914	50.50
Jan. 15, 1914	49.30
Jan. 22, 1914	47.90
Jan. 27, 1914	46.80
Feb. 6, 1914	44.60
Feb. 18, 1914	45.20

M. G. Duarte (2567).

Nov. 1, 1913	57.50
Nov. 13, 1913	56.00
Nov. 30, 1913	56.00
Dec. 12, 1913	56.25
Dec. 24, 1913	54.00
Dec. 31, 1913	50.92
Jan. 13, 1914	48.33
Jan. 19, 1914	47.00
Jan. 28, 1914	46.00
Feb. 1, 1914	46.50
Mar. 3, 1914	47.00
Mar. 11, 1914	42.33

S. E. Stivers (2568).

Dec. 16, 1913	59.17
Dec. 27, 1913	59.64
Jan. 2, 1914	58.90
Jan. 9, 1914	58.17
Jan. 19, 1914	57.12
Jan. 27, 1914	55.90
Feb. 11, 1914	55.53

[65] Additional data for these wells are on file in the U. S. Geological Survey.

Depth in feet, to the water table in wells in the vicinity of the Niles-Irvington fault—Continued.

S. E. Stivers (2568)—Contd.

Feb. 18, 1914	54.43
Mar. 2, 1914	51.40
Mar. 8, 1914	50.50

S. E. Stivers (2571).

Dec. 16, 1913	22.33
Dec. 24, 1913	22.06
Dec. 27, 913	21.37
Jan. 2, 1914	18.80
Jan. 9, 1914	16.46
Jan. 19, 1914	13.00
Jan. 27, 1914	9.20
Feb. 11, 1914	7.33
Feb. 18, 1914	6.72
Mar. 2, 1914	4.17
Mar. 8, 1914	4.00

Dora C. Swaine (2570).

Dec. 16, 1913	28.52
Dec. 24, 1913	28.30
Jan. 1, 1914	24.80
Jan. 9, 1914	21.90
Jan. 19, 1914	18.54
Jan. 27, 1914	15.00
Feb. 11, 1914	13.17

Dora C. Swaine (2570)—Contd.

Feb. 18, 1914	13.66
Mar. 2, 1914	11.25
Mar. 11, 1914	11.25

S. E. Stivers (2572).

Dec. 1, 1913	20.38
Dec. 27, 1913	19.96
Jan. 1, 1914	18.25
Jan. 9, 1914	15.62
Jan. 19, 1914	12.00
Jan. 27, 1914	8.58
Feb. 11, 1914	5.60
Feb. 18, 1914	5.36

S. E. Stivers (2573).

Dec. 1, 1913	30.02
Dec. 13, 1913	30.20
Dec. 27, 1913	30.04
Jan. 1, 1914	28.48
Jan. 9, 1914	28.04
Jan. 19, 1914	24.27
Jan. 27, 1914	21.83
Feb. 11, 1914	19.83
Feb. 18, 1914	18.53

Joseph Furtado (2595).

Dec. 10, 1913	15.75
Dec. 29, 1913	15.62
Jan. 18, 1914	11.12
Feb. 4, 1914	10.37
Feb. 24, 1914	8.00

Road well (2596).

Nov. 17, 1913 (dry)	50.00
May 2, 1914 (dry)	50.00

J. C. Shinn (2593).

Dec. 2, 1913	30.00
Dec. 12, 1913	29.83
Dec. 23, 1913	25.25
Dec. 28, 1913	19.50
Jan. 2, 1914	16.70
Jan. 8, 1914	17.10
Jan. 19, 1914	16.00
Jan. 27, 1914	12.21
Feb. 5, 1914	16.54
Feb. 16, 1914	17.71
Feb. 24, 1914	14.75

J. C. Shinn (2592).

Nov. 17, 1913 (dry)	60.00

Depth to the water level in wells arranged in pairs on opposite sides of the Niles Irvington fault.

[The location of wells is shown by corresponding numbers on Plate XI.]

No. of well.	Owner.	Altitude of surface above sea-level.	Side of fault.	Depth of water level below surface.	Difference in altitude of surface.	Difference in water level.	Approximate distance apart.	Date of measurement (1913).
		Feet.		*Feet.*	*Feet.*	*Feet.*	*Feet.*	
2596	Road well		West	Dry at 50	a 2	23.50—	100	Nov. 17
2595	Joseph Furtado	60.6	East	Dry at 25.50				
2592	J. C. Shinn	68.2	West	Dry at 59.80	80	25.2	125	Do.
2593	do	60.2	East	Dry at 26.57				
2587	do	68.0	West	Dry at 53.81	3.3	19.1	150	Nov. 7
2588	do	64.7	East	Dry at 31.40				
2584	H. J. Tilden		West	Dry at 46.60	a 0	18.26—	b 500	Do.
2583	do		East	Dry at 28.34				
2568	S. E. Stivers	61.1	West	Dry at 58.58	5.3	30.9	200	Nov. 15
2571	do	55.8	East	Dry at 22.38				
2389	M. G. Peixoto		West	Dry at 64.19	a 8	22.40	300	Do.
2388	—Kirk	59.3	East	Dry at 33.79				

a Approximate.
b These wells are both very near the fault line, the distance between them being chiefly along the fault.

The data given in the preceding table and those not published show that practically all the ground water on the west side of the Niles–Irvington fault, both on the Niles cone and on the adjacent area to the south (Pl. X), comes from Alameda Creek, the area east of the fault being supplied at the north by Alameda Creek and farther south by the smaller streams that emerge from the mountains south of this creek. If wells on opposite sides of the fault receive water from the same source there should be no appreciable difference in the time in which they show response to rainfall, and whatever slight lag the wells on the west side might show should be as much in the northern part of the area as in the southern part. If, however, as stated, the wells on the east side are fed not only by Alameda Creek but also by the small streams farther south, and the wells on the west side are supplied only from Alameda Creek, there should be a considerable difference south of the Niles cone in the time in which two wells just across the fault line from each other respond to rainfall. Moreover, this difference in time of response should increase toward the south, because the ground water on the west side must travel successively longer and longer distances on its journey southward. That this lag really occurs and that it is progressive southward is abundantly demonstrated by the data in the table on pages 64–65 and by Figures 9 and 10.

Section *A–B* (fig. 9), the method of constructing which was given on page 63, represents the positions of the water table on the dates indicated relative to its position on December 12, 1913. The water table had been going down slowly for a month or two before December 12. So far as this section is concerned, December 23 might as well have been selected for the date of beginning, for the water in well 2587 was then 50.38 feet below the point of measurement, whereas on December 12 it was 50.60 feet below the same point. On the afternoon of December 23 Alameda Creek began flowing for the first time during the season. On December 26 the water in well 2587 had risen about 2 feet, and on December 29, as shown in the graph (fig. 9), it had risen more than 4 feet. This response, however, extended only a very short distance to the south, the water level in well 2585 having risen only about 6 inches on December 29. On January 4 the water in well 2587 showed a further rise and the response extended considerably farther south, though even at this date it practically died out within a distance of 1 mile. Meanwhile the water table at the south end of the section shown in Figure 9 continued to sink slowly. The curve for each successive date shows the same slow progress toward the south. By studying the graph one may almost see the water creeping slowly southward from Alameda Creek. Even as late as March 12 the rise at the south end

was almost negligible, although at the north end it amounted to nearly 15 feet.

Section *A–C*, just east of the fault (fig. 10), is of very different character from section *A–B*, just west of the fault (fig. 9). In section *A–C* water is supplied from several sources, as is shown by the depressions between different drainage areas, but in section *A–B* the water comes from a single source. These two sections are very close together in most places (Pl. X). At their north ends they start from practically the same point, and at the south end of section *A–B* they are only about 300 feet apart.

Well 2381, just south of section *A–B*, showed a quick response to rainfall and a very much greater rise than its nearest neighbor on the north, about 500 feet distant. This difference is thought to be due to a small leak through the fault plane near the well. The leakage, however, is not sufficient to affect neighboring wells and may affect this one simply because of its nearness to the point of leakage. The water contours for December (Pl. X) might suggest that there was a considerable leak through the fault dam where it crosses Alameda Creek, but the crowding of the contours at this point is thought to be due in large part to the fact that the Niles Sand, Gravel & Rock Co. is continually pumping water and turning it down the creek. This water flows for some distance beyond the fault dam and then rapidly disappears.

The profiles of the water table in section *M–N* (fig. 15), which are based on levels determined instrumentally, show the true slope of the water table along this line and therefore the direction of movement of the ground water, or, rather, the line of one of the two components into which the true motion can be resolved. The absolute motion at any given place, other things being equal, is determined by the direction of the steepest slope, unless friction in this direction is so great that it neutralizes part of the influence of the steepness. The exact position of this path of steepest slope can not be determined from a single section, but the single section *M–N*, for example, shows that one component of the motion of the water is southward.

Water-level data.—Water-level data will be found in the tables on pages 129–183. The data consist of measurements of depths to water level in wells near Hollister, Gilroy, Morgan Hill, and San Jose. Data for 1913 and 1914 for wells in the vicinity of Niles cone are published in Water-Supply Paper 345. More recent data for Niles cone have been collected, but these have been omitted from this report. Copies of them are, however, filed in the office of the Geological Survey at Washington and in the branch office at San Francisco, where they are available for reference. No attempt has been made in this report to use the unpublished data for making estimates of quantity of water,

because the State Water Commission of California, in cooperation with the United States Geological Survey, has recently made a detailed study of the water supply in the Niles cone area.[66]

QUANTITY OF GROUND WATER.

METHODS OF INVESTIGATION.

Absorption method.—Two methods were used in the study of the quantity of ground water available in Santa Clara Valley—the absorption method and the water-level method. In the absorption method gaging stations were established on streams where they enter the valley and at points farther down their courses. The difference between the measured flows of the stream at two successive stations expresses the seepage loss, or amount of water absorbed by the alluvium between these stations. To be complete the method should take into account the absorption from precipitation on the valley itself, the amount of underflow into and out from the valley, and the amount of discharge into the valley of storm waters from small tributary washes. These factors are, however, difficult to ascertain and are far from constant. The water absorbed from the streams is by far the largest amount. The studies of absorption from streams were confined chiefly to Coyote Creek.

Water-level method.—In the water-level method measurements were made of the depth to water level in selected wells at low-water stage and at high-water stage, thus showing the annual fluctuations of the water table. The available porosity of that portion of the alluvium in which the fluctuation occurred was calculated. The area of that portion of the valley (in acres) multiplied by the average rise of its water table during the rainy season (in feet) gives the volume of alluvium in the area annually saturated by water absorbed during the rainy season (in acre-feet). This volume multiplied by the available porosity of the alluvium (in percentage) gives the quantity of water added to the underground supply (in acre-feet). This amount of water is taken to be the average annual recharge. In applying this method it must be recognized that under artesian conditions the rise of the water level in a well may be produced by the transmission of pressure in a confined bed and may not represent any substantial increase in the quantity of ground water. In the following calculations for Santa Clara Valley all changes in water level within the area of artesian flow, whether in the flowing wells themselves or in the shallow nonflowing wells of the area, have been disregarded. This involves some error, which, however, is partly balanced by the rise outside the area of artesian flow that is due to artesian pressure. To differentiate clearly these two causes of rise of the water in wells

[66] California State Water Commission Rept. for 1919-20, pp. 95-106.

would require a large amount of data as to where water was found and whether it rose and how much. Such data are available for only a few of the wells that were measured. It is common knowledge, however, that on the one hand there are unsaturated materials in the area of artesian flow above the horizon yielding the flows, and on the other there is artesian pressure in certain areas outside the area of artesian flow.

ESTIMATES FOR COYOTE FAN.

General conditions.—The area covered by the following estimates consists of that part of the Santa Clara Valley lying north of Maple Avenue, just south of Tennant, and south of the lower gorge (Pls. II and XVI). It comprises the fan of Coyote Creek and several smaller fans and has an area of about 13,000 acres. The prominent part of the Coyote fan occupies between 7,000 and 8,000 acres and extends mostly in the southwesterly direction from the mouth of the canyon. The Southern Pacific Railroad between Madrone and Morgan Hill closely follows the southwestern margin of the fan. Both north and south of the prominent part of the fan the alluvium has been contributed in considerable part by Coyote Creek. This is particularly true north of the fan, where the alluvium has much the form of a valley train. About 80 per cent of the ground water of the area thus defined is believed to have its source in percolation from Coyote Creek. Estimates of the quantity of ground water available in this area were made by both the water-level method, and the absorption method, in order that the results obtained by the two methods might check each other.

Estimate by water-level method.—The average composition of the alluvium of the Coyote fan as determined from 72 selected well logs (see table of well logs in Water-Supply Paper 400) is 69 per cent clay, 29 per cent gravel, and 2 per cent sand. These figures represent the percentages of the aggregate thickness of materials penetrated by wells for which records were obtained, except that the item "soil" in the logs was entirely disregarded, because, for the most part, the "soil" is above the water table and has no effect on the porosity of the saturated part of the alluvium. The term "soil," as used in many of the well logs, is believed to represent angular rock fragments mixed with clay. In some places the proportion of clay is large; in others small. According to the methods described on pages 27–30 the available porosity, or water-yielding capacity, of the alluvium in this area is therefore computed to be 12 per cent of its total volume.

On page 29 the conclusion was reached that the porosity of clays is about 32 per cent of their volume and that of sands and gravels is about 35 per cent of their volume. On pages 29–30 it is concluded that the sand and gravel will yield about 90 per cent of their water con-

tent and that the clay will yield about 10 per cent of its water content. That is, 31 per cent of the alluvium, consisting of sand and gravel, has a porosity of 35 per cent and will yield 90 per cent of its water, or a quantity of water equal to 9.7 per cent of the total volume of the alluvium. About 69 per cent of the total volume of the alluvium, consisting of clay, has a porosity of 33 per cent and will yield about 10 per cent of its water or a quantity of water equal to 2.3 per cent of the total volume of the alluvium, making the combined water-yielding capacity of the sand, gravel, and clay equal to 12 per cent of the total volume of the alluvium.

In the Coyote fan area there is about 1,000 acres in which the annual fluctuation of the water level in wells is not more than 10 feet (see Pl. XVI), and the average is about 5 feet. In this tract, most of which is swampy, the fluctuation is due largely to transmission of pressure rather than to a rise in the water table, and therefore it is omitted from the calculations of recharge of ground water. There is 6,750 acres in which the fluctuation is between 10 and 20 feet, with an average of 15 feet; 3,350 acres in which the fluctuation is from 20 to 30 feet, with an average of about 25 feet; and 1,500 acres in which the fluctuation is more than 30 feet and the average is perhaps 35 feet.

Exclusive of the swampy land that has a fluctuation of less than 10 feet, the volume of the materials through which the fluctuation occurs is 237,500 acre-feet. If 12 per cent of the 237,500 acre-feet is available pore space, then the recharge of ground water represented by this fluctuation is 28,500 acre-feet. This quantity of water represents slightly more than the recharge in the winter of 1914-15 and probably more than the annual average. It is equal to about 2.2 acre-feet per acre for the whole area of 13,000 acres.

However, not all this water can be withdrawn for use on the surface, as water is continuously escaping from the area by percolation at both ends. From the contours of the water table on Plate XVI, it is concluded that much the larger part of the water lost escapes at the north end and through the lower gorge. Even if it were possible to withdraw the whole 2.2 acre-feet for use on the area it would not be desirable to do so, for the water that percolates through the lower gorge is an essential part of the supply of ground water for portions of the Santa Clara Valley north of the lower gorge. The Bay Cities Water Co.[67] on the basis of the cross section and underflow measurements covering a period of seven years concludes that the percolation through the lower gorge is 16 to 20 million gallons a day, varying with different seasons. These figures have not been verified by the United States Geological Survey. They represent the only

[67] California Supreme Court, S. F. 4814. Charles Miller *v.* Bay Cities Water Co., brief of appellant, p. 19.

study of percolation through the lower gorge that has been made. As irrigation is extended on the Coyote fan the percolation through the lower gorge will become less. If 16,000,000 gallons a day is lost from the area this loss is equal to about 18,000 acre-feet a year.

Estimate by absorption method.—The measured absorption from Coyote Creek between the mouth of the canyon (upper gorge) and the lower gorge is found in the table on page 57. The annual absorption or recharge ranges from 10,500 to 36,100 acre-feet in the first four consecutive years of the record, and the annual average for the four years is 20,900 acre-feet. The annual average for the eight years record is 16.900 acre-feet. However, the absorption in 1917–18 and 1919–20 is believed to have been much below the average. For this reason and because the 1903–4 record is low it is believed that an average of the first four consecutive years is nearer the true long-term average than the average of the eight years. If, as previously estimated, Coyote Creek furnishes about 80 per cent of the total recharge of the area and the four consecutive years of record represent the true average absorption, the average annual recharge for the area is about 26,000 acre-feet.

ESTIMATES FOR THE GILROY AREA.

Estimates were made for that portion of Santa Clara Valley lying south of Maple Avenue, just south of Tennant, and north of Pajaro River, an area of about 28,370 acres, here called the Gilroy area.

This area includes a tract of 6,150 acres in which there are flowing wells. It is believed that in perhaps 7,000 acres, or an area somewhat larger than the present area of artesian flow, the rise of water in the wells is due primarily to transmission of pressure and not to any substantial addition to the water content. Doubtless there are some unsaturated materials lying above the zone that produces the artesian flows, and some water is added as these materials became saturated, but on the other hand a part of the rise of water in wells in the bordering area is due to transmission of pressure, so that these two factors tend to balance each other.

In the Gilroy area there is 13,500 acres in which the annual fluctuation does not exceed 10 feet, with an average of perhaps 5 feet. Deducting from this the 7,000 acres of former artesian flow leaves 6,500 acres in which the rise of water is regarded as due to an addition to the ground water. The volume of alluvium concerned in the fluctuation within this area is therefore 32,500 acre-feet. There is an area of 14,870 acres in which the fluctuation is between 10 and 20 feet, with an average of about 15 feet. The volume of material through which the fluctuation occurs is therefore equal to 223,050 acre-feet. On the basis of 12 per cent of available pore space (see p. 30) the quantity of water involved is 30,666 acre-feet. This is

equal to slightly more than 1 acre-foot per acre for the whole area, including the original area of artesian flow of about 7,000 acres. This estimate includes the natural losses over an area at least as large as the present area of artesian flow (6,150 acres) during the period of lowering ground water but is exclusive of this loss during the period of rising ground water. How great these losses are or what proportion of the total loss occurs during the period of rising ground water is not known. These losses are due to evaporation over the area where ground water is at or near the surface and to stream flow that is fed by rising ground water. The loss by stream flow could be entirely eliminated and that by evaporation could at least be very much reduced by a more extended use of ground water and the consequent lowering of the water table. This development would, of course, involve the necessity of pumping water from greater depths than is now necessary. The estimate for this area is based on observations in 1913–14 and 1914–15, in which the precipitation and probably also the recharge were above normal. Some of the ground water in this area comes by underground percolation from Coyote Creek, but most of it comes from Llagas Creek and other sources.

ESTIMATES FOR THE AREA SOUTH OF PAJARO RIVER.

The data on the fluctuation of the water table south of Pajaro River are meager, and therefore the areas having certain fluctuations are not shown on Plates XVI and XVIII. There are a number of wells, however, for which there is a more or less continuous record of depth to water. These records are given in the table on page 129. No stream-gaging records are available, only one discharge measurement having been made on San Benito River and none, so far as known, on any of the other streams in San Benito County. There is, however, a part of a year's record of the discharge of Pajaro River at Watsonville (p. 128). The larger portion of the flood waters of the Pajaro comes from the San Benito. In fact the Pajaro above its junction with the San Benito is comparatively insignificant. The channel of the San Benito is wide and is composed of very porous materials, which afford an excellent opportunity for the percolation of its waters into the ground-water reservoir. South of Hollister the flat portion of the valley rapidly narrows until it practically disappears at Tres Pinos. The south end of the valley is deeply filled with an older alluvium,[68] which is dissected and gives the rough topography between Hollister and Tres Pinos. The surface of the older alluvium is so rough that little of it can be irrigated, and because of its altitude the water table lies so deep that pumping is generally not

[68] Lawson, A. C., Post-Pliocene diastrophism of the coast of southern California: Calif. Univ. Dept. Geology Bull. vol. 1, pp. 151-154, 1893.

economically feasible. It is also likely to yield water too slowly for irrigation, and the water is not everywhere of good quality.

In the area around Hollister and between Hollister and San Felipe conditions for irrigation are much more favorable. Around both San Felipe and San Juan Bautista there are flowing wells. The area of artesian flow around San Juan Bautista is small, but that around San Felipe covers about 16,000 acres south of Pajaro River and extends northward across the river, including somewhat more than 6,000 acres in Santa Clara County.

The limits of the Bolsa de San Felipe are not well defined, but on its southern and eastern borders there seems to be a rather plentiful supply of ground water, and the water-bearing beds may extend under the whole Bolsa. There are a few flowing wells in the central part of this area, but their yield is small. The depth of one of these wells (No. 231) was measured and found to be 231 feet.

The soil of the Bolsa is so alkaline that except on the borders it is not cultivated. It seems that with judicious use there is sufficient ground water in this area south of the Pajaro to irrigate at least the larger part of the nonalkaline land that is suitable for irrigation.

ESTIMATES FOR THE SAN JOSE AREA.

The San Jose area includes that part of Santa Clara Valley lying north of the lower gorge of Coyote Creek and south of latitude 37° 40′ except that portion east of San Francisco Bay between latitudes 37° 30′ and 37° 40′, which is referred to as the Niles cone area and is shown on Plates X and XI. The area here considered is that shown on Plates XIV and XV and covers about 280 square miles exclusive of San Francisco Bay. About 100 square miles of this territory is an area of artesian flow, of which about 61 square miles is salt marsh. The composition of the alluvium of this area, as determined from 333 well logs representing a total penetration of somewhat more than 4.75 miles, is 74 per cent clay, 21 per cent gravel, and 5 per cent sand. Hence the available porosity of the alluvium of this area, or the volume of water it will yield to the pump, is equal to about 10.6 per cent of its volume.

Within the area above described there is nearly 18 square miles, or 11,400 acres, exclusive of the former area of artesian flow, in which the annual fluctuation of the water table is less than 10 feet, with an average of perhaps 7 feet; about 95 square miles, or 60,800 acres, in which the annual fluctuation is between 10 and 20 feet, with an average of perhaps 15 feet; and about 29 square miles, or 18,560 acres, in which the annual fluctuation is between 20 and 30 feet, with an average of perhaps 25 feet.

According to the method of computation previously described the annual recharge in this area (in 1914–15 and 1915–16) amounted to about 1 acre-foot per acre over the entire area of 140,000 acres exclusive of the salt marsh. As this is an area with relatively large amounts of clay and with widespread artesian conditions, the method used may give results that are too high. The recoverable portion of the annual recharge is evidently less than 1 acre-foot per acre.

It should also be borne in mind that the above estimates include the water that percolates through the lower gorge from the Coyote fan and that if for any reason the amount of this percolating water should be reduced the available supply north of the lower gorge would be diminished by the same amount.

The area under present discussion includes the most highly developed and most productive part of Santa Clara Valley, and as more and more land is brought under irrigation the present water supply will become inadequate. This, however, is not a hopeless situation, as the supply is capable of being very materially increased at a relatively small cost per acre. The most feasible method of increasing the supply is storage and flood control on Coyote Creek. Water rights are so involved that it is doubtful whether the flow of the creek could be directly used for irrigation, but by controlling floods and increasing the flow at the low-water stage, particularly by increasing the duration of flow in the creek, the supply of ground water could be greatly increased. (See table on p. 57 and fig. 19.) Conditions for absorption from Coyote Creek by the valley alluvium are exceptionally good, and by proper control a very large part of the discharge of the stream could be made to enter the ground-water reservoir.

ESTIMATES FOR NILES CONE.

Estimates of the quantities of water added to the ground-water reservoir underlying the Niles cone during two years, 1912–13 and 1913–14, are given by the writer in Water-Supply Paper 345 (pp. 158–168). These estimates were based on the rise of the water table during the seasons of recharge and the storage represented by this rise. According to these estimates the recharge for 1912–13 was about 2,600 acre-feet, which was very small, and that for 1913–14 was about 59,000 acre-feet, which was unusually large. In making these estimates an available porosity of 25 per cent was assumed. In the vicinity of Niles 110 logs of wells show about 54 per cent of clay, 35 per cent of gravel, and 11 per cent of sand (p. 26). According to the methods used in this report these logs would therefore indicate an available porosity of about 18 instead of 25 per cent, and would require a corresponding reduction in the estimates of recharge.

In 1913 the Spring Valley Water Co. and the Alameda County Water District began to collect data on seepage losses for a lawsuit to determine certain water rights. In order to avoid duplication of work and to have the data collected and studied by a disinterested party in which both sides had confidence, an agreement was reached to have the State Water Commission of California take over the work and render a decision. Pursuant to this agreement, the commission began its work in 1915, Paul Bailey being assigned to make the investigation. The estimates of recharge were based chiefly on careful measurements of the losses of Alameda Creek on the Niles cone. The recharge was estimated at 79,500 acre-feet for the 5-year period from 1913–14 to 1917–18, which makes an average annual recharge during these years of about 15,900 acre-feet.[69]

RELATION OF GROUND-WATER REPLENISHMENT TO PRECIPITATION AND STREAM FLOW.

The relation of ground-water replenishment to precipitation and stream flow in the Coyote Creek basin is shown in the following table. The column headed "Precipitation on drainage basin above upper gorge" is taken from the table on page 55. The method of making this estimate is explained on page 53. The column headed "Run-off on drainage basin above upper gorge" is taken from the same table. The columns giving ratios of absorption are based on the measured absorption shown in the table on page 57.

Relation of ground-water replenishment to precipitation and stream flow in the Coyote Creek basin.

Year.	Precipitation on drainage basin above upper gorge.	Run-off from drainage basin above upper gorge.	Ground-water replenishment from drainage basin above upper gorge.[a]	Ratio of absorption to precipitation.	Ratio of absorption to run-off.
	Inches.	*Inches.*	*Inches.*	*Per cent.*	*Per cent.*
1903–4	26.3	3.49	1.02	3.88	29.23
1904–5	22.1	3.11	1.54	6.97	49.52
1905–6	29.8	11.34	2.05	6.88	11.08
1906–7	33.5	19.20	3.50	10.45	17.68
1916–17	19.1	6.59	1.43	7.49	21.70
1917–18	12.2	1.19	.78	6.39	65.55
1918–19	21.3	4.51	1.84	8.64	40.80
1919–20	16.6	1.36	.97	5.84	71.32

[a] This table shows only the replenishment between the upper gorge and the lower gorge.

[69] Bailey, Paul, Engineering investigation of percolation from Alameda Creek and ground-water studies on Niles cone: California State Water Commission Bienn. Rept. for 1919–20, pp. 95–106.

The same relations are shown graphically by Figures 16, 17, and 18.

There is no constant relation between absorption or ground-water replenishment and precipitation nor between absorption and stream

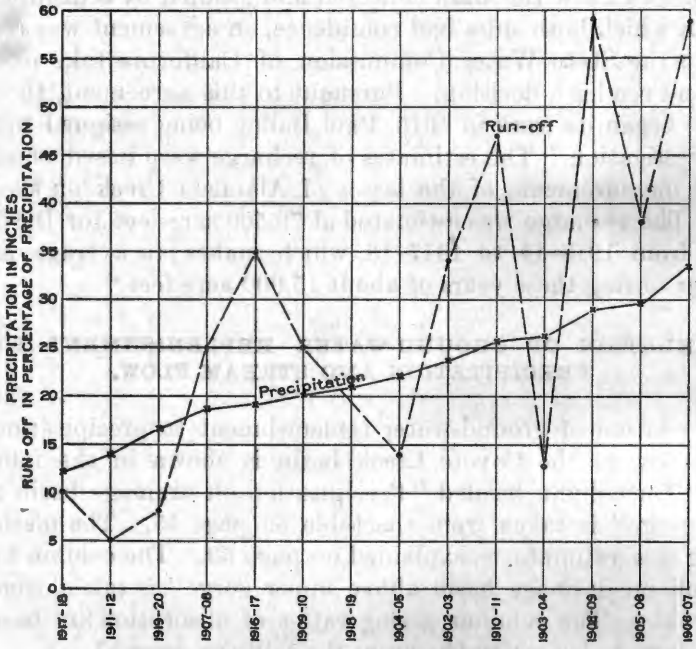

FIGURE 16.—Diagram showing run-off from mountainous area of the drainage basin of Coyote Creek in percentage of precipitation on this area.

flow. The constancy of stream flow is a more important factor in ground-water replenishment than either total discharge or total precipitation.

The following table shows the number of days on which the discharge of Coyote Creek at the upper gorge was 5 second-feet or more and the total absorption for each of the eight years of stream-flow records. The curve in Figure 19 is plotted from the data given in this table.

Relation of ground-water replenishment between upper and lower gorges to duration of stream flow of Coyote Creek.

Year.	Number of days when discharge was 5 second-feet or more at upper gorge.	Absorption in acre-feet.	Year.	Number of days when discharge was 5 second-feet or more at upper gorge.	Absorption in acre-feet.
1903–4	139	10,500	1916–17	195	14,700
1904–5	176	15,900	1917–18	80	8,060
1905–6	247	21,100	1918–19	222	18,900
1906–7	315	36,100	1919–20	138	10,000

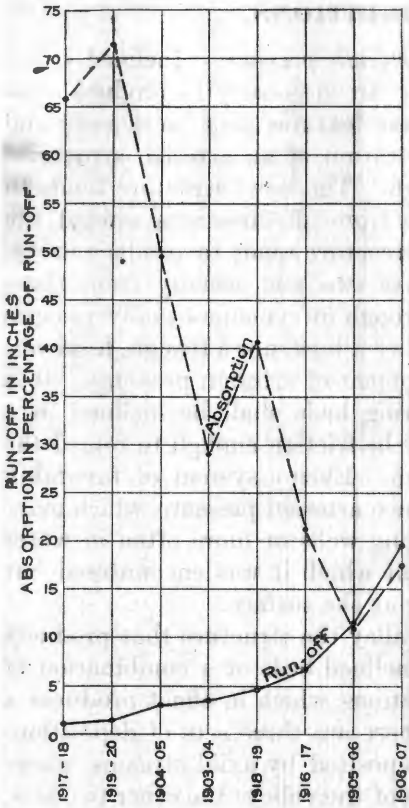

FIGURE 17.—Diagram showing absorption of surface water discharged from the mountainous area of the drainage basin of Coyote Creek in percentage of run-off from this area.

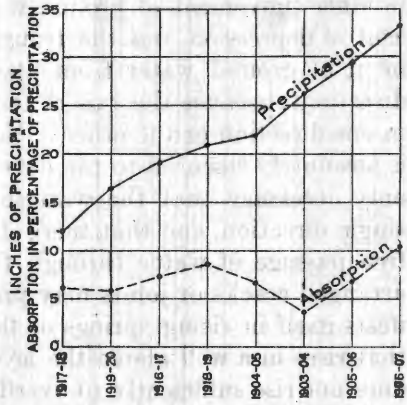

FIGURE 18.—Diagram showing absorption of surface water discharged from the mountainous area of the drainage basin of Coyote Creek in percentage of precipitation on this area.

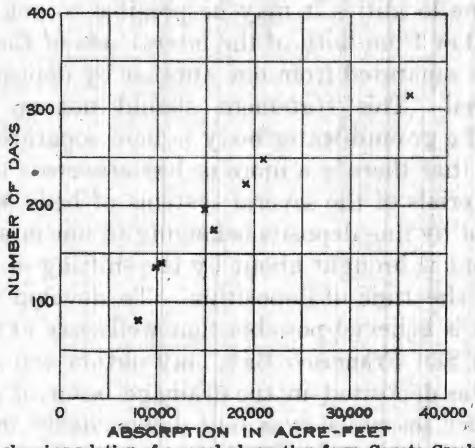

FIGURE 19.—Diagram showing relation of annual absorption from Coyote Creek to number of days on which the discharge at the upper gorge was 5 second-feet or more.

ARTESIAN CONDITIONS.

Structural features that produce artesian pressure.—Inclined structural features of one type or another are necessary to produce artesian pressure. The structure of these features may be depositional or deformational. The classic illustration of an artesian structural basin likens it to a bowl or a trough. The bowl structure tends to produce movement of ground water from all directions toward the central depression, and the trough structure tends to produce movement of ground water from at least two and usually from three directions, because the axis of the trough or syncline usually plunges in one direction or the other. Neither a bowl nor a trough, however, is absolutely essential to the development of artesian pressure. It is only necessary that the water-bearing beds shall be inclined in a single direction, and that there shall be friction enough to retard the free passage of water through them. Even a system of favorably arranged cracks or joints may produce artesian pressure, which manifests itself in rising springs or flowing wells or more often in water that rises in a well above the level at which it was encountered but does not rise sufficiently to overflow at the surface.

In the flat lands of Santa Clara Valley the structure that produces artesian pressure is that of simply inclined beds or a combination of these beds inclined in different directions, which in effect produces a trough. In the valley as a whole there are three sets of depositionally inclined beds. One set was deposited by axial streams whose general slope was parallel to the axis of the valley; the other two sets, one on each side of the valley, were deposited by lateral streams whose slopes were more or less transverse to the axis of the valley, and these beds dip from both sides toward the central part of the valley. Along the central portion of the valley the three sets are more or less united. In some localities it may be possible to get artesian water from the medial or from both of the lateral sets of these beds, which are more or less separated from one another by deposits of intervening fine material. This statement should not be interpreted as implying that the ground-water body is here separated into distinct parts, but only that there is a more or less crisscross arrangement of the coarser materials of the several systems of beds, which are more or less separated by fine deposits belonging to one or another system. This arrangement is brought about by the shifting of the position of the streams at the time of deposition. To develop the idea somewhat further, it is believed possible that wells, say at the foot of the Niles cone or in San Francisco Bay, may obtain water from one set of beds which was deposited in the drainage basin of Alameda Creek and from another set which was laid down chiefly in the drainage basin of Coyote Creek or other drainage basins on the south.

Areas of artesian flow.—There are two large areas of artesian flow in Santa Clara Valley and at least one smaller area. In two or three other small areas wells formerly flowed or now flow only at the high stage of ground water. The largest area is around San Fancisco Bay and includes at least a part of the bay itself, there being a few flowing wells in the bay at the Morgan Oyster Co.'s houses. The other of the two larger areas may be called the Bolsa area, though it is not confined to the Bolsa de San Felipe. It extends from Old Gilroy to a point 2 or 3 miles north of Hollister, its central portion being occupied by the Bolsa. The best-developed part of the area is around San Felipe, though there is considerable development between Old Gilroy and Pajaro River. The small area is just north of San Juan Bautista and covers a little more than a square mile. Deeper borings than any yet made may show that this area is connected with the Bolsa area through the lowlands along San Benito and Pajaro rivers. It is doubtless due to the same general causes that produced the Bolsa area.

The Bolsa area of artesian flow lies partly in San Benito County and partly in Santa Clara County. It covers about 35 square miles, or 22,000 acres, of which about 16,000 acres lie in San Benito County and 6,000 acres in Santa Clara County. Most of the San Benito County portion of the area is little developed, being in large part composed of alkali land, which at present is used only for pasture. The less alkaline portion, lying south of San Felipe and around Dunneville, is largely devoted to growing alfalfa. The portion of the area lying in Santa Clara County is less alkaline and, on the whole, is better developed. The predominant crop here also is alfalfa. The Bolsa area of artesian flow is believed to owe its existence to the facts that the underground drainage is cut off by the solid rock through which the Pajaro Canyon is cut and that the ground-water level is higher toward the north. Thus the outlet of this portion of Santa Clara Valley has a rock rim that effectively prevents the escape of ground water along Pajaro River, and the water is prevented from escaping northward by ground water that is almost 100 feet higher than the surface of the valley floor near the point where the Pajaro Canyon begins.

The area of artesian flow around San Francisco Bay comprises about 120 square miles or 77,000 acres, of which about 50,000 acres is salt marsh. These figures do not include that portion of the area of artesian flow which lies beneath the waters of San Francisco Bay. The artesian flow in this area is due to the slightly inclined position of the water-bearing materials and to the fact that in the lower part of the valley near the bay there is a cap of relatively impervious material, which practically prevents the escape of the water either to the surface or into the bay.

Fluctuations in artesian pressure and in the extent of the areas of artesian flow.—It is a well-established fact that the artesian pressure fluctuates with the season. This is shown by the record of well No. 2166 (see p. 181) and by a large number of wells near the border of the area of artesian flow, which flow during periods of high ground water and cease to flow as the water table lowers. Well No. 1551 may be taken as an example of this type of well. On May 28, 1915, this well was flowing at the rate of about 500 gallons a minute, but it does not flow at all during the dry season of each year.

An attempt has been made on Plates XIV and XVIII to show the former boundary of the area of artesian flow. This area includes the area of intermittently flowing wells and the area in which wells flowed in former times but do not now flow even at the highest stage of ground water. The data upon which this boundary is drawn may be readily seen on the maps. Wells that either now flow intermittently or are known to have flowed in former years are indicated on the map. Many wells in this area, of course, never flowed, perhaps chiefly because they were too shallow or were put in after the areas of artesian flow had contracted beyond their locations. The boundary line of this area is not well established in many places, but it seems likely that the area indicated on the maps is too small rather than too large.

QUALITY OF GROUND WATER.

The ground water of Santa Clara Valley is on the whole satisfactory for both domestic use and irrigation. A few wells have water that is not considered good for domestic use or is said to be injurious to plants. The largest group of such wells is in a small area with meager water supply northwest of Menlo Park. All the wells of this locality are of small yield, and many of them can be pumped dry with an ordinary windmill. The water table here is below sea level, at least in the low-water season. This condition is believed to be due to the relatively impervious character of the materials, which does not permit ground water to enter the area as fast as it is withdrawn during the dry season.

IRRIGATION SUPPLIES.

AREAS AND CROPS IRRIGATED.

The area irrigated from ground water in Santa Clara Valley is rapidly increasing, and the data presented in this paper are therefore far from complete. In 1914–15, when most of these data were collected, the area irrigated from ground water amounted to approximately 45,000 acres distributed about as follows: Orchard, 32,000 acres; alfalfa, 9,000 acres; miscellaneous, 4,000 acres. The area irrigated in 1919 was probably at least 50 per cent greater.

NEED FOR IRRIGATION.

Without irrigation Santa Clara Valley would, in large measure, be converted from one of the most productive fruit valleys of California to a region of precarious production of grain or grain hay. It frequently happens that the rainfall is so low or its distribution so unfavorable that grain will not mature over most of the valley. In some sections of the valley, however, fruit is grown with moderate success where irrigation is not practiced. This is particularly true in the area around Los Gatos and Cupertino, but the practice of irrigation is growing even in this locality. The annual rainfall at Los Gatos is about 33 inches, which is about twice the average of the whole valley. The Morgan Hill area may be taken as more nearly typical of the valley in general, but the average annual rainfall at Morgan Hill is 23.55 inches, which is also considerably above the average for the valley. In reporting on an investigation of the Morgan Hill area Frank Adams[70] says:

> There is ample evidence that none of the old orchards in the area have produced much growth after coming into full bearing, and many of the trees have definitely gone backward and have been especially affected, it is stated, by several dry periods through which the area has passed. While this poor condition of the old orchards is not favorable, the young orchards in the area generally look well, indicating that here as elsewhere in the Santa Clara Valley the need for irrigation is not greatly felt until bearing commences. Absence of irrigation and poor soil management have undoubtedly been the governing factor in bringing about the present poor condition of the old orchards. * * * While some of the old orchards would plainly be better dug up than maintained even under irrigation conditions, it seems safe to assume that trees with strong wood that are not too old will be greatly benefited. * * * The need of irrigation if the Morgan Hill section is to continue permanently in the orchard business is conclusive.

The need for irrigation in most other parts of the valley is even greater than in the Morgan Hill area. The most productive part of the valley lies around San Jose, where the average annual rainfall is only 15.10 inches.

METHODS OF APPLYING WATER.

In the orchards two methods of applying water are in general use—the check method and the furrow method. In the first method checks (banked areas) are made around each tree and filled to a depth of 6 to 12 inches with water. Two types of the furrow method are in use. In one of these a furrow is made on either side of a row of trees at a distance of 4 to 6 feet, depending on the size of the tree, and water is allowed to flow in these furrows for a definite period of time. In the other method a series of furrows covering the entire

[70] Adams, Frank, irrigation manager U. S. Dept. Agr., unpublished report.

area of the orchard is used, and water is allowed to flow in them for a definite period of time. When the latter method is used the water is led along one side of the orchard in a main ditch or at some places through surface or buried pipe and is turned into the smaller furrows as needed. If the point at which the water is to be applied is at a considerable distance from the pump, the water may be carried in slip-joint galvanized pipe. The pipe is employed particularly where the soil is very porous, in order to avoid seepage along an open ditch. Pipe is also used where the grade from the pump will not permit the use of open ditches.

In irrigating alfalfa the check method in conjunction with the slip-joint pipe is most common. However, in some fields the pipe is not used at all, and in others no checks are made and water is applied by shifting the end of the pipe as desired. This is the most economical method of applying water, and good results are obtained with 1½ acre-feet of water a year.

WATER REQUIRED FOR DIFFERENT CROPS.

The water requirement for orchards, as stated by Adams,[71] is two 6-inch irrigations, or 1 acre-foot per acre per year, in addition to that supplied by precipitation. Of course the exact quantity required varies with the nature and condition of the soil.

The requirement for alfalfa is more than twice that for orchards. A series of experiments was carried out by the University of California to determine the most economical duty of water for alfalfa in Sacramento Valley. The experiments were made during the period 1910 to 1915 at the university experiment farm at Davis and on 54 alfalfa farms in Sacramento Valley, scattered through practically the entire length of the valley. The results of these experiments were published by the State.[72] The accompanying diagram, Figure 20, is taken from page 8 of the bulletin cited, and the following paragraphs are drawn from the "Summary and conclusions" of the same bulletin:[73]

> With the exception of the highly permeable Elden gravelly loams at Orland and the very impervious Tehama clays and clay loams at Willows, the results of the work, as a whole, are in agreement with the results of the 6-year duty of water study at Davis. These have indicated that a depth of from 30 to 36 inches of water annually is the most desirable quantity of irrigation water to apply under general Sacramento Vally conditions. Total depths of less than 24 inches annually, exclusive of rainfall, are insufficient for satisfactory yields, as indicated by the Willows work, while application of depths of 48 or more inches per year do not produce corresponding increases in alfalfa yields.

[71] Op. cit.

[72] Adams, Frank, Robertson, R. D., Beckett, S. H., Hutchins, W. A., and Israelsen, O. W., Investigations of economical duty of water for alfalfa in Sacramento Valley, Calif.: California Dept. Eng. Bull. 3, 1917.

[73] Idem, pp. 75, 77.

Alfalfa planted on very open and very impervious soils should be irrigated more than once between cuttings. This is necessary in the case of the open soils because of the inability of such soils to retain all of the moisture needed to mature a crop, and in the case of the impervious clay soils in order to accomplish deeper penetration of the irrigation water into them. In the case of the latter soils it is very desirable that the moisture supplied by winter rains shall be supplemented by irrigation water sufficiently early in the spring to prevent drying out. The frequent use by irrigators on such soils of a soil auger is to be urgently recommended, the investigations reported herein having demonstrated that penetration of irrigation water into the clay soils is very much less than irrigators usually realize.

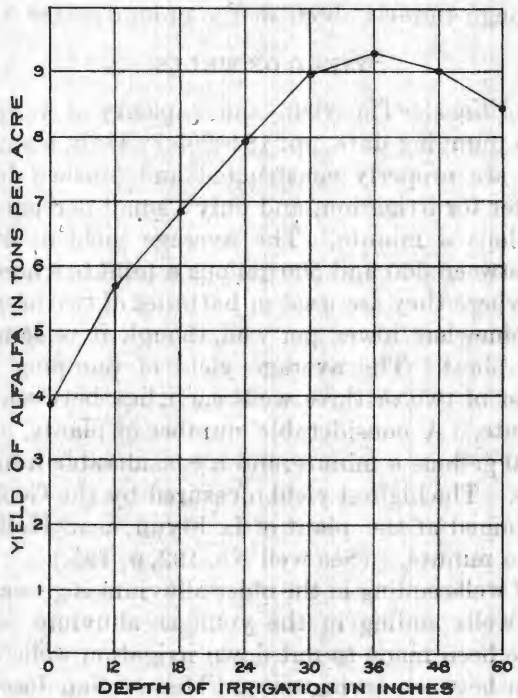

FIGURE 20.—Diagram showing results of experiments on the alfalfa duty of water, made at the University farm, Davis.

KINDS OF IRRIGATION WELLS.

In certain localities water may be obtained from flowing wells, but few of these wells yield more than 100 or 200 gallons a minute from the natural flow, and many of them have been equipped with pumps. The yield of many wells is more than doubled by pumping. At other places the desired quantity of water is obtained by increasing the number of wells. It is not possible from the data at hand to estimate the area irrigated from the natural flow of wells, but it is certain that by far the larger part of the area irrigated in Santa Clara Valley obtains water from wells that are pumped. A small area is irrigated by spreading the winter floods of streams, but a considerable part of

this area is later irrigated with water pumped from wells, the winter flooding being only supplementary to the summer irrigation. It is perhaps safe to say that from 80 to 90 per cent of the irrigated land in the valley is irrigated with water from pumped wells.

The most general practice in Santa Clara Valley is to use two wells in opposite corners of a pit, connected with the same pump. Near Hollister three or more wells are commonly connected with one pump. The pump is usually in a pit, which may or may not be over one of the wells. The wells are connected with the pump by suction pipes that pass through tunnels about at the ground-water level.

YIELD OF WELLS.

General conditions.—The yield and capacity of wells differ rather widely. (See pumping data, pp. 184–205.) Only a small percentage of wells that are properly constructed and finished fail completely to supply water for irrigation, and only a small percentage yields less than 100 gallons a minute. The average yield of irrigation wells is probably between 300 and 500 gallons a minute where the wells are used singly; where they are used in batteries of two or more the average yield is somewhat lower per well, though it is somewhat higher per pumping plant. The average yield of pumping plants, which usually consist of two or three wells each, lies between 500 and 700 gallons a minute. A considerable number of plants, of course, yield more than 700 gallons a minute, and a considerable number fall short of 500 gallons. The highest yield measured by the Geological Survey was that obtained at the plant of L. Flynn, near Hollister, and was 1,325 gallons a minute. (See well No. 192, p. 185.)

The yield of wells ending in the older alluvium is generally much less than that of wells ending in the younger alluvium. A number of attempts have been made to put down irrigation wells in the area of older alluvium between Irvington and Mission San Jose, but only two or three have been successful.

Pumping tests on Coyote fan.—There are only three or four wells used for irrigation in the southern two-thirds of the Coyote fan. The northern part is considerably more developed. Pumping tests were made on two of the wells in the southern part of the area by the writer on March 24, 1916. The yield was measured by a current meter, the water being allowed to flow in an open ditch. The wells measured were the A. Rosa well (No. 692), then owned by G. T. Higgins, and the C. W. Usher well (No. 618), then owned by A. Wheeler. The Rosa well consists of a 4 by 5 foot pit 94 feet deep and a 10-inch drilled well extending 116 feet below the bottom of the pit, giving a total depth of 210 feet.

Log of A. Rosa's well.

	Thickness.	Depth.
	Feet.	*Feet.*
Pit	94	94
Sand	26	120
Gravel	26	146
Clay	9	155
Gravel	13	168
Clay	3	171
Gravel	39	210

The well is equipped with a two-stage 3-inch belt-driven centrifugal pump with a vertical shaft and a 25-horsepower gasoline engine. On the day of the test the total lift was 65.8 feet, the yield was 425 gallons a minute, and 1.02 gallons of distillate was burned per acre-foot per foot of lift. The drawdown during the test was 9.17 feet; hence the specific capacity of the well appears to be 46 gallons a minute.

The pit of the Usher well was originally 65 feet deep, but it had caved and filled until at the time of test it was about 40 feet deep. Fortunately, the well was covered, so that the dirt could not get into it. In the bottom of the pit is a 10-inch drilled well reaching 108 feet below the bottom of the pit, the total depth being, therefore, 173 feet.

Log of C. W. Usher's well.

	Thickness.	Depth.
	Feet.	*Feet.*
Pit	65	65
Sandy clay	16	81
Gravel	9	90
Yellow clay	41	131
Coarse gravel and clay	33	164
Clay	9	173

The well is equipped with a No. 4 belt-driven centrifugal pump with vertical shaft, driven by a 25-horsepower electric motor. The yield was found to be 718 gallons a minute, and electric current was consumed at the rate of 0.43 kilowatt-hour per acre-foot per foot of lift. The drawdown during the test was 13.38 feet. The specific capacity of this well appears to be 54 gallons a minute.

The O. H. Barnhart well (No. 823), near Perry station, has been measured with a Cippoletti weir by F. D. Barnhart, who reports a yield of 880 gallons a minute.

Pumping tests in Gilroy area.—The yield of certain representative wells in the Gilroy area was measured, and the yield of a number of others was reported by the owners. (See table on p. 184.) The measured yields are as follows: E. R. Maze well (No. 345), 520 gallons a minute; George E. Stone well (No. 381), 445 gallons a minute; Mrs. Shepard well (No. 385), 660 gallons a minute; White & Wheelock

well (No. 411), 950 gallons a minute; Gilroy Seed Co.'s well (No. 414), 925 gallons a minute; H. A. Tibbetts well (No. 442), 1,200 gallons a minute[74]; C. Dauberg well (No. 475), 750 gallons a minute; J. H. Carl well (No. 482), 354 gallons a minute; H. Robinson well (No. 562), 145 gallons a minute. These yields were measured in 1914.

Pumping tests in area south of Pajaro River.—The yield of a number of wells in the area south of the Pajaro was measured with the following results: Morse Seed Co.'s four wells (No. 24), 1,500 gallons a minute; Mitchell Fruit Farm well (No. 61), 730 gallons a minute; Bundesen Co.'s well (No. 111), 370 gallons a minute; McCloskey Bros. well (No. 184), 812 gallons a minute; Hudner Bros. well (No. 186), 902 gallons a minute; Larry Flynn well (No. 192), 1,325 gallons a minute; Kydd & Harlan well (No. 193), 1,009 gallons a minute; W. A. Pack well (No. 197), 326 gallons a minute; Johnson & White well (No. 217), 319 gallons a minute[75]; Oliver Orr well (No. 289), 960 gallons a minute. (See pumping plant and irrigation data, pp. 184–205, in table on pumping for irrigation.)

TOTAL PUMPAGE FOR IRRIGATION.

The average amount of water used for irrigation is probably about 1½ acre-feet per acre on orchards, not less than 3 acre-feet per acre for alfalfa, and about 1 acre-foot per acre for miscellaneous crops.

It is estimated that in 1914 and 1915 about 32,000 acres of orchard was irrigated, about 9,000 acres of alfalfa, and about 4,000 acres of miscellaneous crops. (See p. 80.) On the basis of water used as indicated above, about 48,000 acre-feet would be required for orchards, 27,000 acre-feet for alfalfa, and 4,000 acre-feet for miscellaneous crops, or a total of 79,000 acre-feet. It is probable that there was 50 per cent more land under irrigation in 1919 than in 1914–15. If this is true and if the same relative proportions of the different crops were maintained, the total quantity of water used for irrigation in 1919 was probably about 120,000 acre-feet.

MUNICIPAL AND DOMESTIC SUPPLIES.

Records are available of water pumped from wells for the San Jose waterworks, the Palo Alto waterworks, and the People's Water Co., which supplies the cities on the east side of the bay.

San Jose.—San Jose is only partly supplied by ground water. The quantity of ground water pumped differs greatly in different years,

[74] Measured by F. H. Tibbetts, of the dept. of engineering of the University of California.

[75] This well was new, and the pump was not working properly. Later Mr. Johnson reported a yield of 1,000 gallons a minute.

depending on the amount of rainfall and the quantity of surface water available. So far as recorded the smallest quantity pumped in a year (1915) is only about 32 per cent of the largest quantity pumped in a year (1913). The average quantity pumped annually during the seven years of complete record (1912–1918) is about 805 million gallons, or 2,470 acre-feet. The pumpage in 1918 was about 1,027 million gallons, or 3,151 acre-feet. The heaviest pumpage occurs in the driest years, when the draft on the ground-water reservoir for other purposes is also greatest. The growth of the city will force an expansion of the water-supply system, but whether this will be made by a heavier draft on ground water or by increasing the supply of surface water has not been determined. The quantities of water pumped for the San Jose supply are given in the following table:

Water pumped from wells for the city waterworks of San Jose, Calif., in gallons.

Year.	Main station.	Seventeenth Street station.	Buena Vista station.	Total.
1912	762,328,183	117,893,938	128,203,500	1,008,425,521
1913	649,055,908	249,946,090	391,599,350	1,290,601,848
1914	364,067,534	60,113,925	143,629,500	567,810,959
1915	318,586,000	44,225,000	29,739,500	392,550,500
1916	453,094,000	37,557,750	57,275,250	547,927,000
1917	538,101,000	85,148,000	176,151,400	799,400,400
1918	422,528,381	164,806,000	338,145,000	[a]1,026,735,051
1919[b]	357,042,000	152,506,250	113,016,500	622,564,750

[a] This quantity includes 101,255,670 gallons pumped at the new Bascomb Avenue station.
[b] January to October only.

Palo Alto.—The waterworks of Palo Alto are wholly supplied by water pumped from wells. The quantity pumped during the fiscal year 1909–10 was 175,926,000 gallons, during 1910–11 it was 152,165,067 gallons, and during 1911–12 it was 156,639,000 gallons. The pumpage from 1912–13 to 1918–19 is given by months in the following tables. The total in 1918–19 was equivalent to 776 acre-feet.

Water pumped from wells for the city waterworks of Palo Alto, Calif., in gallons.

	1912–13	1913–14	1914–15	1915–16	1916–17	1917–18	1918–19
July	20,450,000	22,825,000	22,989,000	24,027,000	23,138,750	29,809,500	31,899,000
August	21,380,000	22,000,000	21,234,400	21,100,000	19,105,500	23,956,500	34,875,000
September	16,350,000	21,300,000	20,733,220	18,700,000	18,228,000	23,270,250	20,715,750
October	14,600,000	19,375,000	18,429,160	16,515,360	10,866,000	20,041,500	18,308,000
November	9,000,000	12,308,000	13,887,550	11,174,640	11,237,500	11,954,750	11,977,250
December	9,000,000	8,698,000	9,244,720	8,100,000	10,967,000	10,847,000	13,514,750
January	8,000,000	8,680,000	9,033,920	8,398,740	10,300,000	13,969,500	15,582,360
February	8,300,000	8,897,000	8,872,320	8,672,025	11,679,500	12,910,000	13,695,390
March	11,687,000	9,593,000	10,470,000	11,771,475	11,460,750	13,151,500	14,032,060
April	15,635,000	12,448,000	9,700,000	16,346,750	17,250,000	23,784,000	20,244,430
May	20,369,000	18,000,000	11,275,920	23,147,750	26,162,250	26,920,250	29,241,720
June	21,828,000	19,000,000	19,823,840	22,537,500	25,500,000	29,150,000	28,923,580
	176,549,000	183,124,000	175,694,050	190,491,240	195,895,250	239,764,750	253,009,290

People's Water Co.—The People's Water Co. pumps water from wells at its plant at Alvarado for the public supplies of the cities on the east side of the bay. Its average annual withdrawal during the five-year period 1904–1908 was 1,541 million gallons, or 4,730 acre-feet, and during the five-year period 1909–1913, 2,630 million gallons, or 8,075 acre-feet. Its withdrawal in the year 1913 was 2,856 million gallons, or 8,770 acre-feet.

Summary.—The average annual pumpage of ground water for the San Jose and Palo Alto waterworks and the People's Water Co. is probably not less than 13,000 acre-feet. The public supplies of other towns and cities and domestic supplies throughout the valley probably amount to not less than 10,000 acre-feet a year, bringing the average annual withdrawal for municipal waterworks and domestic supplies up to nearly 25,000 acre-feet. Much of this water is used for sprinkling lawns and watering gardens, but it is not included in the estimates of irrigation water given on page 86.

INDUSTRIAL SUPPLIES.

The only industrial water supply of any considerable magnitude in Santa Clara Valley that is not obtained from municipal waterworks is that of the Alameda Sugar Co., at Alvarado. No data are at hand relative to the amount pumped by this company, but the quantity is rather large during the season when the factory is in operation.

SUPPLIES FOR OTHER PURPOSES.

In the vicinity of Alvarado certain areas of salt marsh are diked off, and ground water is pumped for the purpose of washing the excess of soluble salts out of the land, thus rendering it suitable for cultivation. The quantity of water thus used is not known, but it is small compared with other drafts made on this area.

Some water is also used to maintain duck ponds on the salt marsh near Alvarado and Newark.

ADEQUACY OF GROUND-WATER SUPPLIES.

According to estimates for different areas given on pages 69–75 of this paper the average annual recharge of ground water in Santa Clara Valley amounts to approximately 1 acre-foot per acre for the lands suitable for irrigation. This average annual recharge is balanced by the average annual withdrawals through flowing wells and wells that are pumped, together with the natural loss by evaporation, transpiration of plants, and that portion of stream flow which is fed by ground water. The loss is doubtless heavy from the salt marsh, the Bolsa de San Felipe, and other areas where the discharge of ground

water is active. The net quantity recoverable for irrigation and other human uses is probably not more than half an acre-foot per acre for the irrigable portion of the valley.

It is not believed that there is at present an overdraft on the ground water, but development is near its safe limit. In times of protracted drought the supply is now so short that many wells have to be deepened or have their pits lowered, and some of these changes have failed to obtain the needed supply. In general, however, with present development these periods of drought can be passed through without serious injury, though they cause considerable inconvenience. After one or two years of normal rainfall the ground water rises nearly to its normal level, and the cycle of low water is passed. It is very important, however, that steps be taken to forestall overdevelopment.

The supply of ground water annually available can be materially increased by flood control on Coyote Creek, and the duty of the water can be increased by applying it more judiciously. However, it seems evident that even under the most favorable management a portion of the valley can never be irrigated for lack of water.

LOGS OF WELLS.

Logs of wells between the lower gorge of Coyote Creek and the Niles cone, including wells on the west side of the bay.

Well of J. P. Gillespie, below Catholic Seminary and near Ravenswood schoolhouse, Menlo Park.

[Jan. 5, 1903.]

	Thickness.	Depth.		Thickness.	Depth.
	Feet.	*Feet.*		*Feet.*	*Feet.*
Soil	4	4	Blue clay	4	113
Sediment	16	20	Blue gravel	8	121
Gray clay	3	23	Gravelly clay	5	126
Clay and gravel	3	26	Blue clay	29	155
Sand and clay	4	30	Blue gravel	1	156
Yellow clay	6	36	Blue clay	2	158
Water gravel	4	40	Blue clay, shells	3	161
Yellow clay	7	47	Blue clay	4	165
Blue clay	3	50	Yellow clay	14	179
Yellow clay	8	58	Blue clay	11	190
Blue sandy clay	9	67	Yellow sand	9	199
Blue clay	25	92	Blue clay	1	200
Yellow sand	6	98	Yellow clay	2	202
Blue clay	4	102	Water gravel	5	207
Sand	7	109			

Sunnyvale Cooperative Fruit Co.'s well, Sunnyvale.

[Sept. 3, 1903.]

Sediment	18	18	Blue clay	37	103
Yellow clay	20	38	Yellow clay	2	105
Water in sandy clay	2	40	Sand and gravel	2	107
Blue clay	18	58	Clay	1	108
Yellow clay and gravel	5	63	Water gravel	6	114
Water gravel	3	66			

Logs of wells between the lower gorge of Coyote Creek and the Niles cone, including wells on the west side of the bay—Continued.

Well of A. Vargas, Murphy tract.

[Nov. 5, 1903.]

	Thickness.	Depth.		Thickness.	Depth.
	Feet.	*Feet.*		*Feet.*	*Feet.*
Adobe soil	4	4	Yellow sand and clay	13	116
Yellow clay	13	17	Blue clay	56	172
Gravel	2	19	Yellow clay	4	176
Blue clay	3	22	Yellow sand	1	177
Gravel	12	34	Water gravel	3	180
Blue clay	2	36	Yellow clay	10	190
Gravelly clay	3	39	Water gravel	6	196
Blue clay	21	60	Gravelly clay	3	199
White clay	5	65	Water gravel	3	202
Yellow clay	2	67	Blue clay	4	206
Water gravel	3	70	Gravelly clay	2	208
Blue clay	2	72	Yellow clay	5	213
Clay and gravel	8	80	Blue clay	17	230
Blue clay	8	88	Yellow clay	18	248
Yellow clay	4	92	Sand	4	252
Water gravel	5	97	Gravelly clay	3	255
Blue clay	6	103	Cement	2	257

Mountain View city well No. 1.

[Nov. 1, 1904.]

Adobe	4	4	Blue clay	9	139
Yellow clay	3	7	Yellow clay	2	141
Sand, clay, and gravel	4	11	Gravel and clay	13	154
Yellow clay	11	22	Yellow clay	9	163
Yellow sand	2	24	Water gravel	10	173
Water gravel	3½	27½	Yellow gravelly clay	17	190
Blue clay	19½	47	Sand and gravel	6	196
Yellow clay	2½	49½	Yellow clay	7	203
Water gravel	6½	56	Blue sand and wood	6	209
Blue clay	11	67	Blue clay	2	211
Yellow clay and gravel	2	69	Blue sand and gravel	10	221
Blue clay	9	78	Blue clay	13	234
Red sand	8	86	Yellow clay	4	238
Blue sand	6	92	Gravel and clay	2	240
Sandy gravel	2	94	Blue clay	16	256
Yellow clay	6	100	Yellow clay	20	276
Water gravel	6	106	Gravel	6	282
Blue clay	2	108	Yellow clay	10	292
Clay and gravel	4	112	Gravelly clay	4	296
Blue clay	9	121	Sand and clay	2	298
Sand	2	123	Gravelly clay	2	300
Water gravel; water rose 7 feet	7	130	Water gravel	10	310

Well of Mrs. M. A. Stone, Castro station.

[June 26, 1905.]

Adobe	3	3	Yellow clay	4½	76
Yellow clay	7	10	Blue clay	31	107
Water sand	1	11	Brown clay	2	109
Yellow clay	6	17	Blue clay	17	126
Blue clay	18	35	Yellow clay	20	146
Yellow sand	2	37	Water gravel	3	149
Blue clay	10	47	Yellow clay	4	153
Yellow clay	4	51	Water gravel	2	155
Blue clay	17	68	Yellow clay	10	165
Yellow clay	2	70	Water gravel	2	167
Sand and gravel	1½	71½			

Well of Peninsula Hotel, San Mateo.

Yellow sandy clay	9	9	Yellow clay and gravel	22	166
Yellow clay and broken rock	8	17	Yellow clay, sand, and gravel	18	184
Gravel, water	3	20	Blue sandy clay	22	206
Yellow sandy clay	11	31	Blue sand with some gravel	12	218
Gravel, water	3	34	Gravel, water	2	220
Yellow clay and broken rock	15	49	Blue sandy clay	10	230
Yellow sandy clay	13	62	Hardpan	3	233
Gravel, water	15	77	Yellow clay, some sand	15	248
Yellow sandy clay	30	107	Hardpan	2	250
Yellow clay and gravel	32	139	Blue sandy clay	45	295
Yellow sandy clay	5	144	Fine blue sand	6	301

NOTE.—Another well put down close by went down 330 feet and had practically the same log but penetrated another small stratum of water-bearing gravel.

Logs of wells between the lower gorge of Coyote Creek and the Niles cone, including wells on the west side of the bay—Continued.

Well of Geo. A. Newhall, Burlingame (new place).

	Thickness.	Depth.		Thickness.	Depth.
	Feet.	*Feet.*		*Feet.*	*Feet.*
Loam	3	3	Yellow sand and gravel	4	72
Blue mud	3	6	Gray clay	18	90
Soft mud	13	19	Gray sand clay	8	98
Gray clay	5	24	Gray sand	5	103
Yellow sand	18	42	Gray sand clay	10	113
Yellow gravel, water	4	46	Gray sand	12	125
Hard blue sand	2	48	Blue clay	27	152
Blue clay	5	53	Gray clay	6	158
Yellow sand clay	7	60	Yellow sand	12	170
Yellow sticky sand	3	63	Yellow sand clay	10	180
Yellow sand clay	5	68	Yellow sandrock	6	186

San Jose waterworks well No. 1, Bascomb Avenue station.

[February-October 1916.]

Soil	4	4	Water gravel	2	145
Yellow clay	34	38	Cement gravel	1	146
Yellow clay and gravel	9	47	Yellow clay	47	193
Blue sandy clay	6	53	Cement gravel	20	213
Yellow clay and gravel	4	57	Water gravel	24	237
Blue clay	14	71	Yellow clay	11	248
Yellow clay	7	78	Blue clay	17	265
Cement gravel	8	86	Yellow clay	3	268
Water gravel	11	97	Cement gravel	19	287
Cement gravel	3	100	Yellow clay	35	322
Blue clay and gravel	3	103	Cement gravel	248	570
Cement gravel	9	112	Water gravel	18	588
Yellow clay	1	113	Yellow clay	3	591
Cement gravel	5	118	Water gravel	21	612
Water gravel	1	119	Yellow clay	6	618
Cement gravel	24	143			

San Jose waterworks well No. 2, Seventeenth Street station.

Soil	18	18	Cement gravel	12	535
Yellow clay	32	50	Yellow clay	2	537
Blue clay	29	79	Cement gravel	8	545
Gravel	10	89	Yellow clay	5	550
Yellow clay	8	97	Cement gravel	2	552
Gravel	18	115	Blue clay	16	568
Blue clay	15	130	Cement gravel	15	583
Gravel	11	141	Yellow clay	4	587
Yellow clay	4	145	Cement gravel	3	590
Gravel	5	150	Blue clay	25	615
Blue clay	3	153	Yellow clay	5	620
Yellow clay	36	189	Cement gravel	15	635
Gravel	17	206	Yellow clay	38	673
Yellow clay	19	225	Cement gravel	7	680
Blue clay	30	255	Yellow clay	20	700
Yellow clay	7	262	Cement gravel	5	705
Cement gravel	11	273	Yellow clay	7	712
Yellow clay	7	280	Cement gravel	5	717
Cement gravel	7	287	Yellow clay	8	725
Yellow clay	5	292	Cement gravel	10	735
Cement gravel	41	333	Yellow clay	15	750
Blue clay	22	355	Blue clay	10	760
Yellow clay	3	358	Yellow clay	12	772
Blue clay	28	386	Cement gravel	5	777
Cement gravel	7	393	Blue clay	14	791
Blue clay	9	402	Yellow clay	18	809
Gray clay	11	413	Blue clay	4	813
Blue clay	9	422	Yellow clay, mixed with gravel	37	850
Yellow clay	13	435	Blue clay (at this point a boulder was encountered)	5	855
Cement gravel	11	446	Blue clay	10	865
Yellow clay	14	460	Yellow clay	5	870
Cement gravel	5	465	Blue clay	7	877
Yellow clay	10	475	Blue clay and cement	13	890
Blue clay	20	495	Yellow clay and gravel	5	895
Cement gravel	5	500	Blue clay	44	939
Yellow clay	6	506	Yellow clay	11	950
Blue clay	8	514	Yellow clay and gravel	2	952
Yellow clay	9	523			

Logs of wells between the lower gorge of Coyote Creek and the Niles cone, including wells on the west side of the bay—Continued.

San Jose waterworks well No. 2, Seventeenth Street station—Continued.

	Thickness.	Depth.		Thickness.	Depth.
	Feet.	*Feet.*		*Feet.*	*Feet.*
Yellow clay	5	957	Blue clay	40	1,190
Yellow clay and gravel	14	971	Yellow clay	38	1,228
Yellow clay	9	980	Yellow clay and gravel	4	1,232
Yellow clay and gravel	25	1,005	Yellow clay	8	1,240
Blue clay	30	1,035	Blue clay	90	1,330
Yellow clay	10	1,045	Yellow clay	30	1,360
White clay	5	1,050	Blue clay	88	1,448
Yellow clay	10	1,060	Yellow clay	21	1,469
Yellow clay and gravel	12	1,072	Blue clay	19	1,488
Blue clay	58	1,130	Yellow clay	7	1,495
Yellow clay	5	1,135	Yellow clay, mixed with gravel	25	1,520
Blue clay	10	1,145	Yellow clay	15	1,535
Yellow clay	5	1,150			

San Jose waterworks well No. 4, Buena Vista station.

[The deepest of seven wells at the Buena Vista station.]

Soil	8	8	Yellow clay	3	213
Sand and gravel	12	20	Gravel	15	228
Clay and sand	25	45	Yellow clay	7	235
Cement gravel	10	55	Gravel	15	250
Gravel	15	70	Yellow clay	4	254
Cement gravel	4	74	Gravel	6	260
Gravel	10	84	Gravel and clay	2	262
Blue Clay	6	90	Gravel	2	264
Yellow clay	4	94	Yellow clay	2	266
Gravel	5	99	Blue clay	10	276
Yellow Clay	3	102	Gravel and sand	11	287
Gravel	13	115	Yellow clay	8	295
Yellow Clay	2	117	Gravel	3	298
Gravel	31	148	Clay	18	316
Yellow clay	20	168	Gravel and clay	2	318
Gravel	28	196	Gravel	20	338
Yellow clay	4	200	Clay	4	342
Gravel	10	210			

San Jose waterworks well N, main station yard.

[1913.]

Soil	10	10	Yellow clay and gravel	6	402
Yellow clay	15	25	Yellow clay	6	408
Blue clay	39	64	Yellow clay and gravel	6	414
Gravel	4	68	Yellow clay	22	436
Yellow clay	2	70	Water gravel	6	442
Gravel	10	80	Yellow clay	18	460
Yellow clay	6	86	Cement gravel	16	476
Blue clay	10	96	Yellow clay	12	488
Cement gravel	10	106	Water gravel	12	500
Blue clay	34	140	Yellow clay and gravel	48	548
Yellow clay	30	170	Water gravel	2	550
Blue clay	10	180	Yellow clay	28	578
Yellow clay and gravel	5	185	Water gravel	27	605
Gravel	13	198	Yellow clay and gravel	9	614
Yellow clay	38	236	Cement gravel	8	622
Cement gravel	8	244	Yellow clay and gravel	22	644
Yellow clay	6	250	Water gravel	16	660
Cement gravel	16	266	Yellow clay	26	686
Yellow clay	14	280	Yellow clay and gravel	45	731
Blue clay	25	305	Yellow clay and yellow sand	2	733
Yellow clay	60	365	Yellow clay	15	748
Blue clay	15	380	Yellow clay and gravel	117	865
Yellow clay	16	396			

Logs of wells on the Niles cone and in the vicinity.

[Numbers in parentheses refer to numbers of wells on Pl. XI.]

Alameda Sugar Co's. well No. 1, near depot at Alvarado (2627).

[Diameter, 7 inches.]

	Thickness.	Depth.		Thickness.	Depth.
	Feet.	*Feet.*		*Feet.*	*Feet.*
Soil	7	7	Yellow clay, gritty	5	216
Sand	2	9	Yellow clay	4	212
Blue clay	18	27	Yellow clay, sandy	10	226
Yellow clay	5	32	Sand	8	234
Yellow clay grit	11	43	Gravel	3	237
Yellow clay	2	45	Yellow clay	11	248
Yellow clay, sandy	6	51	Yellow clay, sandy	9	257
Sand	10	61	Sand	2	259
Running sand and gravel	3	64	Blue clay	6	265
Gravel	6	70	Running sand	4	269
Yellow clay	8	78	Gravel	5	274
Blue clay	8	86	Yellow clay sand	2	276
Blue clay, sandy	6	92	Cement gravel	2	278
Yellow clay, sandy	17	109	Gravel	13	291
Sand	5	114	Yellow clay	2	293
Sand and gravel	1	115	Gravel	2	295
Blue sandy clay	10	125	Yellow clay	25	320
Blue clay	18	143	Yellow clay, sandy, and some lime rock	14	334
Blue clay, sandy	19	162	Sand, packed	2	336
Blue clay	23	185	Running sand	9	345
Blue clay, sandy	5	190	Gravel	2	347
Quicksand	2	192	Yellow clay, hard	59	406
Gravel	2	194	Gravel	10	416
Yellow clay	1	195			
Yellow clay, sandy	12	207			

Alameda Sugar Co.'s well on Fair ranch (2622 ?).

[Diameter, 14 inches.]

Soil	10	10	Yellow clay	14	182
Yellow clay	6	16	Blue clay	15	197
Sand	4	20	Blue clay, sandy	4	201
Blue clay	12	32	Blue clay	19	220
Yellow clay	16	48	Yellow clay	6	226
Sand	3	51	Sand	9	235
Gravel	12	63	Yellow clay	12	247
Yellow clay	34	97	Blue clay	8	255
Sand	18	115	Yellow clay and gravel	2	257
Gravel	5	120	Hill wash	3	260
Yellow clay, sandy	18	138	Gravel, fine	1	261
Blue clay	19	157	Hill wash	3½	264½
Gravel	3	160	Gravel	1½	266
Yellow clay	6	166	Bedrock.		
Gravel	2	168			

Well of Joseph D. Norris, a quarter of a mile south of Catholic Church, Centerville.

Soil	16	16	Yellow clay	5	53
Dry gravel	26	42	Water gravel	57	110
Yellow clay (water 44 feet from surface)	4	46	Yellow (clay?)	3	113
Blue clay	2	48	Blue (clay?)	3	116

Well of Willett & Burr, Decoto (2613).

Soil	2	2	Gravel	5	59
Hill wash	23	25	Yellow clay	4	63
Gravel	6	31	Gravel	8	71
Yellow clay	15	46	Yellow clay	23	94
Gravel	2	48	Gravel	8	102
Yellow clay (water 50 feet from surface)	6	54	Yellow clay	3	105

Logs of wells on the Niles cone and in the vicinity—Continued.

Union Water Co.'s well No. 1, Newark.

	Thickness.	Depth.		Thickness.	Depth.
	Feet.	*Feet.*		*Feet.*	*Feet.*
Soil	6	6	Blue clay	20	126
Blue sand	2	8	Blue clay and sand	24	150
Gravel	20	28	Blue sand	10	160
Blue clay	13	41	Sand and gravel	20	180
Gravel	34	75	Yellow clay	84	264
Yellow clay	7	82	Blue clay	6	270
Sediment	4	86	Yellow clay	10	280
Sand	5	91	Red cement	9	289
Sediment	15	106	Bedrock.		

Alameda Sugar Co.'s test well on northeastern part of Fair ranch.

[Diameter, 14 inches.]

Soil	10	10	Yellow clay	14	182
Yellow clay	6	16	Blue clay	15	197
Sand	4	20	Blue clay, sandy	4	201
Blue clay	12	32	Blue clay	19	220
Yellow clay	16	48	Yellow clay, sandy	6	226
Sand	3	51	Sand	9	235
Gravel	12	63	Yellow clay	12	247
Yellow clay	34	97	Blue clay	8	255
Sand	18	115	Yellow clay gravel	2	257
Gravel	5	120	Hill wash (clay and gravel mixed), very hard	3	260
Yellow clay, sandy	18	138	Fine gravel	1	261
Blue clay	19	157	Hill wash	3½	264½
Gravel	3	160	Gravel	1½	266
Yellow clay	6	166	Bedrock.		
Gravel	2	168			

NOTE.—The test of this well in May, 1911, showed its greatest flow to be 120 gallons a minute, which was reduced to 35 gallons a minute.

Alameda Sugar Co.'s Creek well, No. 10.

(Diameter 20 inches.)

Mud and sand	20	20	Yellow sandy clay	24	309
Blue clay	4	24	Blue clay	8	317
Yellow clay	9	33	Yellow sandy clay	3	320
Yellow sand	4	37	Gravel, water	6	326
Yellow clay	24	61	Hard yellow, somewhat jointed clay	44	370
Yellow muddy sand	9	70	Yellow clay	13	383
Blue muddy sand	10	80	Sand and clay	4	387
Blue coarse sand	2	82	Yellow clay	9	396
Blue sandy clay	3	85	Sand and clay	7	403
Yellow clay	6	91	Water gravel	12	415
Yellow sandy clay	3	94	Clay and gravel	2	417
Yellow sand	2	96	Water gravel and sand	2	419
Yellow clay	11	107	Clay and gravel	1	420
Yellow sandy clay	8	115	Cement and gravel	12	432
Yellow sand and sediment; fine gravel at 117-119 feet	5	120	Sand and gravel, water	5	437
Blue sandy clay	3	123	Clay and gravel	4	441
Blue clay	26	149	Gravel, water	3	444
Blue sand, running	11	160	Clay and cement gravel	4	448
Blue clay	10	170	Gravel and sand	6	454
Yellow clay	11	181	Gravel, water	2	456
Blue clay	2	183	Yellow clay and gravel	9	465
Blue sandy clay	11	194	Yellow sand and mud	9	474
Yellow clay	4	198	Gravel, water	7	481
Yellow sand and clay	6	204	Yellow clay	15	496
Gravel	14	218	Hard light-blue clay	10	506
Clay	3	221	Hard yellow clay	8	514
Yellow clay	39	260	Hard sand	8	522
Sand	2	262	Gravel, water	3	525
Yellow clay	13	275	Gravel, good water	1	526
Sand	2	277	Hard yellow clay	2	528
Blue clay	8	285			

Logs of wells in the vicinity of Oakland.

Union Water Co.'s Cherry Lane well, No. 2, San Leandro.

	Thickness.	Depth.		Thickness.	Depth.
	Feet.	*Feet.*		*Feet.*	*Feet.*
Soil	4	4	Yellow clay	5	298
Yellow clay	10	14	Blue clay	20	318
Sand	4	18	Yellow clay	16	334
Yellow sand clay	8	26	Blue clay	31	365
Dirty gravel	3	29	Blue sandy clay	14	379
Yellow clay	13	42	Yell w clay	13	39?
Sand	2	44	Yellow sand	2	394
Gravel	6	50	Blue clay	16	410
Yellow clay	6	56	Yellow clay	6	416
Dirty gravel	12	68	Blue clay	3	419
Yellow sand clay	12	80	Blue cement clay	2	421
Yellow clay	10	90	Blue clay	3	424
Blue clay	20	110	Yellow cement clay	3	427
Yellow clay	15	125	Yellow cement sand	5	432
Blue sand clay	6	131	Yellow cement clay	5	437
Blue clay	10	141	Sandstone	2	439
Blue sand clay	7	148	Yellow cement clay	2	441
Sand gravel	2	150	Cementy gravelly sand	6	447
Blue clay	15	165	Cement clay	11	458
Sand gravel	5	170	Yellow clay	16	474
Blue clay	25	195	Cement gravel	6	480
Yellow clay	5	200	Yellow cement clay	10	490
Blue clay	6	206	Yellow clay	4	494
Yellow sand clay	3	209	Yellow sand clay	3	497
Yellow clay	3	212	Yellow clay	15	512
Blue sand clay	18	230	Yellow cement clay	3	515
Yellow cement clay	3	233	Yellow clay	3	518
Yellow clay	7	240	Cementy gravelly clay	2	520
Yellow cement clay	4	244	Yellow clay	10	530
Yellow sand clay	6	250	Yellow cement clay	3	533
Sand	2	252	Yellow clay	8	541
Yellow clay	6	258	Yellow cement gravel	2	543
Sandstone	1	259	Cement clay	10	553
Yellow clay	3	262	Yellow clay	13	566
Sandy gravel	4	266	Cement gravel	7	573
Yellow clay	8	274	Yellow clay	10	583
Yellow sand clay	8	282	Cement gravel	3	586
Yellow clay	3	285	Yellow clay	1½	587½
Gravel	8	293			

Union Water Co.'s well No. 1, West Stonehurst tract, Elmhurst.

Adobe soil	6	6	Blue clay	22	126
Yellow clay	3	9	Cement	1	127
Blue and yellow clay	6	15	Yellow clay	9	136
Light-blue clay	5	20	Sand	2	138
Blue sand clay	3	23	Gravel and sand	8	146
Yellow cement	13	36	Yellow clay	4	150
Gravel, loose	3	39	Blue clay	15	165
Yellow cement	5	44	Yellow cement	5	170
Yellow sand clay	6	50	Gravel, dirty	3	173
Light-blue clay	10	60	Yellow sand clay	5	178
Yellow sand clay	4	64	Gravel, dirty	4	182
Gravel	1	65	Yellow sand clay	3	185
Blue clay	25	90	Gray clay	4	189
Gravel and sand	13	103	Gravel, good	17	206
Yellow clay	1	104			

NOTE.—Well tested at depths of 103, 146, and 206 feet. At 103 feet it yielded little or no water, at 146 feet it was pumped for 7 hours at 33 gallons a minute, at 206 feet it yielded 150 gallons a minute.

Well No. 2, on the West Stonehurst tract, is 214 feet deep and was tested, yielding 100 gallons a minute

Logs of wells in the vicinity of Oakland—Continued.

Union Water Co.'s well No. 7, Walker property, Elmhurst.

	Thickness.	Depth.		Thickness.	Depth.
	Feet.	*Feet.*		*Feet.*	*Feet.*
Soil	7	7	Yellow sand clay	8	180
Yellow clay	13	20	Hard cement	4	184
Gravel	8	28	Gravel	21	205
Yellow clay	4	32	Yellow clay	8	213
Sand	4	36	Sand clay	3	216
Blue clay	8	44	Clay	8	224
Yellow clay	11	55	Coarse sand	2	226
Blue clay, sandy	5	60	Yellow clay	2	228
Blue sand	1	61	Blue clay	4	232
Blue clay	9	70	Blue cement clay	15	247
Blue sand	3	73	Yellow clay	4	251
Blue clay, sandy	9	82	Coarse sand	3	254
Blue clay	17	99	Sand gravel	9	263
Yellow sand clay	3	102	Yellow clay	28	291
Yellow sand	5	107	Dirty gravel	4	295
Blue clay	7	114	Sand	3	298
Blue sand	4	118	Yellow clay	3	301
Blue clay	13	131	Dirty gravel	13	314
Yellow sand clay	13	144	Sand clay	2	316
Yellow sand	2	146	Dirty gravel	3	319
Yellow sand clay	5	151	Yellow clay	30	349
Yellow clay	9	160	Gravel	6	355
Hard sand	1	161	Coarse sand	2	357
Yellow cement clay	11	172	Yellow clay	3	360

NOTE.—The following tests were reported for wells on the Walker property:

Well No. 7 (see log above) was tested at depths of 205, 265, 320, and 360 feet. All tests are reported "no good" except the one at 360 feet, which is reported "good."

Well No. 12, which is 210 feet deep, was tested at 52 feet, and yielded 140 gallons a minute.

Well No. 16, which is 213 feet deep, was tested at 50 feet and yielded 140 gallons a minute.

Union Water Co.'s well No. 1, Dinneen property, Elmhurst.

Loam	5	5	Sand	5	152
Adobe	4	9	Coarse gravel	3	155
Blue clay	21	30	Yellow clay	13	168
Gravel	10	40	Sand	5	173
Yellow clay	7	47	Gravel	11	184
Blue clay	10	57	Yellow clay	24	208
Gravel	2	59	Gravel	22	230
Blue clay	16	75	Yellow clay	14	244
Brown clay	10	85	Gravel	3	247
Yellow clay	5	90	Yellow clay	12	259
Gravel	3	93	Gravel	3	262
Yellow clay	11	104	Yellow clay	12	274
Blue clay	10	114	Cement gravel	16	290
Yellow clay	2	116	Yellow clay	20	310
Coarse gravel	4	120	Yellow cement	10	320
Yellow clay	10	130	Gravel, coarse	7	327
Gravel, dirty	7	137	Gray clay	7	334
Yellow clay	10	147			

NOTE.—The following tests were reported for wells of the Union Water Co. on the Dinneen property, Elmhurst:

Well No. 1 (see log above) was tested at 50 gallons a minute when it had reached the depth of 230 feet, at 50 gallons a minute when it had reached 290 feet, and at 75 gallons a minute when it had reached 327 feet.

Well No. 3, which is 295 feet deep, was tested at 100 gallons a minute, and this rate of pumping lowered the water level in the well from 18 feet below the surface to 82 feet below.

Well No. 7, which is 163 feet deep, was tested at a depth of 85 feet at 100 gallons a minute.

Well No. 8, which is 127 feet deep, was tested at a depth of 36 feet, at 100 gallons a minute.

Well No. 11, which is 122 feet deep, was tested at a depth of 32 feet, at 150 gallons a minute.

Well No. 12, which is 181 feet deep, was tested at 32 feet, at 100 gallons a minute, and at 37 feet, at 150 gallons a minute.

Well No. 13, which is 164 feet deep, was tested at 100 gallons a minute, and this rate of pumping lowered the water level from 9 feet below the surface to 40 feet below.

Logs of wells in the vicinity of Oakland—Continued.

Union Water Co.'s well No. 2, Stonehurst.

	Thickness.	Depth.		Thickness.	Depth.
	Feet.	*Feet.*		*Feet.*	*Feet.*
Soil	4	4	Blue clay	3	147
Dry gravel	13	17	Cement gravel	5	152
Yellow clay	8	25	Sand	5	157
Cement gravel	5	30	Yellow sandy clay	7	164
Yellow clay	16	46	Sand	4	168
Sandy clay	16	62	Yellow clay	6	174
Cement gravel	4	66	Blue sandy clay	20	194
Gravel	9	75	Yellow clay	12	206
Blue sand clay	26	101	Yellow sand clay	5	211
Yellow sand clay	9	110	Yellow cement gravel	8	219
Sand	2	112	Yellow sand clay	3	222
Cement gravel	2	114	Yellow cement clay	10	232
Sandy clay	12	126	Yellow clay	6	238
Cement clay	4	130	Yellow cement clay	3	241
Gravel	5	135	Gravel	8	249
Blue cement clay	9	144	Yellow cement clay	2	251

Union Water Co.'s well No. 2, on the Fremont tract, High Street, East Oakland.

Soil	2	2	Gravel	15	157
Cement	25	27	Cement clay	1	158
Sandy gravel	2	29	Yellow clay	36	194
Cement	69	98	Sand, loose	21	215
Yellow clay	18	116	Yellow clay	31	246
Cement clay	16	132	Sand, hard	2	248
Gravel	4	136	Gravel	16	264
Sand	6	142	Yellow clay	2	266

NOTE.—This well was tested at 37 gallons a minute.

Western Pacific Railroad Co.'s well at foot of Adeline Street, Oakland.

Filling	2	2	Yellow sand clay	4	220
Sand	7	9	Yellow cement lime	6	226
Blue mud	50	59	Yellow sand clay	21	247
Peat	3	62	Hard yellow sand	4	251
Sand	12	74	Cement gravel, water	6	257
Blue clay	2	76	Hard gray sand	5	262
Sand	9	85	Yellow cement gravel	8	270
Sand and shells	2	87	Yellow sand clay	14	284
Blue clay	40	127	Hard red sand clay	2	286
Yellow sand clay	10	137	Yellow sand clay	7	293
Gray clay	8	145	Yellow cement gravel	1	294
White clay and lime	5	150	Yellow sand clay	7	301
Yellow sand clay	11	161	Gray clay	9	310
Blue clay	6	167	Gray cement	2	312
Yellow clay	9	176	Yellow sand clay	8	320
Yellow hard sand	3	179	Gray sand clay	4	324
Fine tight gravel, water	4	183	Yellow sand clay	9	333
Yellow clay	14	197	Yellow gravel, water	5	338
Gray sand clay	3	200	Yellow sand clay	4	342
Gray clay	14	214	Blue clay	9	351
Yellow cement gravel	2	216			

Well of Miss M. Kane, corner of Grand Street and Central Avenue, Alameda.

Sand	71	71	Clay and limestone	21	150
Blue clay	25	96	Cement, dry	4	154
Blue cement	1	97	Cement gravel	6	160
Blue clay	8	105	Yellow clay, with occasional strata of cement (no water)	140	300
Water sand	4	109	Blue clay (no water)	11	311
Blue clay	20	129			

NOTE.—Well reported "no good." Gravel stratum from 154 to 160 feet yields only about 150 gallons an hour. Water cemented off down to 112 feet.

Logs of wells in the vicinity of Oakland—Continued.

C. A. Smith Lumber Co.'s well No. 1A, Bay Point.

	Thickness.	Depth.		Thickness.	Depth.
	Feet.	*Feet.*		*Feet.*	*Feet.*
Soil	6	6	Gravel	5	93
Yellow sand clay	49	55	Yellow sand clay	2	95
Cement	4	59	Yellow clay	20	115
Yellow sand clay	29	88	Bottom is sandrock.		

Western Pipe & Steel Co.'s well, Richmond.

Adobe	10	10	Cement	2	67
Sandy clay	8	18	Yellow sticky clay	3	70
Coarse sand	3	21	Blue clay	11	81
Gray sandy clay	9	30	Gray cement clay	6	87
Yellow clay	7	37	Yellow cement clay	9	96
Blue clay	4	41	Yellow clay	13	109
Blue sandy clay	6	47	Gravel	3	112
Sand	5	52	Clay	1	113
Sandy clay	4	56	Gravel	4	117
Sand	3	59	Clay	2	119
Hard sandy gravel	6	65			

Walnut Creek Water Co.'s well No. 1, Walnut Creek.

Soil	10	10	Sediment	18	54
Sediment	6	16	Gravel	6	60
Sand	8	24	Blue sand clay	4½	64½
Brown clay	12	36			

NOTE.—This well is reported to have been tested in March, 1912, at 813 gallons a minute.

RECORDS OF STREAM DISCHARGE.

COYOTE CREEK[76] AT UPPER GORGE, NEAR MADRONE, 1902-1912.

LOCATION.—At highway bridge on Cochran road at upper gorge, Santa Clara County, about 3 miles east of Madrone, Calif.

RECORDS AVAILABLE.—October 1, 1902, to September 30, 1912.

DRAINAGE AREA.—193.2 square miles.[77]

GAGE.—Vertical staff on bridge pier with high-water sections on right bank. Datum of gage set from United States Geological Survey bench marks and not changed. Since 1907 an automatic gage at the same location and datum has been used during flood periods in addition to the staff gage.

CHANNEL.—Gravel and small boulders. Slight changes noticed at low stages after high water; otherwise fairly permanent.

DISCHARGE MEASUREMENTS.—Made from highway bridge, by wading; by weir, or, at extreme high water, by means of floats.

ACCURACY.—Results consided good by Duryea, Haehl & Gilman.

COOPERATION.—The data for this station have been funished by Duryea, Haehl & Gilman through the courtesy of H. L. Haehl.

[76] Formerly called Coyote River.

[77] Estimate furnished by Duryea, Haehl & Gilman, San Francisco, Calif.

Daily discharge, in second-feet, of Coyote Creek at upper gorge, near Madrone, 1903–1912.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1903.												
1					500		5,380	28	14	8.0		0.9
2							1,500					.8
3						22	925				4.4	.8
4					150		675	26	15			.8
5					140	75	500					.6
6						112	405			7.4	4.0	
7							340	25	13			
8					680	60	295					.9
9						60	270			7.1	3.7	.6
10					185		215	22	12			.5
11						40						
12					110		180			6.8	3.4	.5
13						37	167	21				
14						327	162					.7
15						145	148		11	6.4	3.0	.5
16					40	167		20				
17						213	142					
18								19		6.1	2.7	.4
19						120	125					.6
20					20	90	105					
21						76	95	18	10	5.8	2.4	.7
22							75					.9
23						65	50					
24						52	47	17		5.5	2.0	.5
25						125	40					.5
26												
27				8,000		115		14	8.8	5.1	1.7	
28					18	185	35					
29						1,250						.9
30						2,780	30	15				1.0
31						9,700				4.7	1.2	
1903-4.												
1			1.2	1.6		108	290	48	10		2.0	2.0
2	0.9	0.7	1.2		2.3	77	165					
3	.9	.7	1.2		2.4		150					
4		.8			3.5	45						
5	.8	.8	1.1		3.8		92	28				
6		1.0			3.0		80					
7		.9	1.2		3.4	30	75		7.0	3.0		
8	.5				3.4		70					
9	.7		1.2		3.0		60					
10	1.0	1.0	1.1		3.1	1,890					2.0	
11		.9	1.2	1.9	7.5	612	45					
12	.8	1.1			1,010	300		20				
13	.6	.8			220	142			7.0			
14	.5	1.8	1.2		102	120	38					
15	.4				63	90						
16		1.6	1.6		538		35					
17	.4		1.6	2.6	130	65			5.0			
18			1.4	3.3	60	112	25	18				
19	.4			2.8		930	230					
20						712	115				2.0	
21		1.9	1.4		25	620	80					
22	.4		1.1		25	270	58	13				
23	.4	1.4				1,350	45		6.0	2.0		4.0
24	.6	1.4			28	1,750						4.0
25		1.4			166	750	46					6.5
26	.5		1.4	1.9	90	390						8.5
27	.5	1.2			542							3.0
28		1.3	1.4	2.0	400	376						
29	.5	1.1		2.0	156	472			3.0			
30	.5	1.2		2.2		478	43					
31	.5			2.2		272						

Daily discharge, in second-feet, of Coyote Creek at upper gorge, near Madrone, 1903–1912—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1904–5.												
1	2.0	.....	2.0	.....	767	24	86	19	16	7.0	2.8	0.4
2	.....	.....	.....	.....	2,430	22	84	63	16	.....	2.8	.6
3	.....	.....	.....	.....	203	22	67	49	15	6.2	2.6	.....
4	.....	.....	.....	4.0	103	21	48	33	.....	.....	2.6	.6
5	.....	.....	.....	.....	192	.....	47	26	14	5.6	2.4	.9
6	.....	.....	.....	.....	185	19	44	23	14	5.2	.....	1.2
7	.....	.....	.....	4.0	101	18	41	1,250	11	4.5	2.3	1.0
8	.....	.....	.....	.....	63	18	39	363	13	4.2	1.9	.8
9	.....	.....	.....	9.6	66	18	.....	175	12	.....	2.3	.5
10	2.0	.....	.....	5.2	.....	17	33	85	12	4.0	2.5	.....
11	5.0	.....	.....	2.9	35	17	33	66	.....	4.4	2.3	.7
12	3.0	.....	.....	3.0	.....	26	30	58	11	4.1	2.4	.8
13	.....	3.0	1.5	3.0	21	416	29	49	11	4.4	.....	.8
14	.....	.....	.....	.....	19	380	29	42	11	4.0	2.4	.7
15	3.0	.....	.....	.....	19	235	.....	36	11	4.1	2.4	.5
16	.....	.....	.....	5.0	21	474	.....	31	8.4	.....	2.0	.5
17	.....	.....	.....	4.4	401	462	27	30	8.4	3.8	1.9	.....
18	.....	.....	.....	4.4	268	359	32	30	.....	3.8	1.1	.6
19	.....	.....	.....	5.0	100	2,330	41	26	10	3.8	1.3	.4
20	3.0	.....	.....	5.0	216	786	36	24	9.8	3.6	.....	.4
21	.....	.....	.....	7.0	134	415	31	.....	9.6	3.7	1.6	.4
22	.....	3.0	.....	9.1	.....	280	27	22	9.2	3.8	1.6	.4
23	.....	.....	.....	40	.....	211	.....	21	8.5	.....	1.7	.4
24	.....	.....	.....	26	39	105	23	19	8.0	3.4	1.6	.....
25	.....	.....	.....	21	30	102	23	19	.....	3.2	.9	.6
26	.....	.....	.....	21	.....	73	23	19	7.3	2.8	.7	.6
27	.....	5.0	4.0	18	28	72	22	19	7.0	3.2	.....	.5
28	.....	.....	.....	16	26	71	21	.....	7.0	2.9	.7	.6
29	.....	.....	.....	.....	.....	306	20	18	7.0	2.8	.5	.7
30	.....	.....	12	14	.....	178	.....	18	7.0	.....	.4	.6
31	.....	.....	16	16	.....	105	.....	17	.....	2.4	.4	.....
1905–6.												
1	.....	.4	1.9	.....	43	230	480	79	58	23	.....	5.0
2	.5	.3	1.5	1.8	38	175	805	91	53	22	.....	.....
3	.4	.3	.....	1.8	38	646	586	92	.....	22	10	.....
4	.5	.4	1.4	1.8	.....	662	475	91	71	.....	9.5	.....
5	.6	.....	1.4	1.8	32	354	367	89	60	21	.....	.....
6	.4	.2	1.4	1.3	32	268	302	79	60	19	.....	.....
7	.3	.1	1.2	1.3	30	217	258	79	54	18	.....	5.0
8	.....	.2	1.2	1.3	30	183	220	74	50	.....	8.0	5.1
9	.2	.2	1.1	1.4	30	164	188	66	50	17	8.7	.....
10	.3	.3	.....	1.4	30	134	187	69	.....	.....	7.0	4.6
11	.2	.4	1.0	1.4	.....	130	180	79	44	.....	7.5	.....
12	.2	.....	1.2	1,460	31	621	186	77	36	.....	.....	.....
13	.3	.7	.....	4,390	32	357	148	75	34	15	7.0	4.6
14	.3	.7	1.2	2,560	129	813	144	71	33	15	6.3	4.4
15	.....	.7	1.2	691	546	4,070	130	69	33	.....	.....	4.4
16	.4	.6	1.2	1,270	172	1,630	123	67	33	14	.....	.....
17	.4	.5	.....	1,410	107	738	118	64	.....	.....	.....	4.3
18	.5	.6	1.5	3,080	105	537	115	62	31	.....	.....	4.3
19	.6	.....	1.6	6,110	230	401	137	61	30	.....	.....	3.9
20	.6	.8	1.6	850	160	313	126	.....	28	.....	.....	3.9
21	.7	.8	2.5	400	802	277	120	57	28	14	.....	3.5
22	.....	.8	1.8	245	691	275	121	56	28	.....	.....	3.5
23	.7	.8	1.6	203	709	2,090	159	56	27	12	.....	.....
24	.7	1.6	.....	146	807	1,310	130	56	.....	.....	.....	5.6
25	.7	1.5	.....	97	911	941	110	74	25	.....	.....	4.5
26	.4	.....	1.6	87	497	1,110	108	78	25	.....	.....	4.5
27	.3	3.2	1.9	84	342	743	131	79	25	.....	6.3	4.0
28	.3	3.3	1.8	.....	276	573	135	88	25	11	5.7	4.0
29	.....	2.0	1.8	57	.....	425	102	83	25	.....	.....	4.2
30	.3	.....	1.8	49	.....	1,450	102	66	24	.....	5.7	3.1
31	.4	.....	.....	47	.....	3,340	.....	64	.....	11	5.1	.....

Daily discharge, in second-feet, of Coyote Creek at upper gorge, near Madrone, 1903–1912—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1906–7.												
1	2.9	5.1	6.5	515	393	165	537	98	37	19	.....	6.8
2	.....	4.9	.....	235	1.150	158	458	94	.....	18	.....	6.4
3	.....	5.1	7.3	190	1,030	.....	399	90	35	.....	.....	6.2
4	.....	24	7.3	175	715	241	361	.....	33	.....	12	6.0
5	.....	8.5	6.9	225	550	280	344	.....	32	16	.....	5.9
6	2.9	3.8	6.8	.....	440	342	315	90	32	14	.....	5.8
7	.....	6.8	6.5	279	392	290	290	86	31	.....	.....	5.7
8	2.5	6.6	7.5	1,130	334	270	275	82	.....	14	9.9	5.6
9	.....	6.6	.....	2,670	292	1,130	291	.....	.....	.....	.....	5.4
10	.....	6.6	80	1,830	252	1,700	236	66	30	14	.....	5.2
11	2.5	.....	5,400	1,710	220	1,760	227	71	.....	15	.....	5.0
12	2.9	6.8	1,120	820	202	1,310	215	.....	33	14	.....	4.8
13	3.0	6.6	555	814	167	863	198	60	47	14	.....	4.7
14	.....	6.8	225	1,490	162	655	194	60	41	.....	.....	4.6
15	3.0	6.5	138	1,210	159	488	205	.....	36	16	.....	4.5
16	3.0	6.5	.....	810	165	747	180	55	.....	15	.....	4.4
17	3.0	6.9	65	2,260	180	1,650	174	52	31	14	.....	4.4
18	3.0	.....	52	1,370	135	2,300	158	51	28	.....	.....	4.4
19	3.0	6.9	45	920	130	6,230	148	51	25	12	.....	4.4
20	3.0	6.0	39	892	.....	2,600	140	49	26	.....	.....	4.4
21	.....	6.2	40	823	160	1,740	134	48	27	.....	.....	4.4
22	2.5	6.2	35	850	288	1,440	140	48	26	12	.....	4.4
23	3.1	6.5	.....	840	332	4,220	125	48	.....	.....	6.2	4.4
24	3.2	6.2	35	1,370	265	4,550	124	47	24	.....	.....	4.4
25	3.2	.....	209	1,520	255	3,340	120	48	22	.....	.....	4.4
26	4.4	.....	1,340	910	218	1,920	118	.....	20	12	.....	4.3
27	4.5	6.5	1,040	755	196	1,320	113	42	21	.....	.....	4.2
28	.....	6.5	454	1,030	165	1,060	110	40	21	.....	.....	4.1
29	4.5	.....	250	713	.....	835	106	.....	20	.....	.....	4.1
30	4.9	6.5	220	565	.....	711	99	38	19	12	.....	4.1
31	5.0	.....	676	442	.....	600	.....	38	.....	12	6.8	.....
1907–8.												
1	4.1	4.4	46	230	150	470	40	18	12	6	2.3	1.9
2	4.1	4.5	51	102	374	360	38	17	12	6	2.5	1.8
3	4.1	4.5	55	84	988	286	38	16	12	6	2.3	1.9
4	4.1	4.5	60	104	448	212	38	16	12	6	2.9	1.9
5	4.1	4.5	64	67	298	162	38	16	12	6	2.8	1.9
6	4.1	4.5	74	46	213	360	36	16	12	5.5	2.6	1.8
7	4.1	4.5	110	37	194	310	37	15	11	5.5	2.6	1.9
8	4.2	4.5	146	35	146	204	34	15	11	5	2.5	1.8
9	4.2	4.5	182	40	463	197	32	15	11	5	2.4	1.8
10	4.2	4.5	218	32	308	167	31	15	11	5	2.3	1.7
11	4.2	4.5	255	30	214	137	30	14	10	5	2.2	1.6
12	4.2	4.5	226	30	185	126	28	14	10	5	2.4	1.7
13	4.2	4.6	198	30	142	114	26	14	9	4	2.3	1.7
14	4.2	4.6	170	152	94	108	26	18	9	4	2.4	1.8
15	4.2	4.6	142	414	68	110	26	18	9	4	2.3	1.9
16	4.3	4.6	114	138	80	99	26	16	9	4	2.3	2.1
17	4.3	4.6	86	82	76	91	26	14	9	3.5	2.0	2.2
18	4.3	4.6	58	48	75	75	24	14	9	3	2.2	2.2
19	4.3	4.6	30	63	74	70	24	13	9	2.5	2.1	2.0
20	4.3	4.6	33	56	86	71	22	12	8.5	2	2.2	2.0
21	4.3	4.6	27	64	80	69	21	13	8	2	2.2	2.0
22	4.3	4.6	26	68	78	58	22	12	8	2	2.2	2.0
23	4.3	9.2	23	40	74	51	21	12	8	2	2.2	2.1
24	4.3	14	23	209	70	46	20	12	8	2.4	2.2	2.2
25	4.3	18	23	1,610	68	48	20	12	8	2.4	2.2	2.0
26	4.3	23	20	564	62	50	20	12	8	2.4	2.2	2.0
27	4.3	28	24	343	48	48	19	12	7	2.4	2.2	1.9
28	4.4	32	30	338	49	46	18	12	6.5	2.3	2.4	1.9
29	4.4	37	50	212	203	45	18	12	6	2.3	2.3	1.7
30	4.4	41	98	207	.....	40	18	12	6	2.3	2.2	1.5
31	4.4	.....	1,590	155	.....	38	.....	12	.....	2.3	2.1	.....

Daily discharge, in second-feet, of Coyote Creek at upper gorge, near Madrone, 1903–1912—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1908–9.												
1	1.2	2.0	2.1	5.8	238	257	475	66	37	20	12	9.8
2	1.4	2.0	2.2	6.3	211	226	366	63	36	19	12	9.5
3	1.6	2.0	2.6	8.4	2,360	209	315	61	34	19	12	9.8
4	1.6	2.0	3.3	7.0	1,080	295	294	61	33	19	12	9.8
5	1.7	2.0	3.5	6.3	835	295	273	61	33	19	12	10
6	1.6	2.0	3.3	5.6	653	281	264	59	32	18	12	11
7	1.6	2.0	3.5	5.0	3,520	320	222	58	32	19	12	11
8	1.7	2.0	2.9	7.0	1,980	282	210	53	31	19	12	10
9	1.8	2.0	3.9	494	1,130	278	192	52	31	19	12	10
10	1.9	2.0	3.7	141	931	235	178	52	30	18	12	9.8
11	1.7	2.0	3.2	38	4,820	221	159	50	28	18	12	9.8
12	1.8	2.0	3.1	98	3,940	196	148	49	28	16	12	9.8
13	1.8	2.0	3.0	1,980	2,460	190	141	47	27	16	12	9.5
14	1.8	2.0	3.1	4,060	1,580	176	136	47	28	16	12	9.2
15	1.9	1.9	3.0	1,240	1,180	168	126	47	28	15	12	9.5
16	1.9	2.0	3.0	1,060	860	159	120	44	28	14	12	9.0
17	1.9	1.9	2.6	455	718	142	115	44	28	14	12	9.0
18	2.0	1.9	2.5	527	582	129	114	44	28	14	12	9.0
19	1.9	1.9	2.6	138	530	112	112	44	27	14	11	9.0
20	2.0	2.0	2.5	1,010	572	93	114	43	27	13	11	9.0
21	1.9	2.0	2.8	5,680	838	194	108	43	27	13	11	9.0
22	2.0	2.0	3.2	2,540	642	236	96	42	26	12	11	9.0
23	1.9	2.2	3.3	1,300	545	218	90	43	26	12	11	9.0
24	2.0	2.4	3.3	918	465	323	87	43	25	12	11	9.8
25	2.0	2.9	3.2	2,060	402	1,100	84	41	26	12	10	10
26	1.9	3.7	3.3	2,440	357	692	79	40	25	12	10	12
27	2.0	3.1	3.2	1,000	324	562	75	40	24	12	9	12
28	2.0	2.9	3.2	608	302	476	75	41	23	12	9	12
29	1.9	2.6	3.3	425	.....	1,200	75	40	22	12	9	11
30	1.9	2.4	3.3	397	.....	738	71	40	20	12	9	11
31	2.0	.....	3.4	315	.....	560	.....	38	.....	12	9	.....
1909–10.												
1	12	11	13	843	135	85	156	28	8.8	5.5	4	2.5
2	12	11	13	242	114	82	145	27	9.0	5.5	4	2.5
3	12	11	13	234	100	76	120	26	8.8	5.5	4	2.5
4	12	11	12	147	87	76	105	28	8.8	5.5	4	2.5
5	12	11	38	118	70	70	98	28	9.0	5	3.5	2.5
6	12	11	16	90	55	70	95	28	8.8	5	3.5	2.5
7	12	11	14	68	502	66	91	28	8.8	5	3.5	2.5
8	12	11	15	61	421	55	74	28	8.5	5	3.5	2.5
9	11	16	1,880	61	204	45	68	27	8.5	5	3	3.5
10	11	14	256	56	184	41	65	22	8.0	5	3.5	3
11	11	13	114	52	160	39	88	22	8.5	5	3.5	2.5
12	10	12	58	52	142	40	75	21	8.0	5	3.5	2.5
13	10	12	38	52	128	38	68	20	8.2	5	3.5	3
14	10	12	25	447	118	39	40	19	8.0	5	3.5	3
15	9.8	12	27	938	106	54	38	17	8.2	4.5	3.5	3.5
16	9.8	11	32	1,770	96	51	34	16	8.5	5	3.5	4
17	9.2	12	34	666	91	46	30	16	8.5	5	3.5	4
18	9.8	12	32	424	96	44	29	16	8.0	4.5	3.5	4
19	10	12	28	335	102	41	29	16	7.5	4.5	3.5	4
20	10	12	23	224	103	55	29	15	7.5	4	3.5	3.5
21	11	12	24	158	96	362	29	14	7.5	4	3.5	3.5
22	10	12	23	144	90	496	29	12	7.0	4	3.5	3.5
23	10	12	25	124	88	494	28	12	6.8	4	3.5	3.5
24	10	12	24	1,470	85	345	28	10	6.5	4	3	3.5
25	10	12	25	781	88	300	30	9.8	6.5	4	3	3
26	10	12	24	440	88	264	30	9.5	6.2	4	3	3
27	11	12	26	358	85	217	30	9.5	6.0	4	3	3
28	11	12	32	272	88	215	30	9.5	6.0	4	2.5	3
29	11	13	37	208	.....	213	28	9.0	6.0	4	2.5	3
30	11	13	41	190	.....	206	28	9.0	5.5	4	2.5	3.5
31	11	.....	951	159	.....	199	.....	8.8	.....	4	2.5	.....

Daily discharge, in second-feet, of Coyote Creek at upper gorge, near Madrone, 1903–1912—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1910–11.												
1	3	3	3.5	4.5	996	990	80	12	4.5	3	2	1.5
2	3	3	3.5	4.5	615	816	74	10	4.5	3	2	1.5
3	3	3	4	4.5	552	2,250	68	10	4.5	3	2	1.5
4	3	3	4	5	618	2,070	61	9.8	4.5	3	2	1.5
5	3	3.5	4	5	394	2,570	110	9.8	4.5	3	2	1.5
6	3	3.5	4	5	315	5,230	175	9.5	4.5	3	2	1.5
7	3	3.5	4	5	250	10,100	98	9.0	4.5	3	2	1.5
8	2.5	3.5	4	5	188	3,180	68	8.8	4.5	2.8	2	1.5
9	2.5	3.5	4	5	170	2,480	60	8.8	4.5	2.5	2	1.5
10	2.5	3.5	4.5	7	159	2,100	50	8.2	4.5	2.5	2	1.5
11	2.5	3.5	5	8.8	431	1,850	38	8.8	4.5	2.5	2	1.5
12	3.5	5.5	5	465	358	982	40	8.2	4	2.5	2	1.5
13	5	3.5	5	1,330	552	778	41	7.8	4	2.5	2	1.5
14	5	3.5	5	1,950	678	662	38	7.2	4	2.5	2	1.5
15	5	3.5	5	1,200	425	515	36	6.2	4	2.5	2	1.5
16	5	3.5	5	490	312	440	34	6.0	4	2.5	2	1.5
17	4.5	4	5	200	245	428	31	6.0	4	2.5	2	1.5
18	4.5	4	5	131	195	372	28	6.0	3.8	2.5	2	1.5
19	4.5	3.5	5	112	168	320	24	6.0	3.5	2.5	2	1.5
20	4	4	5	132	150	282	22	6.0	3.5	2.5	1.8	1.5
21	3.5	3.5	5	366	128	252	18	5.8	3.5	2.5	1.5	1.5
22	3	4	5	182	102	215	18	5.2	3.5	2.5	1.5	1.5
23	3	4	5	159	89	205	16	5.0	3.5	2	1.5	1.5
24	3	4	5	414	76	191	18	5.0	3.5	2	1.5	1.5
25	3	4	[illegible]	718	54	184	22	4.8	3	2	1.5	1.5
26	3	4	5	658	54	158	24	4.8	3	2	1.5	1.5
27	3	4	4.5	625	50	142	18	4.5	3	2	1.5	1.5
28	2.5	3.5	4.5	650	161	129	16	4.5	3	2	1.5	1.5
29	2.5	3.5	4.5	3,370	.....	115	16	4.5	3	2	1.5	1.5
30	2.5	3.5	4.5	2,000	.....	98	14	4.5	3	2	1.5	1.5
31	2.5	.....	4.5	1,600	.....	88	.....	4.5	.....	2	1.5	.....
1911–12.												
1	1.5	2.0	1.5	2.0	4.5	3.0	3.5	4.5	3.0	2.5	1.5	1.0
2	1.5	2	1.5	2.2	4	2.5	3.5	4.5	3	2.5	1.5	1.0
3	1.5	2	1.5	2	4	2.5	3.5	4.5	3	2.5	1.5	1.5
4	1.5	1.5	1.5	1.5	4	2.5	3.5	4.2	3	2.5	1.5	1.2
5	1.5	1.5	1.8	1.8	3.8	2.8	3.5	4	3	2.2	1.5	1.0
6	1.5	1.5	2	1.5	3.5	3.5	3.5	4	3	2	1.5	1.5
7	1.5	1.5	2	1.8	3.5	3.5	3.2	4	3	2	1.5	2.5
8	1.5	1.5	2	2	3.5	3.8	3.5	4	3	2	1.5	2.2
9	1.5	1.8	2	2	3.5	4.8	3.8	4	3	2	1.5	1.5
10	1.5	2	2	2	3	4.2	5.5	3.8	3	2	1.5	1.5
11	1.5	2	1.5	2.5	3	4.0	226	3.5	3	2	1.5	1.5
12	1.5	2	1.5	2.5	3	687	215	3.5	3	2	1.5	1.2
13	1.5	2	1.5	2.5	2.8	660	64	3.5	3	2	1.5	1.0
14	1.5	2	1.5	2.5	2.5	130	52	3.5	3	2	1.5	1.0
15	1.5	2	1.5	2.5	2.8	5.2	35	3.5	3	2	1.5	1.0
16	1.5	2	1.5	3	3	242	22	3.5	2.5	2	1.5	1.0
17	1.5	1.8	1.5	3	3	110	8.0	3.5	2.5	2	1.5	1.0
18	1.5	2	1.5	3	3	28	7.2	3.2	2.5	2	1.5	1.0
19	1.5	2	1.5	3	3	13	6.5	3	2.5	2	1.5	1.0
20	1.5	2	1.5	3	3	7.8	5.5	3.5	2.5	2	1.5	1.0
21	1.5	2	1.5	3	2.8	7	5	3.5	2.5	2	1.5	1.0
22	1.5	2	2	3	2.5	6.2	4.5	3	2.5	2	1.5	1.0
23	1.5	2	2	3	2.5	5.2	4	3	2.5	1.8	1.5	1.0
24	1.5	1.5	2	3	2.8	4.5	4	3	2.5	1.5	1.5	1.0
25	1.5	1.5	1.8	3	3	4	4	3	2.5	1.5	1.5	1.0
26	1.5	1.5	2	4	3	4	4	3.2	2.5	1.5	1.5	1.0
27	2	1.5	2	5.1	3	4	4	3	2.5	1.5	1.2	1.0
28	2	1.5	2.5	5.2	3	4	4	3.2	2.5	1.5	1.0	1.0
29	2	1.5	2	4.8	3	4	5	3	2.5	1.5	1.2	1.0
30	2	1.5	2	4.5	.....	4	5	3	2.5	1.5	1.0	1.0
31	1.8	.....	1.8	4.5	.....	4	.....	3	.....	1.5	1.0	.....

NOTE.—Estimates of daily discharge taken from records compiled by Duryea, Haehl & Gilman.

Monthly discharge of Coyote Creek at upper gorge for the years 1902–1912.

[Drainage area, 193.2 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
1902–3.						
October			0.75	0.0039	0.004	46
November			1.93	.010	.01	115
December			2.61	.014	.02	160
January			290	1.50	1.73	17,800
February			153	.793	.83	8,500
March			490	2.54	2.93	30,100
April			400	2.07	2.31	23,800
May			20.4	.106	.12	1,250
June			11.4	.059	.07	678
July			7.42	.038	.04	456
August			4.92	.026	.03	303
September			.66	.0034	.004	39
The year			115	.596	8.10	83,200
1903–4.						
October			.60	.0031	.004	37
November			1.20	.0062	.007	71
December			1.29	.0067	.008	79
January			2.12	.011	.01	130
February			105	.544	.59	6,040
March			384	1.99	2.29	23,600
April			67.8	.351	.39	4,030
May			17.7	.092	.11	1,090
June			6.16	.032	.04	367
July			2.47	.013	.02	152
August			.81	.0042	.005	50
September			2.78	.014	.02	165
The year			49.3	.255	3.49	35,800
1904–5.						
October			2.73	.014	.02	168
November			3.20	.017	.02	190
December			1.09	.0056	.006	67
January	42		9.77	.051	.06	601
February	1,510		165	.855	.89	9,160
March	3,000		252	1.31	1.51	15,500
April	86		35.5	.184	.21	2,110
May	353		48.0	.249	.29	2,950
June			10.8	.056	.06	643
July			4.18	.022	.03	257
August			1.82	.0094	.01	112
September			.61	.0032	.004	36
The year			44.6	.231	3.11	31,800
1905–6.						
October			.43	.0022	.003	26
November			.92	.0048	.005	55
December			1.49	.0077	.009	92
January	8,350	1.8	539	2.79	3.22	33,100
February	1,080	30	235	1.22	1.27	13,100
March	5,750	130	778	4.03	4.65	47,800
April	1,550	102	235	1.22	1.36	14,000
May	95	56	73.1	.379	.44	4,490
June	71	24	38.5	.199	.22	2,290
July			14.4	.075	.09	885
August			6.68	.035	.04	411
September			4.48	.023	.03	726
The year			161	.834	11.34	117,000

Monthly discharge of Coyote Creek at upper gorge for the years 1902–1912—Continued.

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
1906–7.						
October	.....	.....	3.18	0.016	0.02	196
November	25	4.9	6.92	.036	.04	412
December	8,210	6.5	372	1.93	2.22	22,900
January	2,850	175	932	4.83	5.57	57,300
February	1,810	130	326	1.69	1.76	18,100
March	8,200	158	1,380	7.15	8.24	84,800
April	560	98	217	1.12	1.25	12,900
May	98	37	61.9	.321	.37	3,810
June	47	19	29.5	.153	.17	1,760
July	19	12	13.2	.068	.08	812
August	.....	.....	8.32	.043	.05	512
September	.....	.....	4.97	.026	.03	296
The year	.....	.....	280	1.45	19.80	204,000
1907–8.						
October	4.4	4.1	4.3	.022	.03	264
November	41	4.4	14.4	.075	.08	857
December	1,970	20	120	.622	.72	7,380
January	2,150	30	195	1.01	1.16	12,000
February	1,280	47	234	1.21	1.30	13,500
March	690	38	156	.808	.93	9,590
April	40	18	27.4	.142	.16	1,630
May	22	12	14.7	.076	.09	904
June	12	6	8.82	.046	.05	525
July	6	2	4.7	.024	.03	289
August	3	2	2.33	.012	.01	143
September	2.2	1.5	1.90	.0098	.01	113
The year	2,150	1.5	65.3	.338	4.57	47,200
1908–9.						
October	2	1.2	1.82	.0094	.01	112
November	3.7	1.9	2.19	.011	.01	130
December	3.9	2.1	3.07	.016	.02	189
January	[a] 8,230	[a] 3.5	1,100	5.70	6.57	67,600
February	[a] 7,040	[a] 209	1,260	6.53	6.80	70,000
March	1,580	[a] 91	346	1.79	2.06	21,300
April	510	70	173	.896	1.00	10,300
May	68	[a] 39	48.9	.253	.29	3,010
June	38	21	28.6	.148	.17	1,700
July	20	12	15.6	.081	.09	959
August	12	9	11.2	.058	.07	689
September	12	9	9.9	.051	.06	589
The year	[a] 8,230	1.2	250	1.30	17.15	176,000
1909–10.						
October	12.5	9	10.7	.055	.06	658
November	17	10.5	12.0	.062	.07	714
December	3,000	12	105	.544	.63	646
January	2,120	52	355	1.84	2.12	21,800
February	680	52	129	.668	.70	7,160
March	680	38	139	.720	.83	8,550
April	156	25	59.7	.309	.34	3,550
May	28	8.5	17.6	.091	.10	1,080
June	9	5.5	7.7	.040	.04	458
July	5.5	4	4.6	.024	.03	283
August	4	2.5	3.3	.017	.02	203
September	4	2.5	3.1	.016	.02	184
The year	3,000	2.5	70.6	.366	4.96	45,300

[a] From automatic-gage record.

Monthly discharge of Coyote Creek at upper gorge for the years 1902–1912—Continued.

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
1910–11.						
October	5	2.5	3.4	0.018	0.02	209
November	4	3	3.6	.019	.02	214
December	5	3.5	4.6	.024	.03	283
January	4,400	4.5	524	2.72	3.14	32,200
February	1,160	50	292	1.51	1.57	16,200
March	25,000	90	1,190	6.17	7.11	73,200
April	190	13.5	45.1	.234	.26	2,680
May	12.5	4.5	7.0	.036	.04	430
June	4.5	3	3.9	.020	.02	232
July	3	2	2.5	.013	.02	154
August	2	1.5	1.8	.0093	.01	111
September	1.5	1.5	1.5	.0078	.009	89
The year	25,000	1.5	173	.896	12.25	126,000
1911–12.						
October	2	1.5	1.6	.0083	.01	98
November	2	1.5	1.8	.0093	.01	107
December	2.5	1.5	1.8	.0093	.01	111
January	5.5	1.5	2.9	.015	.02	178
February	4.5	2.5	3.2	.017	.02	184
March	1,210	2.5	59.4	.308	.36	3,650
April	283	3	23.4	.121	.14	1,390
May	4.5	3	3.6	.019	.02	221
June	3	2.5	2.8	.014	.02	167
July	2.5	1.5	1.9	.0098	.01	117
August	1.5	1.0	1.4	.0072	.008	86
September	2.5	1.9	1.2	.0062	.07	71
The year	1,210	1.0	8.75	.045	.70	6,380

NOTE.—Mean monthly discharge computed by Duryea, Haehl & Gilman. Maximum and minimum discharges given in the table taken from the compiled or original data and represent highest and lowest computed discharges. Other run-off values computed by engineers of the United States Geological Survey.

COYOTE CREEK AT UPPER GORGE, NEAR MADRONE, 1917-1920.

LOCATION.—In northwest corner of San Jose grant, above highway bridge at mouth of canyon, a quarter of a mile below mouth of Las Animas Creek, and 2¾ miles northeast of Madrone, Santa Clara County.

DRAINAGE AREA.—193.2 square miles (reported by Duryea, Haehl, & Gilman).

RECORDS AVAILABLE.—December 8, 1916, to September 30, 1920.

GAGE.—Inclined staff in three sections on left bank about 1,000 feet above highway bridge.

DISCHARGE MEASUREMENTS.—Made from highway bridge below gage, from cable 800 feet below gage, or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel, boulders, and solid rock; appears permanent. Banks high. One channel at all stages. Control is boulders and solid rock.

EXTREMES OF DISCHARGE.—1902–1912 and 1916–1920: Maximum discharge recorded probably March 7, 1911 (discharge 25,000 second-feet); no flow August 7 to September 30, 1920.

DIVERSIONS.—None.

REGULATIONS.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined throughout. Gage read usually to hundredths twice daily with additional readings during high water. Daily discharge ascertained by applying mean daily gage height to rating table, except at high stages when they were computed from hydrographs. Records good.

Daily discharge, in second-feet, of Coyote Creek at upper gorge, near Madrone, for the years ending Sept. 30, 1917–1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1916–17.												
1	.....	.....	.....	123	18	285	90	28	12	4.4	1.2	1.2
2	.....	.....	.....	389	18	238	90	28	12	4.4	2.0	1.2
3	.....	.....	.....	1,490	18	188	80	23	12	3.1	2.0	1.2
4	.....	.....	.....	270	18	171	70	23	12	3.1	2.0	1.2
5	.....	.....	.....	179	18	156	62	23	12	3.1	1.2	1.2
6	.....	.....	.....	129	17	149	43	23	12	3.1	1.2	1.2
7	.....	.....	.....	90	17	149	43	23	11	4.4	1.2	1.2
8	.....	.....	11	66	16	149	37	19	11	4.4	1.6	1.2
9	.....	.....	11	54	16	208	37	19	11	4.4	1.6	2.0
10	.....	.....	9.5	48	17	149	32	15	7.5	3.1	1.6	2.0
11	.....	.....	9.5	41	18	135	32	15	7.5	3.1	1.6	2.0
12	.....	.....	9	36	18	123	32	15	7.5	3.1	2.0	2.0
13	.....	.....	9	111	18	100	37	15	6	3.1	2.0	1.2
14	.....	.....	8.5	48	16	123	37	15	6	3.1	2.0	1.2
15	.....	.....	9	36	15	111	43	15	6	3.1	2.0	1.2
16	.....	.....	8.5	30	14	100	37	15	6	3.1	2.0	1.2
17	.....	.....	8	28	14	90	40	15	6	3.1	2.0	1.2
18	.....	.....	7	26	14	85	37	17	6	2.0	2.0	1.2
19	.....	.....	7	24	21	80	37	17	6	2.0	1.2	1.2
20	.....	.....	7	26	864	70	34	15	6	2.0	1.2	1.2
21	.....	.....	7	26	5,390	70	32	15	4.4	2.0	1.2	1.2
22	.....	.....	7	24	4,310	70	32	15	4.4	2.0	1.2	1.2
23	.....	.....	110	21	1,120	66	32	15	4.4	2.0	1.2	1.2
24	.....	.....	2,050	21	3,820	62	32	15	4.4	2.0	1.2	1.2
25	.....	.....	475	21	3,550	62	28	15	4.4	1.2	1.2	.6
26	.....	.....	123	21	1,150	62	28	15	4.4	1.2	2.0	.6
27	.....	.....	90	21	659	62	28	15	3.1	1.2	2.0	.6
28	.....	.....	111	18	473	62	23	15	3.1	1.2	2.0	.6
29	.....	.....	135	18	.....	58	28	15	3.1	1.2	2.0	.6
30	.....	.....	100	18	.....	62	28	15	3.1	1.2	1.2	.6
31	.....	.....	80	18	.....	54	.....	14	.....	1.2	1.2	.....
1917–18.												
1	0.4	0.4	.8	.8	1.6	21	21	5	2.5	1.2	.....	.....
2	.4	.4	.8	.8	1.6	18	18	6	2.5	1.2	.....	.....
3	.4	.4	.8	.8	1.6	14	18	3.7	2.5	.8	.....	.....
4	.4	.8	.8	.8	1.6	14	14	3.7	2.5	.8	.....	.....
5	.4	.8	1.6	.8	1.6	11	14	3.7	2.5	.8	.1	.....
6	.4	.8	1.6	.8	2.5	14	14	3.7	2.5	.8	.....	.....
7	.4	.8	1.6	.8	3.7	21	14	3.7	2.5	.8	.....	.....
8	.4	.8	1.6	.8	2.5	62	14	5	2.5	.8	.....	.....
9	.4	.8	.8	1.6	2.5	54	14	5	2.5	.4	.....	.....
10	.4	.8	.8	1.6	2.5	70	11	3.7	2.5	.6	.....	.....
11	.8	.4	1.6	2.5	2.5	62	11	3.7	2.5	.6	.....	.....
12	.8	.4	1.6	2.5	2.5	2,090	11	3.7	2.5	.4	.....	.....
13	.8	.8	1.6	2.5	2.5	530	11	3.7	2.5	.4	.....	.....
14	.4	.8	1.6	2.5	2.5	238	11	3.7	1.6	.2	.....	.....
15	.4	.8	1.6	2.5	2.5	149	11	3.7	1.6	.2	.....	.....
16	.4	.8	1.6	2.5	5	90	9	3.7	1.6	.2	.....	.....
17	.4	1.0	1.6	2.5	5	36	9	3.7	1.6	.1	.....	.....
18	.4	.8	1.6	2.5	3.7	36	9	3.7	1.6	.1	.....	.....
19	.4	.8	1.6	2.5	3.7	770	7	2.5	1.6	.1	.....	.....
20	.4	.8	1.6	2.5	3.7	238	7	2.5	1.6	.1	.....	.....
21	.2	.8	1.6	2.5	7	217	7	2.5	1.6	.....	.....	.....
22	.2	.8	1.6	2.5	48	123	7	2.5	1.6	.....	.....	.....
23	.2	.8	1.6	2.5	36	80	5	3.5	1.4	.....	.....	.....
24	.2	.8	1.6	2.5	41	41	5	2.5	1.4	.....	.....	.....
25	.2	.8	1.6	2.5	41	41	5	2.5	1.2	.....	.....	.....
26	.2	.8	1.6	2.5	36	36	5	3.1	1.2	.....	.....	.....
27	.2	.8	1.6	2.5	36	30	3.7	3.1	1.3	.....	.....	.....
28	.4	.8	1.6	2.5	26	26	3.7	2.5	1.2	.....	.....	.....
29	.4	.8	1.6	2.5	.....	21	3.7	2.5	1.2	.....	.....	.....
30	.4	.8	1.6	1.6	.....	21	5	2.5	1.2	.....	.....	.....
31	.4	.....	1.6	1.6	.....	21	.....	2.5	.....	.....	.....	.....

NOTE.—Discharge Dec. 8–14, 1916; estimated from discharge measurements. Gage not read Dec. 16, 1916; discharge interpolated.

Daily discharge, in second-feet, of Coyote Creek at upper gorge, near Madrone, for the years ending Sept. 30, 1917–1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	.....	.....	.....	7	9.5	217	54	18	12	7.5	2.6	0.8
2	.....	.....	.....	7	9	217	54	18	11	7.5	2.6	.8
3	.....	.....	8.5	7	9	261	54	18	11	7.5	2.4	.8
4	.....	.....	8	7	8.5	198	51	18	11	7.5	2.4	.8
5	.....	.....	7.5	7	7.5	179	48	18	11	7.5	2.3	.7
6	.....	.....	8.5	7	7.5	179	42	17	11	7.5	2.2	.7
7	.....	.....	9	7	7	261	40	17	11	7.5	2.0	.7
8	.....	.....	7.5	7	7	163	36	17	11	7	1.9	.7
9	.....	.....	198	7	420	135	33	17	11	7	1.9	.6
10	.....	.....	100	7	3,350	123	32	16	11	6	1.8	.6
11	.....	.....	29	7	3,460	123	30	16	11	5.5	1.8	.6
12	.....	.....	18	6.5	675	111	29	16	11	5	1.6	.6
13	.....	.....	14	6.5	455	386	29	16	11	4.8	1.4	.5
14	.....	.....	12	6	198	1,820	28	16	10	4.2	1.3	.5
15	.....	.....	11	5.5	238	920	27	15	10	4.0	1.2	.5
16	.....	.....	11	5.5	261	511	26	15	10	3.5	1.2	.5
17	.....	.....	10	5	238	403	25	14	10	3.4	1.2	.4
18	.....	.....	10	5	238	285	24	14	10	3.3	1.2	.3
19	.....	.....	9	5	228	217	24	14	10	3.2	1.2	.3
20	.....	.....	9	12	208	179	23	14	9.5	3.0	1.1	.3
21	.....	2.9	12	7.5	217	163	23	14	9.5	3.0	1.1	.3
22	.....	.....	10	14	217	135	22	13	9.5	3.0	1.1	.3
23	.....	.....	9	14	238	123	22	13	9	2.9	1.1	.3
24	.....	.....	8.5	12	261	111	21	13	9	2.8	1.0	.3
25	.....	.....	8.5	12	238	100	20	13	9	2.7	1.0	.3
26	.....	.....	7.5	11	632	90	20	13	8.5	2.6	1.0	.3
27	.....	.....	7.5	11	550	80	19	13	8.5	2.6	1.0	.3
28	.....	.....	7.5	11	340	70	19	12	8.5	2.6	.9	.3
29	.....	.....	7.5	11	.....	66	19	12	8	2.6	.9	.6
30	.....	.....	7	10	.....	62	19	12	8	2.7	.9	.5
31	.....	.....	7	10	.....	58	.....	12	.....	2.6	.9	.....
1919–20.												
1	0.8	.4	1.7	6.5	4.1	163	38	18	6.5	2.2	.1	.....
2	.9	.5	10	6.5	4.8	198	30	18	6	2.2	.1	.....
3	.4	.6	11	6.5	4.8	129	26	18	6	2.0	.1	.....
4	.4	.8	4.8	6.5	4.5	106	22	18	6	2.0	.1	.....
5	.3	1.0	3.4	6.5	4.5	41	21	16	5.5	1.7	.1	.....
6	.2	1.0	3.5	6.5	4.1	30	21	15	5.5	1.4	.1	.....
7	.2	1.0	3.5	6.5	4.1	21	19	14	5	1.4	.....	.....
8	.2	1.0	2.2	5.5	3.4	18	18	14	5	1.4	.....	.....
9	.2	1.0	2.2	5	3.4	18	41	14	4.8	1.2	.....	.....
10	.3	1.1	2.2	5	3.4	54	90	14	4.8	1.2	.....	.....
11	.3	1.1	123	4.8	3.4	33	54	14	4.8	1.0	.....	.....
12	.2	1.2	179	4.8	3.4	21	41	14	4.8	1.0	.....	.....
13	.2	1.2	36	4.8	3.4	19	30	14	4.8	1.0	.....	.....
14	.3	1.2	18	4.8	3.4	19	30	14	4.8	.8	.....	.....
15	.3	1.2	14	4.8	3.4	14	403	14	5	.8	.....	.....
16	.3	1.1	13	5	3.4	41	403	13	5	.8	.....	.....
17	.3	1.1	11	4.8	3.4	54	123	12	4.8	.5	.....	.....
18	.2	1.2	11	5	3.4	37	90	11	4.8	.3	.....	.....
19	.2	1.2	11	5	3.4	21	66	11	4.8	.3	.....	.....
20	.2	1.0	11	4.8	4.5	19	48	11	4.5	.3	.....	.....
21	.2	1.0	10	4.8	4.1	511	41	10	4.1	.3	.....	.....
22	.2	1.0	10	4.8	3.4	970	38	9	3.4	.3	.....	.....
23	.2	1.2	9	4.8	4.8	370	30	7.5	3.4	.3	.....	.....
24	1.2	1.0	9	4.8	4.1	135	26	6.5	2.9	.2	.....	.....
25	1.0	1.1	9	4.5	4.5	100	24	6.5	2.2	.2	.....	.....
26	.8	1.2	8.5	4.5	4.5	238	21	6.5	2.2	.2	.....	.....
27	.5	1.0	7.5	4.5	4.8	135	21	6.5	2.2	.2	.....	.....
28	.5	1.0	7	4.1	4.1	90	18	6.5	2.2	.1	.....	.....
29	.4	1.1	6.5	4.1	4.1	70	14	6.5	2.2	.1	.....	.....
30	.3	1.2	7	4.1	.....	62	18	6.5	2.2	.1	.....	.....
31	.3	.....	6.5	4.1	.....	44	.....	6.5	.....	.1	.....	.....

NOTE.—No record Nov. 7–14, 1919; discharge interpolated. No flow Aug. 7 to Sept. 30, 1920.

Monthly discharge of Coyote Creek at upper gorge, near Madrone, for the years ending Sept. 30, 1917–1920.

[Drainage area, 193 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total acre-feet.
1916–17.						
December 8–31	2,050	7	142	0.736	0.66	6,760
January	1,490	18	112	.580	.67	6,890
February	5,390	14	773	4.01	4.18	42,900
March	285	54	114	.591	.68	7,010
April	90	23	41.4	.215	.24	2,460
May	28	14	17.5	.091	.10	1,080
June	12	3.1	7.14	.037	.04	425
July	4.4	1.2	2.63	.014	.02	162
August	2.0	1.2	1.61	.0083	.01	99
September	2.0	.6	1.19	.0062	.007	71
The period						67,900
1917–18.						
October	.8	.2	.39			24.0
November	1.0	.4	.74			44.0
December	1.6	.8	1.45			89.2
January	2.5	.8	1.95			120
February	48	1.6	11.7			650
March	2,090	11	168			10,300
April	21	3.7	9.94			591
May	6	2.5	3.47			213
June	2.5	1.2	1.90			113
July	1.2	0.0	.38			23.4
August			.1			6.1
The period						12,200
1918–19.						
December 3–31	198	7	19.7			1,130
January	14	5	8.31			511
February	3,460	7	455			25,300
March	1,820	58	256			15,700
April	54	19	30.4			1,810
May	18	12	15.0			922
June	12	8	10.0			595
July	7.5	2.6	4.60			283
August	2.6	.9	1.49			92
September	.8	.3	.51			30
The period						46,400
1919–20.						
October	1.2	.2	.39			24.0
November	1.2	.4	1.02			60.7
December	179	1.7	18.1			1,110
January	6.5	4.1	5.12			315
February	4.8	3.4	3.95			227
March	970	14	122			7,500
April	403	14	62.2			3,700
May	18	6.5	11.8			726
June	6.5	2.2	4.34			258
July	2.2	0.1	.83			51.0
August	.1	0	0.2			1.2
September	0	0	0			0
The year	970	0	19.3			14,000

NOTE.—Mean discharge for August, 1918, estimated. No record Sept. 1 to Dec. 2, 1918.

COYOTE CREEK AT LOWER GORGE, NEAR COYOTE.

LOCATION.—Near north end of La Laguna Seca grant, a quarter of a mile above ford and 1,000 feet east of Coyote post office, Santa Clara County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 1, 1916, to September 30, 1920.

GAGE.—Vertical staff in two sections fastened to sycamore trees on left bank 1,000 feet east of post office at Coyote.

DISCHARGE MEASUREMENTS.—Made from cable 40 feet below gage or by wading.

CHANNEL AND CONTROL.—Gravel; shifts during high water. One channel at all stages; clean and straight for several hundred feet above and below gage.

EXTREMES OF DISCHARGE.—1916–1920: Maxium stage recorded, 15.2 feet at 5.30 p. m. February 21, 1917 (discharge, 9,900 second-feet); no flow during long periods of each year.

DIVERSIONS.—None. Some water is pumped from wells along the river above Coyote.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent. Several rating curves used during each year. Gage read to quarter-tenths twice daily with additional readings during high water. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair.

Daily discharge, in second-feet, of Coyote Creek at lower gorge, near Coyote, for the years ending Sept. 30, 1917–1920.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.
1916–17.							1916–17.						
1	.....	59	0.0	280	17	0.5	16	.....	2.9	0.9	69	6.5	.....
2	.....	97	.0	204	17	.4	17	.....	2.9	.9	69	6.5	.....
3	.....	1,410	.0	189	17	.2	18	.....	2.9	.0	52	3.5	.....
4	.....	359	.0	149	14	.2	19	.....	2.9	.0	52	3.5	.....
5	.....	125	.0	124	11	.2	20	.....	2.9	643	52	1.1	.....
6	.....	72	.0	111	11	.....	21	.....	4.0	5,090	52	3.5	.....
7	.....	38	.0	89	11	.....	22	.....	2.9	4,470	45	1.1	.....
8	.....	24	.9	79	6.5	.....	23	16	2.9	1,160	38	1.1	.....
9	.....	16	1.8	124	6.5	.....	24	1,320	2.9	2,220	38	1.1	.....
10	.....	7	1.8	124	6.5	.....	25	216	1.8	4,040	26	1.1	.....
11	.....	4.0	.0	100	3.5	.....	26	53	1.8	1,310	26	1.1	.....
12	.....	2.9	.9	89	3.5	.....	27	21	2.9	638	26	.5	.....
13	.....	7	1.8	79	6.5	.....	28	24	5.5	465	26	.5	.....
14	.....	7	.9	89	6.5	.....	29	59	2.9	.....	26	.5	.....
15	.....	2.9	.0	89	6.5	.....	30	30	1.8	.....	22	.4	.....
							31	17	1.8	.....	17	.....	.....

NOTE.—No flow Oct. 1 to Dec. 22 and May 6 to Sept. 30.

Day.	Mar.	Day.	Mar.	Day.	Mar.
1917–18.		1917–18.		1917–18.	
1	.....	11	.....	21	90
2	.....	12	809	22	36
3	.....	13	468	23	8
4	.....	14	100	24	1.2
5	.....	15	25	25	.....
6	.....	16	3.0	26	.....
7	.....	17	.0	27	.....
8	.....	18	.0	28	.....
9	.....	19	288	29	.....
10	.....	20	257	30	.....
				31	.....

NOTE.—No flow Oct. 1 to Mar. 11 and Mar. 25 to Sept. 30.

Daily discharge, in second-feet, of Coyote Creek at lower gorge, near Coyote, for the years ending Sept. 30, 1917–1920—Continued.

Day.	Feb.	Mar.	Apr.	Day.	Feb.	Mar.	Apr.	Day.	Feb.	Mar.	Apr.
1918–19.				1918–19.				1918–19.			
1		192	1.0	11	4,320	20		21	7.5	44	
2		118	.6	12	572	14		22	6	32	
3		191	.4	13	223	155		23	30	20	
4		110	.2	14	100	1,240		24	57	14	
5		86		15	57	830		25	37	12	
6		61		16	32	442		26	506	8	
7		223		17	30	271		27	594	6.5	
8		73		18	32	186		28	289	5.5	
9		61		19	24	95		29		3.6	
10	2,290	30		20	14	82		30		1.9	
								31		1.2	

NOTE.—No flow Oct. 1 to Feb. 9 and Apr. 5 to Sept. 30.

Day.	Dec.	Mar.	Day.	Dec.	Mar.	Day.	Dec.	Mar.
1919–20.			1919–20.			1919–20.		
2		177	23		380	28		30
3		42	24		100	29		10
4		10	25		30	30		2
12	10		26		67	31		.5
22		683	27		57			

NOTE.—Stream dry except where discharge is given. No record Apr. 16–19; discharge estimated from flow at Edenvale as 105 second-feet.

Monthly discharge of Coyote Creek at lower gorge, near Coyote, for the years ending Sept. 30, 1917–1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1916–17.				
October	0.0	0.0	0.0	0.0
November	.0	.0	.0	.0
December	1,320	.0	56.6	3,480
January	1,410	1.8	73.4	4,510
February	5,090	.0	716	39,800
March	280	17	82.4	5,070
April	17	.4	5.87	349
May	.5	.0	.048	3.0
June	.0	.0	.0	.0
July	.0	.0	.0	.0
August	.0	.0	.0	.0
September	.0	.0	.0	.0
The year	5,090	.0	73.5	53,200
1917–18.[a]				
March	809	0	67.3	4,140
1918–19.[b]				
February	4,320	0	329	18,300
March	1,240	1.2	149	9,160
April	1	0	.07	4.2
The year	4,320	0	37.9	27,500
1919–20.				
December	10	0	0.32	20
March	683	0	51.2	3,150
April		0	[c]14	833
The year		0	5.52	4,000

[a] No flow, 1917–18 except in March.
[b] No flow, 1918–19 except as records are given.
[c] Estimated.

COYOTE CREEK NEAR EDENVALE.

LOCATION.—At east boundary of Santa Teresa grant at "The Narrows," 1½ miles northeast of Edenvale, Santa Clara County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 1, 1916, to September 30, 1920.

GAGE.—Inclined staff in two sections fastened to solid rock on left bank at "The Narrows"; read by Mrs. J. H. Swickard.

DISCHARGE MEASUREMENTS.—Made from cable 1,000 feet above gage or by wading.

CHANNEL AND CONTROL.—Bed composed of fine gravel overlying solid rock; not permanent. Channel is clean and straight for several hundred feet above and below gage. Left bank, high; right bank, not likely to be overflowed.

EXTREMES OF DISCHARGE.—1916–1920: Maximum stage recorded, 12.2 feet at 6.10 p. m. February 21, 1917 (discharge, 8,590 second-feet); no flow during long periods of each year.

DIVERSIONS.—None. Water is pumped from wells along the river above station for irrigation.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent. Several rating curves used during each year. Gage read to quarter-tenths twice daily; additional readings during high water. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair.

Daily discharge, in second-feet, of Coyote Creek near Edenvale for the years ending Sept. 30, 1917–1920.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1916–17.							
1	.....	64	.....	338	28	5.5	2.0
2	.....	103	.....	247	23	4.9	1.7
3	.....	1,100	.....	182	23	4.3	1.7
4	.....	300	.....	147	23	4.3	1.8
5	.....	139	.....	124	23	4.3	1.8
		89					
6	.....	.....	.....	100	23	4.3	2.0
7	.....	52	.....	86	23	4.3	2.0
8	.....	25	.....	78	23	4.3	2.0
9	.....	11	.....	96	22	3.7	2.0
10	.....	3.4	.....	124	19	3.4	2.0
11	.....	.4	.....	100	13	2.9	2.0
12	.....	.....	.....	80	11	2.9	2.0
13	.....	.....	.....	65	11	2.3	2.0
14	.....	.....	.....	88	11	1.8	1.7
15	.....	.....	.....	84	11	1.6	1.6
16	.....	.....	.....	69	11	1.7	1.6
17	.....	.....	.....	65	11	2.0	1.2
18	.....	.....	.....	58	11	2.3	1.2
19	.....	.....	.....	56	11	2.9	1.2
20	.....	.....	378	51	9	2.9	1.2
21	.....	.....	3,890	47	8.5	2.9	1.0
22	.....	.....	4,570	46	7	2.9	.6
23	.....	.....	1,300	39	7	2.9	.6
24	902	.....	2,100	39	7	2.9	.4
25	208	.....	4,500	34	7	2.9	.4
26	49	.....	1,540	31	7	2.9	.4
27	13	.....	778	31	7	2.9	.4
28	1.7	.....	480	31	6.5	2.9	.2
29	49	.....	.....	31	5.5	2.9	.2
30	36	.....	.....	31	5.5	2.6	.....
31	18	.....	.....	31	.....	2.3	.....

NOTE.—Stream dry on days when discharge is not given.

Daily discharge, in second-feet, of Coyote Creek near Edenvale for the years ending Sept. 30, 1917–1920—Continued.

Day.	Mar.	Day.	Mar.	Day.	Mar.
1917–18		1917–18.		1917–18.	
1		11		21	60
2		12	363	22	12
3		13	405	23	1.3
4		14	74	24	
5		15	6.5	25	
6		16	.1	26	
7		17	.0	27	
8		18	.0	28	
9		19	159	29	
10		20	240	30	
				31	

Day.	Feb.	Mar.	Apr.	Day.	Feb.	Mar.	Apr.	Day.	Feb.	Mar.	Apr.
1918–19.				1918–19.				1918–19.			
1		204	1.5	11	3,790	20		21		84	
2		120	.2	12	730	15		22		60	
3		188		13	220	159		23		40	
4		122		14	92	1,270		24		28	
5		72		15	46	900		25	0.8	20	
6		46		16	13	492		26	170	16	
7		207		17	2.7	315		27	610	14	
8		111		18	1.5	224		28	291	12	
9		60		19	1.2	56		29		10	
10	1,470	32		20		124		30		6.5	
								31		3.3	

Day.	Mar.	Apr.	Day.	Mar.	Apr.	Day.	Mar.	Apr.
1919–20.			1919–20.			1919–20.		
2	100		19		0.1	26	42	
3	14		22	410		27	41	
16		192	23	338		28	9	
17		56	24	76		29	.2	
18		9	25	9				

Monthly discharge of Coyote Creek near Edenvale for the years ending Sept. 30, 1917–1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1916–17.				
December	902	0.0	41.2	2,530
January	1,100	.0	60.9	3,740
February	4,570	.0	698	38,800
March	338	31	84.8	5,210
April	28	5.5	13.6	809
May	5.5	1.6	3.15	194
June	2.0	.0	1.30	77
The year	4,570	.0	70.9	51,400
1917–18.				
March	405	0	42.6	2,620
1918–19.				
February	3,790	0	266	14,800
March	1,270	3.3	162	9,960
April	1.5	0	.06	3.6
The year	3,790	0		24,800
1919–20.				
March	410	0	33.5	2,060
April	192	0	8.57	510
The year	410	0	3.54	2,570

NOTE.—Stream dry during months for which discharge is not given.

COYOTE CREEK AT SAN JOSE.

LOCATION.—At Julian Street bridge in San Jose, Santa Clara County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 20, 1916, to September 30, 1917, when station was discontinued.

GAGE.—Chain gage fastened to downstream guard rail of Julian Street bridge. A temporary vertical staff fastened to a willow tree on left bank 60 feet below bridge was used December 20, 1916, to January 8, 1917; datum same as for chain gage. Gage read by S. F. Bullard.

DISCHARGE MEASUREMENTS.—Made from Julian Street bridge or by wading just above bridge.

CHANNEL AND CONTROL.—Gravel and clay; fairly permanent. Channel clean and practically straight for several hundred feet above and below gage. Banks steep and covered with brush; one channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage during year, determined from high-water marks, about 22.0 feet at 11 p. m. February 21 (discharge, 8,530 second-feet); stream dry June 21 to September 30.

DIVERSIONS.—None. Water for irrigation is pumped from wells along river above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined below 2,500 second-feet and fairly well defined to maximum stage. Gage read to half-tenths twice a day, with additional readings during high water. Daily discharge ascertained by applying mean daily gage height to rating table, except December 23–25; January 2–4; February 20–27; when they were computed from hydrograph. Records good.

Daily discharge, in second-feet, of Coyote Creek at San Jose for the year ending Sept. 30, 1917.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	.....	35	0.2	381	20	3.8	1.0
2	.....	78	.2	247	20	3.8	1.0
3	.....	1,330	.2	182	20	3.8	1.0
4	.....	389	.....	140	20	2.5	.5
5	.....	156	.....	98	19	2.5	.5
6	.....	91	.....	75	15	2.5	.5
7	.....	42	.....	75	12	2.5	.5
8	.....	30	.....	75	14	2.5	.5
9	.....	22	.....	77	14	2.5	.5
10	.....	17	.....	84	12	2.5	.5
11	.....	12	.....	111	11	2.2	.5
12	.....	12	.....	75	10	1.8	.5
13	.....	9.5	.....	70	9	1.8	.5
14	.....	9	.....	56	7.5	1.8	.5
15	.....	4.5	.....	86	10	1.8	.5
16	.....	2.5	.....	77	10	1.8	.5
17	.....	.8	.....	65	10	1.8	.5
18	.....	.8	.....	58	10	1.8	.5
19	.....	.6	.....	52	10	1.3	.5
20	1.0	.3	270	56	7.5	1.0	.5
21	2.2	.3	3,090	56	7.5	1.0	.....
22	2.5	.3	5,020	47	7.5	1.0	.....
23	8	.3	1,540	47	7.5	1.0	.....
24	986	.3	1,320	47	7.5	1.0	.....
25	346	.3	4,420	41	7.5	1.0	.....
26	60	.3	1,810	36	5	1.0	.....
27	20	.3	886	32	5	1.0	.....
28	1.8	.2	454	31	5	1.0	.....
29	32	.2	.....	29	5	1.0	.....
30	26	.2	.....	26	5	1.0	.....
31	20	.2	.....	23	.....	1.0	.....

NOTE.—No flow Feb. 4–19 and June 21 to Sept. 30, 1917.

Monthly discharge of Coyote Creek at San Jose for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
December 20-31	986	1.0	125	2,980
January	1,330	.2	72.4	4,450
February	5,020	.0	672	37,300
March	381	23	82.4	5,070
April	20	5	10.8	643
May	3.8	1.0	1.84	113
June	1.0	.0	.383	23
July	.0	.0	.00	0
August	.0	.0	.00	0
September	.0	.0	.00	0
The period				50,600

LAGUNA SECA NEAR COYOTE.

LOCATION.—In La Laguna Seca grant, at highway bridge on Bailey Avenue, 1¼ miles south of Coyote, Santa Clara County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 17 to June 30, 1918, when station was discontinued.

GAGE.—Vertical staff in two sections, fastened to downstream side of bridge near right bank. Gage read by E. W. Pruett.

DISCHARGE MEASUREMENTS.—Made by wading or from cable 100 feet below gage.

CHANNEL AND CONTROL.—Drainage canal in clay and hardpan. Banks clean and high. Channel straight below bridge for one-fourth of a mile and curved above bridge. Control affected by growth of weeds.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.48 feet April 12 and 14 (discharge, 1.3 second-feet); no flow after June 27.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed June 17 when a small dam was built across the creek below the gage. Rating curve before change well defined; after change not defined. Gage read to hundredths about every other day. Daily discharge found by applying gage height to rating curve and interpolating discharge for days on which gage height was not read, except June 17 to 27, when discharge was interpolated. Records good.

Daily discharge, in second-feet, of Laguna Seca near Coyote for the year ending Sept. 30, 1918.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	.....	0.07	0.07	1.0	1.2	0.9	16	.....	0.07	0.14	1.3	1.1	0.3
2	.....	.07	.07	1.1	1.2	.8	17	0.01	.08	.14	1.3	1.0	.3
3	.....	.07	.07	1.2	1.2	.8	18	.02	.07	.20	1.3	1.0	.3
4	.....	.07	.07	1.2	1.2	.8	19	.02	.09	.3	1.2	1.0	.2
5	.....	.07	.07	1.2	1.2	.8	20	.03	.08	.3	1.2	1.0	.2
6	.....	.08	.08	1.3	1.1	.8	21	.03	.08	.3	1.2	1.0	.2
7	.....	.08	.08	1.3	1.1	.7	22	.03	.08	.4	1.2	1.0	.1
8	.....	.08	.08	1.3	1.1	.6	23	.03	.14	.5	1.2	1.0	.1
9	.....	.07	.08	1.3	1.1	.6	24	.03	.08	.5	1.2	1.0	.1
10	.....	.07	.14	1.3	1.1	.6	25	.05	.07	.6	1.2	1.0	.06
11	.....	.07	.11	1.3	1.1	.5	26	.07	.07	.7	1.2	1.0	.03
12	.....	.06	.20	1.3	1.1	.4	27	.06	.07	.8	1.2	1.0	.0
13	.....	.06	.14	1.3	1.1	.4	28	.06	.07	.8	1.2	1.0	.0
14	.....	.06	.14	1.3	1.1	.4	29	.06	.....	.9	1.2	1.0	.0
15	.....	.06	.13	1.3	1.1	.3	30	.07	.....	1.0	1.2	.9	.0
							31	.07	.....	1.0	.....	.9	.....

Monthly discharge of Laguna Seca near Coyote for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in ac e-feet.
	Maximum.	Minimum.	Mean.	
January 17-31	0.07	0.01	0.046	1.3
February	.14	.06	.075	4.2
March	1.0	.07	.326	20.0
April	1.3	1.0	1.23	73.2
May	1.2	.9	1.06	65.2
June	.9	.0	.376	22.4
The period				186

SPRING VALLEY WATER CO.'S AQUEDUCT NEAR SUNOLGLEN.

LOCATION.—In sec. 12, T. 4 S., R. 1 W., at Brightside weir, 2½ miles west of Sunolglen.

RECORDS AVAILABLE.—April 6, 1903, to September 30, 1919.

GAGE.—Spring Valley water-stage recorder in pool above the weir.

DISCHARGE.—Computed from gage-height record showing head on four rectangular weirs; weir plates are made of bronze and have a 30-inch crest.

ACCURACY.—The weirs were very carefully installed and much care is exercised in their maintenance. There is no velocity of approach. When no record is obtained at the Brightside weir discharge is computed from record of operation of the Belmont pumps.

COOPERATION.—Records furnished in million gallons per day by the Spring Valley Water Co., through F. C. Herrmann, chief engineer, and G. A. Elliot, engineer; converted into second-feet and monthly discharge computed by engineers of United States Geological Survey.

SOURCE OF WATER.—The water flowing over this weir is ground water that has been pumped by the Spring Valley Water Co. and is on its way to San Francisco.

Monthly discharge of Spring Valley Water Co.'s aqueduct near Sunolglen for the years ending Sept. 30, 1903–1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1903.				
April 6–30	27	23	25.5	1,260
May	26	22	24.7	1,520
June	28	25	26.0	1,550
July	27	25	26.7	1,640
August	24	19.8	22.2	1,360
September	19.8	17.1	18.4	1,090
The period				8,420
1903–4.				
October	17.5	15.8	16.6	1,020
November	27	14.4	19.8	1,180
December	26	25	25.2	1,550
January	26	24	25.2	1,550
February	26	19.8	24.1	1,390
March	27	23	25.2	1,550
April	26	24	25.0	1,490
May	27	24	25.6	1,570
June	27	25	25.9	1,540
July	27	25	26.1	1,600
August	27	19.8	23.4	1,440
September	19.4	17.5	18.3	1,090
The year	27	14.4	23.4	17,000
1904–5.				
October	19.4	17.5	18.2	1,120
November	19.8	19.1	19.4	1.150
December	23	19.8	20.3	1,250
January	26	16.7	24.1	1,480
February	26	19.8	24.0	1,330
March	26	22	24.4	1,500
April	27	23	25.1	1,490
May	27	24	25.5	1,570
June	27	25	26.2	1,560
July	27	17.1	25.6	1,570
August	27	18.7	22.6	1,390
September	18.1	14.9	16.5	982
The year	27	14.9	22.7	16,400
1905–6.				
October	14.9	13.8	14.1	867
November	14.6	13.6	13.8	821
December	14.8	13.8	14.2	873
January	23	11.5	18.0	1,110
February	27	22	25.1	1,390
March	27	19.8	25.0	1,540
April	27	1.9	17.9	1,070
May	20	5.4	10.5	646
June	24	19.9	20.8	1,240
July	24	22	23.0	1,410
August	27	23	24.8	1,520
September	27	24	25.0	1,490
The year	27	1.9	19.3	14,000
1906–7.				
October	26	22	23.1	1,420
November	24	21	22.1	1,320
December	27	14.5	21.8	1,340
January	26	18.4	23.4	1,440
February	27	23	25.7	1,430
March	27	.9	18.8	1,160
April	28	26	26.3	1,560
May	28	26	27.1	1,670
June	28	26	27.0	1,610
July	29	22	26.7	1,640
August	29	26	27.2	1,670
September	27	25	26.5	1,580
The year	29	.9	24.6	17,800

Monthly discharge of Spring Valley Water Co.'s aqueduct near Sunolglen for the years ending Sept. 30, 1908–1919—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1907–8.				
October	27	17.6	25.6	1,570
November	27	24	25.6	1,520
December	26	16.8	23.8	1,460
January	26	21	22.8	1,400
February	26	22	25.1	1,440
March	28	23	26.0	1,600
April	27	26	26.1	1,550
May	28	25	26.2	1,610
June	28	24	26.9	1,600
July	28	22	25.9	1,590
August	22	18.3	19.5	1,200
September	19.8	16.0	17.8	1,060
The year	28	16.0	24.3	17,600
1908–9.				
October	16.8	14.4	15.2	935
November	26	9.3	15.2	904
December	20	5.3	15.7	965
January	24	7.5	16.6	1,020
February	9.0	7.3	7.99	444
March	27	7.7	19.8	1,220
April	29	11.1	24.6	1,460
May	27	26	26.6	1,640
June	27	21	25.5	1,520
July	27	21	24.3	1,490
August	27	21	25.3	1,560
September	27	23	24.8	1,480
The year	29	5.3	20.2	14,600
1909–10.				
October	28	22	25.0	1,540
November	25	22	23.2	1,380
December	28	12.6	23.7	1,460
January	33	24	29.7	1,830
February	30	24	27.9	1,550
March	30	25	27.7	1,700
April	31	24	27.9	1,660
May	27	23	25.9	1,590
June	26	24	24.8	1,480
July	24	20	22.3	1,370
August	27	.....	[a] 24.7	1,520
September	.....	.....	[a] 20.7	1,230
The year	33	.....	25.3	18,300
1910–11.				
October	.....	.....	[a] 11.1	682
November	.....	.....	[a] 16.0	952
December	.....	.....	[a] 21.3	1,310
January	29	18.0	24.3	1,490
February	27	4.6	19.4	1,080
March	29	4.6	21.6	1,330
April	28	12.7	25.0	1,490
May	30	26	27.0	1,660
June	28	26	26.7	1,590
July	31	6.8	24.8	1,520
August	28	24	26.4	1,620
September	[b] 33	21	23.6	1,400
The year	[b] 33	.....	22.3	16,100
1911–12.				
October	.....	.....	[a] 25.8	1,590
November	27	25	25.4	1,510
December	29	25	26.3	1,620
January	28	21	25.7	1,580
February	29	24	25.8	1,180
March	31	23	26.2	1,610
April	27	25	26.0	1,500
May	27	26	26.1	1,650
June	28	25	26.9	1,600
July	26	12.6	21.4	1,320
August	20	16.7	18.2	1,120
September	17.6	13.5	16.2	964
The year	.....	12.6	24.2	16,200

[a] Estimated by the company from Belmont pump records. [b] See footnote to daily discharge table.

Monthly discharge of Spring Valley Water Co.'s aqueduct near Sunolglen for the years ending Sept. 30, 1903–1919—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1912–13.				
October	18.2	14.6	15.4	947
November	16.8	2.1	13.0	774
December	17.6	14.8	16.1	990
January	31	10.4	21.1	1,300
February	27	24	26.1	1,450
March	37	25	27.0	1,660
April	36	26	32.8	1,950
May	31	25	27.6	1,700
June	25	19.2	22.6	1,340
July	21	12.6	18.2	1,120
August	20	3.9	13.2	812
September	21	12.3	16.8	1,000
The year	37	2.1	20.8	15,000
1913–14.				
October	16.9	10.5	15.3	941
November	21	12.0	16.3	970
December	29	10.2	19.2	1,180
January	37	26	33.0	2,030
February	37	34	35.4	1,970
March	47	26	35.5	2,180
April	39	12.9	35.6	2,120
May	37	7.2	32.4	1,990
June	37	34	35.4	2,110
July	36	29	32.3	1,990
August	33	27	30.6	1,880
September	28	21	25.6	1,520
The year	47	7.2	28.9	20,900
1914–15.				
October	26	21	24.3	1,490
November	24	16.2	20.1	1,200
December	35	13.6	30.4	1,870
January	37	31	34.8	2,140
February	37	34	35.3	1,960
March	37	32	35.4	2,180
April	40	34	36.1	2,150
May	40	34	36.8	2,260
June	41	32	37.3	2,220
July	37	33	34.8	2,140
August	35	26	32.0	1,970
September	34	30	32.1	1,910
The year	41	13.6	32.4	23,500
1915–16.				
October	31	27	29.4	1,810
November	30	18.1	27.5	1,640
December	35	28	32.3	1,990
January	34	25	32.6	2,000
February	34	33	33.0	1,900
March	34	32	33.3	2,050
April	34	6.1	31.2	1,860
May	34	26	29.7	1,830
June	26	26	26.0	1,550
July	35	25	29.9	1,840
August	34	31	33.8	2,080
September	35	32	33.5	1,990
The year	35	6.1	31.0	22,500
1916–17.				
October	34	3.8	24.7	1,520
November	35	32	33.8	2,010
December	35	16.1	32.0	1,970
January	35	31	32.9	2,020
February	35	29	32.7	1,820
March	36	21	33.2	2,040
April	36	33	34.1	2,030
May	35	32	33.7	2,070
June	34	26	31.6	1,880
July	34	26	27.9	1,720
August	35	25	33.1	2,040
September	35	31	31.9	1,900
The year	36	3.8	31.8	23,000

Monthly discharge of Spring Valley Water Co.'s aqueduct near Sunolglen for the year ending Sept. 30, 1903-1919—Continued.

Month.	Discharge in second-feet.			Run-off in acre feet.
	Maximum.	Minimum.	Mean.	
1917-18.				
October	36	33	34.1	2,100
November	34	26	29.6	1,760
December	26	23	24.6	1,510
January	23	12.6	22.4	1,380
February	35	15.6	27.1	1,510
March	34	31	32.4	1,990
April	34	31	32.3	1,920
May	34	26	31.6	1,940
June	29	19.0	25.5	1,520
July	35	22	29.4	1,810
August	34	25	32.5	2,000
September	34	23	29.1	1,730
The year	36	12.6	29.2	21,200
1918-19.				
October	34	26	31.2	1,920
November	28	11.3	24.0	1,430
December	33	20	31.3	1,920
January	32	28	31.5	1,940
February	33	29	31.8	1,770
March	33	32	33.0	2,030
April	35	32	33.0	1,960
May	34	27	32.7	2,010
June	33	32	32.6	1,940
July	33	32	33.0	2,030
August	34	33	33.1	2,040
September	34	30	32.9	1,960
The year	35	11.3	31.7	23,000

NOTE.—Monthly and yearly values computed by engineers of the U. S. Geological Survey.

ALAMEDA CREEK AT SUNOLGLEN.

LOCATION.—In SE. ¼ sec. 7, T. 4 S., R. 1 E., at Sunol dam, about 1 mile below junction with Arroyo de la Laguna and 1 mile west of Sunolglen.

DRAINAGE AREA.—620 square miles (measured by Spring Valley Water Co.).

RECORDS AVAILABLE.—October 4, 1900, to September 30, 1919.

GAGE.—Gurley electric water-stage recorder on upstream face of dam on left bank; prior to 1914 a staff gage on upstream side of dam on right bank.

DISCHARGE MEASUREMENTS.—Made from suspension footbridge about 400 feet above dam. Heavy weights and stayline were used to insure correct position of current meter in high-water measurements.

CHANNEL AND CONTROL.—Concrete dam acts as a control for the station. Channel above and below dam composed of gravel and boulders; shifts during high water.

DIVERSIONS.—See Spring Valley Water Co.'s aqueduct near Sunolglen (p. 116).

ACCURACY.—Dam has been rated in accordance with cooperative agreement between the Spring Valley Water Co. and the city of San Francisco. Current-meter measurements were obtained by both parties between December, 1913, and February, 1914, and a rating curve developed, dated March 23, 1914, which was approved by F. C. Herrmann, consulting engineer for the Spring Valley Co., and M. J. Bartell, hydraulic engineer, city engineer's office. This rating curve was used for the entire period for which record is published.

COOPERATION.—Records furnished in million gallons per day by the Spring Valley Water Co. through F. C. Herrmann, chief engineer, and G. A. Elliott, engineer; daily discharge converted into second-feet and monthly discharge computed by engineers of United States Geological Survey.

Monthly discharge of Alameda Creek at Sunolglen for the years ending Sept. 30, 1901–1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1900–1901.				
October 4–31	17	9.4	10.9	605
November	8,260	11	391	23,300
December	17[illegible]	15	52.1	3,200
January	1,13[illegible]	3[illegible]	282	17,300
February	3,840	70	[illegible]93	55,100
March	378	79	1[illegible]1	9,900
April	180	3[illegible]	66.0	3,930
May	229	34	57.8	3,550
June	30	20	23.1	1,370
July	18	2.0	9.31	572
August	7.6	.0	2.7	158
September	.0	.0	.0	0
The period	8,2[illegible]0	.0	164	119,000
190[illegible]–2.				
October	.0	.0	.0	0
November	1.7	.0	.52	31
December	125	1.7	17.4	1,070
January	16	6.5	7.11	437
February	2,760	6.5	[illegible]21	2[illegible],900
March	4,[illegible]30	125	685	42,100
April	299	56	127	7,560
May	56	27	39.3	2,420
June	27	4.6	14.7	[illegible]75
July	7.8	4.6	5.0[illegible]	309
August	7.[illegible]	.0	2.2[illegible]	141
September	.0	.0	.00	0
The year	4,13[illegible]	.0	116	83,800
1902–3.				
October	.0	.0	.0	0
November	100	.0	5.42	323
December	2.6	.07	.730	45
January	3,490	1.5	267	16,400
February	1,880	41	329	18,300
March	6,680	41	677	41,600
April	5,270	77	519	30,900
May	77	16	38.9	2,390
June	16	.07	3.36	200
July	7.0	.0	.958	59
August	.0	.0	.0	0
September	.0	.0	.0	0
The year	6,680	.0	152	110,000
1903–4.				
October	.0	.0	.0	0
November	180	.0	23.8	1,420
December	.6	.0	.32	20
January	27	1.0	5.83	358
February	1,670	2.0	420	24,200
March	2,340	126	812	49,900
April	752	100	273	16,200
May	208	41	90.1	5,540
June	41	.6	9.00	536
July	2.6	.8	1.22	75
August	.8	.0	.229	14
September	.2	.0	.031	2
The year	2,340	.0	135	98,300
1904–5.				
October	.2	.0	.01	1
November	.2	.0	.02	1
December	.6	.0	.103	6
January	152	2.6	52.8	3,250
February	572	38	166	9,220
March	1,880	16	350	21,500
April	332	41	102	6,070
May	365	27	79.5	4,890
June	27	.4	7.88	469
July	.4	.03	.106	7
August	.07	.0	.039	2
September	.0	.0	.0	0
The year	1,880	.0	62.8	45,400

Monthly discharge of Alameda Creek at Sunolglen for the years ending Sept. 30, 1901–1919—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1905–6.				
October	0.03	0.0	0.003	0.2
November	.07	.0	.016	1
December	.6	.03	.099	6
January	7,030	.07	898	55,200
February	2,000	41	397	22,000
March	6,650	226	1,400	86,100
April	3,120	182	462	27,500
May	214	76	130	7,990
June	100	33	57.7	3,430
July	27	.7	9.18	564
August	2.6	.3	1.63	100
September	1.2	.5	.87	52
The year	7,030	.0	281	203,000
1906–7.				
October	.3	.0	.03	2
November	.9	.0	.03	2
December	2,370	.5	321	19,700
January	3,880	214	1,140	70,100
February	2,570	180	518	28,800
March	10,900	202	2,780	171,000
April	957	169	381	22,700
May	180	50	106	6,520
June	56	23	41.0	2,440
July	44	23	29.3	1,800
August	180	2.6	11.5	707
September	2.6	.8	1.86	111
The year	16,900	.0	447	324,000
1907–8.				
October	6.1	.9	2.07	127
November	12	2.0	7.46	444
December	818	6.1	74.2	4,560
January	883	33	229	14,100
February	1,170	44	241	13,900
March	758	44	175	10,800
April	44	14	27.2	1,620
May	110	6.1	12.9	793
June	1.7	.5	.78	46
July	.7	.5	.65	40
August	.6	.3	.35	22
September	6.1	.2	.75	45
The year	1,170	.2	63.9	46,500
1908–9.				
October	.2	.2	.20	12
November	.9	.2	.44	26
December	4.4	.9	1.27	78
January	10,600	.9	1,780	109,000
February	5,800	319	1,830	102,000
March	1,270	81	352	21,600
April	397	16	80.9	4,810
May	23	8.8	13.1	806
June	8.8	4.4	5.40	321
July	33	.5	4.68	286
August	.2	.0	.020	1
September	.9	.03	.229	14
The year	10,600	.0	330	239,000
1909–10.				
October	8.8	.1	1.61	99
November	4.4	.1	1.44	86
December	2,060	1.3	155	9,530
January	2,340	33	552	33,900
February	872	157	259	14,400
March	957	81	276	17,000
April	262	50	112	6,660
May	50	8.8	29.4	1,810
June	8.8	4.4	5.78	344
July	4.4	3.5	3.67	226
August	3.5	.8	1.32	81
September	.9	.5	.72	43
The year	2,340	.1	116	84,200

Monthly discharge of Alameda Creek at Sunolglen for the years ending Sept. 30, 1901–1919—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1910–11.				
October	0.8	0.0	0.290	18
November	1.3	.0	.29	17
December	1.5	.7	1.09	67
January	9,660	.7	1,540	94,700
February	2,420	157	756	42,000
March	14,700	202	2,050	126,000
April	226	56	103	6,130
May	136	6.1	29.8	1,830
June	6.1	4.4	5.65	336
July	4.4	4.4	4.40	271
August	4.4	3.5	3.73	229
September	2.6	2.0	2.26	134
The year	14,700	.0	375	272,000
1911–12.				
October	2.0	1.7	1.83	113
November	4.4	1.7	2.72	162
December	4.4	2.6	3.47	213
January	808	4.4	67.7	4,160
February	50	12	27.5	1,580
March	722	12	134	8,240
April	157	4.4	28.6	1,700
May	12	1.1	5.03	309
June	1.5	.03	.239	14
July	.03	.0	.001	.1
August	.0	.0	.00	0
September	.0	.0	.00	0
The year	808	.0	22.7	16,500
1912–13.				
October	.0	.0	.00	0
November	.0	.0	.00	0
December	.0	.0	.00	0
January	918	.0	89.6	5,510
February	6.1	1.1	2.15	119
March	86	1.1	14.6	898
April	2.6	.02	.329	20
May	.0	.0	.00	0
June	.0	.0	.00	0
July	.0	.0	.00	0
August	.0	.0	.00	0
September	.0	.0	.00	0
The year	918	.0	9.04	6,550
1913–14.				
October	.0	.0	.00	0
November	.0	.0	.00	0
December	3,730	.0	175	10,800
January	8,200	56	1,720	106,000
February	7,620	77	926	51,400
March	404	27	131	8,060
April	100	16	38.5	2,290
May	7.0	1.5	2.98	183
June	1.5	.5	1.08	64
July	.5	.1	.17	10
August	.1	.0	.003	.2
September	.0	.0	.00	0
The year	8,200	.0	247	179,000
1914–15.				
October	.0	.0	.0	0
November	.0	.0	.0	0
December	152	.0	15.8	972
January	3,010	.0	404	24,800
February	6,680	515	1,960	109,000
March	750	100	254	15,600
April	350	55	126	7,500
May	939	83	355	21,800
June	105	9.0	31.7	1,890
July	14	.2	3.77	232
August	.3	.0	.11	7
September	.0	.0	.0	0
The year	6,680	.0	251	182,000

Monthly discharge of Alameda Creek at Sunolglen for the years ending Sept. 30, 1901–1919—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1915–16.				
October	0	0	0.0	0
November	0	0	.0	0
December	856	0	64.4	3,960
January	6,720	12	2,440	150,000
February	5,740	207	938	54,000
March	817	93	291	17,900
April	84	28	55.7	3,310
May	35	20	24.0	1,480
June	26	14	17.9	1,070
July	16	0	11.4	701
August	16	0	7.4	455
September	11	0	2.2	131
The year	6,720	0	321	233,000
1916–17.				
October	8	2.0	5.34	328
November	2.0	.0	.39	23.2
December	701	.0	45.3	2,790
January	924	14	89.9	5,530
February	7,110	2.0	979	54,400
March	529	49	157	9,650
April	45	19	28.9	1,720
May	24	14	17.8	1,090
June	24	10	15.5	922
July	46	12	30.4	1,870
August	46	13	32.8	2,020
September	61	39	49.7	2,960
The year	7,110	0.0	115	83,300
1917–18.				
October	104	53	68.1	4,190
November	20	.9	5.41	322
December	.9	.0	0.52	32.0
January	.0	.0	.00	0.0
February	73	.0	7.66	425
March	570	.2	82.9	5,100
April	6	.0	1.09	64.9
May	.0	.0	.00	0.0
June	.0	.0	.00	0.0
July	34	.0	16.8	1,030
August	29	11	23.5	1,440
September	155	7.5	43.1	2,560
The year	570	.0	21.0	15,200
1918–19.				
October	270	.0	37.9	2,330
November	34	.0	3.51	209
December	121	.3	29.6	1,760
January	127	1.5	13.6	836
February	6,300	.....	795	44,200
March	3,170	122	660	40,600
April	108	9.5	40.1	2,390
May	17	4.6	11.6	713
June	26	3.9	14.2	845
July	34	20	27.8	1,710
August	28	19	22.0	1,350
September	35	22	28.9	1,720
The year	6,300	.0	136	98,700

NOTE.—Monthly and yearly values computed by engineers of the U. S. Geological Survey.

ALAMEDA CREEK NEAR NILES.

LOCATION.—In Niles Canyon, one-eighth of a mile below first Southern Pacific Co.'s bridge above Niles, one-fourth of a mile above highway bridge and 1¼ miles northeast of Niles, Alameda County.

DRAINAGE AREA.—633 square miles (measured on topographic map by State Water Commission.)

RECORDS AVAILABLE.—October 1, 1916, to September 30, 1920.

GAGE.—Gurley electric printing water-stage recorder on right bank at highway water tank 1,800 feet above highway bridge. Before January 15, 1918, gage was a water-stage recorder of the Spring Valley Water Co. type.

DISCHARGE MEASUREMENTS.—Made from suspension footbridge 800 feet below gage or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel; not permanent. Banks are high; channel straight from gage to some distance below suspension bridge. Low water control for gage solid rock and boulders.

EXTREMES OF DISCHARGE.—1917–1920: Maximum stage recorded 11.99 feet at 8.30 p. m. February 10, 1917 (discharge, 13,600 second-feet); no flow during at least part of the time from July 21 to September 30, 1920.

DIVERSION.—Spring Valley Water Co. obtains water from the gravels at lower end of Livermore Valley, above station. (See Spring Valley Water Co.'s aqueduct near Sunolglen, p. 116.) Water, for irrigation is diverted on right bank at Niles dam a mile above station.

REGULATION.—Spring Valley Water Co. has under construction a large storage reservoir on Calaveras Creek. During low water season water was released from Calaveras Reservoir.

ACCURACY.—Stage-discharge relation not permanent. Frequent discharge measurements, covering entire range of stage, were obtained. Rating curves well defined. Daily discharge determined by averaging the results obtained by applying mean gage height for short period to rating table. Records excellent.

COOPERATION.—Data for years 1916–1919 collected and complied under personal supervision of Paul Bailey, engineer, and furnished for publication by State Water Commission.

Monthly discharge of Alameda Creek near Niles for the years ending Sept. 30, 1917–1919.

Month.	Discharge in second-feet.			Run-off in acre-feet
	Maximum.	Minimum.	Mean.	
1916–17.				
October	11.5	1.0	6.05	372
November	10	.5	3.13	186
December	813	1.0	48.9	3,010
January	925	12.5	92.8	5,710
February	8,020	2.0	1,050	58,300
March	504	40	150	9,220
April	39	14	23.6	1,400
May	17	8.5	12.1	744
June	29	4.0	11.9	708
July	60	13.5	34.4	2,120
August	39.5	5.0	28.5	1,750
September	55	31	42.5	2,530
The year	8,020	.5	119	86,000
1917–18.				
October	85.5	49	57.0	3,500
November	22.5	.5	3.35	19.9
December	1.5	.0	.50	30.7
January	.4	.0	.21	12.9
February	41	0.2	6.33	352
March	575	1.0	86.0	5,290
April	3.5	.2	.43	25.6
May	.2	.1	.12	7.4
June	.2	.0	.04	2.4
July	20.5	.0	6.31	388
August	26.5	9.5	18.8	1,160
September	187	2.5	27.6	1,640
The year	575	.0	17.4	12,600

Monthly discharge of Alameda Creek near Niles for the years ending Sept. 30, 1917–1919—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	190	0.7	38.4	2,360
November	44.5	.7	5.75	342
December	93.5	2.0	19.0	1,170
January	131	1.5	13.1	805
February	7,614	3.0	881	48,900
March	3,450	125	701	43,100
April	112	9.0	46.7	2,780
May	16	4.0	10.5	646
June	29.5	3.0	16.2	964
July	36	22.5	30.7	1,890
August	36	10.5	27.8	1,710
September	43	19	34.8	2,070
The year	7,614	.7	147	107,000
1919–20.				
October	15	.6	2.50	154
November	.6	.3	.43	25.6
December	.....	.....	.93	57.2
January	.....	.....	.60	36.9
February	.6	.4	.50	28.8
March	485	1.0	54.1	3,330
April	360	1.9	29.0	1,730
May	22	1.8	11.5	707
June	41	9	25.5	1,520
July 1–20	28	.5	16.5	655
The period [a]	.....	.....	.....	8,240

[a] No record July 21 to Sept. 30, 1920; probably no flow.

NOTE.—Monthly discharge computed by engineers of the U. S. Geological Survey.

ALAMEDA CREEK NEAR DECOTO.

LOCATION.—At Beard tract, 400 feet above mouth of Dry Creek, below Crandall Slough, and 1 mile southwest of Decoto, Alameda County; 6¾ miles below station in Niles Canyon near Niles.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 1, 1916, to September 30, 1919.

GAGE.—Water-stage recorder (Spring Valley Water Co. type) on left bank, 400 feet above mouth of Dry Creek.

DISCHARGE MEASUREMENTS.—Made from suspension footbridge just above gage or by wading. Measurements are also made at Rodiguez bridge, about 1¼ miles downstream, and results reduced by discharge of Dry Creek to give flow at gages.

CHANNEL AND CONTROL.—Gravel, sand, and silt; not permanent. Banks are high and steep and have been cleared in vicinity of station. At flood stage some water leaves channel through Crandall Slough, about 1½ miles above gage.

EXTREMES OF DISCHARGE.—1917–1919: Maximum stage recorded 19.37 feet, 10 p. m. February 10, 1919 (discharge, 9,450 second-feet); no flow during long periods of each year.

DIVERSIONS.—See Alameda Creek near Niles, page 124. Water is also pumped from creek at four points above station for irrigation. At high stages water flows through Crandall Slough 1½ miles above gage. (See p. 127.) Some water is returned to creek at three gravel-washing plants between mouth of canyon and station.

REGULATION.—See Alameda Creek near Niles, page 124.

ACCURACY.—Stage-discharge relation not permanent. Frequent discharge measurements were obtained covering entire range of stage. Several well-defined rating curves were used. Daily discharge ascertained by averaging the results obtained by applying mean gage height for short periods to rating table. Records excellent.

COOPERATION.—Data collected and compiled under personal supervision of Paul Bailey, engineer, and furnished for publication by State water commission of California.

Monthly discharge of Alameda Creek near Decoto for the years ending Sept. 30, 1917–1919.[a]

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1916–17.				
October	0.0	0.0	0.0	0
November	.0	.0	.0	0
December	680	.0	38.4	2,360
January	807	.5	78.2	4,810
February	7,760	.0	1,010	56,100
March	523	31.5	135	8,300
April	25.5	.0	9.92	590
May	.0	.0	.0	0
June	.0	.0	.0	0
July	9.5	.0	4.42	272
August	12	.0	5.32	327
September	31.5	8.0	21.3	1,270
The year	7,760	.0	102	74,000
1917–18.				
October	84	26	40.5	2,490
November	32.5	0	1.42	84.5
March	420	0	68.4	4,210
September	103	0	6.96	414
The year	420	0	9.94	7,200
1918–19.				
October	220	0	18.6	1,140
November	0	0	0	0
December	6	0	.60	36.9
January	45.5	0	2.32	143
February	7,300	0	811	45,000
March	3,662	111	690	42,400
April	97.5	0	33.4	1,990
May	0	0	0	0
June	0	0	0	0
July	8	0	3.23	199
August	8.5	0	5.61	345
September	7	0	1.82	108
The year	7,300	0	126	91,400

[a] In addition to the discharge for February 1917, 1,910 acre-feet passed through Crandall Slough in 1917 and 1,720 acre-feet in 1919; no flow in slough for other months.

CRANDALL SLOUGH NEAR CENTERVILLE.

LOCATION.—Just below crossing of Centerville-Alvarado highway, 1½ miles northwest of Centerville, Alameda County.

RECORDS AVAILABLE.—October 1, 1916, to September 30, 1919, when the station was discontinued.

GAGE.—Water-stage recorder about 300 feet below highway crossing. Stream in one channel at this point.

DISCHARGE MEASUREMENT.—Left channel, made from cable one-fourth of a mile below gage; right channel, made from footbridge 500 feet below gage.

CHANNEL AND CONTROL.—Grazing land.

COOPERATION.—Data collected and compiled under personal supervision of Paul Bailey, engineer, and furnished for publication by State water commission of California.

Daily discharge, in second-feet, of Crandall Slough near Centerville for the years ending Sept. 30, 1917 and 1919.

Day.	February.	Day.	February.
1916-17.		1918-19.	
21	225	10	239
22	303	11	527
24	10.5		
25	425		

NOTE.—Stream dry all other days.

Monthly discharge of Crandall Slough near Centerville for the years ending Sept. 30, 1917 and 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
February, 1917	425	0	34.4	1,910
February, 1919	527	0	30.9	1,720

NOTE.—Stream dry all other months.

PAJARO RIVER AT WATSONVILLE.

LOCATION.—At highway bridge at Watsonville, 10 miles below mouth of San Benito River and 5 miles above mouth of Pajaro River.

RECORDS AVAILABLE.—September 14, 1911, to June 30, 1912.

DRAINAGE AREA.—Not measured.

GAGE.—Vertical staff on first pier from right end of bridge.

CHANNEL.—Shifting sand.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

DIVERSIONS.—Amount of diversions above station not known.

ACCURACY.—Results are fair.

Monthly discharge of Pajaro River at Watsonville, Sept. 14, 1911, to June 30, 1912.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1911.				
September 14-30	19	13	15.8	533
1911-12.				
October	38	8	19.5	1,200
November	46	17	33.9	2,020
December	49	31	36.5	2,240
January	80	43	62.8	3,860
February	52	30	40.6	2,340
March	440	30	82.5	5,070
April	524	27	74.0	4,400
May	46	6	16.9	1,040
June	6	1.9	3.06	182
The period				22,400

RECORDS OF DEPTH TO WATER LEVELS IN WELLS.

Depth to water levels in wells in the vicinity of Hollister.

Map No.	Owner.	Depth of water surface below bench mark.	Date.
		Feet.	
1	Road well	28.9	Aug. 27, 1913
2	New well	12.6	Do.
3	Anderson Fruit Co	7.7	Do.
4	Pit at deserted house	15.5	Do.
5	Mrs. J. Pimentel	Pumping.	Do.
6		Flowing.	Do.
7	Miller & Lux	Closed.	Do.
8	—— Welch	Closed.	Do.
9	—— (Japanese)	Flowing.	Do.
10		Flowing.	Do.
11		Flowing.	Do.
12		Flowing.	Do.
13	F. Bicen	[a] Closed.	Do.
14	Morse Seed Co. (farm No. 4)	4.5	Do.
15	—— Greene		
16	L. P. Jepsen	9.2	Aug. 28, 1913
17		12.6	Aug. 27, 1913
18	Mrs. M. Schaenfeld	24.0	Oct. 2, 1913
	.....do	5.0	Dec. 2, 1913
21	L. Otto Boni	15.0	
22	C. Lorenzen	11.0	Aug. 29, 1913
23		[b] 19.1	Aug. 30, 1913
24	Morse Seed Co	11.0	Aug. 27, 1913
25	A. M. Lindel	12.0	Do.
26	G. Bar	9.4	Do.
27	San Benito County	7.5	Do.
28	W. O. Loederich	19.4	Do.
31	Bointan Bros	61.9	Do.
32	J. E. Lindel	19.3	Aug. 25, 1913
33	B. Flint	19.6	Do.
34	San Ju n Berry Co	Closed.	Do.
35	A. M. Lindel	[c] Closed.	Do.
36	L. Bersinger	21.0	Aug. 24, 1913
37	J. P. Faunt	25.2	Aug. 25, 1913
38	E. F. Gleason	18.6	Aug. 23, 1913
41	W. F. Burnett	[d] Closed.	Aug. 24, 1913
42	Morse Seed Co	10.0	Do.
44		14.4	Do.
45	Schoolhouse	14.0	Do.
46	Overfelt Bros	14.3	Aug. 22, 1913
47	San Benito County	20	Aug. 23, 1913
52		16.9	Aug. 22, 1913
54	Flint		Do.
55	San Juan Watering Co	6.1	Do.
56	John Gonzales	28.0	Do.
57	J. Stone	28.0	Do.
58	Manuel F. Nunis	28.9	Do.
61	Mitchell Fruit Farm	12.5	Aug. 23, 1913
62	Bonnie Brae Farm	16.6	Do.
63	George E. Shaw	12.3	Do.
64	Frank Amsler	20.0	Aug. 17, 1913
65	—— Beumsen	28.2	Aug. 19, 1913
66	C. Berei	39.7	Do.
67	San Benito County (?)	10.0	Aug. 28. 1913
68	—— Shaltz	8.7	Aug. 20, 1913
71	D. B. King	31.1	Do.
72	C. M. Calkins	19.9	Aug. 28, 1913
73	—— Hawkins	28.3	Aug. 27, 1913
74	J. H. Smith	27.0	Do.
75	—— Hagadorn		
76	A. R. Hill		
77	A. A. Smith	[e] 22	
78	M. S. Fraia	31.4	Aug. 15, 1913
79	William Gury		
81		15.1	Do.
82	—— Hogan	16.5	Aug. 25, 1913
83	Miller & Lux	23.0	Do.
84	Mrs. McMahon	26.6	Aug. 16, 1913
85	Blacklock	27.7	Do.
91	R. Elliott	25.0	Do.
	.....do	25.0	Sept. 2, 1913
	.....do	25.5	Oct. 1, 1913
	.....do	25.6	Nov. 1, 1913

[a] Formerly flowed. [b] When pumping. [c] Reported 25 feet. [d] Reported 20 to 25 feet. [e] Reported.

Depth to water levels in wells in the vicinity of Hollister—Continued.

Map No.	Owner.	Depth of water surface below bench mark.	Date.
		Feet.	
91	R. Elliott	29.1	Dec. 1, 1913
	do	28.6	Jan. 2, 1914
	do	24.6	Feb. 1, 1914
	do	20.3	Mar. 2, 1914
	do	17.5	Apr. 1, 1914
	do	15.9	May 1, 1914
	do	15.9	June 1, 1915
	do	18.2	July 3, 1915
	do	17.2	Aug. 3, 1915
	do	18.0	Sept. 10, 1915
	do	18.6	Oct. 1, 1915
	do	19.2	Nov. 1, 1915
	do	19.5	Dec. 1, 1915
	do	19.0	Jan. 9, 1915
	do	17.7	Feb. 1, 1915
	do	13.0	Mar. 8, 1915
	do	11.9	Apr. 15, 1915
	do	11.1	May 1, 1915
	do	10.3	June 1, 1915
92	B. Janquis		
93			
94	Peter Fries	35.0	Aug. 16, 1913
95	R. C. Gury		
96	W. J. Bowden	30.0	Do.
97	W. E. Stevens	14.1	Aug. 15, 1913
98	——Hasbrouck	10.1	Do.
101	——Goodpasture	22.0	Do.
102	A. J. Remhart	23.9	Do.
103	P. B. Hudner		Aug. 12, 1913
104	Hollister Creamery Co.		Do.
105	J. C. Hamilton	22.5	Do.
106	Mrs. M. Bundeson	e 30.0	Do.
107	—— Blacklock		Aug. 15, 1913
108	Mrs. M. Bundeson	31.8	Aug. 12, 1913
111	H. T. Shulz	29.2	Do.
112	C. L. Ladd	42.1	Aug. 15, 1913
113	C. E. Scott	38.8	Do.
114		15.1	Aug. 13, 1913
115	—— Dorbar	45.0	
116	—— Langdon	41.5	Aug. 17, 1913
117	R. F. Bishop	24.8	Do.
	do	17.3	Apr. 29, 1915
118	A. Cowden	22.7	Aug. 17, 1913
121	—— Gelhamet	11.8	Do.
122	S. Charles	21.7	Do.
123		38.6	Aug. 12, 1913
124	C. F. Fowles	74.2	Aug. 14, 1913
	do	76.5	Sept. 19, 1913
	do	76.5	Oct. 3, 1913
	do	74.0	Nov. 15, 1913
125	H. E. Van Hensen	74.0	Aug. 14, 1913
	do	74.0	Sept. 3, 1913
	do	76.0	Oct. 12, 1913
	do	77.0	Nov. 1, 1913
	do	78.0	Dec. 11, 1913
	do	79.0	Dec. 31, 1913
	do	77.0	Feb. 6, 1914
	do	77.0	Mar. 8, 1914
	do	78.0	Apr. 8, 1914
	do	75.5	June 3, 1914
	do	76.0	July 9, 1914
	do	76.0	Sept. 5, 1914
	do	78.5	Oct. 10, 1914
	do	78.5	Oct. 29, 1914
	do	74.0	Dec. 1, 1914
	do	76.0	Jan. 12, 1915
	do	78.0	Mar. 12, 1915
	do	69.5	May 15, 1915
126	—— Caldera		
127		71.3	
128	T. Rucklidge	58.4	Aug. 16, 1913
	do	57.3	Sept. 2, 1913
	do	56.9	Oct. 1, 1913
	do	57.3	Nov. 1, 1913
	do	58.0	Dec. 1, 1913
	do	57.2	Jan. 1, 1914

e Reported.

Depth to water levels in wells in the vicinity of Hollister—Continued.

Map No.	Owner.	Depth of water surface below bench mark.	Date.
		Feet.	
128	T. Rucklidge	57.0	Feb. 1, 1914
	.....do	58.7	Mar. 1, 1914
	.....do	56.7	Apr. 1, 1914
	.....do	57.5	May 1, 1914
	.....do	54.5	June 6, 1914
	.....do	55.3	July 1, 1914
	.....do	55.3	Aug. 1, 1914
	.....do	55.5	Sept. 1, 1914
	.....do	54.5	Oct. 1, 1914
	.....do	54.8	Nov. 1, 1914
	.....do	53.5	Dec. 1, 1914
	.....do	53.5	Jan. 1, 1915
	.....do	53.5	Feb. 1, 1915
	.....do	50.5	Mar. 1, 1915
	.....do	49.5	Apr. 1, 1915
	.....do	49.0	May 1, 1915
129	F. L. Barnhisel	38.6	Aug. 14, 1913
	.....do	38.3	Sept. 23, 1913
	.....do	38.1	Oct. 24, 1913
	.....do	38.0	Nov. 21, 1913
	.....do	37.7	Dec. 30, 1913
	.....do	31.0	Mar. 4, 1914
	.....do	31.0	Apr. 10, 1914
	.....do	31.0	May 6, 1914
	.....do	31.0	June 2, 1914
	.....do	31.3	June 11, 1914
	.....do	32.3	Sept. 2, 1914
	.....do	33.7	Jan. 13, 1915
	.....do	27.3	Mar. 9, 1915
	.....do	26.0	Apr. 22, 1915
131	J. T. Gray	75.0	Aug. 14, 1913
132	Manuel Joseph	c 80.0	Do.
134	——— Garcia	94.6	Do.
135	Frank Amsler	20.0	Do.
136	——— Corotto	3.7	Aug. 15, 1913
137	——— Vinson	22.3	Do.
141	W. O. Matthews	23.5	Do.
142	G. B. Corotto	4.2	Do.
143	B. F. Hanly	10.0	Do.
144	——— Perkins	14.0	Do.
145	J. A. Wright	13.2	Do.
146	——— Dorbar	4.5	Do.
147	George Kehl	26.7	Aug. 16, 1913
	.....do	28.2	Sept. 8, 1913
	.....do	30.3	Oct. 9, 1913
	.....do	30.2	Nov. 9, 1913
	.....do	24.3	Dec. 7, 1913
	.....do	23.1	Jan. 4, 1914
	.....do	20.0	Feb. 15, 1914
	.....do	19.0	Mar. 8, 1914
	.....do	19.5	Apr. 5, 1914
	.....do	20.5	May 16, 1914
	.....do	21.0	June 21, 1914
	.....do	21.2	July 12, 1914
	.....do	21.3	Aug. 12, 1914
	.....do	21.3	Sept. 13, 1914
	.....do	21.2	Oct. 11, 1914
	.....do	21.2	Dec. 20, 1914
	.....do	21.0	Jan. 18, 1915
	.....do	18.1	Feb. 11, 1915
	.....do	18.8	Mar. 18, 1915
	.....do	18.9	May 23, 1915
148	E. J. Douglass	24.3	Sept. 24, 1912
	.....do	25.3	Oct. 1, 1912
	.....do	23.3	Dec. 6, 1912
	.....do	21.6	Jan. 9, 1913
	.....do	19.9	Feb. 2, 1913
	.....do	20.8	Mar. 4. 1913
	.....do	23.1	Apr. 3, 1913
	.....do	24.2	May 1, 1913
	.....do	26.3	June 1, 1913
	.....do	26.9	July 4, 1913
	.....do	28.4	Aug. 1, 1913
	.....do	29.4	Sept. 1, 1913
	.....do	30.6	Oct. 3, 1913

c Reported.

Depth to water levels in wells in the vicinity of Hollister—Continued.

Map No.	Owner.	Depth of water surface below bench mark.	Date.
		Feet.	
148	E. J. Douglass	31.5	Oct. 30, 1913
	do	31.7	Dec. 1, 1913
	do	29.5	Jan. 1, 1914
	do	14.6	Feb. 1, 1914
	do	13.6	Feb. 2, 1914
	do	9.3	Mar. 1, 1914
	do	8.5	Apr. 1, 1914
	do	8.1	May 1, 1914
	do	9.5	July 1, 1914
	do	11.2	Aug. 1, 1914
	do	10.9	Sept. 1, 1914
	do	12.1	Oct. 6, 1914
		72.1	Aug. 17, 1913
151	Joseph Caldera	91.6	Do.
152	do	91.6	Do.
	do	86.5	Jan. 8, 1914
		81.4	Do.
153	A. F. Anderson (warm, mineral)	100.1	May 16, 1915
154	W. H. Best	77.1	Aug. 17, 1913
155	do	74.7	Sept. 2, 1913
	do	75.3	Oct. 7, 1913
	do	76.8	Nov. 7, 1913
	do	72.8	Dec. 2, 1913
	do	71.8	Jan. 8, 1914
	do	72.5	Mar. 7, 1914
	do	71.8	June 8, 1914
	do	78.5	July 11, 1914
	do	73.5	Aug. 12, 1914
	do	72.3	Sept. 11, 1914
	do	72.9	Oct. 9, 1914
	do	72.8	Nov. 7, 1914
	do	72.5	Dec. 7, 1914
	do	72.0	Feb. 18, 1915
	do	73.5	Apr. 6, 1915
	do	72.9	Dec. 18, 1915
158	—— White	101.9	Aug. 15, 1913
162	J. A. Hawkins	80.0	Aug. 13, 1913
163	—— Young	110.0	Do.
164	M. S. Turney	90.0	Do.
165	Lewis, Cushman, & De Frankie	27.4	Aug. 25, 1913
166	Bointon Bros	62.0	Aug. 27, 1913
167	San Benito County	108.0	Aug. 15, 1913
168	H. S. Halsell	49.8	Aug. 17, 1913
	do	52.3	Sept. 5, 1913
	do	50.4	Oct. 3, 1913
	do	49.3	Nov. 1, 1913
	do	49.2	Dec. 4, 1913
	do	47.0	Feb. 1, 1914
	do	47.5	Mar. 3, 1914
	do	47.8	Apr. 3, 1914
	do	47.3	May 4, 1914
	do	47.3	June 4, 1914
	do	48.7	July 2, 1914
	do	48.5	Aug. 3, 1914
	do	46.9	Sept. 4, 1914
	do	48.0	Oct. 8, 1914
	do	48.0	Nov. 3, 1914
	do	47.5	Dec. 3, 1914
	do	47.3	Jan. 10, 1915
	do	46.3	Feb. 2, 1915
	do	47.3	Mar. 10, 1915
	do	50.8	Apr. 16, 1915
	do	48.3	May 17, 1915
171	A. Dovin	106.2	Aug. 16, 1913
	do	100.0	Sept. 2, 1913
	do	106.0	Oct. 4, 1913
	do	106.0	Oct. 30, 1913
	do	98.0	Dec. 2, 1913
	do	96.0	Dec. 31, 1913
	do	96.0	Feb. 5, 1914
	do	96.0	Mar. 3, 1914
	do	96.0	Aug. 11, 1914
	do	106.0	Sept. 12, 1914
	do	92.0	Mar. 11, 1915
	do	92.0	Apr. 16, 1913
	do	93.7	Aug. 16, 1913
	do	95.0	Sept. 2, 1913
	do	96.0	Oct. 4, 1913

Depth to water levels in wells in the vicinity of Hollister—Continued.

Map No.	Owner	Depth of water surface below bench mark.	Date.
		Feet.	
171	A. Dovin	96.0	Oct. 30, 1913
	.....do	82.0	Dec. 2, 1913
	.....do	82.0	Dec. 31, 1913
	.....do	80.0	Feb. 5, 1914
	.....do	82.0	Mar. 3, 1914
	.....do	82.0	Aug. 11, 1914
	.....do	94.0	Sept. 12, 1914
	.....do	90.5	Feb. 1, 1915
	.....do	90.0	Mar. 11, 1915
	.....do	95.0	Apr. 16, 1915
	.....do	96.6	May 17, 1915
174	Charles Gilbert	100.0	Sept. 1, 1913
	.....do	100.0	Sept. 15, 1913
175		66.8	
176	Bert Johnson	43.6	Aug. 14, 1913
177		26.5	Do.
178	W. R. Flint	27.6	Do.
181	M. Wilson	.....	Do.
182	William Hay	56.5	Do.
	.....do	56.6	Sept. 3, 1913
	.....do	51.3	Oct. 12, 1913
	.....do	52.0	Oct. 30, 1913
	.....do	55.0	Dec. 5, 1913
	.....do	52.8	July 2, 1914
183		42.3	Aug. 13, 1913
184	McClosky Bros.	Pumping.	Aug. 27, 1913
185	Robert Gray	32.0	Aug. 13, 1913
186	B. & J. Hudner	42.9	Aug. 12, 1913
187	Walter Brittingham	41.8	Aug. 16, 1913
188	W. J. Ramoni	42.0	Do.
191	San Benito County	36.6	Aug. 13, 1913
192	L. Flynn	37.7	Aug. 22, 1913
193	Kydd & Harlan	38.2	Aug. 16, 1913
	.....do	40.0	Sept. 6, 1913
194	McClosky Bros.	.....	
195	Harry Hawkins	28.6	Aug. 13, 1913
196	D. Bache	34.5	Sept. 5, 1913
197	W. A. Pack	32.0	Jan. 1, 1914
198	D. Bache.	.....	
201	A. T. Brooks	16.2	Aug. 14, 1913
202	.....do	Flowing.	Do.
203	W. K. Goff	30.4	Do.
204	James Sommers	*f* 41.7	Do.
	.....do	35.0	Sept. 8, 1913
	.....do	32.3	Oct. 4, 1913
	.....do	32.2	Oct. 31, 1913
	.....do	33.0	Dec. 2, 1913
	.....do	33.5	Dec. 28, 1913
	.....do	31.7	Jan. 20, 1914
	.....do	28.5	Mar. 1, 1914
	.....do	28.5	Apr. 1, 1914
	.....do	25.7	May 11, 1914
	.....do	25.7	June 1, 1914
	.....do	27.0	July 6, 1914
	.....do	27.0	Aug. 1, 1914
	.....do	27.5	Sept. 1, 1914
	.....do	27.5	Oct. 1, 1914
	.....do	29.5	Nov. 4, 1914
	.....do	28.0	Jan. 1, 1915
	.....do	27.5	Jan. 28, 1915
	.....do	27.0	Mar. 9, 1915
	.....do	26.0	Apr. 16, 1915
	.....do	26.0	May 15, 1915
205	W. & D. Dooling	31.7	Aug. 13, 1913
206	T. J. Dooling	16.0	Do.
207	John Dooling	12.4	Do.
208	Henry Perry	18.1	Aug. 18, 1913
	.....do	15.0	Sept. 3, 1913
211	J. Dooling	4.8	Aug. 18, 1913
212	Ramelli Bros.	10.4	Aug. 13, 1913
213	P. Hewlett	Flowing.	Do.
21		9.4	Do.
215	R. I. Orr	Flowing.	Do.
216		13.2	Do.
217	Johnson & White	27.5	Oct. 3, 1913
	.....do	26.5	Dec. 1, 1913

f Mill had been running.

Depth to water levels in wells in the vicinity of Hollister—Continued.

Map No.	Owner.	Depth of water surface below bench mark.	Date.
		Feet.	
217	Johnson & White	26.5	Jan. 2,1914
	.....do	26.0	June 8,1914
	.....do	25.0	May 17,1915
218	Charles Besimo	24.1	Aug. 21,1913
221	Mrs. J. A. Wiebe	46.0	Oct. 29,1913
222	Beagle & Janquis		
223	O. Kamota	47.4 (pumping)	Aug. 30,1913
224	—— Hudner	21.7	Do.
225	.....do		
226		Flowing.	
227		Flowing.	
231		Flowing.	
232		Flowing.	
233		Flowing.	
234		Flowing.	
235	—— Hogan	16.5	
236	Jack Sullivan	41.7	Aug 30,1913
237	Hart Bros.	42.4	Do.
238		32.1	Do.
241	J. F. Dunne	18.5	Do.
242			Do.
243	J. M. Spencer	Closed. Flowing.	Aug. 18,1913
244	A. G. Pedrazzi	Flowing.	Do.
245		Flowing.	Do.
246	Dan Marcus	30.5	Do.
247	.....do	Pumping.	Do.
248	S. Grant	19.9	Do.
	.....do	20.0	Sept. 1,1913
	.....do	20.5	Oct. 3,1913
	.....do	20.7	Nov. 1,1913
	.....do	20.7	Dec. 1,1913
	.....do	20.6	Jan. 3,1914
	.....do	18.5	Feb. 1,1914
	.....do	17.3	Mar. 1,1914
	.....do	16.5	Apr. 1,1914
	.....do	15.9	May 1,1914
	.....do	16.3	July 1,1914
	.....do	16.9	Aug. 1,1914
	.....do	16.9	Sept. 2,1914
	.....do	14.8	May 17,1915
251	Raymond Votsi	16.0	Aug. 18,1913
252		27.6	Do.
253	B. W. Barrett	41.9	Do.
	.....do	41.0	Sept. 4,1913
	.....do	42.5	Oct. 9,1913
	.....do	42.5	Nov. 3,1913
	.....do	42.5	Dec. 9,1913
254	Isaac James	14.1	Aug. 18,1913
255	San Benito Nursery Co.	34.5	Do.
	.....do	34.8	Sept. 2,1913
	.....do	35.5	Oct. 30,1913
	.....do	27.0	May 19,1915
256	C. M. Brown	28.4	Aug. 18,1913
	.....do	24.0	Sept. 1,1913
	.....do	24.0	Oct. 1,1913
	.....do	24.0	Oct. 27,1913
	.....do	22.0	Nov. 29,1913
	.....do	22.0	Dec. 30,1913
	.....do	23.0	Jan. 31,1913
	.....do	18.0	Mar. 1,1914
	.....do	21.0	Apr. 1,1914
	.....do	18.0	May 1,1914
	.....do	21.5	June 1,1914
	.....do	21.5	June 3,1914
	.....do	23.0	Aug. 1,1914
	.....do	24.0	Sept. 2,1914
	.....do	24.0	Oct. 5,1914
	.....do	24.0	Nov. 4,1914
	.....do	24.0	Nov. 30,1914
	.....do	20.0	Jan. 9,1915
	.....do	18.5	Jan. 27,1915
	.....do	19.5	Mar. 8,1915
	.....do	18.5	Apr. 15,1915
	.....do	18.0	May 16,1915
257		Flowing.	Aug. 19,1913
258	J. F. Dunne	Flowing.	Do.

Depth to water levels in wells in the vicinity of Hollister—Continued.

Map No.	Owner.	Depth of water surface below bench mark.	Date.
		Feet.	
261	J. F. Dunne	2.4	Aug. 19, 1913
262	Hasbrouck & Underwood	14.0	Sept. 2, 1913
	do	13.2	Oct. 2, 1913
	do	10.0	Oct. 30, 1913
	do	6.3	Nov. 30, 1913
	do	5.3	Dec. 30, 1913
	do	3.6	Feb. 3, 1914
	do	2.0	Mar. 3, 1914
	do	2.5	Apr. 1, 1914
	do	2.0	May 1, 1914
	do	6.0	June 10, 1914
	do	8.0	July 3, 1914
	do	12.0	Aug. 1, 1914
	do	6.0	Sept. 10, 1914
	do	Flowing.	Mar. 6, 1915
	do	Flowing.	Apr. 16, 1915
263	M. A. Miller	7.0	Aug. 20, 1913
	do	6.3	Sept. 1, 1913
264	Waldo Rohnert	25.6	Aug. 20, 1913
265	do	16.0	Do.
266	J. F. Dunne	Closed.	Do.
267	—— Stevens	23.8	Aug. 18, 1913
268		a Flows.	Do.
271			Do.
272	Frank Martin	14.1	Aug. 20, 1913
	do	14.0	Oct. 3, 1913
	do	8.0	Oct. 30, 1913
	do	2.2	Nov. 1, 1913
	do	Flowing.	Dec. 30, 1913
	do	Flowing.	Feb. 1, 1914
	do	Flowing.	Mar. 3, 1914
	do	Flowing.	Apr. 16, 1914
	do	Flowing.	May 1, 1914
	do	.6	June 5, 1914
	do	8.0	July 2, 1914
	do	10.0	Aug. 3, 1914
	do	12.0	Sept. 2, 1914
	do	8.0	Oct. 10, 1914
	do	Flowing.	Nov. 6, 1914
	do	Flowing.	Dec. 1, 1914
	do	Flowing.	Jan. 9, 1915
	do	Flowing.	Jan. 27, 1915
	do	Flowing.	Mar. 9, 1915
	do	Flowing.	May 17, 1915
273	John Luz	1.0	Nov. 7, 1913
	do	Flowing.	Dec. 25, 1913
274	Mrs. M. E. McCullough	Flowing.	Aug. 20, 1913
275	Mrs. Mary A. Chase	11.0	Do.
	do	7.7	Oct. 14, 1913
	do	3.0	Nov. 5, 1913
	do	1.5	Dec. 2, 1913
	do	Flowing.	Jan. 7, 1914
276	E. J. Turner	14.0	Sept. 13, 1913
277	A. T. Fry	3.0	Aug. 20, 1913
278	O. C. Braden	4.3	Do.
	do	3.0	Oct. 3, 1913
	do	Flowing.	June 16, 1914
281	C. D. Sweet	Flowing.	Aug. 20, 1913
282	C. S. Putnam	Flowing.	Do.
283	S. B. Gillespie	Flowing.	Do.
284	F. M. Frazell	Flows in spring.	Do.
291	Peter Canapi	Flowing.	Do.
292	B. Leonard	11.8	Aug. 19, 1912
	do	10.0	Sept. 3, 1913
	do	5.0	Oct. 29, 1913
	do	Flowing.	Dec. 1, 1913
	do	Flowing.	Jan. 23, 1914
	do	Flowing.	Mar. 4, 1914
	do	4.0	Oct. 7, 1914
	do	Flowing.	Nov. 1, 1914
293		Flowing.	Aug. 19, 1913
294	H. A. Skeels	Flowing.	Do.
295	D. Backstead	Flowing.	Do.
296	E. J. Dunlap	10.5	Do.

a In bed of creek.

Depth to water levels in wells in the vicinity of Hollister—Continued.

Map No.	Owner	Depth of water surface below bench mark.	Date.
		Feet.	
296	E. J. Dunlap	10.0	Sept. 1, 1913
	do	Flowing.	Nov. 1, 1913
	do	Flowing.	May 20, 1915
297	J. F. Dunne	Closed.	
298	Santa Clara County	10.4	Aug. 20, 1913
302	W. W. Bates	Flowing.	Do.
303	Wood Co., San Jose	Flowing.	Do.
304	O. B. Coch	Flowing.	Do.
305	August Maurer	Flowing.	Do.
306	E. Coleman	Flowing.	Do.

Depth to water levels in wells in the vicinity of Gilroy.

307		Flowing.	Oct. 29, 1 13
308	Spring Valley Water Co	Flowing.	Do.
309	Miller & Lux (J. C. Frago)	4.6	Do.
	do	3.6	Dec. 1, 1913
	do	3.1	Dec. 31, 1913
	do	3.1	Jan. 1, 1 14
	do	3.6	Mar. 3, 1914
	do	1.9	Apr. 3, 1914
	do	2.8	May 2, 1914
	do	3.3	June 19, 1914
	do	3.8	Aug. 3, 1914
	do	3.8	Oct. 1, 1914
	do	4.2	Oct 9, 1 14
	do	3.8	Nov. 12, 1 14
	do	3.4	Dec. 3, 1914
	do	5.3	Dec. 28, 1916
311	Doctor Chesbro (F. B. Sperber)	Flowing.	Oct. 27, 1913
312	do	Flowing.	Do.
313	do	Flowing.	Do.
314	W. H. Sawyer	Flowing.	Oct. 28, 1913
315	do	Flowing.	Do.
316	do	Flowing.	Do.
317	do	1.7	Do.
318	do	3.5	Do.
321	Samuel Rea	2.0	July —, 1913
	do	Flowing.	Oct. 28, 1913
322	Sargent estate	Flowing.	Do.
323	do	Flowing.	Do.
324	Santa Clara County	9.4	Do.
325	Miller & Lux	10.4	Oct. 29, 1913
326	do	Flows.	Do.
327	do		
328	do	[a] 18.8	
331	do	10.5	Oct. 27, 1913
332	—— Ray	[b] Closed.	Do.
333	T. Nak	Flows.	Do.
334	Miller & Lux	[c] Closed.	Do.
335	do	Flows.	Oct. 29, 1913
336	Miller & Lux (Frank Costa)	12.1	Do.
	do	9.3	Sept 8, 1914
	do	10.6	Oct. 13, 1914
337	Miller & Lux	1.3	Oct. 29, 1913
338	do	Flows.	Do.
341	Annabel Ellis	Flows.	Oct. 30, 1913
342	Al xander Watson	Flows.	Do.
343	R. Esselenberg	Flows.	Do.
34	Ann bel Ellis	Flows.	Do.
345	E. R. Maze	Flows.	June 23, 1914
346	do	15.1	Do.
347	George Ross	25.8	Nov. 30, 1913
	do	32.0	Dec. 1, 1913
	do	30.0	Jan. 4, 1914
	do	27.0	Mar. 5, 1914
	do	23.0	Apr. 3, 1914

[a] Pump had been running. [b] Pump 5 feet below surface. [c] Pump about 4½ feet below surface.

Depth to water levels in wells in the vicinity of Gilroy—Continued.

Map No.	Owner.	Depth of water surface below bench mark.	Date.
		Feet.	
347	George Ross	27.0	June 4, 1914
	do	26.0	Nov. 1, 1914
	do	26.3	Nov. 3, 1914
	do	25.0	Jan. 9, 1915
	do	26.0	Jan. 28, 1915
348	G. A. Moore	Flows.	Nov. 30, 1913
351	C. W. Doan	Flows.	Do.
252	Edward Holoway estate	Flows.	Oct. 30, 1913
353	Santa Clara County	4.6	Do.
354		Flows.	Do.
355	A. Ellis	[d]6.6	Do.
356	A. Gubser	7.0	Do.
357	George C. White	5.2	Do.
	do	3.7	Dec. 30, 1913
	do	3.3	Feb 6, 1914
	do	4.7	Apr. 1, 1914
	do	Flows.	June 3, 1913
358	C. C. Lester	22.3	Oct. 31, 1913
362	do	23.4	Do.
363	Otis Dexetr	21.0	Oct. 30, 1913
	do	17.0	Dec. 1, 1913
	do	7.8	Jan. 6, 1914
	do	10.0	Mar. 4, 1914
364	Harry Dexter (J.L. Lindeleaf)	10.0	Aug. 3, 1913
	do	9.0	Sept. 5, 1913
	do	8.5	Oct. 12, 1913
	do		Nov. 13, 1913
365	Santa Clara County	30 closed.	Oct. 31, 1913
366	Ralph Zuck	Flows.	Do.
367	W. G. Burchell	Flows.	Oct. 30, 1913
368	H. H. Burton	7.0	Do.
371		(d)	Do.
372	John Bert (two wells)	[e]1.7	June 22, 1913
373	J. C. Zuck estate	[d]Closed.	June 30, 1913
374	J W. Richman	66.3	Do.
375	J. M. Hecker	20.0	June 19, 1914
381	George E. Stone	25.3	Aug. 5, 1914
	do	25.1	Sept. 8, 1914
	do	24.1	Nov. 4, 1914
	do	22.3	Jan. 30, 1915
382	A. Rianda	(f)	June 22, 1914
384	Miss Shepard	7	Oct. 30, 1913
385	Mrs. Shepard	2.5	June 19, 1914
	do	4.0	Aug. 6, 1914
	do	3.7	Sept. 5, 1914
	do	3.1	Oct. 10, 1914
	do	2.6	Nov. 14, 1914
	do	2.4	Dec. 3, 1914
	do	1.6	Jan. 9, 1915
	do	1.4	Jan. 28, 1915
	do	0.6	Mar. 11, 1915
	do	1.1	Apr. 26, 1925
386	Ryan Bros.	7.8	Aug. 6, 1914
	do	8.4	Sept. 9, 1914
	do	8.3	Oct. 12, 1914
	do	7.7	Nov. 4, 1914
	do	7.8	Dec. 5, 1914
	do	6.3	Jan. 11, 1915
	do	3.8	Feb. 1, 1915
	do	3.8	Apr. 1, 1915
	do	4.4	May 25, 1915
388	A. Arena	11.1	June 30, 1914
	do	12.0	Nov. 30, 1914
	do	9.0	Jan. 28, 1915
	do	11.0	May 20, 1915
	do	11.9	Dec. 27, 1916

[d] Formerly flowed. [e] Old flow, flush. [f] Flows in winter.

Depth to water levels in wells in the vicinity of Gilroy—Continued.

Map No.	Owner.	Depth of water surface below bench mark.	Date.
		Feet.	
391	John Sturla	12.9	June 30, 1914
393	Miller & Lux	7.2	June 23, 1914
	.....do	10.9	Aug. 28, 1914
394	.....do	Flows.	June 23, 1914
395		12.7	June 20, 1914
396	J. P. Lindeleaf	8.1	Do.
397		5.0	June 23, 1914
398	B. Settrini	9.0	June 29, 1914
401	W. B. Halselaw	10.3	Do.
402	H. M. Wolfe	21.1	June 19, 1914
	.....do	12.0	Jan. 9, 1915
403	D. J. Wolfe	30.9	June 21, 1914
	.....do	31.9	Aug. 7, 1914
	.....do	33.8	Sept. 26, 1914
	.....do	86.1	Nov. 4, 1914
	.....do	35.7	Jan. 22, 1915
	.....do	30.7	Feb. 30, 1915
	.....do	30.7	Mar. 15, 1915
	.....do	28.2	Apr. 15, 1915
	.....do	28.2	May 17, 1915
	.....do	28.8	June 1, 1915
406	J. N. Poe	61.1	June 25, 1914
407	W. A. Russell	32.0	Do.
	.....do	31.3	Aug. 1, 1914
	.....do	32.0	Sept. 3, 1914
	.....do	34.0	Oct. 7, 1914
	.....do	31.0	Dec. 2, 1914
	.....do	29.9	Jan. 28, 1915
	.....do	24.7	Mar. 10, 1915
	.....do	24.0	Apr. 21, 1915
408	George W. Teeters	65.9	June 25, 1914
411	White & Wheelock	12.8	June 29, 1914
	.....do	14.7	Aug. 2, 1915
	.....do	14.8	Sept. 13, 1914
	.....do	16.4	Oct. 17, 1914
	.....do	16.3	Nov. 10, 1914
	.....do	13.2	Feb. 1, 1915
412	K. L. Enans	6.8	June 29, 1914
	.....do	11.0	Aug. 7, 1914
	.....do	Flowing.	Mar. 11, 1915
	.....do	Flowing.	Apr. 16, 1915
	.....do	1.5	May. 17, 1915
413	Gilroy Seed Co	(a)	
414	.....do	12.3	Aug. 3, 1914
	.....do	13.2	Sept. 8, 1914
	.....do	14.3	Oct. 7, 1914
	.....do	15.0	Nov. 4, 1914
	.....do	15.0	Dec. 2, 1914
	.....do	14.0	Jan. 1, 1915
	.....do	13.7	Feb. 1, 1915
	.....do	6.5	Mar. 8, 1915
	.....do	7.0	May 5, 1915
	.....do	6.0	May 18, 1915
415	Peters-Wheeler Seed Co	6.6	June 29, 1914
416	P. Liguori	8.3	Do.
417	J. W. Linder	12.1	June 25, 1914
418	F. L. Jones	14.3	Sept. 27, 1914
421	G. W. Earl	12.9	Sept. 13, 1914
	.....do	14.0	Oct. 19, 2914
	.....do	15.1	Dec. 15, 1914
	.....do	5.6	Feb. 1, 1915
	.....do	5.5	Feb. 11, 1915
	.....do	(?) 6.2	Mar. 15, 1915
	.....do	5.0	Apr. 15, 1915
	.....do	5.4	Apr. 25, 1915
	.....do	5.4	May 1, 1915
	.....do	7.1	June 8, 1915
	.....do	9.4	Aug. 1, 1915
422	F. S. Clark	10.1	June 28, 1914
423	W. O. Goold	11.7	Sept. 13, 1914
	.....do	[b] 19	Oct. 13, 1914
	.....do	13.0	Nov. 7, 1914
	.....do	14.0	Dec. 3, 1914
	.....do	12.6	Jan. 26, 1915
	.....do	4.5	Mar. 15, 1915

[a] Flowed until 1912. [b] Pumping mill.

Depth to water levels in wells in the vicinity of Gilroy—Continued.

Map No.	Owner.	Depth of water surface below bench mark.	Date.
		Feet.	
423	W. O. Goold	4.0	May 22, 1915
	do	11.0	Jan. 3, 1917
424	J. C. Webb	14.3	June 27, 1914
	do	17.5	Aug. 30, 1914
	do	18.8	Oct. 6, 1914
	do	18.6	Nov. 9, 1914
	do	17.5	Jan. 9, 1915
	do	8.2	Mar. 25, 1915
	do	9.7	Apr. 21, 1915
	do	20.0	Jan. 26, 1917
425	O. Lindstrom	12.2	June 27, 1914
	do	14.5	Sept. 16, 1914
426	J. J. Peterson	17.5	June 26, 1914
	do	20.0	Sept. 3, 1914
427	A. T. Jones	4.7	June 28, 1914
428	S. Gamble	10.0	Do.
429	August Swenson	8.4	Do.
	do	8.4	Aug. 4, 1914
	do	12.2	Oct. 12, 1914
	do	13.3	Dec. 5, 1914
	do	13.2	Jan. 15, 1915
	do	5.2	Feb. 7, 1915
	do	4.6	Apr. 17, 1915
	do	5.8	May. 24, 1915
	do	9.8	Jan. 6, 1917
431	S. Gamble	9.4	June 28, 1914
432	Miller & Lux	23.6	June 27, 1914
433	Miller & Lux (Glen ranch)	10.9	Do.
	do	14.2	Aug. 3, 1914
	do	17.0	Sept. 12, 1914
	do	18.5	Oct. 12, 1914
	do	21.0	Nov. 7, 1914
	do	21.5	Dec. 1, 1914
	do	7.0	Jan. 9, 1914
	do	5.0	Mar. 1, 1915
	do	5.0	Mar. 16, 1915
	do	5.5	May 1, 1915
	do	5.5	May 15, 1915
434	B. F. Thomas	30.2	Oct. 29, 1915
	do	32.0	Dec. 1, 1913
	do	26.6	Dec. 30, 1913
	do	4.0	Feb. 1, 1913
	do	6.4	Mar. 6, 1914
	do	7.9	Apr. 4, 1914
	do	8.2	May 3, 1914
	do	9.7	June 1, 1914
	do	12.0	July 1, 1914
	do	14.2	Aug. 1, 1914
	do	16.5	Sept. 5, 9114
	do	18.3	Oct. 1, 1914
	do	19.4	Nov. 4, 1914
	do	21.0	Dec. 1, 1914
	do	14.2	Jan. 1, 1914
	do	9.2	Feb. 1, 1915
	do	7.7	Apr. 1, 1915
435	J. C. Patison	[1]23.0	——, 1912
436	C. R. Thomas	32.1	Oct. 29, 1913
437	Massy Thomas	33.9	Do.
	do	34.9	Dec. 1, 1913
438	R. Rasmussen	38.4	Oct. 29, 1913
442	H. A. Tibbetts	28.9	Oct. 28, 1913
443	Miller & Lux	28.8	Do.
444	H. A. Tibbetts	23.5	Sept. —, 1913
	do	26.1	Oct. 28, 1913
445	Miller & Lux	40 pumping.	Do.
446	W. J. Hanna	16.0	June 26, 1914
451	Santa Clara County	22.9	Oct. 28, 1913
454	do	21.2	Oct. 27, 1913
455	Miller & Lux	23.7	Oct. 28, 1913
456	Elmer Rea (B. L. Ogan)	14.0	Oct. 29, 1913
	do	13.5	Dec. 31, 1913
	do	4.1	Feb. 3, 1914
457	Elmer Rae	Flows.	Oct. 29, 1913
458	Dowdy Bros	[1]18.0	Apr. —, 1914
461	A. B. Martin	7.5	June 28, 1914

[1] Reported.

Depth to water levels in wells in the vicinity of Gilroy—Continued.

Map No.	Owner.	Depth of water surface below bench mark.	Date.
		Feet.	
462	F. J. Polly	17.0	Nov. 12, 1941
	.....do	17.7	Dec. 1, 1914
	.....do	15.3	Feb. 2, 1915
463	A. K. Langdon	11.9	June 28, 1914
464	C. M. Orr	18.5	Nov. 4, 1914
	.....do	18.2	Jan. 29, 1915
	.....do	17.7	Dec. 28, 1916
465	P. H. Meyer	16.1	Sept. 13, 1914
468	James E. Lowder	20.0	Dec. 11, 1914
	.....do	18.0	Jan. 30, 1915
	.....do	14.3	Feb. 10, 1915
	.....do	11.5	Feb. 22, 1915
	.....do	8.3	Apr. 17, 1915
	.....do	9.0	May 19, 1915
469	D. H. Franklin	18.1	Sept. 14, 1914
472	M. Benson	17.5	Do.
473	W. L. Kroesen	16.4	Do.
	.....do	20.0	Nov. 10, 1914
	.....do	20.5	Jan. 15, 1915
	.....do	18.0	Feb. 1, 1915
	.....do	18.0	Mar. 9, 1915
	.....do	17.4	Dec. 28, 1916
474	J. F. Wheeler	20.9	Sept. 14, 1914
	.....do	23.3	Oct. 7, 1914
	.....do	20.0	Nov. 7, 1914
	.....do	26.0	Dec. 3, 1914
	.....do	26.9	Jan. 13, 1915
	.....do	26.3	Jan. 29, 1915
	.....do	13.0	Mar. 15, 1915
	.....do	12.2	May. 17, 1915
475	C. Dauberg	20.7	Sept. 14, 1914
	.....do	21.6	Oct. 10, 1914
	.....do	23.5	Nov. 10, 1914
	.....do	24.2	Dec. 11, 1913
	.....do	24.8	Jan. 11, 1915
	.....do	24.3	Jan. 28, 1915
	.....do	14.0	Feb. 17, 1915
	.....do	11.2	Mar. 12, 1915
	.....do	10.8	Apr. 21, 1915
	.....do	10.3	May 24, 1915
	.....do	22.0	Dec. 28, 1916
476	Hermon Brown	28.0	Sept. 15, 1814
	.....do	34.5	Nov. 19, 1914
	.....do	34.5	Dec. 1, 1915
	.....do	26.3	Feb. 9, 1915
	.....do	22.8	Feb. 27, 1914
478	H. Lewis	41.2	Nov. 4, 1914
	.....do	42.0	Jan. 27, 1915
481	J. H. Carl	[f] 73.2	Sept. 15, 1914
482	.....do	[e] 74.9	June —, 1913
	.....do	[e] 60.0	Spring, 1913
483	Fred Bahler	79.4	Sept. 14, 1914
484	D. B. Munroe	48.2	Sept. 15, 1913
485	.....do	38.0	Do.
486	W. McCantyre	19.3	Sept. 26, 1913
487	H. C. Hagan	19.9	Sept. 15, 1914
	.....do	21.9	Oct. 11, 1914
	.....do	23.8	Nov. 15, 1914
	.....do	24.6	Dec. 3, 1914
	.....do	25.0	Jan. 11, 1915
	.....do	16.6	Feb. 1, 1915
	.....do	8.1	Feb. 22, 1915
	.....do	7.8	Mar. 19, 1915
	.....do	7.6	Apr. 24, 1915
	.....do	7.5	May 28, 1915
	.....do	19.5	Jan. 2, 1917
488	George Hollenbeck	18.6	Sept. 15, 1914
	.....do	20.9	Oct. 11, 1914
	.....do	21.6	Nov. 8, 1914
	.....do	22.8	Dec. 4, 1914
	.....do	24.0	Jan. 25, 1815
	.....do	9.0	Feb. 24, 1915
	.....do	7.8	Mar. 16, 1915
	.....do	7.8	Apr. 16, 1915

[e] Reported. [f] Well 482 being pumped.

Depth to water levels in wells in the vicinity of Gilroy—Continued.

Map No.	Owner.	Depth of water surface below bench mark.	Date.
		Feet.	
488	George Hollenbeck	7.5	May 16, 1915
	do	21.2	Dec. 31, 1916
491	A. B. Martin	6.5	June 28, 1914
	do	7.9	Aug. 6, 1914
	do	8.5	Sept. 12, 1914
	do	9.3	Oct. 14, 1914
	do	9.8	Dec. 7, 1914
	do	10.9	Jan. 14, 1915
	do	5.9	Feb. 16, 1915
	do	1.9	Mar. 18, 1915
	do	2.0	May 13, 1915
	do	3.0	May 19, 1915
492	Dr. J. W. Fair	24.2 pumping.	Sept. 15, 1914
493	O. Knepper	24.3	Sept. 16, 1914
	do	28.3	Nov. 4, 1914
	do	26.1	Dec. 7, 1914
	do	16.3	Jan. 27, 1915
	do	6.8	Mar. 8, 1915
	do	7.1	Apr. 15, 1915
494	L. Lion	17.3	Oct. 4, 1914
	do	19.0	Nov. 3, 1914
	do	21.0	Dec. 3, 1914
	do	21.0	Jan. 4, 1915
	do	9.8	Feb. 6, 1915
	do	1.8	Mar. 1, 1915
	do	3.0	Apr. 1, 1915
	do	3.3	Apr. 30, 1915
	do	3.6	June 2, 1915
495	do	15.7	Nov. 3, 1914
	do	17.1	Dec. 3, 1914
	do	17.8	Jan. 4, 1915
	do	6.2	Feb. 6, 1915
	do	.7	Mar. 1, 1915
	do	.8	Apr. 1, 1915
	do	1.0	Apr. 30, 1915
	do	2.0	June 2, 1915
496	Mrs. M. Bundesen	22.0	Sept. 27, 1914
	do	27.2	Dec. 20, 1914
	do	14.0	Jan. 27, 1915
	do	8.9	Feb. 10, 1915
	do	8.1	Feb. 18, 1915
	do	7.3	Mar. 8, 1915
	do	7.2	Mar. 25, 1915
	do	6.9	Apr. 15, 1915
	do	6.9	May 16, 1915
498	P. Judge	16.8	Oct. 9, 1914
	do	19.8	Nov. 10, 1914
	do	18.7	Dec. 3, 1914
	do	19.0	Jan. 16, 1915
	do	16.2	Feb. 1, 1915
	do	10.3	Feb. 10, 1915
	do	8.2	Feb. 25, 1915
	do	8.2	Mar. 16, 1915
	do	9.5	Apr. 19, 1915
501		19.3	Sept. 27, 1914
502	George Curtis	15.0	Sept. 26, 1914
	do	19.7	Nov. 5, 1914
	do	24.3	Dec. 2, 1914
	do	22.3	Jan. 14, 1915
	do	22.0	Jan. 28, 1915
	do	7.0	Feb. 18, 1915
	do	4.2	Mar. 11, 1914
	do	4.0	Apr. 19, 1915
	do	3.8	May 24, 1915
563	F. W. Johnson	19.0	Sept. 27, 1914
	do	22.0	Jan. 17, 1915
	do	12.0	Feb. 6, 1915
504	W. Salhkie	15.9	Sept. 26, 1914
505		20.7	Sept. 27, 1914
506	G. B. Call	33.5	Do.
	do	34.3	Oct. 5, 1914
	do	36.2	Nov. 9, 1914
	do	36.0	Jan. 9, 1915
	do	23.0	Feb. 3, 1915

Depth to water levels in wells in the vicinity of Gilroy—Continued.

Map No.	Owner.	Depth of water surface below bench mark.	Date.
		Feet.	
506	G. B. Call	26.2	Feb. 18, 1915
	do	24.0	Mar. 13, 1915
507	John Silbersack	53.8	Sept. 16, 1914
508	do	69.0	Oct. 13, 1914
	do	71.5	Nov. 16, 1914
509	Mary Smith	79.2	Sept. 27, 1914
512	Joseph Fisch	64.1	Sept. 28, 1914
	do	66.7	Oct. 7, 1914
	do	74.0	Nov. 9, 1914
	do	68.0	Dec. 2, 1914
	do	68.0	Jan. 29, 1915
515	Santa Clara County	62.7	Sept. 27, 1914
516	A. O. Bechis	40.1	Sept. 28. 1924
	do	41.1	Oct. 8, 1914
	do	44.1	Nov. 4, 1914
	do	43.2	Jan. 17, 1915
	do	42.9	Jan. 28, 1915
	do	41.2	Feb. 9, 1915
	do	33.8	Apr. 15, 1915
	do	28.1	May 17, 1915
517		28.3	Sept. 28, 1914
518	T. Neary	17.1	Do.
	do	16.3	Oct. 9, 1914
	do	18.7	Nov. 10, 1914
	do	18.0	Dec. 3, 1914
	do	18.9	Jan. 16, 1915
	do	15.5	Feb. 1, 1915
	do	9.8	F b. 10, 1915
	do	7.5	Feb. 25, 1915
	do	7.5	Mar. 16, 1915
	do	8.8	Apr. 19, 1915
521	—— Ward	21.9	Sept. 27, 1915
522	T. Neary	20.9	Sept. 28, 1915

Depth to water levels in wells in the vicinity of Morgan Hill.

No. 523. Adolph Petrick.

Date.	Altitude of bench mark at mouth of well (feet above sea level).	Depth to water in well (feet below bench mark).	Altitude of water table (feet above sea level).
Sept. 27, 1914	283.34	19.55	263.79
Oct. 7, 1914	.....	19.66	263.68
Nov. 9, 1914	.....	21.00	262.34
Dec. 5, 1914	.....	25.00	258.34
Feb. 6, 1915	.....	12.50	270.84
Feb. 17, 1915	.....	9.42	273.92
Mar. 10, 1915	.....	8.75	274.59
Mar. 28, 1915	.....	12.00	271.34
Apr. 16, 1915	.....	13.00	270.34
Feb. 2, 1916	.....	9.03	274.31
Mar. 14, 1916	.....	9.68	273.66

No. 524. Road well.

Feb. 1, 1916	293.49	27.80	265.69
Mar. 14, 1916	.....	24.77	268.72
Dec. 4, 1917	.....	39.3	.....
Mar. 30, 1918	.....	28.9	.....
Dec. 4, 1919	.....	40.0	.....
June 23, 1919	.....	43.0	.....
May 12, 1919	.....	30.5	.....
Nov. 28, 1919	.....	54.5	.....
Jan. 23, 1920	.....	[a] 58.00	235.49
Apr. 22, 1920	.....	[a] 53.00	240.49

[a] Measurement taken from the surface of the ground.

No. 525. L. H. Meigs.

Date.	Altitude of bench mark at mouth of well (feet above sea level).	Depth to water in well (feet below bench mark).	Altitude of water table (feet above sea level).
Feb. 1, 1916	304.72	44.00	260.72
Mar. 13, 1916	.....	38.06	266.66

No. 526. P. Dethlefson.

Feb. 1, 1916	285.23	15.27	269.96
Mar. 15, 1916	.....	14.77	270.46

No. 527. B. F. Brown.

Sept. 29, 1914	275.90	16.53	259.37
Feb. 1, 1916	.....	6.56	269.34
Mar. 15, 1916	.....	6.14	269.76

No. 531. W. B. Jackson.

Sept. 29, 1914	289.20	16.90	272.30
Nov. 29, 1914	.....	19.75	269.45
Feb. 1, 1915	.....	10.33	278.87
Mar. 14, 1916	.....	10.90	278.30
May 1, 1917	.....	11.4	.....

Depth to water levels in wells in the vicinity of Morgan Hill—Continued.

No. 531. W. B. Jackson—Continued.

Date.	Altitude of bench mark at mouth of well (feet above sea level).	Depth to water in well (feet below bench mark).	Altitude of water table (feet above sea level).
Dec. 4, 1917	.....	24.5	.....
Feb. 10, 1919	.....	15.0	.....
Feb. 14, 1919	.....	21.1	.....
May 25, 1919	.....	19.6	.....
Nov. 28, 1919	.....	28.0	.....
Jan. 23, 1920	.....	Dry.	.....
Apr. 20, 1920	.....	Dry.	.....

No. 532. W. D. Griffin.

Sept. 28, 1914	287.37	27.58	259.79
Feb. 1, 1916	.....	16.66	270.71
Mar. 14, 1916	.....	16.23	271.14

No. 533. Dan McKeon.

Sept. 28, 1914	292.08	33.45	258.63
Dec. 13, 1914	.....	44.50	247.58
Feb. 11, 1915	.....	26.00	266.08
Feb. 1, 1916	.....	23.50	268.58
Mar. 14, 1916	.....	22.33	269.75
May 1, 1917	.....	24.6	.....
Dec. 4, 1917	.....	37.4	.....
May 21, 1918	.....	45.0	.....
Jan. 2, 1919	.....	54.0	.....
Nov. 28, 1919	.....	51.7	.....
Jan. 23. 1920	.....	[a] 54.90	237.12
Apr. 10, 1920	.....	[a] 49.70	242.38

No. 534. E. J. Rhodes.

Nov. 2, 1914	308.07	45.00	263.07
Feb. 1, 1916	.....	41.93	266.14
Mar. 13, 1916	.....	41.65	266.42

No. 535. E. J. Rhodes.

June 14, 1914	.....	45.00	.....

No. 536. W. C. Gwinn.

Sept. 28, 1914	.....	58.00	.....
Nov. 26. 1914	.....	58.00	.....

No. 537. Frank Fultz.

Sept. 28, 1914	322.18	55.57	266.61
Feb. 1, 1916	.....	44.16	278.02
Mar. 13, 1916	.....	41.02	281.16
May 1, 1917	.....	46.2	.....
Dec. 4, 1917	.....	53.6	.....
Feb. 14, 1919	.....	66.8	.....
May 5, 1919	.....	53.7	.....
Nov. 28, 1919	.....	67.1	.....
Jan. 23, 1920	.....	[a] 69.50	252.68
Apr. 10, 1920	.....	[a] 73.60	248.58

[a] Measurement taken from the surface of the ground.

No. 538. Frank H. Eberts.

Date.	Altitude of bench mark at mouth of well (feet above sea level).	Depth to water in well (feet below bench mark).	Altitude of water table (feet above sea level).
Feb. 1, 1916	312.03	45.74	266.29
Mar. 13, 1916	.....	30.39	281.64
Dec. 4, 1917	.....	42.1	.....
Nov. 28, 1918	.....	54.6	.....
Dec. 2, 1918	.....	47.5	.....
Dec. 19, 1918	.....	55.0	.....
Feb. 14, 1919	.....	56.9	.....
Nov. 28, 1919	.....	56.8	.....
Jan. 23, 1920	.....	61.30	250.73
Apr. 10, 1920	.....	59.70	252.33

No. 539. William Eddy.

Sept. 29, 1914	312.18	47.37	264.81
Feb. 1, 1916	.....	32.02	280.16
Mar. 13, 1916	.....	26.80	285.38

No. 541. C. M. Van de Bogart.

Sept. 27, 1914	314.48	49.40	265.08
Feb. 1, 1916	.....	44.28	270.20
Mar. 13, 1916	.....	36.37	278.11

No. 542. B. C. Thiman.

Feb. 1, 1916	312.49	43.03	269.46
Mar. 13, 1916	.....	35.82	277.67

No. 543. S. W. Kinney.

Sept. 29, 1914	.....	29.83	.....
Dec. 2, 1914	.....	34.33	.....

No. 544. Frank Kennedy.

Sept. 29, 1914	290.06	24.26	265.80
Jan. 30, 1915	.....	23.00	267.06
Feb. 1, 1915	.....	13.72	276.34
Mar. 14, 1916	.....	13.57	276.49
Dec. 4, 1917	.....	29.3	.....
Feb. 14, 1919	.....	41.0	.....
May 25, 1919	.....	25.9	.....
Nov. 28, 1919	.....	44.5	.....
Jan. 23, 1920	.....	[a] 45.00	245.06
Apr. 10, 1920	.....	[a] 39.10	250.96

No. 545. Enos Bechis.

Sept. 29, 1914	290.17	18.76	271.41
Oct. 6, 1914	.....	19.38	270.79
Nov. 3, 1914	.....	20.50	269.67
Nov. 30, 1914	.....	22.83	267.34
Jan. 11, 1915	.....	16.42	273.75
Jan. 27, 1915	.....	14.00	276.17
Feb. 6, 1915	.....	12.66	277.51
Feb. 18, 1915	.....	7.83	282.34
Feb. 24, 1915	.....	7.66	282.51

[a] Measurement taken from the surface of the ground.

Depth to water levels in wells in the vicinity of Morgan Hill—Continued.

No. 545. Enos Bechis—Continued.

Date.	Altitude of bench mark at mouth of well (feet above sea level).	Depth to water in well (feet below bench mark).	Altitude of water table (feet above sea level).
Mar. 8, 1915	.....	8.75	281.42
Mar. 20, 1915	.....	8.92	281.25
Mar. 27, 1915	.....	9.50	280.67
Apr. 16, 1915	.....	8.50	281.67
May 17, 1915	.....	7.58	282.59
Feb. 2, 1916	.....	7.87	282.30
Mar. 14, 1916	.....	8.68	281.49
Dec. 28, 1916	.....	12.9	.....
Apr. 12, 1917	.....	8.2	.....
Dec. 4, 1917	.....	25.4	.....
Mar. 26, 1918	.....	18.9	.....
Nov. 26, 1918	.....	44.7	.....
Dec. 19, 1918	.....	47.9	.....
Feb. 11, 1919	.....	37.0	.....
Nov. 28, 1919	.....	43.1	.....
Jan. 23, 1920	.....	[a] 44.00	246.17
Apr. 10, 1920	.....	26.30	263.87

No. 546. C. Mangels.

Sept. 29, 1914	.....	23.63	.....
Nov. 5, 1914	.....	27.08	.....
Dec. 2, 1914	.....	28.54	.....
Jan. 9, 1915	.....	24.42	.....
Jan. 27, 1915	.....	13.17	.....
Feb. 17, 1915	.....	7.33	.....
Mar. 4, 1915	.....	6.17	.....
Mar. 22, 1915	.....	6.83	.....
Apr. 16, 1915	.....	7.00	.....
Apr. 11, 1917	.....	7.4	.....
Nov. 26, 1918	.....	56.4	.....
Dec. 18, 1918	.....	47.3	.....

No. 547. George Pitchford.

Sept. 29, 1914	.....	18.55	.....
Oct. 6, 1914	.....	18.92	.....
Nov. 4, 1914	.....	20.83	.....
Dec. 2, 1914	.....	23.66	.....
Jan. 9, 1915	.....	14.50	.....
Jan. 28, 1915	.....	5.83	.....
Feb. 8, 1915	.....	3.50	.....
Feb. 17, 1915	.....	3.25	.....
Feb. 26, 1915	.....	3.66	.....
Mar. 11, 1915	.....	4.17	.....
Mar. 23, 1915	.....	4.66	.....
Mar. 30, 1915	.....	4.42	.....
Apr. 20, 1915	.....	4.83	.....
May 15, 1915	.....	4.58	.....
Apr. 12, 1917	.....	4.7	.....
Nov. 26, 1918	.....	45.2	.....
Dec. 18, 1919	.....	46.5	.....

No. 548. W. B. Trumbull.

Sept. 29, 1914	294.50	22.70	271.80
Oct. 6, 1914	.....	21.92	272.58
Nov. 3, 1914	.....	23.30	271.20
Dec. 2, 1914	.....	25.17	269.33
Jan. 11, 1915	.....	23.00	271.50
Jan. 29, 1915	.....	19.00	275.50
Feb. 6, 1915	.....	14.46	280.04
Feb. 20, 1915	.....	11.38	283.12

[a] Measurement taken from the surface of the ground.

No. 548. W. B. Trumbull—Continued.

Date.	Altitude of bench mark at mouth of well (feet above sea level).	Depth to water in well (feet below bench mark).	Altitude of water table (feet above sea level).
Feb. 23, 1915	.....	10.80	283.70
Mar. 7, 1915	.....	10.66	283.84
Mar. 22, 1915	.....	11.33	283.17
Mar. 28, 1915	.....	10.80	283.70
Apr. 20, 1915	.....	12.54	281.96
May 16, 1915	.....	11.30	283.20
Feb. 2, 1916	.....	10.98	283.52
Mar. 14, 1916	.....	11.67	282.83
Apr. 11, 1917	.....	13.8	.....
Dec. 1, 1918	.....	44.7	.....
Dec. 22, 1918	.....	44.9	.....

No. 551. E. Herback.

Sept. 29, 1914	295.01	24.46	270.55
Oct. 30, 1914	.....	22.66	272.35
Dec. 12, 1914	.....	18.66	276.35
Feb. 1, 1915	.....	9.66	285.35
Feb. 23, 1915	.....	4.17	290.84
Mar. 27, 1915	.....	4.92	290.09
Apr. 18, 1915	.....	5.08	289.93
Feb. 2, 1916	.....	3.75	291.26
Mar. 14, 1916	.....	4.65	290.36

No. 552. John Wickman.

Feb. 2, 1916	297.46	3.45	294.01
Mar. 14, 1916	.....	5.04	292.42

No. 553. ——.

Feb. 2, 1916	300.29	5.07	295.22
Mar. 14, 1916	.....	5.82	294.47
Dec. 4, 1917	.....	19.6	.....
Feb. 11, 1919	.....	41.5	.....
May 25, 1919	.....	19.8	.....
Nov. 28, 1919	.....	34.9	.....

No. 554. E. D. Valliant.

Sept. 29, 1914	.....	15.00	.....

No. 555. John Schubert.

Feb. 1, 1916	296.39	4.48	291.91
Mar. 14, 1916	.....	5.44	290.85

No. 556. L. Perkins.

Sept. 29, 1914	293.85	19.34	274.51
Oct. 6, 1914	.....	19.33	274.52
Nov. 6, 1914	.....	16.54	277.31
Dec. 12, 1914	.....	16.83	277.02
Jan. 17, 1915	.....	14.80	279.05
Feb. 1, 1916	.....	6.32	287.53
Mar. 14, 1916	.....	6.90	286.95

Depth to water levels in wells in the vicinity of Morgan Hill—Continued.

No. 557. F. M. Byerly.

Date.	Altitude of bench mark at mouth of well (feet above sea level).	Depth to water in well (feet below bench mark).	Altitude of water table (feet above sea level).
Sept. 29, 1914	301.08	19.80	281.28
Oct. 15, 1914	.....	18.00	283.08
Nov. 4, 1914	.....	23.00	278.08
Dec. 7, 1914	.....	24.00	277.08
Feb. 2, 1915	.....	16.00	285.08
Feb. 19, 1915	.....	10.00	291.08
Mar. 10, 1915	.....	9.00	292.08
Apr. 16, 1915	.....	13.00	288.08
Feb. 2, 1916	.....	6.02	295.06
Mar. 14, 1916	.....	7.32	293.76
Jan. 26, 1917	.....	13.0	.....
May 10, 1917	.....	15.0	.....
Dec. 4, 1917	.....	21.1	.....
Feb. 14, 1919	.....	31.1	.....
Dec. 3, 1919	.....	39.0	.....
Jan.. 23, 1920	.....	Dry.	.....
Apr 10, 1920	.....	[a] 44.00	257.08

No. 558. E. P. Pope.

Feb. 1, 1916	303.12	6.97	296.15
Mar. 14, 1916	.....	7.90	295.22

No. 561. R. McGlashan.

Sept. 29, 1914	.....	23.82	.....
Oct. 14, 1914	.....	24.00	.....
Nov. 11, 1914	.....	24.00	.....
Mar. 29, 1915	.....	12.00	.....

No. 562. H. Robinson.

Sept. 29, 1914	308.30	21.68	286.62
Oct. 15, 1914	.....	22.42	285.88
Nov. 3, 1914	.....	28.92	279.37
Dec. 5, 1914	.....	25.83	282.47
Jan. 11, 1915	.....	25.00	283.30
Jan. 27, 1915	.....	23.00	285.30
Feb. 17, 1915	.....	11.50	296.80
Feb. 23, 1915	.....	10.33	297.97
Mar. 9, 1915	.....	10.00	298.30
Mar. 26, 1915	.....	11.17	297.13
Mar. 30, 1915	.....	11.00	297.30
May 16, 1915	.....	10.00	298.30
Jan. 31, 1916	.....	8.75	299.52
Mar. 13, 1916	.....	9.23	299.07
Mar. 16, 1916	.....	9.35	298.95

No. 563. Santa Clara County.

Sept. 29, 1914	308.35	19.92	288.43
Aug. 1, 1914	.....	17.00	291.35
Jan. 31, 1916	.....	8.70	299.65
Mar. 13, 1916	.....	9.16	299.19
Jan. 23, 1920	.....	[a] 44.20	264.15
Apr. 10, 1920	.....	[a] 41.60	266.75

[a] Measurement taken from the surface of the ground.

No. 564. W. E. Bowman.

Date.	Altitude of bench mark at mouth of well (feet above sea level).	Depth to water in well (feet below bench mark).	Altitude of water table (feet above sea level).
Sept. 29, 1914	309.00	21.06	287.94
Oct. 10, 1914	.....	21.66	287.34
Nov. 9, 1914	.....	22.83	286.17
Dec. 7, 1914	.....	24.09	284.91
Jan. 18, 1915	.....	23.66	285.34
Feb. 11, 1915	.....	12.00	297.00
Feb. 24, 1915	.....	10.50	298.50
Mar. 7, 1915	.....	10.00	299.00
Mar. 20, 1915	.....	10.50	298.50
Apr. 2, 1915	.....	10.66	298.34
Apr. 19, 1915	.....	10.83	298.17
Jan. 31, 1916	.....	8.70	300.30
Mar. 13, 1916	.....	11.05	297.95
Dec. 31, 1916	.....	23.0	.....
May 1, 1917	.....	14.3	.....
Dec. 4, 1917	.....	25.4	.....
Mar. 28, 1918	.....	30.0	.....
Dec. 13, 1918	.....	41.6	.....
Dec. 18, 1918	.....	41.6	.....
Feb. 14, 1919	.....	42.1	.....
May 25, 1919	.....	26.5	.....
Nov. 28, 1919	.....	39.7	.....

No. 565. Robert Westcott.

Sept. 29, 1914	310.99	21.59	289.40
Oct. 25, 1914	.....	23.08	287.91
Feb. 15, 1915	.....	8.33	302.66
Jan. 31, 1916	.....	6.86	304.13
Mar. 13, 1916	.....	6.92	304.07

No. 566. David Danyat.

Sept. 29, 1914	315.42	31.13	284.29
Dec. 2, 1914	.....	28.33	287.09
Feb. 1, 1916	.....	27.29	288.13
Mar. 14, 1916	.....	22.32	293.10

No. 567. ———.

Feb. 1, 1916	329.79	52.31	277.48
Mar. 13, 1916	.....	45.27	284.52

No. 568. E. H. Reignier.

Sept. 28, 1914	339.22	68.30	270.92
Oct. 21, 1914	.....	60.25	278.97
Nov. 30, 1914	.....	45.75	293.47
Jan. 25, 1915	.....	30.33	308.89
Feb. 24, 1915	.....	21.75	317.47
Feb. 1, 1916	.....	61.78	277.44
Mar. 13, 1916	.....	54.98	283.24
May 1, 1917	.....	59.0	.....
Dec. 4, 1917	.....	66.7	.....
Feb. 14, 1919	.....	83.5	.....
May 24, 1919	.....	65.0	.....
Nov. 28, 1919	.....	81.5	.....
Jan. 23, 1920	.....	[a] 80.50	258.72
Apr. 10, 1920	.....	[a] 81.50	257.72

[a] Measurement taken from the surface of the ground.

Depth to water levels in wells in the vicinity of Morgan Hill—Continued.

No. 571. M. E. Hillman.

Date.	Altitude of bench mark at mouth of well (feet above sea level).	Depth to water in well (feet below bench mark).	Altitude of water table (feet above sea level).
Sept. 28, 1914	352.64	57.94	294.70
Feb. 1, 1916	.....	50.40	302.24
Mar. 13, 1916	.....	61.45	291.19

No. 572. G. Logan.

Sept. 29, 1914	315.52	20.60	294.92
Oct. 8, 1914	.....	18.08	297.44
Nov. 5, 1914	.....	19.50	296.02
Dec. 8, 1914	.....	21.66	293.86
Jan. 10, 1915	.....	23.38	292.14
Feb. 1, 1915	.....	22.75	292.77
Feb. 18, 1915	.....	19.25	305.27
Feb. 23, 1915	.....	8.58	306.94
Mar. 8, 1915	.....	7.08	308.44
Mar. 21, 1915	.....	7.00	308.52
Mar. 31, 1915	.....	7.00	308.52
Apr. 17, 1915	.....	8.50	307.02
May 17, 1915	.....	8.17	307.35
Feb. 2, 1916	.....	7.36	308.16
Mar. 13, 1916	.....	5.92	309.60
Jan. 10, 1916	.....	20.4	.....
Dec. 7, 1917	.....	Dry at 22 ft.	.....
May 6, 1919	.....	34.8	.....
Nov. 28, 1919	.....	47.3 (well deepened.)	.....
Dec. 8, 1919	.....	47.3	.....
Jan. 23, 1920	.....	[a] 47.50	278.02
Apr. 10, 1920	.....	[a] 52.50	263.02

No. 573. Andrew Ross.

Sept. 29, 1914	327.81	38.29	289.52
Jan. 31, 1916	.....	17.38	310.43
Mar. 14, 1916	.....	16.18	311.63

No. 574. J. J. Golden.

Sept. 29, 1914	328.63	27.06	301.57
Oct. 10, 1914	.....	27.92	300.71
Nov. 13, 1914	.....	30.00	298.63
Dec. 5, 1914	.....	31.50	297.13
Jan. 12, 1915	.....	32.50	296.13
Jan. 30, 1915	.....	30.58	298.05
Feb. 18, 1915	.....	28.83	299.80
Mar. 1, 1915	.....	27.25	301.38
Jan. 31, 1916	.....	17.23	311.40

No. 575. J. S. Flinn.

Jan. 31, 1916	325.79	17.37	308.42
Mar. 14, 1916	.....	15.95	309.84

[a] Measurement taken from the surface of the ground.

No. 576. ——.

Date.	Altitude of bench mark at mouth of well (feet above sea level).	Depth to water in well (feet below bench mark).	Altitude of water table (feet above sea level).
Sept. 29, 1914	323.17	24.80	298.73
Jan. 31, 1916	.....	13.31	309.86
Mar. 14, 1916	.....	14.08	309.06
Dec. 17, 1917	.....	33.20	.....
Nov. 27, 1918	.....	46.20	.....
Dec. 21, 1918	.....	47.40	.....
May 5, 1919	.....	36.50	.....
Jan. 23, 1920	.....	Sealed.	.....
Apr. 10, 1920	.....	Sealed.	.....

No. 577. ——.

Jan. 31, 1916	320.61	12.90	307.71
Mar. 14, 1916	.....	11.66	308.95

No. 578. S. L. Harris.

Sept. 29, 1914	319.24	25.00	294.24
Jan. 31, 1916	.....	15.74	303.50
Mar. 14, 1916	.....	12.84	306.40

No. 581. J. P. Seal.

Sept. 29, 1914	314.79	23.95	290.84
Oct. 6, 1914	.....	25.50	289.29
Nov. 4, 1914	.....	23.33	291.46
Dec. 1, 1914	.....	23.33	291.46
Jan. 11, 1915	.....	21.50	293.29
Jan. 28, 1915	.....	22.66	292.13
Feb. 8, 1915	.....	22.25	292.54
Feb. 17, 1915	.....	22.00	292.79
Feb. 23, 1915	.....	13.54	5301.2
Mar. 8, 1915	.....	16.00	298.79
Mar. 10, 1915	.....	16.17	298.62
Mar. 23, 1915	.....	13.00	301.79
Mar. 31, 1915	.....	12.25	302.54
Apr. 14, 1915	.....	12.66	302.13
May 15, 1915	.....	13.42	301.37
June 15, 1915	.....	14.70	.....
July 5, 1915	.....	17.00	.....
Aug. 17, 1915	.....	19.40	.....
Sept. 11, 1915	.....	20.00	.....
Oct. 12, 1915	.....	22.00	.....
Nov. 16, 1915	.....	24.00	.....
Dec. 2, 1915	.....	22.00	.....
Dec. 23, 1915	.....	22.00	.....
Jan. 4, 1916	.....	20.0	.....
Jan. 25, 1916	.....	13.0	.....
Jan. 30, 1916	.....	12.0	.....
Jan. 31, 1916	.....	11.91	302.88
Feb. 5, 1916	.....	11.0	.....
Feb. 22, 1916	.....	10.5	.....
Mar. 14, 1916	.....	12.05	302.64
Mar. 20, 1916	.....	11.0	.....
Apr. 15, 1916	.....	10.0	.....
May 15, 1916	.....	14.5	.....
June 11, 1916	.....	15.5	.....
July 26, 1916	.....	16.0	.....
Aug. 25, 1916	.....	17.0	.....
Sept. 18, 1916	.....	19.0	.....
Oct. —, 1916	.....	18.5	.....
Nov. —, 1916	.....	20.0	.....
Dec. —, 1916	.....	27.0	.....
Jan. 15, 1917	.....	23.6	.....

Depth to water levels in wells in the vicinity of Morgan Hill—Continued.

No. 581. J. P. Seal—Continued.

Date.	Altitude of bench mark at mouth of well (feet above sea level).	Depth to water in well (feet below bench mark).	Altitude of water table (feet above sea level).
Feb. 6, 1917	.....	24.0	.....
Mar. 3, 1917	.....	16.6	.....
Apr. 1, 1917	.....	15.0	.....
May 1, 1917	.....	17.3	.....
May 17, 1917	.....	18.0	.....
June 12, 1917	.....	18.5	.....
July 3, 1917	.....	23.4	.....
July 24, 1917	.....	22.0	.....
Aug. 20, 1917	.....	21.7	.....
Sept. 25, 1917	.....	22.0	.....
Oct. 25, 1917	.....	21.5	.....
Nov. 23, 1917	.....	29.0	.....
Dec. 7, 1917	.....	29.2	.....
Jan. 6, 1918	.....	23.3	.....
Feb. 8, 1918	.....	28.5	.....
Mar. 17, 1918	.....	31.0	.....
Apr. 20, 1918	.....	32.0	.....
May 16, 1918	.....	33.0	.....
June 4, 1918	.....	33.5	.....
July 3, 1918	.....	37.0	.....
Aug. 28, 1918	.....	41.0	.....
Sept. 14, 1918	.....	36.5	.....
Oct. 15, 1918	.....	41.0	.....
Nov. 25, 1918	.....	39.5	.....
Dec. 21, 1918	.....	40.5	.....
Feb. 14, 1919	.....	46.0	.....
Mar. 7, 1919	.....	41.5	.....
May 7, 1919	.....	34.5	.....
May 25, 1919	.....	30.7	.....
Nov. 28, 1919	.....	43.7	.....
Jan. 23, 1920	.....	a 52.10	272.69
Apr. 10, 1920	.....	45.60	279.19

No. 582. W. B. Steel.

Jan. 31, 1916	306.72	3.92	303.20
Mar. 13, 1916	.....	4.36	302.36

No. 583. ———.

Jan. 31, 1916	307.17	4.20	302.97
Mar. 13, 1916	.....	5.27	301.90

No. 584. G. H. Du Bois.

Jan. 28, 1915	308.60	12.92	295.68
Mar. 8, 1915	.....	6.50	302.10
Feb. 2, 1916	.....	3.50	305.10
Mar. 13, 1916	.....	5.26	303.34

No. 585. Santa Clara Co.

Sept. 23, 1912	305.15	23.40	281.75
Oct. 4, 1914	.....	15.77	289.38
Feb. 2, 1916	.....	3.67	301.48
Mar. 13, 1916	.....	5.55	299.60

No. 586. William Linden.

Sept. 23, 1912	.....	24.4	.....

a Measurement taken from the surface of the ground.

No. 587. A. Dahle.

Date.	Altitude of bench mark at mouth of well (feet above sea level).	Depth to water in well (feet below bench mark).	Altitude of water table (feet above sea level).
Oct. 4, 1914	315.96	20.51	295.45
Nov. 3, 1914	.....	19.00	296.96
Feb. 2, 1916	.....	6.57	309.39
Mar. 13, 1916	.....	8.32	307.64
May 1, 1917	.....	14.0	.....
Dec. 4, 1917	.....	25.4	.....
Mar. 30, 1918	.....	24.7	.....
Dec. 13, 1918	.....	30.0	.....
Dec. 19, 1918	.....	b 44.0	.....
Feb. 8, 1919	.....	42.0	.....
May 6, 1919	.....	20.0	.....
Jan. 23, 1920	.....	a 42.80	273.16
Apr. 10, 1920	.....	a 43.20	272.76

No. 588. E. J. Cunningham.

Oct. 5, 1914	318.02	20.94	297.08
Feb. 2, 1916	.....	6.69	311.33
Mar. 13, 1916	.....	8.10	309.92

No. 591. M. O. Ryan.

Oct. 5, 1914	314.99	16.62	298.37
Nov. 5, 1914	.....	21.25	293.74
Feb. 4, 1915	.....	8.50	306.49
Apr. 6, 1915	.....	10.33	304.66
Feb. 2, 1916	.....	3.45	311.54
Mar. 13, 1916	.....	4.47	310.52

No. 592. Road well.

Feb. 2, 1916	319.23	7.26	311.97
Mar. 13, 1916	.....	7.85	311.38
May 1, 1917	.....	14.3	.....
Dec. 4, 1917	.....	25.8	.....
Feb. 14, 1919	.....	36.9	.....
May 25, 1919	.....	27.8	.....
Nov. 28, 1919	.....	40.0	.....
Jan. 23, 1920	.....	a 42.00	277.23
Apr. 10, 1920	.....	a 43.00	276.23

No. 594. A. Mast.

Oct. 5, 1914	327.31	27.16	300.15
Feb. 2, 1916	.....	12.80	314.51
Mar. 17, 1916	.....	14.21	313.10

No. 595. G. L. Marvin.

Oct. 5, 1914	328.94	21.89	307.05
Dec. 1, 1914	.....	23.25	305.69
Jan. 30, 1915	.....	19.00	309.94
Feb. 7, 1915	.....	11.00	317.94
Feb. 18, 1915	.....	9.00	319.94
Feb. 2, 1916	.....	8.02	320.92
Mar. 17, 1916	.....	11.75	317.19

a Measurement taken from the surface of the ground.

b Pumped well out Dec. 16, and water has never come back.

Depth to water levels in wells in the vicinity of Morgan Hill—Continued.

No. 595. G. L. Marvin—Continued.

Date.	Altitude of bench mark at mouth of well (feet above sea level).	Depth to water in well (feet below bench mark).	Altitude of water table (feet above sea level).
Apr. 14, 1917	.....	14.8	.....
Dec. 4, 1917	.....	27.2	.....
Apr. 10, 1918	.....	26.5	.....
Jan. 23, 1920	.....	a 43.30	285.64
Apr. 10, 1920	.....	a 38.10	290.84

No. 596. Leonard-Coats Nursery.

Oct. 4, 1914	.....	13.57	.....

No. 597. Leonard-Coats Nursery.

Oct. 4, 1914	.....	11.12	.....

No. 598. J. C. McCloud.

Oct. 5, 1914	.....	21.28	.....
Nov. 5, 1914	.....	24.00	.....

No. 601. C. W. Stone.

Oct. 5, 1914	339.68	11.92	327.76
Nov. 3, 1914	.....	13.10	326.58
Nov. 30, 1914	.....	12.96	326.72
Jan. 9, 1915	.....	12.39	326.29
Jan. 28, 1915	.....	12.08	327.60
Feb. 8, 1915	.....	9.60	330.08
Feb. 18, 1915	.....	9.25	330.43
Feb. 24, 1915	.....	9.33	330.35
Mar. 11, 1915	.....	10.66	329.02
Mar. 19, 1915	.....	11.25	328.43
Mar. 27, 1915	.....	11.58	328.10
May 15, 1915	.....	12.17	327.51
Feb. 2, 1916	.....	9.00	330.68
Mar. 17, 1916	.....	11.51	328.17
Dec. 4, 1917	.....	13.2	.....
Apr. 10, 1918	.....	12.4	.....
Dec. 18, 1918	.....	13.9	.....
Jan. 23, 1920	.....	14.50	325.18
Apr. 10, 1920	.....	12.10	327.58

No. 602. J. M. Squibb.

Oct. 5, 1914	.....	19.17	.....
Dec. 4, 1914	.....	19.17	.....
Jan. 9, 1915	.....	9.75	.....
Jan. 29, 1915	.....	8.83	.....
Feb. 6, 1915	.....	7.75	.....
Feb. 20, 1915	.....	7.70	.....

No. 603. A. Dauberg.

Oct. 6, 1914	.....	13.45	.....
Nov. 4, 1914	.....	13.60	.....
Jan. 14, 1915	.....	10.83	.....
Feb. 28, 1915	.....	10.58	.....
Feb. 24, 1915	.....	8.92	.....
Mar. 28, 1915	.....	10.17	.....

a Measurement taken from the surface of the ground.

No. 604. Mrs. John Patrone.

Date.	Altitude of bench mark at mouth of well (feet above sea level).	Depth to water in well (feet below bench mark).	Altitude of water table (feet above sea level).
Oct. 6, 1914	.....	13.45	.....
Nov. 5, 1914	.....	12.00	.....

No. 605. ———.

Nov. 6, 1914	.....	15.06	.....

No. 608. John Douglass.

Sept. 1, 1914	.....	35.00	.....

No. 611. Santa Clara County.

Oct. 5, 1914	338.68	33.50	305.18
Feb. 2, 1916	.....	16.52	322.16
Mar. 17, 1916	.....	18.13	320.55
Apr. 12, 1917	.....	12.2	.....
Dec. 4, 1917	.....	37.7	.....
Jan. 23, 1920	.....	a 51.50	287.18
Apr. 10, 1920	.....	a 50.20	288.48

No. 615. ———.

Oct. 6, 1914	.....	7.73	.....
Mar. 15, 1916	.....	1.00	.....

No. 616. Santa Clara County.

Oct. 6, 1914	.....	7.47	.....
Mar. 15, 1916	.....	1.92	.....

No. 617. 21-Mile House.

Oct. 5, 1914	327.73	26.00	301.73
Feb. 5, 1916	.....	13.78	313.95
Mar. 15, 1916	.....	12.40	315.33
Dec. 5, 1917	.....	30.0	.....
Feb. 14, 1919	.....	46.6	.....
May 25, 1919	.....	23.9	.....
Nov. 28, 1919	.....	Closed.	.....
Jan. 23, 1920	.....	a 57.00	270.73
Apr. 10, 1920	.....	a 55.70	272.03

No. 618. Dr. C. W. Usher.

Jan. 16, 1916	327.06	20.53	306.53
Mar. 15, 1916	.....	12.53	314.53
Mar. 24, 1916	.....	12.94	314.12
Dec. 5, 1917	.....	22.2	.....
Jan. 9, 1919	.....	50.9	.....
Feb. 14, 1919	.....	50.9	.....
May 5, 1919	.....	35.0	.....
May 25, 1919	.....	39.1	.....
Nov. 28, 1919	.....	47.4	.....
Jan. 23, 1920	.....	a 51.00	275.96
Apr. 10, 1920	.....	a 53.10	274.06

a Measurement taken from the surface of the ground.

Depth to water levels in wells in the vicinity of Morgan Hill—Continued.

No. 621. F. Tremoureux.

Date.	Altitude of bench mark at mouth of well (feet above sea level).	Depth to water in well (feet below bench mark).	Altitude of water table (feet above sea level).
Oct. 6, 1914	330.08	27.14	303.94
Feb. 5, 1916	.....	13.80	316.28
Mar. 15, 1916	.....	13.24	316.84

No. 622. Valentine Gardner.

Oct. 6, 1914	332.26	42.26	290.00
Nov. 15, 1914	.....	33.50	298.76
Jan. 22, 1915	.....	32.33	299.93
Jan. 27, 1915	.....	32.50	299.76
Feb. 21, 1915	.....	22.50	309.76
Feb. 24, 1915	.....	21.33	310.93
Mar. 17, 1915	.....	18.00	314.26
Mar. 21, 1915	.....	19.00	313.26
Mar. 28, 1915	.....	21.00	311.26
Apr. 16, 1915	.....	19.58	312.68
May 17, 1915	.....	18.50	313.76
Feb. 5, 1916	.....	15.92	316.24
Mar. 15, 1916	.....	13.10	319.16
May 1, 1917	.....	21.7	.....
Dec. 5, 1917	.....	33.6	.....
Feb. 14, 1919	.....	51.0	.....
May 25, 1919	.....	40.4	.....
Nov. 28, 1919	.....	48.7	.....

No. 623. ——.

Jan. 23, 1920	.....	[a] 51.20	.....
Apr. 10, 1920	.....	[a] 53.20	.....

No. 627. Ahern & Schilling.

Feb. 5, 1916	338.29	24.08	314.21
Mar. 15, 1916	.....	22.66	315.63
May 1, 1917	.....	31.5	.....
Dec. 7, 1917	.....	43.0	.....
Feb. 14, 1919	.....	64.3	.....
May 25, 1919	.....	50.7	.....
Nov. 28, 1919	.....	60.5	.....
Jan. 23, 1920	.....	[a] 62.90	275.39
Apr. 10, 1920	.....	[a] 63.40	274.89

No. 628. ——.

Feb. 5, 1916	340.53	25.60	314.93
Mar. 15, 1916	.....	24.15	316.38

No. 632. J. D. Cowan.

Jan. 16, 1916	344.16	42.56	301.60
Mar. 15, 916	.....	28.26	315.90
May 1, 1917	.....	37.6	.....
Dec. 7, 1917	.....	49.2	.....
Feb. 14, 1919	.....	70.2	.....
May 25, 1919	.....	67.2	.....
Nov. 28, 1919	.....	(c)	.....
Jan. 23, 1920	.....	65.30	288.86
Apr. 10, 1920	.....	69.20	274.96

[a] Measurement taken from the surface of the ground.
[c] Could not measure.

No. 633. Doctor Cheal.

Date.	Altitude of bench mark at mouth of well (feet above sea level).	Depth to water in well (feet below bench mark).	Altitude of water table (feet above sea level).
Oct. 7, 1914	349.48	43.59	305.89
Feb. 3, 1916	.....	30.75	318.73
Mar. 15, 1916	.....	29.03	320.45
Dec. 11, 1917	.....	[d] 50.8	.....
Nov. 29, 1919	.....	65.0	.....
Jan. 23, 1920	.....	[a] 71.00	278.48
Apr. 10, 1920	.....	[c] 71.50	277.89

No. 634. B. F. Brawn.

Sept. 29, 1914	.....	16.5	.....

No. 636. F. B. Bussing.

Oct. 7, 1914	343.32	38.98	304.34
Nov. 7, 1914	.....	40.0	303.32
Dec. 12, 1914	.....	44.58	298.74
Jan. 12, 1915	.....	44.66	298.64
Feb. 6, 1915	.....	40.58	302.74
Feb. 22, 1915	.....	32.58	310.70
Mar. 2, 1915	.....	30.42	312.96
Mar. 19, 1915	.....	29.00	314.32
Apr. 2, 1915	.....	28.83	314.49
Apr. 9, 1915	.....	28.66	314.66
May 15, 1915	.....	33.25	310.07
Feb. 3, 1916	.....	27.82	315.50
Mar. 15, 1916	.....	25.00	318.32
Dec. 28, 1916	.....	41.3	.....
Apr. 11, 1917	.....	34.7	.....
Dec. 11, 1917	.....	46.1 well closed.	.....
Jan. 23, 1920	.....	Sealed.	.....
Apr. 10, 1920	.....	Sealed.	.....

No. 637. John Arton.

Nov. 9, 1915	347.41	42.02	305.39
Feb. 3, 1916	.....	30.02	317.36
Mar. 17, 1916	.....	26.55	320.86
Apr. 30, 1917	.....	36.4	.....
Dec. 11, 1917	.....	47.8	.....
Feb. 14, 1919	.....	66.2	.....
Nov. 29, 1919	.....	63.6	.....
Jan. 23, 1920	.....	[a] 65.00	282.41
Apr. 10, 1920	.....	[a] 67.20	280.21

No. 638. Roy Hatch.

Oct. 7, 1914	347.37	41.98	305.39
Feb. 3, 1916	.....	24.95	322.42
Mar. 15, 1916	.....	26.76	320.61
Apr. 30, 1917	.....	36.8	.....
Dec. 11, 1917	.....	49.2	.....
Feb. 14, 1919	.....	65.8	.....
Nov. 29, 1919	.....	60.6	.....
Jan. 23, 1920	.....	62.10	285.27
Apr. 10, 1920	.....	68.50	287.87

[a] Measurement taken from the surface of the ground.
[c] Could not measure.
[d] 2 feet above surface.

Depth to water levels in wells in the vicinity of Morgan Hill—Continued.

No. 642. P. L. Lepera.

Date.	Altitude of bench mark at mouth of well (feet above sea level).	Depth to water in well (feet below bench mark).	Altitude of water table (feet above sea level).
Oct. 7, 1914	348.32	43.81	304.51
Nov. 9, 1914	.....	45.66	302.66
Jan. 10, 1915	.....	48.58	299.74
Jan. 29, 1915	.....	48.83	299.49
Feb. 26, 1915	.....	36.58	311.74
Mar. 8, 1915	.....	34.00	314.32

No. 644. William Hatch.

Feb. 3, 1916	350.51	35.74	314.77
Mar. 15, 1916	.....	32.12	318.39

No. 645. B. Johnson.

Nov. 9, 1914	.....	52.35	302.06
Jan. 14, 1915	.....	49.50	304.91
Feb. 24, 1915	.....	49.00	305.41
Mar. 26, 1915	.....	33.10	321.31

No. 646. ——.

Feb. 3, 1916	354.41	35.90	318.51
Mar. 17, 1916	.....	35.82	318.59
Jan. 23, 1920	.....	[a] 74.30	280.11
Apr. 10, 1920	.....	77.90	276.51

No. 647. H. R. Fulkner.

Feb. 3, 1916	355.46	39.80	315.60
Mar. 15, 1916	.....	35.18	320.28
Dec. 11, 1917	.....	57.3	.....
Feb. 14, 1919	.....	76.5	.....
Nov. 28, 1919	.....	79.1	.....

No. 648. W. J. Hatch.

Nov 9, 1914	359.05	55.40	303.65
Jan. 9, 1915	.....	53.00	306.05
Feb. 3, 1916	.....	43.18	314.32
Mar. 15, 1916	.....	38.24	320.81

No. 652. —— Jackson.

Jan. 30, 1916	361.27	48.72	312.55
Mar. 15, 1916	.....	41.77	319.50

No. 653. Road well.

Nov. 9, 1914	361.21	60.58	300.63
Jan. 16, 1916	.....	55.88	305.33
Jan. 30, 1916	.....	47.00	314.21
Mar. 15, 1916	.....	38.50	322.71
Ap . 30, 1917	.....	51.4	.....
Dec. 11, 1917	.....	[e] 64.0	.....
Feb. 14, 1919	.....	72.1	.....

[a] Measurement taken from the surface of the ground.
[e] Mill running.

No. 653. Road well—Continued.

Date.	Altitude of bench mark at mouth of well (feet above sea level).	Depth to water in well (feet below bench mark).	Altitude of water table (feet above sea level).
May 25, 1919	.....	73.1	.....
Nov. 28, 1919	.....	79.51	.....
Jan. 23, 1920	.....	Dry.	.....
Apr. 10, 1920	.....	[a] 83.00	278.21

No. 657. Herbert Somers.

Jan. 16, 1916	357.73	53.26	304.47
Mar. 15, 1916	.....	38.91	318.82
Apr. 30, 1917	.....	49.2	.....
Dec. 11, 1917	.....	61.0	.....
Feb. 14, 1919	.....	79.9	.....
Nov. 28, 1919	.....	83.4	.....
Jan. 23, 192	.....	79.50	278.23
Apr. 10, 1920	.....	82.00	275.73

No. 658. T. B. Wilkie.

Oct. 7, 1914	354.61	50.99	[illegible]
Jan. 31, 1916	.....	41.89	312.42
Mar. 15, 1916	.....	35.72	318.59

No. 661. F. G. Stocking.

Oct. 7, 1914	352.74	50.00	302.74
Jan. 16, 1916	.....	49.07	303.67
Jan. 31, 1916	.....	39.79	312.95
Mar. 15, 1916	.....	34.18	318.56
Apr. 30, 1917	.....	44.9	.....
Dec. 7, 1917	.....	56.6	.....
——, 1918	.....	Well closed.	.....
Feb. 7, 1919	.....	78.0	.....
Jan. 23, 1920	.....	.....	.....
Apr. 10, 1920	.....	78.50	274.24

No. 663. T. Cathers.

Jan. 31, 1916	353.77	39.00	314.77
Mar. 15, 1916	.....	33.67	320.10

No. 664. M. S. Byers.

Jan. 31, 1916	345.28	33.65	311.63
Mar. 15, 1916	.....	29.07	316.21

No. 667. James Castillou.

Sept. 29, 1914	342.27	49.00	293.27
Oct. 6, 1914	.....	49.00	293.27
Nov. 10, 1914	.....	52.00	290.27
Dec. 6, 1914	.....	54.00	288.27
Jan. 11, 1915	.....	52.00	290.27
Feb. 17, 1915	.....	42.00	300.27
Mar. 30, 1915	.....	42.00	300.27
Apr. 15, 1915	.....	40.00	302.27
May 18, 1915	.....	38.00	304.27
Jan. 31, 1916	.....	39.35	302.92
Mar. 15, 1916	.....	34.20	308.07

[a] Measurement taken from the surface of the ground.

Depth to water levels in wells in the vicinity of Morgan Hill—Continued.

No. 668. Tony Muchetto.

Date.	Altitude of bench mark at mouth of well (feet above sea level).	Depth to water in well (feet below bench mark).	Altitude of water table (feet above sea level).
Oct. 7, 1914	355.39	55.90	299.49
Nov. 3, 1914	.....	50.00	305.39
Jan. 31, 1916	.....	41.52	313.87
Mar. 15, 1916	.....	34.06	321.33
Apr. 30, 1917	.....	45.7	.....
Dec. 7, 1917	.....	58.4	.....
Feb. 14, 1919	.....	69.3	.....
May 25, 1919	.....	72.6	.....
Nov. 28, 1919	.....	90.4	.....
Jan. 23, 1920	.....	[a] 78.00	277.39
Apr. 10, 1920	.....	[a] 83.00	272.39

No. 671. P. Locarnini.

Oct. 7, 1914	363.81	60.50	303.31
Dec. 10, 1914	.....	60.17	303.64
Dec. 29, 1914	.....	60.25	303.56
Jan. 30, 1915	.....	65.00	298.81
Jan. 30, 1916	.....	22.50	341.31
Mar. 15, 1916	.....	29.55	334.26
Apr. 30, 1917	.....	42.8	.....
Dec. 11, 1917	.....	64.7	.....
Feb. 14, 1919	.....	69.5	.....
Nov. 28, 1919	.....	97.7	.....
Jan. 23, 1920	.....	[a] 83.50	280.31
Apr. 10, 1920	.....	88.40	275.41

No. 672. Mrs. M. Rait.

Jan. 30, 1916	363.41	49.04	314.37
Mar. 15, 1916	.....	41.70	321.71

No. 674. Albert Hintz.

Oct. 7, 1914	365.23	62.15	303.08
Jan. 30, 1916	.....	49.52	315.71
Mar. 15, 1916	.....	40.30	314.93

No. 675. F. Nielson.

Jan. 26, 1915	373.19	67.50	305.69
Jan. 30, 1916	.....	55.05	318.14
Mar. 17, 1916	.....	44.11	329.08

No. 676. Levi Plavan.

Jan. 30, 1916	375.61	39.42	336.19
Mar. 17, 1916	.....	36.92	338.69

No. 677. G. Bettencourt.

Jan. 30, 1916	378.65	50.18	328.47
Mar. 17, 1916	.....	38.10	340.55
Dec. 11, 1917	.....	75.0	.....
Jan. 23, 1920	.....	100.00	278.65
Apr. 10, 1920	.....	100.00	278.65

[a] Measurement taken from the surface of the ground.

No. 678. John J. Nielsen.

Date.	Altitude of bench mark at mouth of well (feet above sea level).	Depth to water in well (feet below bench mark).	Altitude of water table (feet above sea level.)
Nov. 9, 1914	.....	81.00	.....
Dec. 2, 1914	.....	79.42	.....
Jan. 12, 1915	.....	67.00	.....
Feb. 9, 1915	.....	66.00	.....
Feb. 27, 1915	.....	62.00	.....
Apr. 20, 1915	.....	62.00	.....

No. 681. John Hokawson.

Jan. 30, 1916	385.60	72.12	313.48
Mar. 17, 1916	.....	59.54	326.06
Dec. 27, 1916	.....	78.6	.....
Apr. 30, 1917	.....	71.4	.....
Dec. 11, 1917	.....	83.4	.....
Feb. 14, 1919	.....	103.0	.....
Nov. 29, 1919	.....	100.0	.....
Jan. 23, 1920	.....	[a] 102.00	283.60
Apr. 10, 1920	.....	108.00	277.60

No. 683. R. F. Brady.

Jan. 30, 1916	380.90	67.39	313.51
Mar. 17, 1916	.....	54.54	326.36

No. 685. Road well.

Nov. 9, 1914	373.88	67.67	306.21
Jan. 16, 1916	.....	63.15	310.73
Jan. 30, 1916	.....	46.20	327.74
Mar. 17, 1916	.....	42.28	331.60
Dec. 27, 1916	.....	68.9	.....
Apr. 30, 1917	.....	61.0	.....
Dec. 11, 1917	.....	73.2	.....
Feb. 14, 1919	.....	92.7	.....
Nov. 29, 1919	.....	89.6	.....
Jan. 23, 1920	.....	[a] 95.20	278.68
Apr. 10, 1920	.....	Dry.	.....

No. 686. L. Cunningham.

Jan. 30, 1916	372.73	59.16	313.57
Mar. 17, 1916	.....	50.24	322.49

No. 688. John Munson.

Nov. 9, 1914	.....	78.74	.....

No. 692. J. T. Higgins.

Nov. 10, 1914	382.43	73.40	309.03
Jan. 16, 1916	.....	73.88	308.55
Mar. 17, 1916	.....	55.79	326.64
Mar. 24, 1916	.....	50.63	331.80
Dec. 27, 1916	.....	74.6	.....
Apr. 30, 1917	.....	68.4	.....
Dec. 11, 1917	.....	79.6	.....
Feb. 13, 1919	.....	99.7	.....
May 25, 1919	.....	91.4	.....
Nov. 29, 1919	.....	96.6	.....

[a] Measurement taken from the surface of the ground.

Depth to water levels in wells in the vicinity of Morgan Hill—Continued.

No. 693. E. J. Dubois.

Date.	Altitude of bench mark at mouth of well (feet above sea level).	Depth to water in well (feet below bench mark).	Altitude of water table (feet above sea level).
Nov. 10, 1914	.....	82.45	.....
Nov. 30, 1914	.....	82.92	.....
Jan. 14, 1915	.....	84.66	.....
Feb. 18, 1915	.....	81.00	.....
Mar. 15, 1915	.....	75.33	.....

No. 694. Mrs. K. Pollock.

Jan. 16, 1916	393.89	85.26	308.63
Jan. 28, 1916	.....	81.20	312.69
Mar. 17, 1916	.....	65.31	328.58
Dec. 27, 1916	.....	85.6	.....
Apr. 30, 1917	.....	78.2	.....
Dec. 12, 1917	.....	90.9	.....
Feb. 14, 1919	.....	116.4	.....
Nov. 29, 1919	.....	110.4	.....
Jan. 23, 1920	.....	[a] 108.20	285.69
Apr. 10, 1920	.....	Sealed.	.....

No. 696. J. O. Braden.

Nov. 10, 1914	397.36	87.80	309.56
Jan. 28, 1916	.....	84.20	313.16
Mar. 17, 1916	.....	68.07	329.29

No. 698. G. Saccaggi.

Jan. 28, 1916	397.62	83.32	314.30
Mar. 17, 1916	.....	67.74	329.88
Dec. 12, 1917	.....	93.7	.....
Nov. 29, 1919	.....	111.0	.....
Jan. 23, 1920	.....	[a] 100.00	297.62
Apr. 10, 1920	.....	116.40	281.22

No. 701. C. De Sachy.

Nov. 10, 1914	398.14	85.28	312.86
Mar. 17, 1916	.....	65.05	333.09

No. 702. John L. Fisher.

Nov. 10, 1914	.....	[?] 93.27	.....
Dec. 2, 1914	.....	94.33	.....

No. 703. M. E. Shirley.

Nov. 10, 1914	.....	114.85	.....
Dec. 1, 1914	.....	102.75	.....
Jan. 16, 1915	.....	106.00	.....
Feb. 4, 1915	.....	98.00	.....
Feb. 25, 1915	.....	103.66	.....

No. 704. W. G. Rhodes.

Well unsuccessful; about 500 feet deep.

[a] Measurement taken from the surface of the ground.

No. 705. R. C. Howe.

Date.	Altitude of bench mark at mouth of well (feet above sea level).	Depth to water in well (feet below bench mark).	Altitude of water table (feet above sea level).
.....	.....	50 (dry)	.....

No. 706. W. G. Rhodes.

Good for domestic purposes only; about 110 feet deep.

No. 707. R. C. Howe.

Feb. 3, 1916	404.64	48.67	355.97
Mar. 17, 1916	.....	47.50	357.14

No. 711. George J. Powell.

Nov. 10, 1914	395.46	58.57	336.89
Jan. 13, 1915	.....	59.66	335.80
Feb. 1, 1915	.....	58.00	337.46
Feb. 12, 1915	.....	36.00	359.46
Feb. 17, 1915	.....	44.00	351.46
Feb. 24, 1915	.....	42.83	352.63
Mar. 10, 1915	.....	40.83	354.63
Mar. 28, 1915	.....	40.50	354.96
Apr. 15, 1915	.....	40.00	355.46
May. 17, 1915	.....	45.17	350.29
Jan. 15, 1916	.....	53.60	341.86
Feb. 3, 1916	.....	41.03	354.43
Mar. 17, 1916	.....	40.10	355.36
Dec. 10, 1916	.....	64.8	.....
Apr. 10, 1917	.....	48.8	.....
Mar. 25, 1918	.....	56.7	.....
Sept. 20, 1918	.....	89.0	.....
Sept. 27, 1918	.....	85.5	.....
Oct. 7, 1918	.....	84.0	.....
Oct. 14, 1918	.....	80.0	.....
Oct. 31, 1918	.....	79.0	.....
Dec. 26, 1918	.....	73.0	.....
Feb. 13, 1919	.....	71.9	.....
May 4, 1919	.....	58.0	.....
Dec. 8, 1919	.....	91.7	.....
Jan. 23, 1920	.....	[a] 87.50	307.96
Apr. 10, 1920	.....	69.00	326.46

No. 712. R. C. Howe.

No data.

No. 713. H. D. Pete.

Nov. 10, 1914	392.83	74.26	318.57
Dec. 11, 1914	.....	[f] 78.00	[f] 315.00
Jan. 30, 1915	.....	74.00	318.83
Feb. 21, 1915	.....	62.00	330.83
Mar. 14, 1915	.....	54.00	338.83
Mar. 24, 1915	.....	54.00	338.83
Apr. 19, 1915	.....	56.00	336.83
Jan. 15, 1916	.....	72.17	320.66
Mar. 17, 1916	.....	57.67	335.16

No. 714. F. Croft.

Jan. 15, 1916	383.97	[g] 33.97	350.02
Mar. 17, 1916	.....	28.76	355.21

[a] Measurement taken from the surface of the ground.
[f] Approximate.
[g] Measurement checked high.

Depth to water levels in wells in the vicinity of Morgan Hill—Continued.

No. 715. —— (Chinaman).

Date.	Altitude of bench mark at mouth of well (feet above sea level).	Depth to water in well (feet below bench mark).	Altitude of water table (feet above sea level).
Jan. 15, 1916	376.03	55.96	320.97
Mar. 17, 1916	.....	36.85	339.18

No. 716. Twin Oaks ranch.

Feb. 3, 1916	370.44	36.58	333.86
Mar. 17, 1916	.....	38.93	331.51

No. 717. Vincent Rosso.

Nov. 10, 1914	365.91	49.00	316.91
Feb. 3, 1916	.....	33.86	332.05
Mar. 17, 1916	.....	34.59	331.32

No. 718. Road well.

Jan. 15, 1916	373.39	52.10	321.29
Mar. 17, 1916	.....	40.25	333.14
Dec. 9, 1916	.....	60.26	.....
Dec. 15, 1916	.....	60.6	.....
Apr. 24, 1917	.....	51.6	.....
Apr. 30, 1917	.....	51.9	.....
Dec. 12, 1917	.....	66.4	.....
Nov. 11, 1918	.....	80.0	.....
Nov. 21, 1918	.....	80.2	.....
Jan. 22, 1919	.....	80.6	.....
Feb. 13, 1919	.....	79.6	.....
May 25, 1919	.....	40.9	.....
Dec. 8, 1919	.....	79.6	.....
Jan. 23, 1920	.....	.....	.....
Apr. 10, 1920	.....	[a]80.60	292.79

No. 721. William Pierce.

Nov. 10, 1914	382.20	76.43	305.77
Dec. 9, 1914	.....	69.17	313.03
Feb. 8, 1915	.....	59.58	322.62
Mar. 9, 1915	.....	68.58	313.62
Mar. 29, 1915	.....	58.66	323.54
Jan. 15, 1916	.....	59.37	322.83
Mar. 17, 1916	.....	47.82	334.38
Dec. 15, 1916	.....	67.7	.....
Dec. 12, 1917	.....	73.7	.....
Jan. 23, 1920	.....	[a]94.50	287.70
Apr. 10, 1920	.....	[a]70.00	312.20

No. 722. A. Andrade.

Jan. 28, 1916	371.91	57.47	314.44
Mar. 17, 1916	.....	46.37	325.54

[a] Measurement taken from the surface of the ground.

No. 723. E. S. Dyre.

Date.	Altitude of bench mark at mouth of well (feet above sea level).	Depth to water in well (feet below bench mark).	Altitude of water table (feet above sea level).
Nov. 10, 1914	378.53	71.70	306.83
Jan. 14, 1915	.....	67.66	310.81
June 14, 1915	.....	92.00	.....
Jan. 16, 1916	.....	70.72	307.81
Mar. 17, 1916	.....	53.10	325.43
Dec. 27, 1916	.....	72.00	.....
Apr. 30, 1917	.....	65.20	.....
Dec. 11, 1917	.....	76.70	.....
Feb. 13, 1919	.....	86.00	.....
Nov. 29, 1919	.....	93.00	.....
Jan. 23, 1920	.....	[a]98.50	280.03
Apr. 10, 1920	.....	97.50	281.03

No. 724. J. Jones.

Jan. 28, 1916	373.27	59.63	313.64
Mar. 17, 1916	.....	48.06	325.21

No. 725. Z. Bagwill.

Nov. 10, 1914	369.78	61.15	308.63
Jan. 22, 1915	.....	62.60	307.18
Feb. 10, 1915	.....	59.00	310.78
Feb. 17, 1915	.....	55.25	314.53
Feb. 26, 1915	.....	51.58	318.20
Mar. 9, 1915	.....	47.75	322.03
Mar. 25, 1915	.....	45.58	324.20
Apr. 7, 1915	.....	45.66	324.12
Apr. 20, 1915	.....	45.17	324.61
Jan. 16, 1916	.....	60.89	307.89
Mar. 17, 1916	.....	44.95	324.83
Dec. 11, 1917	.....	66.70	.....
Jan. 23, 1920	.....	[a]87.50	282.28
Apr. 10, 1920	.....	[a]86.30	283.48

No. 726. C. R. Cooper.

Jan. 28, 1916	361.36	46.44	314.92
Mar. 17, 1916	.....	46.06	315.30

No. 727. T. F. McConnell.

Jan. 16, 1916	358.51	48.36	310.15
Mar. 17, 1916	.....	37.20	321.31
Jan. 23, 1920	.....	[a]75.80	282.71
Apr. 10, 1920	.....	[a]78.10	280.41

No. 728. D. P. Weichert.

Jan. 10, 1914	361.87	53.93	307.94
Nov. 5, 1914	.....	54.92	306.95
Dec. 16, 1915	.....	52.03	309.84
Jan. 28, 1916	.....	45.40	316.47
Mar. 17, 1916	.....	44.76	317.11
Dec. 27, 1916	.....	54.80	.....

[a] Measurement taken from the surface of the ground.

Depth to water levels in wells in the vicinity of Morgan Hill—Continued.

No. 728. D. P. Welchert—Continued.

Date.	Altitude of bench mark at mouth of well (feet above sea level).	Depth to water in well (feet below bench mark).	Altitude of water table (feet above sea level).
Apr. 11, 1917	.....	47.80	.....
Dec. 11, 1917	.....	59.30	.....
Mar. 30, 1918	.....	66.00	.....
Dec. 2, 1918	.....	77.60	.....
Dec. 23, 1918	.....	77.60	.....
Feb. 13, 1919	.....	78.50	.....
May —, 1919	.....	69.00	.....
Nov. 29, 1919	.....	75.50	.....

No. 731. Mrs. Fowles.

Jan. 30, 1916	358.83	43.73	315.10
Mar. 17, 1916	.....	36.00	322.83

No. 732. W. A. Cunningham.

Nov. 9, 1914	361.75	53.68	308.07
Dec. 6, 1914	.....	54.83	306.92
Jan. 12, 1915	.....	53.92	307.83
Feb. 9, 1915	.....	56.00	305.75
Mar. 27, 1515	.....	45.58	316.17
Jan. 30, 1916	.....	37.63	324.12
Mar. 17, 1916	.....	40.59	321.16

No. 733. C. E. Barnes.

Jan. 30, 1916	366.98	53.12	313.86
Mar. 17, 1916	.....	49.97	317.01
Dec. 11, 1917	.....	68.10	.....
Feb. 14, 1919	.....	85.80	.....
Nov. 29, 1919	.....	82.90	.....
Jan. 23, 1920	.....	[a]90.00	276.98
Apr. 10, 1920	.....	88.20	278.78

No. 734. S. F. Dowell.

Jan. 30, 1916	364.30	50.29	314.01
Mar. 17, 1916	.....	43.07	321.23
Dec. 27, 1916	.....	59.60	.....
Apr. 12, 1917	.....	55.90	.....
Dec. 11, 1917	.....	64.00	.....
Mar. 28, 1918	.....	77.20	.....
Nov. 26, 1918	.....	81.40	.....
Dec. 20, 1918	.....	82.60	.....
Feb. 14, 1919	.....	84.50	.....
May 22, 1919	.....	75.20	.....
May 25, 1919	.....	82.50	.....
Nov. 29, 1919	.....	80.50	.....
Jan. 23, 1920	.....	[a]86.20	278.10
Apr. 10, 1920	.....	85.20	279.10

No. 736. J. P. Knowlton.

Jan. 30, 1916	351.64	36.20	315.44
Mar. 17, 1916	.....	30.00	321.64

[a] Measurement taken from the surface of the ground.

No. 737. E. A. Johnson.

Date.	Altitude of bench mark at mouth of well (feet above sea level).	Depth to water in well (feet below bench mark).	Altitude of water table (feet above sea level).
Feb. 3, 1916	345.53	18.95	326.58
Mar. 17, 1916	.....	19.63	325.90

No. 746. M. Casalegno.

Nov. 10, 1914	350.31	34.57	315.74
Dec. 1, 1914	.....	41.66	308.65
Jan. 9, 1915	.....	40.00	310.31
Jan. 27, 1915	.....	40.00	310.31
Feb. 23, 1915	.....	32.00	318.31
Mar. 8, 1915	.....	28.00	322.31
Mar. 20, 1915	.....	27.00	323.31
Mar. 26, 1915	.....	27.00	323.31
Apr. 18, 1915	.....	27.00	323.31
May 27, 1915	.....	27.00	323.31
Jan. 15, 1916	.....	34.23	316.08
Mar. 17, 1916	.....	24.00	326.31
Dec. 11, 1917	.....	45.60	.....
Mar. 27, 1918	.....	52.00	.....
Nov. 26, 1918	.....	56.50	.....
Dec. 20, 1918	.....	57.00	.....
Feb. 13, 1919	.....	61.30	.....
May 1, 1919	.....	56.00	.....
Nov. 29, 1919	.....	56.90	.....
Jan. 23, 1920	.....	[a]61.20	289.11
Apr. 10, 1920	.....	[a]68.00	282.31

No. 747. Higgins & Sterrett.

Nov. 11, 1914	352.82	49.82	303.00
Dec. 15, 1914	.....	50.25	302.57
Feb. 24, 1915	.....	65.00	287.82
Jan. 15, 1916	.....	35.42	316.08
Mar. 17, 1916	.....	23.76	329.06
Dec. 12, 1917	.....	43.70	.....
Nov. 29, 1919	.....	57.80	.....
Jan. 23, 1920	.....	[a]56.70	296.12
Apr. 10, 1920	.....	[a]64.00	288.82

No. 748. —— McMann.

Feb. 7, 1916	350.62	20.88	329.74
Mar. 17, 1916	.....	25.73	324.89

No. 751. Lillian McMullen.

Nov. 11, 1914	.....	26.02	.....

No. 754. W. R. Sterrett.

Feb. 7, 1916	354.76	9.82	344.94
Mar. 17, 1916	.....	5.38	349.38

[a] Measurement taken from the surface of the ground.

Depth to water levels in wells in the vicinity of Morgan Hill—Continued.

No. 755. ———.

Date.	Altitude of bench mark at mouth of well (feet above sea level).	Depth to water in well (feet below bench mark).	Altitude of water table (feet above sea level).
Nov. 11, 1914	353.24	25.10	328.14
Feb. 7, 1916	.....	16.10	337.14
Mar. 17, 1916	.....	10.80	342.44

No. 756. Peter Bender.

Nov. 10, 1914	354.52	39.45	315.07
Dec. 5, 1914	.....	52.66	311.86
Jan. 12, 1915	.....	43.41	311.11
Jan. 28, 1915	.....	40.32	314.20
Feb. 6, 1915	.....	40.00	314.52
Feb. 18, 1915	.....	34.66	319.86
Feb. 23, 1915	.....	33.32	321.20
Mar. 8, 1915	.....	30.66	323.86
Mar. 22, 1915	.....	29.66	324.86
Mar. 29, 1915	.....	29.16	325.36
Apr. 16, 1915	.....	28.58	325.94
May 15, 1915	.....	29.32	325.20
Jan. 15, 1916	.....	36.61	317.91
Mar. 17, 1916	.....	24.60	329.92
Dec. 9, 1916	.....	38.7	.....
Apr. 11, 1917	.....	31.0	.....
Dec. 12, 1917	.....	44.4	.....
Mar. 27, 1918	.....	48.5	.....
Nov. 26, 1918	.....	60.0	.....
Dec. 19, 1918	.....	61.7	.....
May 2, 1919	.....	50.5	.....
Nov. 29, 1919	.....	59.7	.....
Jan. 23, 1920	.....	a 61.30	392.22
Apr. 10, 1920	.....	a 63.00	291.52

No. 757. F. H. Earls.

Dec. 10, 1914	350.03	35.00	315.03
Dec. 11, 1914	.....	35.00	315.03
Feb. 7, 1916	.....	20.71	329.32
Mar. 17, 1916	.....	18.40	331.63

No. 758. P. F. Compagnon.

Nov. 11, 1914	354.48	19.05	335.43
Dec. 4, 1914	.....	25.00	329.48
Jan. 13, 1915	.....	21.42	333.06
Jan. 30, 1915	.....	21.00	333.48
Feb. 20, 1915	.....	12.00	342.48
Mar. 8, 1915	.....	18.00	336.48
Mar. 23, 1915	.....	20.00	334.48
Mar. 27, 1915	.....	20.00	334.48
Apr. 17, 1915	.....	19.66	334.82
Feb. 7, 1916	.....	7.44	347.04
Mar. 17, 1916	.....	4.00	350.48

No. 761. Road well.

Jan. 15, 1916	351.10	34.48	316.62
Mar. 17. 1916	.....	23.30	327.80
Dec. 15, 1916	.....	36.6	.....
———, 1917	.....	31.6	.....
Dec. 12, 1917	.....	38.8	.....
Jan. 22, 1919	.....	43.2	.....
Feb. 13, 1919	.....	36.2	.....

a Measurement taken from the surface of the ground.

No. 761. Road well—Continued.

Date.	Altitude of bench mark at mouth of well (feet above sea level).	Depth to water in well (feet below bench mark).	Altitude of water table (feet above sea level).
Nov 29, 1919	.....	44.6	.....
Dec. 8, 1919	.....	44.0	.....
Jan. 23, 1920	.....	a 45.00	306.10
Apr. 10, 1920	.....	a 39.60	311.50

No. 762. John Attos.

Jan. 15, 1916	350.12	33.36	316.76
Mar. 17, 1916	.....	21.16	328.96

No. 763. Guido Bros.

Jan. 15, 1916	357.34	41.00	316.34
Mar. 17, 1916	.....	28.28	329.06

No. 764. Ben Patrone.

Jan. 15, 1916	347.73	28.86	318.87
Mar. 17, 1916	.....	19.42	328.31
Dec. 15, 1916	.....	39.1	.....
May 1, 1917	.....	30.1	.....
Dec. 12, 1917	.....	47.8	.....
Jan. 22, 1919	.....	58.5	.....
Feb. 13, 1919	.....	54.8	.....
May 25, 1919	.....	43.7	.....
Dec. 8, 1919	.....	56.3	.....

No. 765. ———.

Jan. 23, 1920	.....	57.00	.....
Apr. 10, 1920	.....	59.00	.....

No. 766. C. Conlan.

Nov. 11, 1914	.....	39.14	.....

No. 768. Mrs. Casio.

Nov. 11, 1914	336.37	30.82	305.55
Feb. 7, 1916	.....	9.95	326.42
Mar. 17, 1916	.....	12.73	323.64

No. 772. John Burk.

Feb. 7, 1916	335.00	8.90	326.10
Mar. 18, 1916	.....	11.40	323.60
Dec. 15, 1916	.....	30.8	.....
Dec. 27. 1916	.....	30.8	.....
Apr. 3, 1917	.....	39.0	.....
Apr. 21. 1917	.....	18.2	.....
Apr. 24, 1917	.....	20.7	.....
Dec. 13, 1917	.....	35.6	.....
Nov. 11, 1918	.....	46.9	.....
Nov. 28, 1918	.....	45.0	.....
May 5, 1919	.....	27.5	.....
Dec. 7, 1919	.....	45.0	.....
Jan. 23, 1920	.....	.....	.....
Apr. 10, 1920	.....	a 45.00	290.00

a Measurement taken from the surface of the ground.

Depth to water levels in wells in the vicinity of Morgan Hill—Continued.

No. 773. G. F. Peyler.

Date.	Altitude of bench mark at mouth of well (feet above sea level).	Depth to water in well (feet below bench mark).	Altitude of water table (feet above sea level).
Nov. 11, 1914	327.99	24.80	303.19
Feb. 7, 1916	.....	10.28	317.71
Mar. 18, 1916	.....	12.43	315.56

No. 774. G. Legge.

Feb. 7, 1916	328.91	8.43	320.57
Mar. 18, 1916	.....	10.63	318.28
Dec. 13, 1917	.....	33.2	.....
Dec. 7, 1919	.....	41.5	.....
Jan. 23, 1920	.....	46.80	282.11
Apr. 10, 1920	.....	41.17	287.21

No. 775. ——— Reynolds.

Feb. 7, 1916	323.03	10.54	322.49
Mar. 18, 1916	.....	12.90	320.13

No. 776. ———.

Feb. 7, 1916	331.85	7.89	323.96
Mar. 18, 1916	.....	10.41	321.44

No. 778. P. Raggio.

Nov. 11, 1914	353.04	42.77	310.27
Dec. 8, 1914	.....	49.92	303.12
Jan. 11, 1915	.....	44.33	308.71
Jan. 28, 1915	.....	42.25	310.79
Feb. 10, 1915	.....	26.08	326.96
Feb. 19, 1915	.....	20.00	333.04
Feb. 24, 1915	.....	19.00	334.04
Mar. 6, 1915	.....	18.50	334.54
Mar. 18, 1915	.....	18.00	335.04
Mar. 30, 1915	.....	19.50	333.54
Feb. 8, 1916	.....	17.16	335.88
Mar. 18, 1916	.....	19.14	333.90
Dec. 27, 1916	.....	42.0	.....
Apr. 30, 1917	.....	26.1	.....
Dec. 12, 1917	.....	56.3	.....
Jan. 22, 1919	.....	66.6	.....
Feb. 13, 1919	.....	57.4	.....
Dec. 7, 1919	.....	68.7	.....
Jan. 23, 1920	.....	Closed.	.....
Apr. 10, 1920	.....	[b] 53.00	300.4

No. 781. G. Traverso.

Nov. 11, 1914	361.98	50.88	311.10
Jan. 15, 1916	.....	43.61	318.37
Mar. 17, 1916	.....	30.20	331.78
Dec. 15, 1916	.....	50.6	.....
May 1, 1917	.....	40.0	.....
Dec. 12, 1917	.....	58.4	.....
Feb. 13, 1919	.....	67.3	.....
Dec. 7, 1919	.....	71.5	.....
Jan. 23, 1910	.....	[a] 69.20	292.78
Apr. 10, 1920	.....	[a] 75.00	286.98

[a] Measurement taken from the surface of the ground.

[b] Old well caved; this well is 50 feet northeast of old one.

No. 782. Jack Bevilaqua.

Date.	Altitude of bench mark at mouth of well (feet above sea level).	Depth to water in well (feet below bench mark).	Altitude of water table (feet above sea level).
Nov. 11, 1914	366.93	53.26	313.67
Jan. 12, 1915	.....	33.00	333.93
Feb. 7, 1915	.....	30.50	336.43
Jan. 15, 1916	.....	45.42	321.51
Mar. 17, 1916	.....	29.02	337.91

No. 783. ———.

Jan. 15, 1916	378.15	35.87	342.28
Mar. 17, 1916	.....	26.60	351.55
Dec. 12, 1917	79.2	.....	.....
Feb. 13, 1919	60.5	.....	.....
Dec. 8, 1919	76.9	.....	.....
Jan. 23, 1920	.....	Closed.	.....
Apr. 10, 1920	.....	[a] 59.20	318.95

No. 784. ———.

Nov. 11, 1914	.....	47.87	.....

No. 785. Stefano Puppo.

Nov. 11, 1914	.....	43.23	.....
Dec. 9, 1916	.....	43.2	.....
Dec. 15, 1916	.....	33.0	.....
May 1, 1917	.....	23.6	.....
Dec. 12, 1917	.....	70.4	.....
Feb. 13, 1919	.....	38.2	.....
Dec. 8, 1919	.....	67.2	.....
Jan. 23, 1920	.....	[a] 36.00	.....
Apr. 10, 1920	.....	[a] 30.80	.....

No. 786. Kirby estate.

Nov. 21, 1914	355.06	43.97	311.09
Dec. 1, 1914	.....	44.50	310.56
Feb. 8, 1916	.....	16.93	338.13
Mar. 18, 1916	.....	19.72	335.34
Dec. 9, 1916	.....	40.8	.....
Apr. 30, 1917	.....	23.2	.....
Dec. 12, 1917	.....	57.7	.....
May 25, 1919	.....	25.0	.....
Dec. 7, 1919	.....	53.0	.....
Jan. 23, 1920	.....	Dry.	.....
Apr. 10, 1920	.....	35.50	319.56

No. 787. Mrs. Rogan.

Nov. 21, 1914	348.26	53.10	295.16
Dec. 1, 1914	.....	54.17	294.09
Feb. 8, 1916	.....	28.64	319.62
Mar. 18, 1916	.....	28.66	319.60

No. 788. Mrs. Rogan.

Nov. 21, 1914	346.33	52.28	294.05
Dec. 1, 1914	.....	52.16	293.17
Feb. 8 1916	.....	16.16	330.17
Mar. 18, 1916	.....	18.62	327.71

[a] Measurement taken from the surface of the ground.

Depth to water levels in wells in the vicinity of Morgan Hill—Continued.

No. 791. M. Mast.

Date.	Altitude of bench mark at mouth of well (feet above sea level).	Depth to water in well (feet below bench mark).	Altitude of water table (feet above sea level).
Nov. 21, 1914	341.77	49.72	282.05
Feb. 8, 1916	.....	13.08	328.69
Mar. 18, 1916	.....	14.80	326.97
Dec. 12, 1917	.....	58.8	.....
Jan. 23, 1920	.....	[i] 44.50	297.27
Apr. 10, 1920	.....	[i] 24.50	317.27

No. 792. E. G. Sharon.

Feb. 8, 1916	332.26	9.88	322.38
Mar. 18, 1916	.....	10.92	321.34
Dec. 10, 1916	.....	15.4	.....
Dec. 13, 1917	.....	50.7	.....
Jan. 23, 1920	.....	32.70	299.56
Apr. 10, 1920	.....	7.50	324.76

A little water flowing in Coyote River.

No. 794. Rudolph Miana.

Nov. 20, 1914	325.92	34.91	291.01
Dec. 1, 1914	.....	34.33	291.59
Jan. 10, 1915	.....	32.83	293.09
Jan. 22, 1915	.....	29.17	296.75
Feb. 19, 1915	.....	17.17	308.75
Mar. 7, 1915	.....	15.83	310.09
Mar. 22, 1915	.....	16.00	309.92
Mar. 29, 1915	.....	16.00	309.92
Feb. 7, 1916	.....	16.42	309.50
Mar. 18, 1916	.....	15.32	310.60
Dec. 15, 1916	.....	34.4	.....
Dec. 13, 1917	.....	39.5	.....
Nov. 21, 1918	.....	50.0	.....
Jan. 22, 1919	.....	41.2	.....
May 25, 1919	.....	23.7	.....
Dec. 7, 1919	.....	46.5	.....
Jan. 23, 1920	.....	46.00	279.92
Apr. 10, 1920	.....	.....	.....

No. 795. B. Martella.

Dec. 1, 1914	327.43	30.58	297.05
Jan. 10, 1915	.....	31.33	296.10
Jan. 30, 1915	.....	27.75	299.68
Feb. 17, 1915	.....	16.33	311.10
Feb. 23, 1915	.....	15.00	312.43
Mar. 9, 1915	.....	14.92	312.51
Mar. 22, 1915	.....	14.83	312.60
Mar. 27, 1915	.....	14.50	312.93
May 18, 1915	.....	14.58	212.85
Feb. 7, 1916	.....	12.45	314.98
Mar. 18, 1916	.....	13.28	314.15
Dec. 15, 1916	.....	32.8	.....
Dec. 22, 1916	.....	32.4	.....
Apr. 30, 1917	.....	22.9	.....
Dec. 13, 1917	.....	37.7	.....
Jan. 22, 1919	.....	45.3	.....
Feb. 12, 1919	.....	41.5	.....
May 25, 1919	.....	29.0	.....
Dec. 7, 1919	.....	48.0	.....
Jan. 22, 1920	.....	46.30	281.13
Apr. 10, 1920	.....	40.60	286.83

[i] Measurement taken from the surface of the ground. Mill had been running. Water rose 15 feet in ½ hour after mill stopped pumping.

No. 796. B. Martella.

Date.	Altitude of bench mark at mouth of well (feet above sea level).	Depth to water in well (feet below bench mark).	Altitude of water table (feet above sea level).
Nov. 11, 1914	330.05	31.45	298.60
Feb. 7, 1916	.....	14.72	315.33
Mar. 18, 1916	.....	15.13	314.92

No. 797. ———.[k]

Nov. 11, 1914	320.74	21.75	298.99
Feb. 7, 1916	.....	6.36	314.38
Mar. 18, 1916	.....	7.37	313.37
Dec. 10, 1916	.....	34.7	.....
Apr. 30, 1917	.....	14.5	.....
Dec. 13, 1917	.....	28.2	.....
Feb. 12, 1919	.....	33.4	.....
May 23, 1919	.....	20.1	.....
Dec. 7, 1919	.....	35.8	.....
Jan. 23, 1919	.....	37.50	283.24
Apr. 10, 1920	.....	36.80	282.94

No. 798. ———.

Feb. 7, 1916	310.80	6.06	304.74
Mar. 18, 1916	.....	4.16	306.64

No. 801. ———.

Feb. 7, 1916	307.05	9.76	297.09
Mar. 18, 1916	.....	5.64	301.41
Apr. 30, 1917	.....	10.9	.....
Dec. 13, 1917	.....	26.9	.....
Feb. 12, 1919	.....	31.8	.....
May 23, 1919	.....	19.2	.....
Dec. 7, 1919	.....	32.8	.....
Jan. 23, 1920	.....	33.50	273.55
Apr. 10, 1920	.....	31.80	275.25

No. 802. ———.

.....	.....	22.75	.....

No. 803. G. P. Blaine.

Feb. 8, 1916	307.05	12.28	294.77
Mar. 18, 1916	.....	7.39	299.66

No. 804. G. B. Cushing.

Feb. 8, 1916	308.46	13.70	294.76
Mar. 1, 1916	.....	8.0	.....
Mar. 18, 1916	.....	8.58	299.88
Dec. 15, 1916	.....	30.7	.....
Mar. 1, 1917	.....	14.9	.....
Mar. 13, 1917	.....	13.7	.....
Mar. 16, 1917	.....	13.3	.....
Apr. 30, 1917	.....	14.9	.....
Dec. 13, 1917	.....	34.3	.....
Feb. 12, 1919	.....	31.5	.....
May 23, 1919	.....	20.2	.....
Dec. 7, 1919	.....	39.1	.....
Jan. 23, 1920	.....	36.00	272.46
Apr. 10, 1920	.....	25.80	282.66

[k] Said to have struck bedrock at 244 feet.

Depth to water levels in wells in the vicinity of Morgan Hill—Continued.

No. 805. S. M. Rossi Co.

Date.	Altitude of bench mark at mouth of well (feet above sea level).	Depth to water in well (feet below bench mark).	Altitude of water table (feet above sea level).
Nov. 20, 1914	311.09	31.42	279.67
Dec. 1, 1914	.....	30.54	280.55
Jan. 11, 1915	.....	30.33	280.66
Feb. 8, 1916	.....	16.79	294.30
Mar. 18, 1916	.....	11.73	299.36

No. 806. A. J. Nielsen.

Feb. 7, 1916	319.97	16.77	303.18
Mar. 18, 1916	.....	14.21	305.76

No. 807. P. Tarp.

Nov. 20, 1914	322.05	38.77	283.28
Dec. 4, 1914	.....	41.83	280.22
Jan. 11, 1915	.....	32.75	289.30
Feb. 3, 1915	.....	26.83	295.22
Feb. 19, 1915	.....	20.66	301.39
Feb. 24, 1915	.....	19.58	302.47
Mar. 10, 1915	.....	18.04	304.01
Mar. 26, 1915	.....	17.54	304,51
Apr. 26, 1915	.....	18.50	303.55
Feb. 7, 1916	.....	19.32	302.73
Mar. 18, 1916	.....	16.87	305.18
Dec. 15, 1916	36.9	.....	.....
Dec. 27, 1916	34.8	.....	.....
Apr. 24, 1917	20.8	.....	.....
Dec. 13, 1917	44.1	.....	.....
Nov. 21, 1918	51.8	.....	.....
Jan. 22, 1919	43.2	.....	.....
Feb. 12, 1919	38.9	.....	.....
May 23, 1919	27.2	.....	.....
Dec. 7, 1919	50.3	.....	.....
Jan. 23, 1920	.....	Dry.	.....
Apr. 10, 1920	.....	32.80	289.25

No. 808. E. G. Sharon.

Nov. 20, 1914	323.62	45.66	277.96
Dec. 1, 1914	.....	43.58	280.04
Jan. 10, 1915	.....	14.17	309.45
Feb. 1, 1915	.....	10.42	313.20
Feb. 8, 1916	.....	8.66	314.96
Mar. 18, 1916	.....	10.00	313.62

No. 811. ——.

Jan. 23, 1920	.....	46.70	.....
Apr. 10, 1920	.....	19.00	.....

No. 813. Antone Moniz.

Feb. 8, 1916	309.51	13.44	196.07
Mar. 18, 1916	.....	10.70	298.81
Jan. 23, 1920	.....	Dry.	.....
Apr. 10, 1920	.....	21.00	285.51

No. 815. H. A. Peppin.

Date.	Altitude of bench mark at mouth of well (feet above sea level).	Depth to water in well (feet below bench mark).	Altitude of water table (feet above sea level).
Nov. 20, 1914	307.88	31.46	276.42
Dec. 2, 1914	.....	32.33	275.55
Jan. 10, 1915	.....	25.21	282.67
Jan. 29, 1915	.....	20.75	287.13
Feb. 9, 1915	.....	15.75	292.13
Feb. 19, 1915	.....	12.42	295.46
Feb. 24, 1915	.....	11.21	296.67
Mar. 7, 1915	.....	9.66	298.22
Mar. 22, 1915	.....	9.25	298.63
Mar. 29, 1915	.....	9.25	298.63
Apr. 21, 1915	.....	10.33	297.55
May 17, 1915	.....	11.00	296.88
Feb. 8, 1916	.....	10.76	297.12
Mar. 18, 1916	.....	8.54	299.34
Dec. 27, 1916	.....	27.4	.....
Apr. 13, 1917	.....	12.0	.....
Dec. 14, 1917	.....	36.5	.....
Dec. 1, 1918	.....	43.5	.....
Dec. 30, 1918	.....	37.4	.....
Feb. 12, 1919	.....	30.9	.....
May 12, 1919	.....	18.0	.....
May 23, 1919	.....	18.9	.....
Dec. 7, 1919	.....	41.4	.....

No. 817. P. A. Ramelli.

Nov. 21, 1914	302.45	31.38	271.07
Feb. 8, 1916	.....	9.86	292.59
Mar. 18, 1916	.....	7.32	295.13
Dec. 15, 1916	.....	51.1	.....
Dec. 14, 1917	.....	35.5	.....
May 23, 1919	.....	16.8	.....
Dec. 7, 1919	.....	39.1	.....
Jan. 23, 1920	.....	35.90	266.55
Apr. 10, 1920	.....	26.90	275.55

No. 821. Santa Clara County.

Nov. 21, 1914	305.40	34.52	270.88
Feb. 8, 1916	.....	8.29	297.11
Mar. 18, 1916	.....	7.29	298.11

No. 822. ——.

Jan. 23, 1920	.....	43.30	.....
Apr. 10, 1920	.....	14.50	.....

No. 823. O. H. Barnhart.

Nov. 21, 1914	309.56	39.76	269.80
Feb. 8, 1916	.....	9.10	300.46
Mar. 18, 1916	.....	9.54	300.02
Dec. 10, 1916	.....	34.5	.....
Apr. 24, 1917	.....	14.3	.....
Dec. 14, 1917	.....	44.5	.....
Jan. 22, 1919	.....	42.0	.....
Feb. 12, 1919	.....	16.3	.....
May 23, 1919	.....	22.1	.....
Dec. 7, 1919	.....	48.0	.....

Depth to water levels in wells in the vicinity of Morgan Hill—Continued.

No. 824. John Shepard.

Date.	Altitude of bench mark at mouth of well (feet above sea level).	Depth to water in well (feet below bench mark).	Altitude of water table (feet above sea level).
Nov. 21, 1914	298.24	30.78	267.46
Dec. 1, 1914	.....	31.58	266.66
Jan. 10, 1915	.....	23.50	274.74
Feb. 1, 1915	.....	15.32	282.92
Feb. 9, 1915	.....	9.66	288.58
Mar. 1, 1915	.....	5.92	292.22
Apr. 6, 1915	.....	6.75	291.49
May 1, 1915	.....	7.75	290.49
Feb. 8, 1916	.....	6.10	292.14
Mar. 18, 1916	.....	5.69	292.55
Dec. 27, 1916	.....	21.6	.....
Dec. 29, 1916	.....	21.6	.....
Apr. 24, 1917	.....	7.2	.....
Dec. 14, 1917	.....	35.7	.....
Jan. 22, 1919	.....	34.5	.....
May 23, 1919	.....	16.0	.....
Dec. 7, 1919	.....	39.0	.....
Jan. 23, 1920	.....	35.20	263.04
Apr. 10, 1920	.....	[a]17.30	280.94

No. 825. O. Cristopher.

Feb. 8, 1916	296.20	7.01	289.19
Mar. 18, 1916	.....	5.67	290.53

No. 826. ——— (Chinaman).

Feb. 8, 1916	288.35	5.65	282.70
Mar. 18, 1916	.....	4.26	284.09
Dec. 10, 1916	.....	27.4	.....
Apr. 24, 1917	.....	6.8	.....
Dec. 14, 1917	.....	28.2	.....
Jan. 22, 1919	.....	30.9	.....
May 23, 1919	.....	13.1	.....
Dec. 7, 1919	.....	31.5	.....
Jan. 23, 1920	.....	[a]29.40	258.95
Apr. 10, 1920	.....	[a]24.50	263.85

No. 827. Mathew Smith.

Nov. 21, 1914	290.08	25.44	264.64
Feb. 8, 1916	.....	3.16	286.92
Mar. 18, 1916	.....	2.44	287.64

No. 830. E. Jensen.

Dec. 14, 1917	.....	41.0	.....

No. 831. Manuel Costa.

Feb. 8, 1916	293.20	5.03	287.17
Mar. 18, 1916	.....	4 56	288.64

No. 832. F. Passintino.

Feb. 8, 1916	297.06	13.03	284.03
Mar. 18, 1916	.....	13.15	283.91

[a] Measurement taken from the surface of the ground.

No. 833. P. J. Wooley.

Date.	Altitude of bench mark at mouth of well (feet above sea level).	Depth to water in well (feet below bench mark).	Altitude of water table (feet above sea level).
Nov. 22, 1914	296.43	43.88	252.55
Dec. 13, 1914	.....	43.75	252.68
Jan. 10, 1915	.....	28.66	267.77
Feb. 13, 1915	.....	14.00	182.43
Feb. 14, 1915	.....	14.00	282.43
Feb. 28, 1915	.....	13.75	282.68
Mar. 7, 1915	.....	14.17	282.26
Mar. 21, 1915	.....	14.83	281.60
Apr. 18, 1915	.....	15.83	280.60
May 9, 1915	296.43	16.42	280.01
Feb. 8, 1916	.....	14.10	282.33
Mar. 18, 1916	.....	14.94	281.49
Jan. 23, 1920	.....	33.80	262.63
Apr. 10, 1920	.....	26.90	269.53

No. 834. ——— Sheriffs.

Nov. 22, 1914	291.32	32.34	258.98
Feb. 8, 1916	.....	12.57	278.75
Mar. 18, 1916	.....	12.66	278.66

No. 835. ——— Porter.

Nov. 22, 1914	285.04	26.80	258.24
Feb. 8, 1916	.....	9.02	276.02
Mar. 18, 1916	.....	9.19	275.85

No. 836. ——— Richmond.

Nov. 22, 1914	286.15	31.33	254.82
Jan. 15, 1915	.....	28.00	258.15
Feb. 4, 1915	.....	21.00	265.15
Mar. 4, 1915	.....	14.00	272.15
Apr. 2, 1915	.....	15.50	270.65
Feb. 8, 1916	.....	12.86	273.29
Mar. 18, 1916	.....	13.21	272.94
Apr. 24, 1917	.....	14.4	.....
Dec. 14, 1917	.....	([l])	.....
Jan. 22, 1919	.....	40.2	.....
Feb. 14, 1919	.....	35.4	.....
May 23, 1919	.....	22.5	.....
Dec. 7, 1919	.....	31.2	.....
Jan. 23, 1920	.....	Dry.	.....
Apr. 10, 1920	.....	27.40	258.75

No. 837. Lion Mosbacher.

Nov. 22, 1914	.....	31.4	.....
Dec. 29, 1916	.....	28.7	.....
Dec. 14, 1917	.....	Pumping.	.....
Nov. 21, 1918	.....	42.6	.....
Jan. 23, 1920	.....	42.6	.....
Apr. 10, 1920	.....	32.9	.....

No. 838. Well in field.

Nov. 23, 1914	.....	[m]4.0	.....

[l] Dry at 30 feet; caved.
[m] Sometimes closed in winter.

Depth to water levels in wells in the vicinity of Morgan Hill—Continued.

No. 839. ———.

Date.	Altitude of bench mark at mouth of well (feet above sea level).	Depth to water in well (feet below bench mark).	Altitude of water table (feet above sea level).
Dec. 15, 1917	.....	25.9	.....
Jan. 23, 1920	.....	25.0	.....
Apr. 10, 1920	.....	21.9	.....

No. 840. ———.

Dec. 22, 1915	.....	(n)	(n)

No. 841. B. Cassou.

Nov. 23, 1914	.....	5.6	.....
Dec. 5, 1914	.....	5.6	.....
Jan. 30, 1915	.....	2.4	.....
Feb. 18, 1915	.....	2.1	.....
Mar. 1, 1915	.....	1.9	.....
Mar. 19, 1915	.....	2.1	.....
Mar. 27, 1915	.....	2.0	.....
Apr. 19, 1915	.....	2.1	.....

No. 842. D. G. Fisher.

Nov. 22, 1914	.....	30.8	.....
Feb. 6, 1915	.....	17.9	.....
Feb. 15, 1915	.....	15.8	.....
Feb. 24, 1915	.....	15.7	.....
Mar. 7, 1915	.....	16.4	.....
Mar. 21, 1915	.....	17.3	.....

No. 843. H. C. Simpson.

Nov. 22, 1914	.....	30.5	.....

No. 844. ———.

Dec. 14, 1917	.....	12.2	.....

No. 845. P. A. Ramelli.

Nov. 22, 1914	.....	18.7	.....
Feb. 12, 1915	.....	10.3	.....
Jan. 23, 1920	.....	24.5	.....
Apr. 10, 1920	.....	18.9	.....

No. 846. P. T. Hincks.

Nov. 22, 1914	.....	15.6	.....
Dec. 5, 1914	.....	15.8	.....
Jan. 28, 1915	.....	8.8	.....
Feb. 28, 1915	.....	5.5	.....
Mar. 31, 1915	.....	6.7	.....
Apr. 27, 1915	.....	7.5	.....

n Water flush with surface.

No. 847. H. N. Harvey.

Date.	Altitude of bench mark at mouth of well (feet above sea level).	Depth to water in well (feet below bench mark).	Altitude of water table (feet above sea level).
Nov. 23, 1914	.....	16.7	.....
Jan. 3, 1915	.....	11.1?	.....
Jan. 11, 1915	.....	15.1	.....
Feb. 5, 1915	.....	8.9	.....
Feb. 25, 1915	.....	9.5	.....
Mar. 10, 1915	.....	10.1	.....
Mar. 20, 1915	.....	10.5	.....
Mar. 29, 1915	.....	10.5	.....
May 5, 1915	.....	10.8	.....

No. 848. E. Kay.

Nov. 23, 1914	.....	8.8	.....
Dec. 24, 1914	.....	6.5	.....
Jan. 11, 1915	.....	6.2	.....
Jan. 29, 1915	.....	3.9	.....
Feb. 23, 1915	.....	2.2	.....
Jan. 23, 1920	.....	13.8	.....
Apr. 10, 1920	.....	9.3	.....

No. 851. Shepard Bros.

Dec. 14, 1917	.....	20.4	.....
Jan. 23, 1920	.....	20.2	.....
Apr. 10, 1920	.....	16.1	.....

No. 852. O. E. Rouse

Nov. 23, 1914	.....	2.4	.....

No. 853. Bay Cities Water Co.

Aug. 21, 1912	.....	(o)	.....

No. 854. Bay Cities Water Co.

Aug. 21, 1912	.....	p12.6	.....
Nov. 23, 1914	.....	p10.7	.....

No. 870. ———.

Jan. 23, 1920	.....	43.3	.....
Apr. 10, 1920	.....	36.4	.....

No. 871. John Jones.

Nov. 23, 1914	.....	31.1	.....
Feb. 6, 1915	.....	31.0	.....

No. 872. Bay Cities Water Co.

Nov. 23, 1914	233.29	23.6	209.69
Jan. 7, 1916	.....	17.0	216.29

o Well in bottom of underflow ditch; flowing.
p West well; 14 wells, in line across valley.

Depth to water levels in wells in the vicinity of Morgan Hill—Continued.

No. 873. John Himlan Co.

Date.	Altitude of bench mark at mouth of well (feet above sea level).	Depth to water in well (feet below bench mark).	Altitude of water table (feet above sea level).
Dec. 2, 1914	.....	41.4	.....
Jan. 9, 1915	.....	30.0	.....
Jan. 30, 1915	.....	30.0	.....
Feb. 23, 1915	.....	26.7	.....
Mar. 11, 1915	.....	27.8	.....
Mar. 20, 1915	.....	27.8	.....
Mar. 29, 1915	.....	27.7	.....
May 15, 1915	.....	16.8	.....

No. 874. ———.

Dec. 2, 1914	223.63	39.6	184.03
Jan. 9, 1915	.....	35.0	188.63
Jan. 30, 1915	.....	31.7	191.93
Feb. 23, 1915	.....	26.7	196.93
Mar. 29, 1915	.....	28.0	195.63
May 15, 1915	.....	17.0	206.63
Jan. 7, 1916	.....	24.1	199.53
Jan. 23, 1920	.....	[a] 59.6	164.03
Apr. 10, 1920	.....	[a] 42.4	181.23

No. 876. J. E. Robertson.

Nov. 23, 1914	221.93	35.5	186.43
Dec. 13, 1914	.....	35.3	186.63
Jan. 10, 1915	.....	31.1	190.83
Jan. 28, 1915	.....	28.3	193.63
Feb. 8, 1915	.....	21.0	200.93
Feb. 20, 1915	.....	19.0	202.93
Mar. 28, 1915	.....	17.2	204.73
Apr. 15, 1915	.....	16.9	205.03
May 8, 1915	.....	17.1	204.83
Jan. 7, 1916	.....	24.5	197.43
Jan. 23, 1920	.....	[a] 35.8	186.13
Apr. 10, 1920	.....	[a] 30.5	191.43

No. 878. R. McDade.

Nov. 23, 1914	.....	28.6	.....

No. 889.——— Fitzgerald.

Dec. 15, 1917	.....	25.1	.....
Jan. 23, 1920	.....	[a] 38.8	.....
Apr. 10, 1920	.....	[a] 32.0	.....

No. 890. John Hinlan Co.

Dec. 15, 1917	.....	30.4	.....

No. 891. William Cobb.

Jan. 7, 1916	217.94	24.7	193.24
Jan. 23, 1920	.....	[a] 37.0	180.94
Apr. 10, 1920	.....	[a] 34.0	183.94

[a] Measurement taken from the surface of the ground.

No. 892. Mrs. M. Fitzgerald.

Date.	Altitude of bench mark at mouth of well (feet above sea level).	Depth to water in well (feet below bench mark).	Altitude of water table (feet above sea level).
Jan. 6, 1916	209.70	19.0	190.70
Dec. 15, 1917	.....	24.7	185.00

No. 893. J. M. Martin.

Nov. 23, 1914	203.38	21.0	182.38
Dec. 3, 1914	.....	21.2	182.18
Jan. 14, 1915	.....	19.8	183.58
Feb. 18, 1915	.....	12.2	191.18
Feb. 24, 1915	.....	11.3	192.08
Mar. 9, 1915	.....	10.3	193.08
Mar. 25, 1915	.....	9.6	193.78
Mar. 29, 1915	.....	9.1	194.28
Apr. 16, 1915	.....	8.3	195.08
May 19, 1915	.....	8.0	195.38
Jan. 6, 1916	.....	9.5	193.88

No. 894.[q] Herschel Johnson.

Nov. 23, 1914	200.40	19.5	180.90
Dec. 7, 1914	.....	20.0	180.40
Jan. 15, 1915	.....	18.6	181.80
Feb. 3, 1915	.....	15.0	185.40
Feb. 13, 1915	.....	11.3	189.10
Feb. 21, 1915	.....	10.5	189.90
Feb. 28, 1915	.....	9.6	190.80
Mar. 10, 1915	.....	8.8	191.60
Mar. 28, 1915	.....	7.7	192.70
Apr. 3, 1915	.....	7.3	193.10
Apr. 22, 1915	.....	7.0	193.40
May 18, 1915	.....	6.5	193.90
Jan. 6, 1916	.....	11.5	188.90

No. 895. M. W. Martin.

Nov. 23, 1914	203.39	22.0	181.39
Dec. 6, 1914	.....	22.8	180.59
Jan. 30, 1915	.....	20.0	183.39
Feb. 20, 1915	.....	14.0	189.39
Jan. 6, 1916	.....	14.5	188.89

No. 896. Seely Bros.

Nov. 23, 1914	197.14	18.3	178.84
Jan. 6, 1916	.....	10.7	186.44

No. 897. M. W. Martin.

Dec. 6, 1914	203.64	24.2	179.44
Jan. 30, 1915	.....	22.0	181.64
Feb. 20, 1915	.....	15.0	188.64

No. 898. R. Fisk.

Jan. 7, 1916	198.01	12.4	185.61

[q] Point of measurement about 2 feet above surface.

Depth to water levels in wells in the vicinity of Morgan Hill—Continued.

No. 899. E. Richmond.

Date.	Altitude of bench mark at mouth of well (feet above sea level).	Depth to water in well (feet below bench mark).	Altitude of water table (feet above sea level).
Jan. 6, 1916	197.32	12.6	184.72
Jan. 23, 1920	.....	a 30.8	166.52
Apr. 10, 1920	.....	a 31.3	166.02

No. 901. R. Fisk.

Nov. 24, 1914	207.25	27.0	180.25
Jan. 7, 1916	.....	12.4	194.85

No. 902. R. Good.

Nov. 24, 1914	208.26	26.4	181.86
Dec. 5, 1914	.....	26.5	181.76
Jan. 12, 1915	.....	23.4	184.86
Jan. 28, 1915	.....	22.7	185.56
Feb. 10, 1915	.....	19.2	189.06
Jan. 7, 1916	.....	18.7	189.56
Jan. 23, 1920	.....	a 44.4	663.76
Apr. 10, 1920	.....	Locked.	.....

No. 903. Wm. Sherriffs.

Jan. 7, 1916	212.28	19.8	192.48

No. 904. A. Smith.

Nov. 24, 1914	218.00	34.6	183.40
Jan. 7, 1916	.....	22.5	195.50
Dec. 18, 1917	.....	36.3	181.70

No. 908. O. N. Featherston.

Nov. 24, 1914	205.76	24.4	181.36
Jan. 7, 1916	.....	14.4	191.36
Jan. 23, 1920	.....	37.4	168.36
Apr. 10, 1920	.....	34.1	171.66

No. 909. M. S. Amerine.

Nov. 24, 1914	.....	29.0	.....
Jan. 23, 1920	.....	a 47.2	.....
Apr. 10, 1920	.....	a 34.5	.....

No. 911. E. Van Every.

Nov. 24, 1914	211.50	33.1	178.40
Dec. 5, 1914	.....	33.4	178.10
Jan. 9, 1915	.....	30.3	181.20
Jan. 27, 1915	.....	24.9	186.60
Feb. 6, 1915	.....	21.2	190.30
Feb. 17, 1915	.....	18.2	193.30
Feb. 24, 1915	.....	17.0	194.50
Mar. 7, 1915	.....	16.2	195.30
Mar. 21, 1915	.....	16.0	195.50
Mar. 27, 1915	.....	15.8	195.70
Apr. 16, 1915	.....	15.5	196.00
May 15, 1915	.....	15.0	196.50
Jan. 7, 1916	.....	22.1	189.40

a Measurement taken from the surface of the ground.

No. 913. J. H. Swickard.

Date.	Altitude of bench mark at mouth of well (feet above sea level).	Depth to water in well (feet below bench mark).	Altitude of water table (feet above sea level).
Jan. 10, 1916	192.67	12.1	180.57
Dec. 17, 1917	.....	24.2	168.47

No. 914. O. Christopher.

Nov. 24, 1914	195.62	20.2	175.42
Dec. 13, 1914	.....	20.3	175.32
Jan. 27, 1915	.....	17.2	178.42
Feb. 9, 1915	.....	13.9	181.72
Mar. 7, 1915	.....	10.4	185.22
Mar. 11, 1915	.....	10.2	185.42
May 19, 1915	.....	8.8	186.82
Jan. 10, 1915	.....	11.6	184.02
Jan. 23, 1920	.....	31.0	164.62
Apr. 10, 1920	.....	32.3	163.32

No. 915. W. Sherriffs.

Nov. 24, 1914	.....	33.1	.....

No. 916. J. H. Swickard.

Nov. 27, 1914	197.06	21.5	175.56
Jan. 10, 1916	.....	13.9	183.46
Jan. 23, 1920	.....	a 32.4	164.66
Apr. 10, 1920	.....	33.4	163.66

No. 917. Seely Bros.

Nov. 27, 1914	195.38	19.3	176.08
Jan. 6, 1916	.....	11.8	183.58
Jan. 23, 1920	.....	a 31.0	164.38
Apr. 10, 1920	.....	32.5	162.88

No. 918. C. Frost.

Nov. 27, 1914	191.08	16.5	174.58
Jan. 6, 1916	.....	7.7	183.38
Jan. 23, 1920	.....	a 28.2	162.88
Apr. 10, 1920	.....	a 29.0	162 08

No. 921. Seely Bros.

Nov. 27, 1914	[illegible]	12.0	.....

No. 922. Mrs. W. P. Taylor.

Jan. 6, 1916	185.06	3.9	181.16

No. 923. Mrs. W. P. Taylor.

Nov. 28, 1914	.....	9.2	.....

a Measurement taken from the surface of the ground.

Depth to water levels in wells in the vicinity of Morgan Hill—Continued.

No. 924. Hale ranch.

Date.	Altitude of bench mark at mouth of well (feet above sea level).	Depth to water in well (feet below bench mark).	Altitude of water table (feet above sea level).
Nov. 28, 1914	.....	6.2	.....

No. 925. —— Kocher.

Nov. 28, 1914.	.....	3.9	.....

No. 926. H. A. Leaderick.

Jan. 6, 1916	186.05	6.0	180.05

No. 927. William McKillape.

Nov. 28, 1914	184.71	13.6	171.11
Jan. 5, 1916	.....	5.9	178.81

No. 928. A. B. Anderson.

Nov. 28, 1914	.....	12.8	.....

No. 929. E. Richmond.

Nov. 28, 1914	188.47	18.4	170.07
Jan. 5, 1916	.....	11.6	176.87
Jan. 23, 1920	.....	a 29.0	159.47
Apr. 10, 1920	.....	a 32.1	156.37

No. 930. Woods and Lenz.

Dec. 30, 1916	186.87	10.1	176.77
Jan. 5, 1916	.....	8.3	178.57
Jan. 23, 1920	.....	a 24.5	162.37
Apr. 10, 1920	.....	22.0	164.87

No. 931. E. Richmond.

Jan. 5, 1916	183.91	7.0	176.91

No. 932. C. A. Topham.

Dec. 9, 1914	.....	13.5	.....
Jan. 9, 1915	.....	11.6	.....
Feb. 2, 1915	.....	7.7	.....
Feb. 21, 1915	.....	6.2	.....

a Measurement taken from the surface of the ground.

No. 933. Frank Pospishek.

Date.	Altitude of bench mark at mouth of well (feet above sea level)	Depth to water in well (feet below bench mark).	Altitude of water table (feet above sea level).
Nov. 28, 1914	169.78	11.3	158.48
Jan. 12, 1915	.....	10.7	159.08
Feb. 9, 1915	.....	4.5	165.28
Feb. 18, 1915	.....	4.8	164.98
Mar. 9, 1915	.....	4.7	165.08
Mar. 30, 1915	.....	4.4	165.38

No. 934. R. Whaley.

Nov. 28, 1914	166.41	Closed.	.....
Jan. 11, 1916	.....	1.2	165.21

No. 935. —— Kocher.

Nov. 28, 1914	168.26	7.7	160.56
Jan. 11, 1916	.....	1.5	166.76

No. 936. Santa Clara County.

Nov. 28, 1914	168.83	11.2	157.63
Jan. 11, 1916	.....	4.8	164.03

No. 938. Fred. L. Chapman.

Nov. 28, 1914	163.73	10.4	153.33
Jan. 27, 1915	.....	6.9	156.83
Jan. 11, 1916	.....	3.9	159.83
Jan. 23, 1920	.....	a 40.3	123.43
Apr. 10, 1920	.....	a 38.0	125.73

No. 943. T. J. Dailey.

Nov. 28, 1914	174.01	21.9	152.11
Dec. 3, 1914	.....	22.1	151.91
Jan. 12, 1915	.....	19.5	154.51
Feb. 3, 1915	.....	14.6	159.41
Feb. 9, 1915	.....	12.3	161.71
Feb. 12, 1915	.....	12.6	161.41
Feb. 24, 1915	.....	11.6	162.41
Mar. 11, 1915	.....	11.9	162.11
Mar. 30, 1915	.....	11.9	162.11
Apr. 16, 1915	.....	11.8	162.21
May 20, 1915	.....	11.7	162.31
Jan. 11, 1916	.....	13.4	160.61
Jan. 6, 1917	.....	18.0	156.01

No. 945. Edward McAbee.

Dec. 2, 1914	.....	28.0	.....
Jan. 13, 1915	.....	23.8	.....
Feb. 5, 1915	.....	18.4	.....
Feb. 9, 1915	.....	16.9	.....
Feb. 19, 1915	.....	15.2	.....
Mar. 3, 1915	.....	15.3	.....
Mar. 18, 1915	.....	15,4	.....
Mar. 21, 1915	.....	15.4	.....
Mar. 29, 1915	.....	15.5	.....
Apr. 17, 1915	.....	15.5	.....

a Measurement taken from the surface of the ground.

Depth to water levels in wells in the vicinity of San Jose.

Map No.	Owner.	Depth of water surface below bench mark.	Date.
		Feet.	
1001	J. S. Shepherd (altitude, 210.12 feet)	21.99	Jan. 7, 1916
	do	45.2	Jan. 23, 1920
	do	39.5	Apr. 10, 1920
1002	R. Wheeler	26.6	Nov. 24, 1916
1003		31.2	Do.
1004	A. N. Kellner (altitude, 204.34 feet)	20.5	Apr. 6, 1915
	do	25.8	Jan. 4, 1916
1005	P. Swansen (altitude, 193.76 feet)	23.4	Nov. 23, 1914
	do	16.5	Jan. 4, 1916
1006	J. H. Swickard (altitude, 194.666 feet)	18.1	Do.
	do		Jan. 23, 1920
	do	33.3	Apr. 10, 1920
1007	Theodore Johnson (altitude, 193.08 feet)	23.1	Nov. 23, 1914
	do	19.0	Feb. 3, 1915
	do	16.2	Jan. 4, 1916
	do	19.0	Dec. 30, 1916
	do	34.0	Jan. 23, 1920
	do	29.5	Apr. 10, 1920
1008	E. C. Bonar (altitude, 188.63 feet)	10.2	Apr. 23, 1914
	do	13.4	Jan. 5, 1916
1009	L. Frost (altitude, 183.06 feet)	15.7	Nov. 23, 1914
	do	8.0	Jan. 11, 1916
	do	11.9	Dec. 30, 1916
1010	H. A. Leaderich (altitude, 180.82 feet)	6.0	Jan. 11, 1916
	do	[a] 30.8	Jan. 23, 1920
	do	27.5	Apr. 10, 1914
1011	Carlson Bros	10.8	Apr. 24, 1920
1012	A. C. Robinson	11.3	Do.
1013	Mrs. William McKnab	16.7	Do.
	do	38.1	Jan. 23, 1920
	do	36.5	Apr. 10, 1920
1014	H. Swickard	16.2	Apr. 24, 1914
	do	25.8	Jan. 23, 1920
	do	36.0	Apr. 10, 1920
1015	W. P. Lyon	12.65	Apr. 24, 1914
1016	Fisher-Wolde & Dicken	16.1	Do.
1017	E. G. Keeble (altitude, 187.74 feet)	16.4	Do.
	do	20.5	May 15, 1915
	do	19.5	Jan. 4, 1916
1018	——— (Japanese)	10.6	Do.
1021	E. Crosby	5.6	Do.
1022		4.6	Jan. 23, 1916
1023		6.6	Jan. 24, 1916
1024		6.8	Jan. 23, 1916
1025	John Silveira	11.4	Nov. 27, 1914
	do	11.2	Jan. 28, 1915
	do	8.5	Feb. 20, 1915
1026	A. Miller	16.8	Nov. 27, 1914
	do	[a] 29.2	Jan. 23, 1920
	do	[a] 27.0	Apr. 10, 1920
1028	H. Netz (altitude, 161.70 feet)	9.6	Nov. 28, 1914
	do	3.2	Jan. 11, 1916
	do	6.57	Dec. 30, 1916
	do	[a] 23.6	Jan. 23, 1920
	do	[a] 20.1	Apr. 10, 1920
1031	G. L. Rogers (altitude, 175.14 feet)	10.6	Apr. 23, 1916
	do	11.6	Jan. 12, 1916
1033	Santa Clara County (altitude, 166.45 feet)	4.2	May 25, 1914
	do	6.3	Jan. 12, 1916
	do	29.5	Jan. 23, 1920
	do	26.0	Apr. 10, 1920
1034	E. A. & J. O. Hayes (altitude, 180.40 feet)	15.1	Apr. 23, 1914
	do	16.8	Jan. 12, 1916
1035	H. W. Lester (altitude, 181.50 feet)	18.3	Apr. 23, 1914
	do	18.4	Jan. 4, 1916
1036	E. G. Keeble (altitude, 179.15 feet)	15.4	Apr. 23, 1914
	do	19.5	Jan. 4, 1916
1037	H. W. Lester	17.0	Apr. 23, 1914
1038	H. W. Lester (altitude, 176.80 feet)	15.5	Do.
	do	18.8	Jan. 4, 1916
1041	A. A. & Leo Cottle (altitude, 170.19 feet)	15.1	Apr. 23, 1914
	do	16.3	Jan. 12, 1916
	do	30.3	Jan. 23, 1920
	do	27.3	Apr. 10, 1920
1042	C. C. Carroll (altitude, 169.29 feet)	17.9	Apr. 23, 1914

[a] Measurement taken from the surface of the ground.

Depth to water levels in wells in the vicinity of San Jose—Continued.

Map No.	Owner.	Depth of water surface below bench mark.	Date.
		Feet.	
1042	C. C. Carroll (altitude, 169.29 feet)	19.6	Jan. 12, 1916
1043	Jack Carroll	13.6	May 24, 1914
1044	T. Cottle (altitude, 173.12 feet)	25.9	Apr. 23, 1914
	do	27.3	Jan. 12, 1916
1045	Santa Clara County (altitude, 172.29 feet)	26.7	Do.
1046	F. H. Buck (altitude, 171.70 feet)	50.9	Jan. 8, 1914
	do	42.0	Jan. 30, 1914
	do	37.0	Mar. 1, 1914
	do	35.0	Apr. 1, 1914
	do	33.0	May 1, 1914
	do	39.8	July 1, 1914
	do	39.0	Jan. 26, 1915
	do	30.0	Apr. 19, 1915
	do	30.0	May 18, 1915
	do	31.9	Jan. 12, 1916
	do	34.0	Dec. 29, 1916
1048	George Rudd	62.4	Jan. 8, 1914
	do	52.0	Jan. 31, 1914
1052		31.6	May 25, 1915
		[a] 45.0	Jan. 23, 1920
		[a] 41.0	Apr. 10, 1920
	Harriet Stock	50.9	Jan. 8, 1914
1053	S. P. Swenson	54.0	Jan. 5, 1914
1055	do	40.2	Feb. 2, 1914
	do	41.5	Mar. 2, 1914
	do	41.2	Apr. 2, 1914
	do	41.2	May 4, 1914
	do	46.4	June 7, 1914
	do	44.9	July 6, 1914
	do	45.7	Aug. 2, 1914
	do	46.5	Sept. 3, 1914
	do	44.3	Dec. 1, 1914
	do	42.7	Jan. 13, 1915
	do	35.6	Mar. 25, 1915
	do	35.2	Apr. 22, 1915
	do	34.0	May 21, 1915
	do	38.5	Jan. 8, 1917
1056	D. Burrone	51.2	Jan. 8, 1914
	do	47.0	Feb. 7, 1914
	do	37.0	Apr. 25, 1914
	do	43.0	Nov. 5, 1914
	do	51.5	Dec. 9, 1914
	do	40.6	Jan. 12, 1915
	do	32.0	May 16, 1915
	do	35.7	Jan. 5, 1917
1057	Southern Pacific Co. (altitude, 152.05 feet)	26.7	Jan. 12, 1916
	do	24.0	Jan. 24, 1917
	do		Jan. 23, 1920
	do		Apr. 10, 1920
1058	J. Bettencourt (altitude, 152.93 feet)	10.0	May 24, 1915
	do	11.1	Jan. 12, 1916
	do	16.3	Dec. 30, 1916
1061	M. Dutra	7.8	May 24, 1915
1062	——— (altitude, 159.51 feet)	20.4	Do.
	do	25.7	Jan. 12, 1916
1063	——— Campbell (altitude, 156.82 feet)	5.0	Apr. 24, 1914
	do	4.0	May 24, 1915
	do	5.1	Jan. 12, 1916
1064	——— (altitude, 155.45 feet)	1.9	May 24, 1915
	do	2.0	Jan. 12, 1916
1065	G. S. Rawlings	3.0	May 24, 1915
1067	H. W. Ogan (altitude, 177.61 feet)	24.4	Nov. 30, 1914
	do	18.5	Jan. 30, 1915
	do	12.6	Jan. 12, 1916
	do	20 7	Dec. 30, 1916
1068	W. Courtney (altitude, 174.94 feet)	20.2	Nov. 30, 1914
	do	14.8	Jan. 12, 1916
1069	W. B. Mabie	31.3	Nov. 30, 1914
	do	26.8	Jan. 11, 1915
	do	20.7	Jan. 28, 1915
	do	12.7	Feb. 11, 1915
	do	12.4	Feb. 18, 1915
	do	12.0	Feb. 24, 1915
	do	12.3	Mar. 11, 1915
	do	12.3	Mar. 24, 1915

[a] Measurement taken from the surface of the ground.

Depth to water levels in wells in the vicinity of San Jose—Continued.

Map. No.	Owner.	Depth of water surface below bench mark.	Date.
		Feet.	
1069	W. B. Mabie	12.3	Mar. 29 1915
	do	12.4	Apr. 21, 1915
	do	11.9	May 17, 1915
	do	26.8	Dec. 30, 1916
1071	Tim. Cooney (altitude, 164.69 feet)	13.8	Nov. 28, 1914
	do	13.9	Dec. 11, 1914
	do	a 27.0	Jan. 23, 1920
	do	a 25.4	Apr. 10, 1920
	do	11.3	Jan. 12, 1915
	do	7.8	Jan. 30, 1915
	do	3.2	Feb. 23, 1915
	do	3.3	Mar. 5, 1915
	do	3.4	Mar. 19, 1915
	do	3.3	Mar. 27, 1915
	do	3.3	Apr. 23, 1915
	do	3.1	May 18, 1915
	do	4.8	Jan. 11, 1916
	do	10.8	Dec. 30, 1916
1072	A. Lindsay (altitude, 180.49 feet)	17.9	Jan. 12, 1916
1073	R. J. Mayne (altitude, 182.84 feet)	31.3	Nov. 28, 1914
	do	14.0	Feb. 16, 1914
	do	13.3	Feb. 23, 1914
	do	17.7	Jan. 12, 1916
	do	26.8	Dec. 30, 1916
1074	C. J. Rylander (altitude, 189.28 feet)	34.5	Nov. 28, 1914
	do	34.3	Dec. 6, 1914
	do	15.8	Jan. 11, 1915
	do	10.8	Jan. 31, 1915
	do	8.7	Feb. 11, 1915
	do	6.8	Feb. 20, 1915
	do	9.9	Mar. 1, 1915
	do	10.5	Mar. 14, 1915
	do	10.2	May 18, 1915
	do	12.4	Jan. 12, 1916
1075	W. G. Mayne	32.1	Nov. 28, 1914
1076	David Davis	36.0	Nov. 30, 1914
1077	Charles O. Ahlgren	34.8	Do.
	do	32.0	Jan. 11, 1915
	do	21.5	Jan. 28, 1915
	do	11.0	Feb. 18, 1915
	do	11.0	Feb. 26, 1915
	do	11.0	Mar. 9, 1915
	do	11.0	Mar. 23, 1915
	do	11.0	Mar. 30, 1915
	do	11.0	May 18, 1915
1078	Roberts estate	9.6	Feb. 18, 1915
1082	Ester Skillings	26.1	Nov. 28, 1914
	do	20.9	Dec. 30, 1916
1083	William Turner	25.6	Nov. 28, 1914
	do	23.5	Jan. 12, 1915
	do	18.3	Jan. 28, 1915
	do	13.5	Feb. 8, 1915
	do	9.3	Feb. 19, 1915
	do	8.3	Feb. 24, 1915
	do	7.7	Mar. 9, 1915
	do	7.5	Mar. 20, 1915
	do	8.3	Apr. 15, 1915
	do	7.5	May 15, 1915
	do	20.9	Dec. 30, 1916
1085	T. J. Armstrong	24.2	Jan. 12, 1915
	do	17.5	Feb. 1, 1915
	do	8.3	Feb. 17, 1915
	do	7.8	Feb. 23, 1915
	do	8.2	Mar. 8, 1915
	do	8.2	Mar. 26, 1915
	do	7.8	May. 18, 1915
	do	23.5	Jan. 1, 1917
1091		45.2	Nov. 28, 1914
1092	P. Estrave	72.0	Do.
	do	70.0	Dec. 12, 1914
	do	70.0	Jan. 21, 1915
	do	66.0	Feb. 3, 1915
	do	47.0	Feb. 24, 1915
	do	40.2	Mar. 29, 1915
1095	C. A. Anderson	39.5	Nov. 28, 1914

a Measurement taken from the surface of the ground.

Depth to water levels in wells in the vicinity of San Jose—Continued.

Map. No.	Owner.	Depth of water surface below bench mark.	Date.
		Feet.	
1096	N. M. Desin	32.9	Nov. 28, 1914
	.....do	35.6	Dec. 3, 1914
	.....do	32.5	Jan. 16, 1915
	.....do	28.5	Jan. 29, 1915
	.....do	16.0	Feb. 11, 1915
	.....do	13.5	Feb. 19, 1915
	.....do	12.6	Feb. 24, 1915
	.....do	11.5	Mar. 22, 1915
	.....do	11.0	Mar. 30, 1915
	.....do	10.5	Apr. 16, 1915
	.....do	10.5	Apr. 23, 1915
	.....do	10.0	May 30, 1915
	.....do	28.5	Jan. 8, 1917
1097	P. Nelson	35.5	Nov. 30, 1914
1098	H. N. Holthouse	35.0	Do.
1101	T. Kelty	34.8	Do.
1105	N. Barton	12.1	Do.
	.....do	12.3	Jan. 13, 1915
	.....do	10.3	Jan. 28, 1915
	.....do	4.0	Feb. 8, 1915
	.....do	2.1	Feb. 26, 1915
	.....do	1.5	Mar. 14, 1915
	.....do	1.8	Mar. 22. 1915
	.....do	1.4	Apr. 8, 1915
	.....do	1.8	Apr. 22, 1915
1106	A. C. Nicholson	20.7	Nov. 30, 1914
	.....do	19.5	Jan. 19, 1915
	.....do	17.5	Jan. 28, 1915
	.....do	2.8	Feb. 18, 1915
	.....do	2.3	Feb. 25, 1915
	.....do	2.8	Apr. 3, 1915
	.....do	2.9	Apr. 17, 1915
	.....do	3.0	May 25, 1915
1108		31.7	Nov. 30, 1914
1111		34.0	Do.
1112	S. Hario	25.4	Do.
1114		28.3	Do.
1117	H. A. Von Dorsten	56.2	Do.
	.....do	55.3	Jan. 18, 1915
	.....do	54.3	Jan. 27, 1915
	.....do	49.8	Jan. 8, 1915
	.....do	43.5	Jan. 20, 1915
	.....do	40.5	Jan. 24, 1915
	.....do	38.8	Mar. 10, 1915
	.....do	37.3	Mar. 21, 1915
	.....do	37.3	Mar. 27, 1915
	.....do	35.3	Apr. 26, 1915
	.....do	34.1	May 15, 1915
1121	H. W. Cole	37.6	Nov. 30, 1914
	.....do	22.3	Feb. 10, 1915
	.....do	17.8	Feb. 24, 1915
	.....do	15.1	Mar. 20, 1915
	.....do	13.6	May 19, 1915
1126	J. M. Mace	60.0	Jan. 21, 1915
1127	Mays-Pavlicevich	62.8	Apr. 22, 1915
1128	W. L. Beacock	66.4	Do.
1131		80.2	Nov. 30, 1914
1132	C. P. Nelson	82.2	Do.
1133	I. J. Brewster	27.0	Nov. 16, 1904
	.....do	49.0	May 30, 1907
	.....do	63.0	May 29, 1908
	.....do	78.0	Dec. 8, 1910
	.....do	90.5	Apr. 6, 1913
	.....do	71.6	Nov. 30, 1914
1134	Peter Poulson	73.2	Do.
	.....do	56.7	Jan. 22, 1915
	.....do	47.4	Feb. 8, 1915
	.....do	44.0	Feb. 20, 1915
	.....do	44.6	Feb. 26, 1915
	.....do	50.2	Mar. 17, 1916
	.....do	54.8	Mar. 31, 1915
	.....do	54.2	Apr. 28, 1915
1135	——— Nelson	55.1	Apr. 22, 1915
1136	Ray Ranch	75.9	Do.
1137	——— Briggs	85.0	Apr. 21, 1915
1138	Gem City Packing Co	15.8	Do.
1141	W. A. Watrous	24.2	Do.

Depth to water levels in wells in the vicinity of San Jose—Continued.

Map. No	Owner.	Depth of water surface below bench mark.	Date.
		Feet.	
1142	R. W. Kennedy	54.0	Dec. 20, 1914
1143	J. Bonnett	55.0	Apr. 22, 1915
1144	R. A. Witford	59.2	Do.
1145	B. Kirk	65.6	Do.
1146	L. Bucksin	62.3	Do.
1147	H. A. Lee	63.4	Do.
1148	Lester Bros	61.2	Dec. 23, 1914
1151	A. C. Kessling	74.0	Do.
	.....do	72.0	May 1, 1915
	.....do	78.0	Jan. 4, 1917
1152	H. A. Brown	(?) 68.0	Do.
1153	J. W. McKillop	43.0	Do.
1154		45.5	Apr. 22, 1915
1155	Keefer & Kohl	46.4	Do.
1156	A. M. Wright	20.6	Jan. 22, 1903
	.....do	27.6	Feb. 14, 1903
	.....do	25.0	Mar. 12, 1903
	.....do	39.0	May 27, 1903
	.....do	20.0	Feb. 4, 1904
	.....do	32.5	May 25, 1904
	.....do	33.0	June 15, 1904
	.....do	20.0	Feb. 3, 1905
	.....do	35.0	May 25, 1905
	.....do	24.0	Nov. 4, 1905
	.....do	19.5	Dec. 20, 1905
	.....do	37.0	Mar. 31, 1906
	.....do	40.0	Apr. 14, 1906
	.....do	43.0	May 3, 1906
	.....do	38.0	Aug. 29, 1906
	.....do	32.0	Oct. 30, 1906
	.....do	29.0	Jan. 1, 1907
	.....do	39.0	Mar. 1, 1907
	.....do	46.0	Apr. 1, 1907
	.....do	54.0	May 1, 1907
	.....do	35.0	Dec. 9, 1907
	.....do	30.0	Feb. 1, 1908
	.....do	35.0	Mar. 17, 1908
	.....do	28.5	July 1, 1908
	.....do	16.5	Dec. 1, 1908
	.....do	14.0	Jan. 10, 1909
	.....do	49.0	May 1, 1909
	.....do	50.0	June 1, 1909
	.....do	31.0	Jan. 1, 1910
	.....do	34.0	Mar. 1, 1910
	.....do	15.0	Dec. 20, 1910
	.....do	13.0	Jan. 15, 1911
	.....do	44.0	Mar. 25, 1911
	.....do	50.0	Apr. 6, 1911
	.....do	56.0	May 10, 1911
	.....do	29.0	Mar. 1, 1912
	.....do	26.0	Apr. 1, 1912
	.....do	(b)	
	.....do	3.9	Feb. 26, 1914
	.....do	7.0	Mar. 6, 1914
	.....do	30.0	Apr. 4, 1914
	.....do	39.0	May 1, 1914
	.....do	41.0	May 19, 1914
	.....do	30.0	Sept. 22, 1914
	.....do	45.0	Apr. 8, 1915
	.....do	46.0	Apr. 15, 1915
	.....do	43.9	Apr. 22, 1915
	.....do	49.3	May 13, 1915
1157	F.E. Mitchell	52.3	Apr. 22, 1915
1158		(?) 21.9	Do.
1161	T. S. Montgomery	8.0	Dec. 26, 1914
1162	Frank Jenkins	25.2	Do.
1166	Frank J. Murphy	100.5	Apr. 20, 1915
1167	—— Kron	85.5	Do.
1168	A. Hanson	71.1	Do.
1171	—— Shelly	64.3	Do.
1172	John Lannis	84.2	Do.
1173	J. M. McKinnon	c 98.0	Apr. —, 1914
1175	Quito ranch	95.7	Apr. 20, 1915
1176	Abernethy & Smith	99.1	Do.

b Water about 12 feet below bottom of 90-foot pit in 1913.

c Reported.

Depth to water levels in wells in the vicinity of San Jose—Continued.

Map. No.	Owner.	Depth of water surface below bench mark.	Date.
		Feet.	
1177	W. C. Bogen	65.7	Apr. 21, 1915
1178	Ione D. Kelly	57.3	Do.
1181	A. M. Elberg	81.2	Dec. 22, 1914
1182	W. M. Reed	80.0	Do.
1183	A. C. Brille	(?) 81.0	Do.
1184	E. B. Stone	67.0	Do.
1185	A. C. Clark	67.0	Do.
1186	M. Nunes	61.0	Do.
1187		(?) 65.0	Do.
1188	J. E. Sloss	66.0	Do.
	do	60.0	May 20, 1915
1192	J. N. Sloss	61.9	Apr. 19, 1915
1193	J. E. Wiesendanger	57.4	Do.
1194	William Holburn	91.3	Do.
1195	M. Zarevich	81.1	Apr. 19, 1915
1196	Theodore Keech	75.7	Do.
1197	W. H. Roberts	66.9	Do.
1198	T. J. Streeter	70.2	Do.
1199	C. A. Baron	60.2	Do.
1201	W. & R. Hunter	58.2	Do.
1203	C. A. Curtis	80.3	Do.
1204	W. M. Scott	84.0	Do.
1205	E. Johnson	112.0	Dec. 21, 1914
1206		112.0	Do.
1207	Hind Fruit Co	112.0	Do.
1208	F. J. White	127.0	Do.
	do	122.0	Apr. 25, 1915
	do	115.0	Jan. 5, 1917
1211	F. G. Carolan	149.2	Dec. 21, 1914
1212	A. Montgomery	149.0	Do.
1213	John Leonard	174.0	Apr. 21, 1915
1214		161.9	Do.
1215	R. C. Nelson	113.0	Dec. 21, 1914
1216	—— Lannis	112.0	Do.
1217	P. H. Shone	(?) 75.0	Do.
1218	F. B. Bailey	71.4	Dec 19, 1914
	do	71.1	Apr. 17, 1915
	do	71.0	June 18, 1915
1221	Phillip Hays	66.5	Apr. 17, 1915
1226	A. C. Butcher	45.0	Apr. 20, 1915
1227	G. W. Glendenning	53.8	Dec. 20, 1914
	do	52.9	Apr. 17, 1915
	do	51.6	May 15, 1915
	do	50.4	Jan. 4, 1917
1231	J. Luther	41.6	Apr. 19, 1917
1232	Nathan Lester	30.9	Do.
1233	N. L. Lester	33.0	Dec. 23, 1914
1234	W. Lester	38.5	Do.
1235	M. Zarevich	35.1	Apr. 20, 1914
1236		32.8	Do.
1237	Mrs. Barr	37.1	Do.
1238	E. K. Hurlbert	39.4	Do.
1241	W. Lenegas	46.0	Do.
1242	—— Parsons	50.0	Dec. 21, 1914
1243	S. L. Winchester	52.0	Do.
1244		36.3	May 31, 1915
1245	W. J. Brown	41.2	Dec. 21, 1915
	do	36.0	May 31, 1915
1246	F. Newton	35.0	Dec. 21, 1914
	do	30.0	May 31, 1915
1247	Horst & Hamilton	34.5	Do.
1251	Mrs. M. Gilbert	33.5	Dec. 21, 1914
1252		33.0	Do.
1254	S. De Fore	21.8	Dec. 20, 1914
1255	G. F. Smith	21.2	Do.
1257		4.6	May 29, 1915
1258	C. A. Desmond	11.2	June 1, 1915
1261		14.6	May 29, 1915
1262		19.3	Do.
1263	O'Conner Sanitarium	25.7	Dec. 24, 1914
1264	San Jose Water Co	31.6	May 31, 1915
1265	W. W. Craney	24.3	Do.
1267	J. E. Boynton	43.8	Dec. 22, 1914
1268		23.6	May 31, 1915

Depth to water levels in wells in the vicinity of San Jose—Continued.

Map. No.	Owner.	Depth of water surface below bench mark.	Date.
		Feet.	
1271	E. R. Campagni	47.2	Dec. 22, 1914
1272	L. Nelson	32.1	May 31, 1915
1273	R. W. Morrison	32.6	Do.
1274	Herman Hoeft	30.7	Do.
1275	F. R. Shafter	c 64.0	——— 1913
1276	L. Artana	39.6	May 31, 1915
1277	Bradley Ranch	c 66.0	——— 1914
	.....do	43.4	May 31, 1915
1278	E. A. McCartney	53.0	Dec. 24, 1915
	.....do	51.3	Apr. 16, 1915
	.....do	57.3	Jan. 5, 1917
1281	County Infirmary	51.7	Dec. 24, 1914
1282	G. Consilla	52.0	Do.
1283	A. Foster	52.5	Do.
1284	E. O. Humphrey	(?) 63.2	Do.
	.....do	70.3	Apr. 12, 1915
1286	A. E. Barker	72.0	Dec. 24, 1914
1287	A. C. Keesling	72.5	Do.
1291	F. K. Bartholmi(?)	70.0	Do
1292	H. G. Keesling	68.0	Do.
1293	A. A. Woodruff	60.0	Do.
1294	E. W. Conant	53.0	Do.
	.....do	47.5	Apr. 18, 1915
1296	G. W. Worthen	43.2	May 26, 1915
1298	G. D. Worswick	50.0	Dec. 24, 1914
	.....do	40.2	May 1, 1915
1302	——— Kelly	51.0	Dec. 24, 1914
1303		36.8	Do.
1305	G. Guinasso	24.8	May 25, 1915
1306		16.0	Do.
1307	W. L. Norden	7.7	Do.
1308	R. Heilmann	31.0	Do.
1309	Mrs. A. Michener	37.3	Do.
1310		47.2	Nov. 30, 1914
1312	George T. McLaughlin	53.1	Jan. 11, 1915
	.....do	51.6	Jan. 27, 1915
	.....do	41.7	Feb. 18, 1915
	.....do	37.3	Mar. 4, 1915
	.....do	38.0	Mar. 8, 1915
	.....do	36.0	Apr. 5, 1915
	.....do	35.3	Apr. 27, 1915
1314	P. D. Landon	45.0	Jan. 11, 1915
	.....do	28.0	Mar. 28, 1915
	.....do	28.0	Apr. 16, 1915
1315	F. H. Flanders	59.2	Jan. 27, 1915
1320	M. E. Ryan	40.2	Nov. 30, 1914
1321	Louis Boosin	50.2	Do.
	.....do	49.6	Jan. 19, 1915
	.....do	48.2	Jan. 29, 1915
	.....do	35.5	Feb. 25, 1915
	.....do	36.0	Mar. 23, 1915
	.....do	33.5	Apr. 21, 1915
	.....do	30.0	May 18, 1915
1324	N. P. Johnson	39.3	Jan. 14, 1915
	.....do	34.2	Jan. 29, 1915
	.....do	20.6	Feb. 24, 1915
	.....do	18.5	Mar. 24, 1915
	.....do	19.9	Mar. 27, 1915
	.....do	19.3	Apr. 19, 1915
	.....do	18.0	May 17, 1915
1326	John Lester	35.9	Dec. 2, 1914
1331		18.4	May 24, 1915
1332	J. M. Harworth	16.4	Do.
1333	C. W. Hugy	20.0	Do.
1334	C. R. Smith	16.1	Do.
1336	——— Johnson	13.4	Do.
1341	John Dondell	12.8	Do.
1342	A. Gagliardo	15.2	Do.
1343	Southern Pacific Co	8.3	May 25, 1915
1344	P. Bruno	12.8	Do.
1346	Ralph Ornato	14.0	Do.
1347	B. Hall	8.1	Do.
1348	R. C. Wilson	15.1	Do.
1351	Santa Clara County	14.0	Do.
1352	Mrs. S. A. Woodrow	8.9	Do.
1353	J. F. Barry	35.2	Jan. 9, 1914

c Reported.

Depth to water levels in wells in the vicinity of San Jose—Continued.

Map. No.	Owner.	Depth of water surface below bench mark.	Date.
		Feet.	
1354	Oak Hill Improvement Co	[c] 56.0	—— 1913
	.....do	[c] 30.0	—— 1914
	.....do	23.6	Mar. 24, 1915
1355	Albert Joseph	29.2	Do.
1356	L. B. Millman	[c] 33.0	—— 1912
	.....do	[c] 46.0	—— 1913
	.....do	29.3	Mar. 24, 1915
1357	Antone Pierson	49.0	Jan. 5, 1914
	.....do	44.0	Feb. 3, 1914
	.....do	39.0	Mar. 3, 1914
	.....do	36.0	Apr. 2, 1914
	.....do	37.2	May 2, 1914
	.....do	41.0	June 4, 1914
	.....do	40.3	July 2, 1914
	.....do	45.6	Aug. 5, 1914
	.....do	45.3	Sept. 4, 1914
	.....do	47.2	Oct. 13, 1914
	.....do	41.3	Dec. 5, 1914
1358	J. J. Carothers	46.8	Jan. 5, 1914
	.....do	38.2	Jan. 16, 1915
	.....do	37.2	Feb. 3, 1915
	.....do	34.3	Mar. 12, 1915
	.....do	31.6	May 4, 1915
	.....do	33.2	June 2, 1915
	.....do	36.2	Jan. 5, 1917
1360	T. H. Derby (W. E. Bradford)	[d] 39.0	Jan. 10, 1914
	.....do	27.0	Feb. 3, 1914
	.....do	29.0	Mar. 4, 1914
	.....do	25.0	Apr. 4, 1914
	.....do	30.0	May 1, 1914
	.....do	28.5	Jan. 12, 1915
	.....do	23.0	Feb. 12, 1915
	.....do	25.0	Mar. 9, 1915
1361	T. C. Price	36.0	Feb. 2, 1914
	.....do	29.0	Mar. 10, 1914
	.....do	42.3	Apr. 5, 1914
	.....do	43.0	May 1, 1914
	.....do	48.2	June 6, 1914
	.....do	47.0	July 5, 1914
	.....do	45.0	Aug. 5, 1914
	.....do	47.0	Sept. 2, 1914
	.....do	48.6	Oct. 13, 1914
	.....do	49.2	Nov. 5, 1914
	.....do	49.2	Dec. 2, 1914
	.....do	47.0	Jan. 22, 1915
	.....do	46.0	Jan. 27, 1915
	.....do	38.0	Mar. 8, 1915
	.....do	36.0	Apr. 20, 1915
	.....do	35.5	May 17, 1915
1362	T. C. Price (John Bohlin)	[e] 52.1	Jan. 12, 1914
	.....do	45.5	Feb. 2, 1914
	.....do	37.0	Mar. 10, 1914
	.....do	36.2	Apr. 5, 1914
	.....do	37.3	May 1, 1914
	.....do	45.8	June 6, 1914
	.....do	47.7	July 5, 1914
	.....do	47.5	Aug. 5, 1914
	.....do	46.5	Sept. 2, 1914
	.....do	48.0	Oct. 13, 1914
	.....do	47.5	Nov. 5, 1914
	.....do	44.7	Dec. 2, 1914
	.....do	42.2	Jan. 22, 1915
	.....do	41.0	Jan. 27, 1915
	.....do	34.0	Mar. 8, 1915
	.....do	32.0	Apr. 20, 1915
	.....do	30.0	May 17, 1915
1364	John Hensell	50.0	Jan. 10, 1914
1365	W. H. Sheldon	(?) 46.4	Do.
	.....do	(?) 41.5	Feb. 1, 1914
	.....do	54.5	Jan. 5, 1914
1373	W. J. Maher	[f] 37.8	Jan. 8, 1915
	.....do	31.4	Feb. 2, 1915

[c] Reported.
[d] Well about 30 feet below general level.
[e] Well about 15 feet below general level.
[f] Well about 11 feet below general level.

Depth to water levels in wells in the vicinity of San Jose—Continued.

Map. No.	Owner.	Depth of water surface below bench mark.	Date.
		Feet.	
1373	W. J. Maher	27.0	Mar. 5, 1915
	do	24.4	Apr. 2, 1915
	do	25.0	May 5, 1915
	do	26.0	June 4, 1915
	do	34.0	Aug. 17, 1915
	do	33.6	Sept. 2, 1915
	do	29.0	Dec. 5, 1915
	do	26.4	Jan. 30, 1915
	do	19.9	Mar. 15, 1915
	do	22.0	Apr. 20, 1915
	do	18.5	May 23, 1915
1375	John A. Fair	40.9	Jan. 8, 1914
	do	33.5	Feb. 13, 1914
	do	28.7	Mar. 2, 1914
	do	28.0	Apr. 10, 1914
	do	37.8	July 21, 1914
	do	37.3	Sept. 11, 1914
	do	30.8	Jan. 22, 1914
	do	24.5	Mar. 8, 1914
	do	23.2	Jan. 15, 1917
1377	F. C. Wood	17.6	May 24, 1915
1378	I. G. Tredwell	18.3	Do.
1379	Henry Hoover	13.3	Do.
1381	Pyle Canning Co	14.1	Do.
1382	P. A. Anderson	[g] 4.9	Do.
1383	do	5.6	Do.
1384	F. E. Rose	9.47	Do.
1385		13.9	Do.
1386		[h] 4.5	Do.
1388	Quinn estate	41.7	Jan. 8, 1914
	do	30.0	Mar. 12, 1914
	do	31.5	May 6, 1914
	do	24.0	May 20, 1915
1391	M. T. Sequeira	40.0	Jan. 8, 1914
	do	34.0	Feb. 1, 1914
	do	29.0	Mar. 4, 1914
	do	26.0	Apr. 10, 1914
	do	31.0	July 9, 1914
	do	34.0	Sept. 11, 1914
	do	33.0	Nov. 3, 1914
	do	24.0	Jan. 4, 1914
1393	N. Maher	28.2	Apr. 2, 1914
1394	James B. Fair	28.0	Jan. 8, 1914
	do	20.8	Feb. 13, 1914
	do	27.2	Jan. 1, 1915
1395	W. H. White	27.5	Jan. 8, 1915
	do	22.9	Feb. 3, 1915
	do	18.3	Mar. 3, 1915
	do	14.8	Apr. 6, 1915
	do	17.0	May 7 1915
	do	(?) 27.5	June 6, 1915
	do	22.7	Aug. 3, 1915
	do	23.4	Sept. 3, 1915
	do	22.3	Oct. 13, 1915
	do	20.5	Nov. 9, 1915
	do	19.5	Dec. 2, 1915
	do	18.2	Jan. 12, 1915
	do	17.3	Jan. 30, 1915
	do	11.9	Mar. 8, 1915
	do	11.8	Apr. 21, 1915
	do	10.8	May 27, 1915
1396	William Provan	27.3	Jan. 8, 1914
	do	23.2	Feb. 3, 1914
	do	16.7	Mar. 2, 1914
	do	16.2	Apr. 4, 1914
	do	19.3	May 5, 1914
	do	24.2	July 9, 1914
	do	19.8	Dec. 24, 1914
	do	18.7	Jan. 20, 1915
	do	17.8	Feb. 1, 1915
1397	P. A. Shultz	28.5	Jan. 10, 1914
	do	28.5	Do.
	do	24.2	Jan. 24, 1914
	do	19.2	Mar. 2, 1914
	do	16.8	Apr. 1, 1914

[g] Well about 5 feet below general level. [h] Well about 10 feet below general level.

Depth to water levels in wells in the vicinity of San Jose—Continued.

Map. No.	Owner.	Depth of water surface below bench mark.	Date.
		Feet.	
1397	P. A. Shultz	19.2	May 2, 1914
1398	P. J. Gomez	7.4	—— 24, 1914
	do	i2.1	—— 1911
1401	C. Toscanelli	j28.0	—— 1914
	do	2.1	May 24, 1915
1402	A. M. Fairbanks	3.0	Do.
1405	H. H. Edmunds	23.1	Jan. 10, 1914
	do	18.7	Feb. 1, 1914
	do	13.5	Mar. 2, 1914
	do	11.7	Apr. 2, 1914
	do	13.8	May 2, 1914
	do	22.0	June 4, 1914
	do	20.0	July 2, 1914
	do	20.7	Aug. 3, 1914
	do	20.0	Sept. 2, 1914
	do	20.8	Oct. 7, 1914
	do	18.0	Nov. 3, 1914
	do	16.0	Dec. 1, 1914
	do	14.7	Jan. 12, 1915
	do	13.9	Jan. 29, 1915
	do	8.3	Mar. 9, 1915
	do	8.8	Apr. 19, 1915
	do	7.5	May 17, 1915
	do	22.6	Jan. 8, 1917
1406	F. W. Osterman	15.3	Jan. 28, 1914
	do	14.6	Feb. 2, 1914
	do	9.2	Mar. 3, 1914
	do	7.8	Apr. 2, 1914
	do	9.9	May 2, 1914
	do	(?) 21.7	June 4, 1914
	do	16.5	July 2, 1914
	do	16.8	Aug. 2, 1914
	do	19.3	Sept. 2, 1914
	do	17.0	Oct. 7, 1914
	do	13.6	Nov. 3, 1914
	do	12.0	Dec. 2, 1914
	do	10.7	Jan. 11, 1915
	do	9.9	Jan. 28, 1915
	do	5.0	Mar. 8, 1915
	do	4.0	May 16, 1915
	do	6.7	Jan. 4, 1917
1407	——Jennings	14.0	Jan. 28, 1914
1408	F. Eisermann	14.9	Do.
	do	13.9	Feb. 1, 1914
	do	8.8	Mar. 1, 1914
	do	7.6	Apr. 1, 1914
	do	9.2	May 3, 1914
	do	(?) 24.5	June 4, 1914
	do	16.4	Aug. 1, 1914
	do	17.2	Sept. 1, 1914
	do	16.5	Oct. 16, 1914
	do	10.1	Dec. 28, 1914
	do	9.8	Jan. 11, 1915
	do	9.2	Jan. 27, 1915
	do	3.8	Mar. 8, 1915
1411	O. E. Shepard	19.0	Jan. 10, 1914
	do	14.4	Feb. 1, 1914
	do	9.0	Mar. 1, 1914
	do	7.2	Apr. 1, 1914
	do	9.0	May 1, 1914
	do	14.2	June 1, 1914
	do	17.8	July 1, 1914
	do	16.3	Aug. 1, 1914
	do	18.0	Sept. 1, 1914
	do	16.8	Oct. 8, 1914
	do	13.0	Nov. 1, 1914
	do	11.7	Dec. 1, 1914
	do	10.0	Jan. 1, 1915
	do	8.0	Feb. 1, 1915
	do	4.2	Mar. 1, 1915
	do	3.3	Apr. 1, 1915
	do	3.0	May 15, 1915
	do	5.8	Jan. 8, 1917
1412	——Farrari	11.0	Jan. 10, 1914
1413	J. C. Booth	19.8	Do.

i Flowed in 1911. j Reported in fall of 1914.

Depth to water levels in wells in the vicinity of San Jose—Continued.

Map. No.	Owner.	Depth of water surface below bench mark.	Date.
		Feet.	
1413	J. C. Booth	20.5	Jan. 12, 1914
	.....do	14.5	Feb. 3, 1914
	.....do	8.9	Mar. 3, 1914
	.....do	7.8	Apr. 1, 1914
	.....do	14.2	May 6, 1914
	.....do	(?) 20.0	June 12, 1914
	.....do	15.9	July 13, 1914
	.....do	17.2	Aug. 2, 1914
	.....do	15.8	Oct. 10, 1914
	.....do	13.1	Nov. 8, 1914
	.....do	12.2	Dec. 5, 1914
	.....do	10.8	Jan. 4, 1915
	.....do	10.1	Feb. 1, 1915
	.....do	4.7	Mar. 8, 1915
	.....do	5.0	Apr. 15, 1915
	.....do	3.7	May 16, 1915
	.....do	6.7	Jan. 5, 1917
1414	Nellie Clements	22.6	Jan. 8, 1914
1415	H. Menzel	21.9	Jan. 10, 1914
	.....do	17.3	Jan. 30, 1914
	.....do	11.2	Mar. 7, 1914
	.....do	8.7	Apr. 18, 1914
	.....do	21.2	June 22, 1914
	.....do	18.0	Aug. 3, 1914
	.....do	17.7	Sept. 20, 1914
	.....do	17.7	Oct. 18, 1914
	.....do	13.3	Dec. 4, 1914
	.....do	6.7	Mar. 9, 1915
	.....do	6.6	Apr. 19, 1915
	.....do	5.7	May 20, 1915
1417	A. R. Denike	12.5	Jan. 10, 1914
1418	.....do	[k] 20.9	Do.
1421		23.3	Do.
1422	J. O. Hansen	25.3	Do.
	.....do	14.2	Feb. 1, 1914
	.....do	11.4	Mar. 2, 1914
	.....do	11.8	Apr. 3, 1914
	.....do	12.5	May 1, 1914
	.....do	[l] 40.0	June 3, 1914
	.....do	22.5	July 5, 1914
	.....do	23.2	Aug. 1, 1914
	.....do	24.7	Sept. 2, 1914
	.....do	21.5	Oct. 25, 1914
	.....do	20.8	Dec. 7, 1914
	.....do	11.1	Mar. 8, 1915
	.....do	11.4	Feb. 2, 1915
	.....do	9.7	May 16, 1915
	.....do	12.8	Jan. 13, 1915
1423	Frank Joseph	[m] 35.0	——— 1913
	.....do	30.0	Jan. 10, 1914
1424	W. A. Pyle	16.8	Do.
1425	A. Hanson	21.7	Do.
1426	M. Freitas	16.7	Apr. 23, 1915
1427	Louis S. Rameiro	31.7	Jan. 28, 1914
1431	B. B. Bradshaw	11.5	Do.
1433		7.0	Apr. 27, 1915
1434	James Whelan	2.2	Do.
1435	H. A. Thomas	1.9	Apr. 26, 1915
1436	—— Howard	5.2	Do.
1437	George Carraher	8.3	Do.
1438	L. D. Tibbits & Son	4.9	Do.
1441	.....do	13.2	Do.
1442	W. L. Edwards	18.4	Apr. 25, 1915
1443		26.9	Do.
1444		31.7	Apr. 26, 1915
1445	E. Fuller	34.2	Do.
1446	L. Dillon	30.9	Do.
1447	C. W. Stevens	29.0	Do.
1448	W. H. Farthing	24.0	Do.
1451	A. R. McClony	67.8	Do.
1452	E. E. Chase	10.3	Do.
1453	C. M. Brodie	22.8	Do.
1454	W. H. Farthing	37.0	Do.
1455	Fred Marten	76.0	Do.

[k] Formerly flowed. [l] Reported pumping 400 gallons per minute. [m] Lowest reported, fall of 1913.

Depth to water levels in wells in the vicinity of San Jose—Continued.

Map. No.	Owner.	Depth of water surface below bench mark.	Date.
		Feet.	
1456		2.5	Apr. 26, 1915
1457		.2	Apr. 25, 1915
1458	——— Slinger	4.9	Apr. 26, 1915
1461	J. Tiearix	9.5	Do.
1462	A. H. Washburn	49.4	Apr. 27, 1915
1463	R. F. Black	21.9	Do.
1464	D. Novana	28.0	Do.
1465	——— Mahony	5.0	May 6, 1915
1466	C. A. Werner	87.7	Do.
1467		102.0	Do.
1468	W. R. King	13.7	Do.
1471	H. G. Holzhaner	13.3	Apr. 27, 1915
1472	E. B. Moyer	18.0	Do.
1473	———Heidland	13.4	Do.
1474		9.1	Do.
1475	J. S. Nelson	4.1	Do.
1476	J. Bernsen	9.7	Do.
1477	D. Kempfer	8.1	Do.
1478	L. G. Bradshaw	13.0	Jan. 28, 1914
	.....do	7.2	May 3, 1914
	.....do	16.6	July 1, 1914
	.....do	12.0	Sept. 2, 1914
	.....do	12.3	Oct. 10, 1914
	.....do	10.3	Nov. 7, 1914
	.....do	8.9	Dec. 5, 1914
	.....do	6.2	Feb. 1, 1915
	.....do	2.0	Mar. 17, 1915
	.....do	2.2	Apr. 17, 1915
	.....do	1.5	May 15, 1915
	.....do	3.7	Jan. 10, 1917
1482	George Breves	11.0	Jan. 28, 1914
1483	A. Kammerer	13.5	Feb. 8, 1914
	.....do	5.0	May 15, 1915
1485	C. A. Casey	7.2	Jan. 28, 1914
	.....do	4.0	Feb. 7, 1914
	.....do	1.3	Mar. 3, 1914
	.....do	0.2	Apr. 2, 1914
	.....do	[n] 10.0	June 8, 1914
	.....do	Flowing.	May 18, 1915
1486	U. A. Kammerer	(o)	Jan. 28, 1915
1487		7.7	Do.
1488	C. Perry	12.0	Do.
	.....do	10.6	Feb. 9, 1915
1492	H. Emanuel	12.6	Jan. 28, 1914
	.....do	12.0	Feb. 1, 1914
	.....do	8.0	Mar. 2, 1914
	.....do	6.0	Apr 1, 1914
	.....do	9.2	May 2, 1914
	.....do	14.0	June 4, 1914
	.....do	13.5	July 2, 1914
	.....do	13.5	Aug. 3, 1914
	.....do	13.5	Sept. 3, 1914
	.....do	12.5	Oct. 8, 2914
	.....do	10.0	Nov. 5, 1914
	.....do	10.0	Dec. 1, 1914
	.....do	8.5	Jan. —, 1915
	.....do	8.0	Jan. 29, 1915
	.....do	3.5	Mar. 9, 1915
	.....do	5.0	Apr. 17, 1915
	.....do	3.6	May 20, 1917
	.....do	5.5	Jan. 9, 1914
1493	Beckett & Crothers Real Estate Co.	13.3	Jan. 28, 1915
1494		[k] 4.5	Do.
1495	Joseph Heinrick	10.8	Do.
	.....do	10.0	Feb. 11, 1914
	.....do	7.7	Apr. 6, 1914
	.....do	11.2	May 1, 1914
	.....do	12.0	June 5, 1914
	.....do	14.0	July 3, 1914
	.....do	14.5	Aug. 11, 1914
	.....do	15.0	Oct. 12, 1914
	.....do	10.0	Nov. 4, 1914

[k] Formerly flowed. [n] Pumping. [o] Flowed until 1912.

Depth to water levels in wells in the vicinity of San Jose—Continued.

Map. No.	Owner.	Depth of water surface below bench mark.	Date.
		Feet.	
1495	Joseph Heinrick	9.0	Dec. 3, 1914
	.....do	7.5	Jan. 12, 1915
	.....do	6.7	Jan. 27, 1915
	.....do	8.0	Apr. 19, 1915
	.....do	3.5	Jan. 8, 1917
1496	A. A. Azevedo	12.4	May 13, 1915
1497	Mrs. Martin	10.2	May 7, 1915
1498	P. Doherty	15.7	May 13, 1915
1501	H. Menizen	22.0	Do.
1502	George Walker	17.0	Do.
1503	——Barina	53.0	May 6, 1915
1504	G. Giannotta	56.1	Do.
1505	.....do	84.4	Do.
1506	John Massini	51.5	Do.
1507	——Goss	30.2	Do.
1508	J. F. Pyle & Son	15.7	May 7, 1915
1511		6.1	Do.
1512		16.8	Do.
1513	San Filippo	23.0	Do.
1514	C. L. Lampson	(?) 19.0	May 14, 1915
1515	N. Hannon	16.5	Do.
1516	Joseph Ferriar	32.7	May 7, 1915
1517	A. V. Lopez	38.2	Do.
1518	D. Hobson	39.0	Do.
1521	Lloyd Lundy	61.1	May 6, 1915
1522	San Filippo	50.9	Do.
1523	V. Nola	52.1	Do.
1524	H. A. Thomson	62.3	Do.
1525	E. C. Gould	81.9	Do.
1526	John Pistono	80.8	Do.
1527	F. Fearora	76.6	Do.
1528	J. W. Dickson	97.6	Do.
1531	J. Basile	108.8	Do.
1532	Catherine Millar	77.6	May 13, 1915
1533	E. L. Moody	54.6	Do.
1534	J. W. Shaw	43.0	May 14, 1915
1535	F. DeFiore	39.0	Do.
1536	J. H. Flickinger Cannery Co	32.8	Do,
1537	L. Rossi	18.3	Do.
1538	M. C. Vennum & Bro	18.8	Do.
1541	O. Cali	11.5	May 26, 1915
1542	Phillip Tabor	7.6	Do.
1545		15.1	Do.
1551	S. F. Leib	Flowing.	May 28, 1915
1552	O. G. Marlin	Flowing.	Do.
1553	Frank Tells	2.0	Do.
1554		Flowing.	Do.
1555		Flowing.	Do.
1556		4.1	Do.
1557	M. Ernst	5.1	May 26, 1915
1558	A. Foster	7.3	Do.
1561	J. H. Stanier	5.3	Do.
1562	G. Martella	2.8	May 14, 1915
	.....do	2.8	May 26, 1915
1563	.....do	2.9	May 14, 1915
1564	E. Benone & Co.	3.9	Do.
	.....do	4.5	May 26, 1915
1565		6.5	May 29, 1915
1567	Mrs. Mark Comish	6.5	May 26, 1915
1568	D. Lundy	5.0	Do.
1571	Mrs. J. Stocklin	2.5	Do.
1572	Mrs. McNeil	3.6	Do.
1573	D. M. Bowen	8.0	Do.
1574		Flowing.	Do.
1576		1.6	Do.
1577		7.7	Do.
1578		3.3	Do.
1581	Doyle	Flowing.	Do.
1582	F. J. Mangin	Flowing.	Do.
1583	John Heinlan Co	Flowing.	Do.
1584	Mrs. M. Luning	7.3	May 31, 1915
1585	Mrs. H. Berberich	7.0	Do.
1586	J. W. Hines estate	6.4	Do.
1587		3.7	Do.

Depth to water levels in wells in the vicinity of San Jose—Continued.

Map. No.	Owner.	Depth of water surface below bench mark.	Date.
		Feet.	
1588	V. D. Nichols	Flowing.	May 31, 1915
1591		Flowing.	Do.
1592	W. J. Fogal	Flowing.	Do.
1593	S. Fleet	Flowing.	May 28, 1915
1594	J. Gillespe	Flowing.	May 26, 1915
1595	James D. Phelan	Flowing.	Do.
1596	.....do	Flowing.	Do.
1597	.....do	Flowing.	Do.
1598	.....do	Flowing.	Do.
1601	.....do	Flowing.	Do.
1603	Jack Lawrence	.8	May 28, 1915
1604	E. Jones	Flowing.	Do.
1606	W. J. Fogal	Flowing.	May 31, 1915
1607	.....do	Flowing.	Do.
1608	James D. Phelan	Flowing.	May 28, 1915
1611	.....do	Flowing.	Do.
1612	.....do	Flowing.	Do.
1613	.....do	Flowing.	Do.
1614	.....do	Flowing.	Do.
1615	J. Gohranson	Flowing.	Do.
1616	Mrs. J. H. M. Townsend	Flowing.	Do.
1617	—— Beverson	1.0	Do.
1618	M. Lynn	Flowing.	Do.
1621		Flowing.	Do.
1622		Flowing.	Do.
1626	F. B. Evans	Flowing.	Do.
1627	.....do	Flowing.	Do.
1628		Flowing.	Do.
1631		Flowing.	Do.
1643	F. R. & M. E. Schallenberger	Flowing.	Do.
1645	.....do	Flowing.	Do.
1682	S. G. Tully	Flowing.	Do.
1683	M. Judge	Flowing.	Do.
1685	Santa Clara County	Flowing.	June 1, 1915
1686	C. A. Phelps	Flowing.	Do.
1687	M. Zgragen	Flowing.	Do.
1688		Flowing.	Do.
1691	J. Parker	Flowing.	Do.
1692	George Bray	Flowing.	Apr. 2, 1915
1693	Clara C. Bray	Flowing.	Do.
1694	A. Block Fruit Co	9.6	Do.
1695	R. T. Pierce	16.9	Do.
1698	G. C. Kircher	7.2	Do.
	.....do	8.5	Apr. 20, 1915
1701	George E. Hamilton	7.1	Apr. 2, 1915
1702	Mrs. Gripenstraw	Flowing.	Do.
1703	A. Block Fruit Co	Flowing.	Do.

Depth to water levels in wells of the San Jose waterworks.

[Feet below or above surface.[a]]

Main pumping station.

	Jan. 1.	Feb. 1.	Mar. 1.	Apr. 1.	May 1.	June 1.	July 1.	Aug. 1.	Sept. 1.	Oct. 1.	Nov. [illegible]	[illegible]	Dec. 31
1915	[b] 4	[b] 0	[b] +6	[b] +1	[d] +10	+9.1	+3.1	+0.3	2.2	3.1	4.[illegible]	[illegible]	.....
1916	+1.1	+3.3	+11.7	+8.3	+4.2	4.6	6.4	7.8	8.2	7.4	6.	6.	.....
1917	4.3	2.3	3.1	+2.4	1.8	7.6	[b] 12	[b] 16	14.8	[b] 14	12.	10.	.....
1918	9.8	12.3	12.3	12.3	14.5	24.8	37.3	31.8	25.8	25.8	22.	19.	.....
1919	18.8	−16.4	11.4	[c] 1.3	[d] 24.8	29.3	32.3	33.3	33.1	32.3	30.	[illegible]	27.2

[a] Water levels above surface are indicated by the plus sign.
[b] No accurate records; computed from the best available data.
[c] April 8.
[d] May 30.

Depth to water levels in wells of the San Jose waterworks—Continued.

Buena Vista pumping station.

	Jan. 1.	Feb. 1.	Mar. 1.	Apr. 1.	May 1.	June 1.	July 1.	Aug. 1.	Sept. 1.	Oct. 1.	Nov. 1.	Dec. 1.	Dec. 31
1909 ..	[b] 32	[b] 34	[b] 30	[b] 28	[b] 28	32	35.	36	38	39	39	39	.....
1910 ..	39	[b] 36	[b] 35	[b] 35	36	37	37.5	37	38	39	39.5	40.5	.....
1911 ..	40	[b] 36	[b] 32	[b] 26	24	26	30.	33	34	36	36	36	.....
1912 ..	[b] 35	[b] 34	[b] 32	[b] 31	[b] 30	[b] 40	[b] 52	[b] 54	[b] 54	[b] 54	[b] 54	[b] 54	.....
1913 ..	[b] 54	47.7	48.9	50.5	52	.....	62.3	64.5	66.5	67.3	66	66	.....
1914 ..	52.7	46	37.8	31.7	31.7	38.5	41.5	42.6	43.9	45.6	45.3	45.3	.....
1915 ..	43.7	41.8	32.7	28.7	26.6	25.3	31	33.8	35.1	36.8	37	35	.....
1916 ..	34	30.3	22.5	23.5	27.7	32	34.7	37.8	38	39	38	38	37.5
1917 ..	37.5	35.7	34.3	31.2	34.5	39	42	44.7	45.5	46.7	46.2	46.2	.....
1918 ..	45	44.8	46.1	46.6	49.8	56.8	60.3	61.9	62	59	57.5	53	.....
1919 ..	52	50.5	46.5	46	47	55	59.3	61.5	61.5	61.3	60.8	60.8	59.1

Seventeenth Street pumping station.

1912 ..	[b] 22	[b] 19	[b] 16	[b] 15	[b] 16	20.5	23.6	23.9	25.8	25	24.3	23.3	.....
1913 ..	22.2	18.2	21.9	22.5	30.5	33.3	36.3	38.3	36.5	37	34.4	31	.....
1914 ..	29	21.5	14.8	10.7	13	18.8	22.3	23.3	23.3	23.8	[b] 24	[b] 22	.....
1915 ..	[b] 18	[b] 14	[b] 10	[b] 6	[b] 8.	[b] 10	11.2	13.3	13.8	15.1	[b] 15	[b] 15	.....
1916 ..	[b] 14	[b] 10	[b] 8	[b] 6	9.6	14	16.2	18	18	16.2	14.3	13.3	.....
1917 ..	12.3	11.3	11.1	7.3	13.2	18.6	28.6	32	36.2	35.1	34.3	32.3	.....
1918 ..	31.4	25	20.7	19.3	22.7	33	37	38	39	31	28.3	28	.....
1919 ..	26.7	24.5	20	20	21.2	34	37	38.4	39.4	37.4	36.4	35	31.6

Bascomb Avenue pumping station, well No. 1.

1918 ..	45	45	47	47.4	50	58	64.5	65	66.1	60	59	56	.....
1919 ..	54	53.4	50.4	48	43.7	57.5	62.3	61.4	63	62.4	62.4	62.1	58.4

[b] No accurate records; computed from the best available data.

Depth to water levels in wells in the vicinity of Mountain View.

Map No.	Owner.	Depth of water surface below bench mark.	Date.
		Feet.	
1704	John Weber	Flowing.	Apr. 2, 1915
1705	C. D. Kent	14.2	Do.
1706	——Smith	(a)	Do.
1711	C. J. Warder	11.5	Do.
	.....do	12.8	Apr. 16, 1915
	.....do	9.5	May 16, 1915
1713	W. Kiely	12.3	May 23, 1915
1714	Mrs. D. F. Whittenberg	10.0	Apr. 2, 1915
1715	F. W. Park	26.9	Do.
1716	M. E. Grimes	23.6	Do.
1717	Dolfman & Rosenthal	30.5	Do.
1718	Frank Kemper	22.6	Do.
	.....do	22.5	Apr. 16, 1915
	.....do	22.3	May 18, 1915
1723	R. MacMillan	48.1	Mar. 28, 1915
	.....do	47.8	Apr. 19, 1915
	.....do	45.8	May 17, 1915
1724	A. C. Butcher	56.0	Mar. 26, 1915
	.....do	60.0	Apr. 20, 1915
1725	M. E. Grimes	33.4	Mar. 20, 1915
	.....do	34.8	Apr. 15, 1915
1727	——Frank	78.8	Mar. 26, 1915
1728	C. R. Forge	(?)70	Do.
1731	J. W. Kennedy	84.9	Do.
1732	J. Evans	80.0	Dec. 20, 1914
1733	N. J. Buck	(?)100	Do.
	.....do	107.3	May 15, 1915
1734	E. Graybill	(?) 00	Dec. 20, 1914
1735	W. J. Schmidt	105.0	Do.
1736	C. N. Miller	185.0	Do.
1737	W. J. Gardner	106.0	Do.
1738	C. Wolfe	144.0	Do.

[a] Flowed, 1911.

Depth to water levels in wells in the vicinity of Mountain View—Continued.

Map. No.	Owner.	Depth of water surface below bench mark.	Date.
1741	Mrs. J. J. Morrison	100.0	Dec. 20, 1914
1742	——— Henry	190.0 (dry)	Do.
1744	C. Christenson	90.0	Do.
1745	M. J. Kochman	(?)138.0	Do.
1747	G. Carpenter	80.0	Do.
1748	Mrs. W. T. Wright	85.0	Do.
1749	H. G. Sterling	90	Do.
	.....do	90.5	Apr. 15, 1915
	.....do	88.0	June 1, 1915
1751	H. E. Losse	85.0	Dec. 20, 1914
1753		139.0	June 3, 1914
1754	J. C. Kircher	113.0	Mar. 29, 1914
1755	Mary A. Brown	98.4	June 8, 1914
1756	S. H. Kifer	113.3	Do.
1757	R. C. Kirkwood	113.0	Do.
1758	L. E. Walters	81.0	Do.
1759	George McComb	111.7	Apr. 16, 1914
	.....do	114.6	May 19, 1914
1761	A. F. Fluger	77.0	June 9, 1914
1762	H. S. McKean	81.8	Do.
1763		68.2	Do.
1764	J. G. North	78.7	Do.
1765		76.2	Do.
1766		62.8	Do.
1767		112.5	Do.
1771	B. F. Wright	(?) 45.0	Mar. 27, 1915
1772	W. P. Wright	62.2	Dec. 10.1914
1773	Dr. Powers	98.9	Do.
1774	W. F. Bubb	75.5	Jan. 30, 1914
	.....do	71.0	Mar. 6, 1914
	.....do	66.5	Apr. 4, 1914
1775	Ehrhorn estate	47.3	Dec. 10.1913
	.....do	47.8	Dec. 31, 1913
	.....do	43.5	Feb. 4, 1914
	.....do	40.3	Mar. 1, 1914
	.....do	38.9	Apr. 2, 1914
1776	J. E. McCarty	39.0	June 4, 1915
1778	Mercer Bros	64.8	June 8, 1915
1781	J. U. Levin	75.2	Do.
1783	E. R. Freeman	75 to 80	May —, 1912
1784	H. E. Losse	74.6	Mar. 27, 1915
1785	Ira Van Moren	[b] 105.0	Mar. —, 1914
1786		87.4	Mar. 26, 1914
1788	Calkins & Spaulding	60.0	Spring, 1914
1792	A. C. Butcher	34.3	Mar. 26, 1915
	.....do	36.0	Apr. 20, 1915
1793	A. E. Smith	23.6	Mar. 28, 1915
1794	H. Martens	32.0	Do.
1795	C. H. Clement	37.0	Do.
1798	C. L. Stowell	(?) 80.0	Mar. 26, 1915
1801	C. O. Bocks	68.3	Mar. 27, 1915
1803	James Palmer	60.6	Do.
1804	J. Christensen	62.0	May 18, 1915
1805	A. Dechman	47.8	Mar. 28, 1915
1807	J. E. Nelson	49.9	Do.
1808	J. E. Brown	49.2	Do.
1811	E. R. Freeman & Conley	53.1	Do.
1812	Bernard Ave. Water Co	40.5	May 7, 1915
1814	A. S. Dutro	20.1	Apr. 1, 1915
1815	S. I. Imai	16.5	Do.
	.....do	8.5	June 4, 1915
1822	P. W. Mitchell	3.5	Do.
1823	J. H. McCullough	(?) 7.0	Apr. 1, 1915
1824	Mrs. A. Toney	9.2	Do.
	.....do	9.2	Apr. 18, 1915
	.....do	8.9	May 17, 1915
1825	A. E. Curtner	4.4	Apr. 1, 1915
1826	Frank Vargas	1.9	Mar. 28, 1915
1827	.....do	Flowed.	——— 1911
1832	——— Jones	23.7	Mar. 27, 1915
1833	M. O. Fiehmann	11.6	Mar. 28, 1915
1834		24.2	June 4, 1915
1835		9.6	Do.
1836	O. M. Taylor	Flowing.	Apr. 1, 1915
1837	W. K. Hooper	Flowing.	Do.

[b] Reported.

Depth to water levels in wells in the vicinity of Mountain View—Continued.

Map. No.	Owner.	Depth of water surface below bench mark.	Date.
		Feet.	
1838	H. P. Hansen	Flowing.	Apr. 1, 1915
1841		4.6	June 4, 1915
1842	——Bowman	Flowing.	Do.
1843	Joshua Hendy Iron Works	16.7	June 14, 1915
1844	——Richard	10.2	June 1, 1915
1845	A. Tognazzini	8.6	Do.
1846	Mrs. Abby	10.4	Apr. 2, 1915
1847	L. E. Grove	8.4	Do.
	.....do	8.7	Apr. 15, 1915
	.....do	8.1	May 15, 1915
1858	C. R. Arques	Flowing.	June 1, 1915
1861	.....do	Flowing.	Do.
1862	Santa Clara County	5.3	Do.
1863	F. C. Andrews	Flowing.	Do.
1865	Bracher Trust Co.	Flowing.	Do.
1866	.....do	Flowing.	Do.
1867	.....do	Flowing.	Do.
1872	Willcox Fruit Co.	Flowing.	Do.
1876	F. B. Westen	Flowing.	Do.
1877		Flowing.	Do.
1878	J. H. Morse	Flowing.	Do.
1896	C. A. Phelps	Flowing.	Do.
1902	O. Oaks Co.	Flowing.	Do.
1903	J. H. Morse	Flowing.	Do.
1904		Flowing.	Do.
1905		Flowing.	Do.
1906	O. Oaks Co.	Flowing.	Do.
1907	Ida L. Oaks	Flowing.	Do.
1914	J. Bogart heirs	Flowing.	Do.
1915	J. C. Phelps	Flowing.	Do.
1962	—— Terths (?)	Flowing.	May 27, 1915
1963	M. S. Nunes	Flowing.	Do.
1964	J. S. Sivera	Flowing.	May 14, 1915
1965	M. A. Rose	Flowing.	Do.
1966	J. Bronk	1.0	Do.
1967	S. Massina	Flowing.	Do.
1968	Mrs. A. Katz	16.0	Do.
1971	M. S. Nunes	12.3	May 13, 1915
1972	A. M. Foster	15.2	Do.
1973	J. W. Smith	17.1	Do.
1974	A. Kawata & T. Morita	27.9	Do.
1975	J. S. Rodrigues	33.3	Do.
1976	A. Machado	42.4	Do.
1977	—— Filliggio	44.8	Do.
1978	F. Yager	46.6	Do.
1981	A. Orlando	54.9	Do.
1982	H. F. Curry	58.1	Do.
1983	—— Moore	69.7	May 14, 1915
1984		73.0	Do.
1985	A. Gladawitz	97.7	Do.
1986	W. K. Lewis	88.9	Do.
1987	C. H. Max	60.9	Do.
1988	F. H. Holmer	62.2	Do.
1991	A. Cataldi	46.6	May 13, 1915
1992	J. S. Nunes	43.0	May 14, 1915
1993	F. De Fiore	39.8	Do.
1994	J. P. Cabral	40.0	Do.
1995	Bert Herrington	35.7	May 27, 1915
1996	.....do	32.7	Do.
1997	.....do	48.4	Do.
1998	.....do	28.0	Do.
2001	J. A. Roderick	1.3	Do.
2002	A. F. Cunha	11.8	Do.
2003	Carson Bros.	9.7	Do.
2004	.....do	Flowing.	Do.
2005		3.1	
2101	C. L. Stowell	Flowing.	Mar. 26, 1915
2104		Flowing.	Aug. 21, 1912
2105		Flowing.	Do.
2106		Flowing.	Do.
2107		Flowing.	Do.
2108		Flowing.	Do.
2111		Flowing.	Do.
2112		Flowing.	Do.
2113	Z. Tompkins	Flowing.	June 4, 1915
2114	E. W. Kenny	Flowing.	Do.
2115	.....do	Flowing.	Do.
2116		Flowing.	Aug. 21, 1912

Depth to water levels in wells in the vicinity of Mountain View—Continued.

Map. No.	Owner.	Depth of water surface below bench mark.	Date.
		Feet.	
2117	.....	Flowing.	Aug. 21, 1912
2118	.....	Flowing.	Do.
2119	.....	Flowing.	Do.
2121	.....	Flowing.	Do.
2122	.....	Flowing.	Do.
2122	.....	Flowing.	Do.
2124	.....	Flowing.	Do.
2125	Mrs. J. B. Martin	Flowing.	June 4, 1915
2126	(Shallow pit)	10.3	Do.
2128	T. Mannix	15.8	Apr. 1, 1915
	.....do	15.1	Apr. 15, 1915
	.....do	14.0	May 26, 1915
2131	J. G. Gwartney	27.5	Apr. 15, 1915
	.....do	26.3	Apr. 22, 1915
	.....do	26.3	Apr. 17, 1915
2132	J. H. Brainard	26.2	June 4, 1915
2135	——— Snell	12.5	Do.
2136	Wheeler & Pratt	28.5	Do.
2138	James Center	16.2	Do.
2140	.....	11.4	June 16, 1915
2141	.....	17.3	June 7, 1915
2143	G. A. Johnson	10.0	June 16, 1915
2145	S. Ogata (Japanese)	Flowing.	Do.
2146	J. C. McCleary	Flowing.	Do.
2147	.....	Flowing.	Do.
2148	.....	Flowing.	Do.
2151	J. C. McCleary	Flowing.	Do.
2152	.....do	Flowing.	Oct. 16, 1912
2153	.....	Flowing.	Do.
2154	Mrs. Rengstorff	Fiowing.	Do.
2155	Whisman School	Flowing.	Do.
2156	.....	Flowing.	Do.
2157	George Levin	Flowing.	Do.
2158	Mrs. Charlston	Flowing.	Do.
2161	.....	Flowing.	Do.
2162	.....	Flowing.	Do.
2163	.....	Flowing.	Do.
2164	Charles H. Swall	Flowing.	Do.
2165	.....do	Flowing.	Do.
2166	J. Arthur Huff	Flowing.	Do.
	.....do	c 14.0	Dec. 3, 1912
	.....do	c 12.0	Jan. 10, 1913
	.....do	(?)18.0	Feb. 8, 1913
	.....do	14.0	Feb. 10, 1913
	.....do	18.0	Apr. 18, 1914
	.....do	18.0	May 6, 1913
	.....do	13.0	Sept. 1, 1914
	.....do	16.0	Dec. 2, 1914
2167	A. Bener	Flowed.	——— 1913
2168	——— Huff	Flowing.	Oct. 16, 1912
2173	L. Marengo	Flowing.	Do.
2174	.....dc	Flowing.	Jan. 15, 1916
2175	.....	Flowing.	June 16, 1916
2176	.....	4.1	Do.
2177	.....	7.0	Oct. 16, 1912
	L. Marengo	8.2	June 16, 1915
2181	Charles Woog	18.0	Do.
2182	F. Toft	32.1	Dec. 6, 1913
	.....do	32.3	Jan. 2, 1914
	.....do	28.7	Feb. 4, 1914
	.....do	26.4	Mar. 6, 1914
	.....do	26.4	Apr. 4, 1914
	.....do	28.2	May 3, 1914
	.....do	30.3	June 6, 1914
	.....do	32.0	July 10, 1914
	.....do	32.6	Aug. 2, 1914
	.....do	33.5	Sept. 3, 1914
	.....do	29.8	Oct. 13, 1913
	.....do	29.3	Nov. 5, 1914
	.....do	29.1	Dec. 2, 1914
	.....do	29.2	Jan. 10, 1915
	.....do	29.0	Jan. 27, 1915
	.....do	24.8	Mar. 8, 1915
	.....do	24.2	Apr. 16, 1915
	.....do	24.0	May 15, 1915
2184	C. Antoinoli	42.2	June 9, 1915

c Height to which water rises above surface.

Depth to water levels in wells in the vicinity of Mountain View—Continued.

Map. No.	Owner.	Depth of water surface below bench mark.	Date.
		Feet.	
2185	Edwin W. Earl	56.0	Dec. 5, 1913
	do	51.5	Mar. 31, 1914
2186	J. E. Youngberg	1.0	Dec. 5, 1913
2188	S. A. Wood	Flowing.	Oct. 16, 1912
2191	C. L. Kennedy	53.9	Dec. 5, 1913
	do	50.8	Jan. 1, 1914
	do	49.5	Feb. 2, 1914
	do	48.6	Mar. 4, 1914
	do	47.5	Apr. 4, 1914
	do	46.5	May 2, 1914
	do	50.2	June 5, 1914
	do	49.1	July 10, 1914
	do	48.2	Aug. 6, 1914
	do	48.3	Sept. 1, 1914
	do	47.7	Nov. 3, 1 14
	do	47.5	Dec. 1, 1914
	do	47.6	Jan. 9, 1915
	do	47.3	Feb. 1, 1915
	do	44.8	Apr. 19, 1915
	do	42.5	May 16, 1915
	do	42.1	May 29, 1915
2192	E. Poppleton	39.7	De . 5, 1913
	do	37.7	Feb. 1, 1914
	do	36.9	Mar. 4, 1914
	do	36.9	Apr. 1, 1914
	do	38.2	May 1, 1914
	do	41.0	June 20, 1914
	do	38.8	Aug. 8, 1914
	do	38.4	Nov. 1, 1914
	do	38.0	Dec. 6, 1914
	do	37.9	Jan. 1, 1915
	do	37.8	Jan. 27, 1915
	do	32.9	May 1, 1915
2193	—— Racomi	24.7	Dec. 6, 1913
2195		21.1	Aug. 21, 1912
2196	J. W. Seitz	17.0	Fall of 1914
	do	11.7	June 9, 1915
2197	M. J. Pear	4.9	Oct. 16, 1912
	do	7.0	June 9, 1915
2198	Miller & Lux	F owing.	Do.
2201	A. C. Paul	22.6	Oct. 16, 1912
	do	24.0	Nov. 2, 1912
	do	23.0	Dec. 8, 1912
	do	26.2	Nov. 11, 1913
	do	26.2	Dec. 6, 1913
2202	M. Rafferty	29.6	June 16, 1915
2203	George Mahoney	29.2	Do.
2204	M. Rafferty	[d] 27.7	Dec. 1, 1913
	do	29.2	June 16, 1915
2205	R. Wilke	19.5	Oct. 16, 1912
2207	do	7.3	Do.
	do	12.8	Dec. 1, 1913
	do	12.2	Dec. 6, 1914
2208	C. T. Powell	17.4	Dec. 1, 1913
	do	10.5	June 16, 1915
2209	S. Clack	20.4	Dec. 1, 1913
2211		9.7	June 16, 1915
2212	Edward Barron estate	10.6	Do.
2213	do	21.0	Do.
2214		15.6	Do.
2215	Anna L. Backus	15.0	Do.
2216	do	14.9	Oct. 16, 1912
	do	14.4	Sept. 21, 1912
	do	18.3	Nov. 11, 1913
	do	13.8	June 8, 1915
2217	D. C. Elliott	23.7	June 1, 1915
2218	Stanford Irrigated Tract	7.0	June 2, 1915
2221	Maud Booth Home	3.2	Do.
2223	City of Palo Alto	.....	
2227		8.2	June 7, 1915
2228	B. Mauroux	12.8	Do.
2231	Miss Harker's School	17.1	June 7, 1915
2232		20.1	Do.
2234	——Martin	4.8	Do.
2235	M. L. Pitman	14.0	Do.

[d] Mill had been running.

Depth to water levels in wells in the vicinity of Mountain View—Continued.

Map. No.	Owner.	Depth of water surface below bench mark.	Date.
		Feet.	
2236	D. E. Ashley	(e)	June 7, 1915
2237	Peter Faber	17.6	June 24, 1915
2242	.....do	2.8	Do.
2243		8.3	Do.
2244	Mrs. J. C. Fontes	27.0	Do.
2245		9.8	Do.
2246	First National Bank, San Jose	15.5	Do.
2247	.....do	1.0	Do.
2248		5.0	Do.
2251	W. A. Camduff	Flowing.	Do.
2252	Thomas Fitzgerald	10.2	Do.
2254	W. C. Wilbur	30.0	Do.
2255	R. H. McGowen	30.3	Do.
2256	City of Palo Alto	39.6	June 7, 1915
2257	T. Hopkins	46.3	Do.
2261	James Flood	28.2	Oct. 7, 1914
	.....do	28.1	Dec. 2, 1914
	.....do	28.2	Jan. 12, 1915
	.....do	27.3	Feb. 1, 1915
	.....do	24.3	Mar. 7, 1915
	.....do	23.0	Apr. 23, 1915
	.....do	22.3	May 18, 1915
2268	Sharon estate	f 80.0	Aug. 19, 1915
2271	S. L. Goldstein	80.2	Do.
2272	Mrs. D. S. Dorn	64.3	Do.
2274	E. B. Hindes	45.0	Dec. —, 1914
2275	John S. Hansen	75.0	Aug. 24, 1915
2276	H. Rasmussen	55.9	Aug. 19, 1915
2277	John Drinkhouse	50.0	Do.
2278	Mrs. Hilda R. Sossi	50.0	July 15, 1915
2283	Paul Peyre	g 34.6	Aug. 20, 1915
	.....do	30.2	Aug. 25, 1915
2284		30.2	Aug. 20, 1915
2285	Henry Goertzhain	22.0	Do.
2286	Mrs. M. A. Fantina	13.8	Aug. 20, 1915
2287	R. Krupke	15.5	Aug. 19, 1915
2288	Fred Lightbody	24.3	Do.
2291	C. M. Solari	31.4	Do.
2292	.....do	32.5	Do.
2293	.....do	24.3	Do.
2294		18.6	Do.
2295	L. Veani	Pumping.	
2296		14.2	Aug. 20, 1915
2297		12.2	Do.
2298	S. T. Schivo	12.3	Do.
2301		7.2	Do.
2302		7.1	Sept. 29, 1915
2304		10.4	Sept. 28, 1915
2305		1.3	Sept. 28, 1915
2306		1.8	Do.
2307			
		h 11.8	Do.
2308	McConn Realty Co.	22.3	Do.
2309		11.3	Do.
2311	B. C. Murray	17.6	Do.
2312		13.5	Do.
2313		28.0 / Dry.	Do.
2314	R. E. Woodhoms	25.5	Do.
2315	P. Gandy	15.7	Do.
2316	MacRarie, McLaren Co.	16.8	Do.
2317	——— Jennings	4.4	Do.
2318		Flowing.	Do.
2321	E. Casey	26.6	Do.
2322	Fanny Schudt	31.8	Do.
2323	P. J. May	10.6	Do.
2324	Peninsula Water Co.	(i)	
2325		10.3	Sept. 29, 1915
2326		6.0	Do.
2328	Burlingame municipal waterworks	(j)	
2331		14.7	Oct. 1, 1915
2332		3.6	Do.
2333	Chris. Shuttleworth	9.9	Do.
2334		8.6	Do.

e Flowed 15 years ago. g Mill running. i Flows in spring.
f Reported; pumping. h Pump had been running. j Pumping 12,000 gallons an hour.

PUMPING PLANTS USED FOR IRRIGATION.

Pumping plants used for irrigation in the Santa Clara Valley.

[The data were collected in 1913, 1914, and 1915.]

No.	Owner.	Wells.			Size and type of pump.[a]	Kind of power[b] and amount in horsepower.	Cost of plant.	Yield per minute.	Area irrigated.			Remarks.
		Number.	Diameter.	Depth.					Orchard.	Alfalfa.	Miscellaneous.	
			Inches.	*Feet.*				*Gallons.*	*Acres.*	*Acres.*	*Acres.*	
5	Mrs. J. Pimental										30	
9					3-in. H.	E. 5	$800				30	
14	Morse Seed Co				T. V.	G. 17					80	
16	L. P. Jepsen				5-in. H.	G. 10	1,000			30		
18	M. Schaenfeld				5-in. H.	E. 10	1,400			75		Direct connection.
22	C. Lorenzen				6-in. H.	E. 15						Do.
24	Morse Seed Co	4			7-in. H.	E. 35		1,500		40		Four wells connected.
33	Ben Flint				6-in. H.	G. 25	2,000			40		
34	San Juan Berry Co				4-in. V.	G. 15	1,300				30	
35	A. M. Lindel				5-in. V.	G. 20	3,000		75	15		
37	J. P. Faunt				4-in. V.	G. 18	600			19		
38	E. F. Gleason				5-in. V.	G. 15	4,100		28	2		
42	Morse Seed Co				7-in. V.	E. 75	5,000				400	
54	—— Flint				4-in. H.	E. 20	2,000			100		
55	San Juan Valley Irrigation Co.				6-in. H.	E. 25	5,000		220			
56	John Gonzales				4-in. V.	G. 25	3,000		20			
57	James Stone											
58	Manuel Nunes				4-in. H.	E. 15	800		10	10		
59	—— Swanson					E. 10	1,500			80		
61	Mitchell Fruit Farm				6-in. H.	E. 25	3,500	730	80		24	Measured by float in flum
62	Bonnie Brae Ranch								100			
63	George E. Shaw					E. 25		570	25			Reported yield.
65	—— Beumsen (?)					G. 25			3	17		
66	C. Berri				6-in. H.	G. 25	2,600			50		
71	D. B. King				4-in. V.	S. 12	1,500		80	5		
73	—— Hawkins				6-in. V.	G. 25	1,600		15			
74	John Smith								40			
79	William Gury				4-in. H.	G. 25	1,400			15		
91	R. Elliott				5-in. V.	G. 30	2,800		30			
93					3-in. H.	E. 5	800				30	
97	W. E. Stevens				2½-in. V.	G. 4	500		11			
101	—— Goodpasture				5-in. H.	G. 10	3,500		(?)			
105	J. C. Hamliton				5-in. H.	G. 20	2,500	700	86		19	
111	Bundesen Co				5-in. V.	G. 40		370	150			Weir measurement.
112	C. L. Ladd				4-in. V.		1,500		10			Sells water.
116	—— Langdon						2,000		30			Equipment removed.
117	R. F. Bishop				5-in. V.	G. 21	3,500		90	30		
118	A. Cowden				4-in. H.	G. 14	1,500		32			
121						G. 3	1,000		4	7		
122	S. Charles								9	2	4	
129	F. M. Barnhisel				5-in. V.	E. 20			145			Minimum area irrigated 70 acres.
136					6-in. H.	G. 6	800					
137	—— Vincent (?)						800		9	9		
142	G. B. Corrotto				4-in. V.	G. 6	500		30			
143	B. F. Haney				3-in. V.	G. 6	800		5	5		
145	J. A. Wright				4-in. V.	G. 15	2,000		20			
146	—— Dorbar				6-in. V.	G. 12			30			
148	E. J. Douglas				6-in. H.	G. 23						
165	Lewis, Cushman & De Frankie.				6-in. V.	E. 20	2,200		45	87		
166	Bointon Bros				6-in. H.	G. 40	2,000	900	200			Reported yield.
184	McClaskey Bros				7-in. H.	E. 30	2,000	812	81	110		Weir measurement.
186	Hudner Bros				6-in. H.	E. 25		902				Drawdown 10.79 feet. Weir measurement.
187	Walter Brittingham				6-in. H.	E. 25	2,000			23		
188	W. J. Ramoni				6-in. H.	E. 25				27		
192	L. Flynn				7-in. H.	E. 30	4,500	1,325		57	100	Weir measurement. Cost includes leveling land and ditches.
193	Kydd & Harlan				6-in. H.	E. 25	1,800	1,000		63		Float method.
194, 195	Harry Hawkins				5-in. H.	E. 20				100		
196	D. Bache				No. 6 T.	E. 30	2,500		10	40		
197	W. A. Pack				6-in. H.	E. 25	1,750	326		37		Vacuum gage 25.7. Weir measurement.
212	Ramelli Bros				5-in. H.	G. 20					150	
213	P. Hewlett				6-in. H.	E. 25		300		90		Reported measurement.
215	R. I. Orr				6-in. H.	E. 20				100		
217	Johnson & White				16 in. T.		2,000	1,000				Reported. Weir measurement when the well was new indicated only 319 gallons a minute.
223	O. Kamoto				3-in. V.	E. 10	750				30	
236	Jack Sullivan				7-in. H.	E. 35	2,200		20	123		
237	Hart Brothers				6-in. H.	G. 32	1,600	850	30	100		Reported yield.
241	—— Dunn				8-in. V.	G. 25				200		
242	J. F. Dunne					G. 25				75		
247	D. Marcus				6-in. H.	E. 15	2,400			20		
248	S. Grant				3-in. H.		425			5	10	
251	Isaac James				4-in. H.	G. 15					60	
256	C. M. Brown				5-in. V.	G. 25	1,600		40			
262	Hasbrouck & Underwood				6-in. V.	E. 20	1,200				70	

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[b] E.=electric; G.=gasoline; O.=oil; S.=steam.

Pumping plants used for irrigation in the Santa Clara Valley—Continued.

No.	Owner.	Wells. Number.	Wells. Diameter.	Wells. Depth.	Size and type of pump.[a]	Kind of power[b] and amount in horsepower.	Cost of plant.	Yield per minute.	Area irrigated. Orchard.	Area irrigated. Alfalfa.	Area irrigated. Miscellaneous.	Remarks.
			Inches.	*Feet.*				*Gallons.*	*Acres.*	*Acres.*	*Acres.*	
263	M. A. Miller				5-in. H.	G. 15	$1,250				10	
264	Waldo Rohnert				7-in. V.	E. 25	1,700	1,200			150	Reported yield.
266	J. F. Dunne					G. 25				100		
271	—— (Italian)				8-in. V.	E. 50						
272	Frank Martin				6-in. H.	E. 20				60		
273	John Lu[illegible]				5-in. H.	E. 15				55	6	
274	M. E. McCullough									30		
275	Mary A. Chase				4-in. H.	E. 10	1,200			40		
276	E. J. Turner				5-in. H.	G. 15	1,300			22		
277	A. T. Fay				5-in. H.	G. 8					30	
278	O. C. Braden				5-in. H.	E. 5				20	10	
279	J. F. Dunne					G. 40				250		
281	C. D. Sweet				5-in. H.	G. 10	900			20		
283	S. B. Gillespie	9					800			70		Flowing wells. Small portable pumping rig used when needed.
284	F. M. Frazell	9			One 6-in. H. and two 5-in. H.	G. 15 G. 10 G. 5		2,300		70	45	Yield reported from three wells.
289	Oliver Orr				5-in. H.	G. 15		960		50		Float method.
290	G. J. James	6			5-in. H.	G. 15				50		Pumps from four wells with portable rig.
292	B. Leonard						850			29		
293					6-in. H.	E. 15				50		
294	H. A. Skeels	7								30	10	Pumps from two wells.
296	E. J. Dunlap				6-in. H.	G. 16	1,000				60	
303	The Wood Co				8-in. H.	G. 22				60		
308	Spring Valley Water Co										40	Irrigation from flow.
312	H. R. Chesbro									30		Do.
314 318	—— Rae										20	Do.
327	Miller & Lux									40	80	
328	.....do				10-in. H.	E. 30				100		
332	—— Ray				6-in. H.					30	20	Portable pumping rig.
333	T. Naka				3-in. H.	E. 7½				15	15	Flowing well.
334	Miller & Lux				8-in. H.	E. 40				65	120	
342	Alex. Watson				6-in. H.	G. 20				235		
343	R. Eschenberg				6-in. H.	G. 32				60		
345	E. R. Maze				5-in. H.	E. 15		520		20		Do.
348	G. A. Moore				No. 12 T.		1,400		67	14		
351	C. W. Doan				6-in. H.	E. 50	2,000		70	60	7	
356	A. Gubse				6-in. H.	E. 20				20	40	
357	Geo. C. White				5-in. H.	G. 10	1,000			23		
361	A. Dexter				4-in. H.	G. 25				20		
362	C. C. Lester				V.	G. 60				70		
363	O. Dexter				5-in. V.	G. 20				20		
366	Ralph Zuck				5-in. H.							
367	W. G. Burchell				6-in. H.		4,000	1,000		70		Flowing wells. Reported yield.
371					3-in. H.	E. 10				20		
372	Joseph Bert				5-in. H.	E. 20				40 ?		
377	—— Hecker				5-in. H.	E. 20				40		
381	George E. Stone				4-in. V.	G. 15	1,600	445		10		
382	A. Rianda						5,150	1,200		85		Reported yield.
383	Leman Wilson								12	35		
384	Miss Shepard				6-in. H.	E. 25	1,000	1,200		60		
385	Mrs. Shepard				4-in. H.	G. 6		660		27		
386	Ryan Bros.				5-in. H.	G. 12				45		
388	A. Arena								16			
391	John Sturla				6-in. H.	E. 15	2,500	800	67		100	Do.
392	P. Bailage									50		
396	J. P. Lindeleaf				5-in. H.	E. 10				25		
397					4-in. H.	E. ?				20		
398	B. Sellrini				4-in. H.	G. 15				14		
401					6-in. H.	E. ?			10	20		
402	H. M. Wolfe				5-in. V.	E. 20				40 ?		
404	C. J. Holmes								9			Very small irrigation.
411	White & Wheelock				6-in. V.	G. 25	2,000	950		50		
412	K. L. Enans				(?)	E. 15				30	5	
413	Gilroy Seed Co.				6-in.	G. 32			100		50	
414	.....do				L. T.	G. 30	2,200	925	75		75	
417	J. W. Linder				6-in. V.	G. 25	3,000	1,100		35	15	Do.
421	G. W. Earl								20			
423	W. O. Goold				4-in. H.	E. 7½	1,000		22	4		
424	J. C. Webb				3-in. V.	G. 6	1,100		12			
425	O. Lindstrom				4-in. V.	G. 10			20	5		
427	A. T. Jones				6-in. V.	G. 20	3,000		20	30	10	
436	C. R. Thomas								46			
437	Massy Thomas				6-in. H.	S. 20			40			
442	H. A. Tibbetts				7-in. V.			1,200	25			Measured by F. H. Tibbetts, of department of civil engineering of University of California.
443	Miller & Lux				8-in. H.	E. 25		2,700	100			Reported measurement believed to be high.
445	.....do				8-in. H.	E. 25		2,300	185			Do.
446	W. J. Hanna				6-in. H.	E. 20				40		

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[b] E.=electric; G.=gasoline; O.=oil; S.=steam.

Pumping plants used for irrigation in the Santa Clara Valley—Continued.

No.	Owner.	Wells.			Size and type of pump.[a]	Kind of power[b] and amount in horsepower.	Cost of plant.	Yield per minute.	Area irrigated.			Remarks.
		Number.	Diameter.	Depth.					Orchard.	Alfalfa.	Miscellaneous.	
			Inches.	*Feet.*				*Gallons.*	*Acres.*	*Acres.*	*Acres.*	
447	Miller & Lux				8-in. H	E. 25		2,700		40	40	Reported measurement believed to be high.
448	do				10-in. H	E. 30				100		
452	do				10-in. H	E. 30				80		
453	W. J. Hanna				6-in. H		$900			20		
462	F. Polly								20			
468	J. E. Lowder						1,500		38			
473	W. L. Kroesen								30			
475	C. Dauberg				5-in. V	E. 25	2,750	750	450		10	Current meter measurement. Drawdown 11.29 feet.
482	J. H. Carl				No. 10 T	G. 20	2,800	354	15	5		Current-meter measurement.
486	W. McCantyre								25			
487	C. H Hagen				5-in. V	G. 25			90			
492	J. W. Fair								45			
493	O. Knepper				4-in. V	E. 20	1,300		35	5		
495	L. Lion				4-in. V	G. 15				60		
499	do				5-in. V	G. 15				60		
502	George Curtis				3-in. V	E. 7½	1,000	250	23			Reported yield.
506	G. B. McCall				2½-V	E. 10	925	300	12	2		Do.
508	John Silbersack				3-in. V	G. 15	1,900	225	18			Do.
513	J. M. Hagen				Plunger, 7 in. or 8 by 12	E. 7½	1,250		14			
562	H. Robinson				3-in. V	E. 7½		145				
595	G. L. Marvin				3-in. V	G. ?			20			
618	A. Wheeler				4-in. V	E. 25		718	80?			Current-meter measurement.
692	J. T. Higgins				Two stage, 3-in. V	G. 25		425	35	2		Do.
795	B. Martella				3-in. V	G. 12	1,200			10		
806	W. W. Thompson								60			
807	P. Tarp				4-in. V	G. 15	1,500		20			
815	H. A. Peppin				3-in. V	G. 15	1,600		50			
817	P. A. Ramelli				4-in. V				40			Power removed.
823	O. H. Bamhart				5-in. V	E. 20	2,500	880	50			Weir measurement.
824	John Shepard				3-in. V	G. 15	1,500		15			
825	O. Christopher				5-in. V	G. 25			20			
827	Mathew Smith				5-in. V	E. 10	1,000	400	30	3		Reported yield.
833	P. J. Wooley				T				60			
834	—— Sheriffs				5-in. V	E. ?			90			
835	—— Porter				5-in. V	E. 20			33			
836	—— Richmond				6-in. V	E. 25			50			
837					5-in. V				30			
841	B. Casson				6-in. V					55		
842	D. G. Fisher											
845	P. A. Ramelli				4-in. V				16	2		
846	P. T. Hicks				5-in. V	E. 15			30			
847	H. M. Harvey				4-in. V	E. 15			25			
851	Shepard Bros.								20			Power removed.
873	John Heinlen Co.				6-in. V		1,200	600	30			
874	do				6-in. V		1,500	600	50			
875	Herman Susong								45			
876	J. E. Robertson						1,100	800	23			Reported yield.
891	William Cobb				5-in. V		1,500	700	50	10		Do.
892	M. Fitzgerald									30		
894	Herschel Johnson				5-in. V	E. 25	1,000		40			
896	Seely Bros.				6-in. V	E. 20	1,200			200		
897	M. W. Martin				5-in. V	E. 20	1,200		20		16	
901	R. Fisk				8-in. V	E. 50			100	40		
902	R. Good				3-in. V	E. 15	1,000		32		6	
903	William Sheriffs								40			
908	O. N. Featherston								20			
909	M. S. Amerine				6-in. V	E. 30			90			
911	E. Van Every				5-in. V	E. 20	1,500		80			
914	O. Christopher				5-in. V	E. 25	1,300		60			
915	W. Sheriffs								20			
916	Bisceglia Bros.				7-in. V	E. 50					150	
917	Seely Bros.				6-in. V	E. 35	1,000				100	
918	C. Frost				4-in. V	G. 12½			24		20	
926	H A. Leaderich								20			
927	Wm. McKillope								40			
928	A. B. Anderson				5-in. V	G. 12	600	750	30			Do.
929	E. Richmond				V	E. 20			50			
931	do								50			
932	C. A. Topham				6-in. H	G. 25				15		
933	Frank Pospishek				6-in. V	G. 25		800	20			Do.
934	R. Whaley				4-in. H	G. 10						
935	—— Cocher				6-in. V	E. 30				105		
938	Fred L. Chapman				3-in. H	G. 6						
941	Bert Walker				4-in. V	G. 20			40		20	
942	R. Atkinson								30			
943	N. J. Dailey				5-in. V	E. 20			10	14		
945	Edward McAbee				5-in. V	E. 20	1,000			10	50	
946	G. M. Smith								10	20		
1947	H. L. Allen				4-in. V	G. 25	1,000				30	
1001	J. S. Shepard				5-in. V		1,500	1,000	30			
1002	R. Wheeler								65			
1004	A. M. Kellner											
1005	P. Swanson				5-in. V	E. 15		1,000	20			
1006	Bisceglia Bros.										150	Pump and power removed.
1007	Theodore Johnson				5-in. V	G. 25	1,400	1,000	15	7		
1008	E. C. Bonar				? V				10			No power in.
1009	L. Frost				4-in. V				20			Do.

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No.	Owner.	Wells. Number.	Wells. Diameter.	Wells. Depth.	Size and type of pump.[a]	Kind of power[b] and amount in horsepower.	Cost of plant.	Yield per minute.	Area irrigated. Orchard.	Area irrigated. Alfalfa.	Area irrigated. Miscellaneous.	Remarks.
			Inches.	*Feet.*				*Gallons.*	*Acres.*	*Acres.*	*Acres.*	
1010	H. A. Leaderich				4-in. V.				20			
1011	Corkran Bros.					G.			12½			
1012	A. C. Robinson				5-in. V.	E.			22			
1013	John Hensell				5-in. V.	E.			24			
1014	H. Swickard				5-in. V.	E. 20			32	8		
1015	W. P. Lyon					E. 30						
1016	Fisher-Welde-Dieken				5-in. V.	E. 25			65	15		
1017	E. G. Keeble				5-in. V.	E. 20			40			
1018	—— Keeble				5-in. V.	E. 20			23			
1021	E. Crosby				4-in. V.	E. 10			10			
1025	John Silveira				4-in. V.	G. 12				10		
1026	L. L. Pryor									30		
1031	G. H. Dow				5-in. V.	E. 15				30		
1032					5-in					40		Power removed.
1034	E. A. & J. O. Hayes				Two stage, 6-in. V.	E. 35			115	10	25	
1035	H. W. Lester				6-in. V.	G			60			
1037	H. W. Lester				6-in. V.	G			80			
1038					3-in. V.	E. 5					15	
1041	Mrs. A. Cottle				5-in. V.	E			20?			
1042	C. C. Carroll				5-in. V.	E			10			
1044	T. Cottle				5-in. V.	G. 22			25			
1046	F. Buck				4-in. V.	E. 30	$1,000	650	85	35	110	
1047	E. Richmond								47			
1051	O. L. Baker										30	
1052											60	
1053	Harriett Stark				5-in. V.	E. 35		900			50	
1055	S. P. Swenson				4-in. V.	E. 15	1,000		45	4		
1056	D. Burrone											
1065	G. S. Rawlins				6-in. V.	G. 32				60?		
1067	H. W. Ogan	2	10	71	6-in. V.	S. 20			20			
1068	W. Courtney	1	10	100	4-in. V.	E. 15			13			
1069	W. B. Mabie	2	12	112	5-in. V.	E. 20			48			
1071	T. Cooney	1	10	85	4-in. V.	G. 6	700			20	8	
1072	A. Lindsay								30			
1073	R. J. Mayne	2	10	100	4-in. V.	G. 25	1,200		30	4		
1076	David Davis	2	10	110					15			
1077	Chas. Ahlgren				4-in. V.	E. 15			15			
1078	Roberts estate	2	12	190	5-in. V.	E. 30		800	40			350 to 800 gallons of water a minute, depending on stage.
1081	G. S. Rawlings								25			
1082	Esther Skillings								26			
1083	William Turner	2	10	75	4-in. V.	G. 12			40			Two plants.
1084									30?			
1085	T. J. Armstrong	1	10	112					20			
1086	G. S. Rawling								26			
1087	T. J. Armstrong	2	10	120	4-in. V.	G. 25	1,000		20			
1088	M. Stojanovich								25			
1091									20?			
1093	Mrs. A. C. Layton	1	10	220	Double plunger, 7 by 18 in.	E. 10	3,000	200	30			
1094	—— Nicholson									20		
1096	M. M. Desin	2	10	75	6-in. V.	G. 32		800	25			
1097	P. Nelson								10	5		
1098	H. M. Holthouse								5	70		
1101	T. Kelly	1	10	140	5-in. V.	E. 25	1,000			20		
1102	—— Sequeira								10	10		
1104	M Barton	1	10	125					10			
1106	A. C. Nicholson				4-in. V.	G. 15	800	500		10		
1107	J. L. Mosher								30			
1108									20?			
1111									10	20		
1112	S. Horio	1	10	150					47			
1113	J. P. Scheuer								15			
1114		1	10							20		
1115	B. Asaro				4-in. V.				20			
1116	do				4-in. V.				20			
1117	H. A. Van Dorston	2	10	150-240	6-in. V.	E. 50	5,000		215			Just installed meter.
1118	P. Grass								75		20	
1122	A. Armona			225					125			
1123	—— Schuh								20			
1125	D. M. Utter	2	10	200	6-in. V.				100			
1126	J. M. Mace			275	4-in. V.	G. 40	1,200		100			
1127	Mays-Pavlicevich	2	10	275	4-in. V.	G. 40			100			
1136	Ray Ranch			250	4-in. V.	E. 30			5			
1138	Gem City Packing Co.				2-in. V.	G. 10			5			Water supply small.
1141	W. A. Watson			160	4-in. V.	G.			20			
1142	R. W. Kennedy	2	10	175	4-in. V.	E. 40	3,000		200			
1143	J. Bonnett	1	24	193	3 stage No. 9	E. 40			100			
1144	R. A. Witford	2	10	130	2 stage, 5-in. V.	E. 65			85			
1145	Bert Kirk				3-in. V.	S						Has not been used for several years.
1146	L. Bucksin				6-in. V.	S			32			
1148	Lester Bros.	2	12	208	5-in. V.	E. 40			50			
1151	A. C. Kusling	1	12	207	4-in. V.	E. 40			40			
1152	H. A. Brown	1	16	200	T	E. 30			30			
1153	McKillay Bros.	1	10	1,000	5-in. V.	E. 72			80			

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[b] E.=electric; G.=gasoline; O.=oil; S.=steam.

Pumping plants used for irrigation in the Santa Clara Valley—Continued.

No.	Owner.	Wells. Number.	Wells. Diameter.	Wells. Depth.	Size and type of pump.[a]	Kind of power[b] and amount in horsepower.	Cost of plant.	Yield per minute.	Area irrigated. Orchard.	Area irrigated. Alfalfa.	Area irrigated. Miscellaneous.	Remarks.
			Inches.	*Feet.*				*Gallons.*	*Acres.*	*Acres.*	*Acres.*	
1154												New well. Power not installed.
1155	Keefer & Kohl	1			2 stage, 4-in. V	30			20			
1156	A. M. Wright	1	10	126	2 stage, 3-in. V	30			50			
1157	F. E. Mitchell	2	10-12	150-204	3 stage, 4-in. V	50			110			
1167	—— Kron			125	Plunger, 5 in. by 18 in.	G. 15			40			
1161	T. S. Montgomery					E. 5						Small plant used for garden and house.
1168	A. Hansen	2	10	160	2 stage, 3-in. V	G			60			
1171	—— Shelly			145					60			6-inch discharge.
1172	John Lannis	1	12	150	Plunger, 4 by 16 in.				20			
1173	J. M. McKimon	1	10	165	Double action plunger 7 by 18 in.	G. 25		160	27			
1174	Sorosis Farm	2	12	300	T.	E			300			
1176	Abernethy & Smith	1	10	165	Double action plunger 5 in.	G. 8			32			
1177	W. C. Bogen								90			
1178	Ione D. Kelly	1	24	198								Abandoned.
1181	A. M. Elberg	2	10	300	4-in. V	E. 40			160			
1182	W. M. Rudd					G. 7½						
1183	A. C. Brille	1	16	130	T	E. 25			30			
1184	E. B. Stone	2	10	500	5-in. V	E. 50	$7,000		100			
1185	A. C Clark	3	10	250	4-in. V	E. 40	3,500		70			
1186	M. Nunes	2	10	140	3-in. V	E. 20			20			
1187		1	12	179	T.	G. 25	2,000		10			
1188	J. N. Sloss	2	10	320	5-in. V	E. 50	7,000		80			
1191	John Bogen	2	12-14		T.				20			
1192	J. N. Sloss				? V	E			44			
1193	J. E. Wiesendanger	2			6-in. V	E. 40			95			
1194	William Holburn	3	7	298					25			
1195	M. Zarevich	1			6-in.(?)V	E			80			
1196					8 in.	E			100			
1197	W. H. Roberts	2		275-120	2 stage 5-in. V				70			
1198	T. J. Streeter		12	125	5-in. V				25			
1201	W. & S. Hunter	2	8	220	5-in. V	E. 40			100			
1202	Mrs. McLeod	2	8	170-370	2-stage, 5-in. V	E. 50			85			
1203	C. A. Curtis	4	10	138-180	2-stage, 5-in. V	E. 50			40			
1204	W. M. Scott	2	10	160-212	4-in. V	E. 35			30			
1205	E. Johnson	2	10	390	6-in. V	E. 50			160			
1106	F. W. Fanton	3	10	300	6-in. V	S. 70	7,000	800	490		15	
1207	Hind Fruit Co.	1	18	500	T				285			
1208	F. White	2	10	235	6-in. V	E. 30	2,600		50			
1211	F. G. Carblan	2	10	230	6-in. V	E. 15						
1212	A. Montgomery	1	7	180	5-in. V	E. 5			11			
1213	J. Leonard	1	12		10-stage, 10-in				20			
1214	S. Cakeh	1	16	250	10 stage, 8-in				64			
1215	R. C. Melson	1	16	200	5-in. V	E. 50			70			
1216	—— Lannis	1	10	112	3-in. V	G. 25	2,000		5			
1217	P. H. Shone	1	24	274		E. 50	2,800		185			
1218	F. B. Bailey	2		123					16			
1221	P. Hayes								80			
1222	—— James										80	
1223									40			
1224	Joseph Wolf	1	12	208	Double-action plunger, 9 by 18 in.		230		40			
1225	—— Cochran								130			
1226	A. C. Butcher	2	10	450					65			
1227	G. W. Glendenning	1	16	163					40			
1228	John Patterson	1	24	152	T				140		60	
1231	J. Luther	5	10		6-in. V	E. 50		1,000	100			
1232	N. Lester				12 in. V	E. ?						
1233	M. L. Lester	1	10	125	5-in. V	E. 30			50			
1234	W. W. Lester	1	10	125	4-in. V	E. 50			50			
1235	M. Zarevich		8		4-in. V	G. ?			22			
1236												Power removed; not in use.
1237	Mrs. Barr	1	12		4-in. V	G. 12			24	18		
1238	E. K. Hurlbert								25			
1241	W. Lenegas	2	10	120-210	6-in. V	G. 25?			20			
1242	—— Parsons	2	10	130	5-in. V	E. 30			25			
1243	S. L. Winchester	3	10	120	5-in. V	G. 35			60			
1244												Not in use.
1245	W. J. Brown	1	10	160	4-in. V	E. 20	2,000		50			
1246	F. Newton	1	10	165	5-in. V	E. 15			25			
1247	Hart & Hamilton				4-in. V	E. 20			20			
1251	Mrs. M. Gilbert	1	10	168	4-in. V	E. 20			19			
1252	P. Talia	1	10	115	5-in. V	G. 30			16			
1254	—— DeFiore	2	10	145	6-in. V	E. 35			50			
1255	G. F. Smith	3	10	150	6-in. V	E. 40			90			
1256	..... do	3	10	150	6-in. V	E. 40			90			
1257										5		
1263	O'Connor Sanitarium	2	10	180	4-in. V	E. 20					8	Also supplies laundry.
1264	San Jose Water Co.	4	10	200				1,400				Perforated all the way down.
1264	.....do	2	16	342				1,400				New wells. Not perforated above 276 feet.
1266	S. D. DeFiore	3	10	160	6-in. V	E. 50		1,000	48			Also supply 30,000 gallons per day to DeFiore Cannery.

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No.	Owner.	Wells. Number.	Wells. Diameter.	Wells. Depth.	Size and type of pump.[a]	Kind of power[b] and amount in horsepower.	Cost of plant.	Yield per minute.	Area irrigated. Orchard.	Area irrigated. Alfalfa.	Area irrigated. Miscellaneous.	Remarks.
			Inches.	*Feet.*				*Gallons.*	*Acres.*	*Acres.*	*Acres.*	
1267	J. E. Boynton	1	10	160	5-in. V	E. 40			50			
1271	do	1	10	160	5-in. V	E. 40			50			
1272	L. Nelson	1	10	180	2-in. V	E. 7½			10			
1273	R. W. Morrison	1	10	100	2½-in. V	E. 5			11			
1274	Hennan Hoeft				4-in. V	E. 20			20			
1275	F. R. Shafter	3	10	128	8-in. V	S. 40	$3,500	1,238	80			
1276	E. Artana	1	10	100	4-in. V	G. 15	700		10			
1277	Bradley Ranch	2	8		8-in. V	S. 45		1,800	80			
		1	6									
1278	E. A. McCarty	1	10	170	5-in. V	E. 25			35			
1281	Santa Clara County Infirmary.	2	10	180	5-in. V	E. 50			20			
1282	G. Concilla	1	10	180					20			
1283	A. Foster	1	10	170	5-in. V	E. 30			20			
1284	E. O. Humphrey	5							80			
1285	P. W. Howard	1	10	190	T	E. 30		700	22			
1286	E. A. Parker	1	2½	110	T	E. 50	3,500		90			
1287	A. C. Keesling	2	10	150	4-in. V	E. 40			40			
1288	S. Sunzeri	2	10	145	5-in. V	G. 40	2,200	900	15			
1291	F. K. Bartholemew	2	12	150	5-in. V	G. 40			100			
1292	H. G. Keesling	2	12	130	5-in. V	E. 40			60			
1293	A. A. Woodruff	2	12	140	5-in. V	E. 40			90			
1294	E. W. Conout	2	10	180	5-in. V	E. 40			120			
1295	Clara Knight								5			
1296	G. W. Worthen	2	10	110	4-in. V	E. 25	1,500	500	18			
1297	George Ridley								11			
1298	G. G. Worswick	2	10	135	5-in. V	E. 20			25			
1301	R. G. Mitchell								35			
1302	—— Kelly	2	10	140	5-in. V	20			50			
1303		2	10	160	3-in. V	G. 15			5			
1305	G. Guinasso	2	10	125	4-in. V	E. 20	1,000	500	13			
1307	W. L. Norden	2	10	196	5-in. V	E. 30	1,500	1,000	31			
1309	Mrs. A. Michener	2	10	175	5-in. V	G. 40	1,500	1,000	10			
1310									30			
1311									35			
1312	George T. McLaughlin	2	7	144	5-in. V	E. 20		800	46			
1313									60?			
1314	P. D. Landon	2	10	110	5-in. V	E. 30	2,000	1,000	35			
1315	F. H. Flanders	2	10	133	5-in. V	E. 30			55			
1316									40?			
1317	M. Vrooman								25			
1318									30			
1319	C. Z. Saunders								10			
1320	M. E. Ryan				3-in. V	G. 10			5			
1321	L. Booksin								52			
1322	M. L. Lester	2	10	120	5-in. V	E. 35			60			
1323	—— White								10			
1324	M. P. Johnson	1	10	133	3-in. V	G. 8			8			
1325									20?			
1326	John Lester								70			
1327									20			
1328									35			
1331					3-in. V	E. 15			22			
1332	J. M. Harworth				4-in. V	S.			9			
1334	C. R. Smith								5			
1335	Manuel Howe								5			
1336									60			
1337	J. Nicora	2	10	100	4-in. V	E. 15		800	20			
1338	do	2	10	100	4-in. V	E. 15		800	30			
1341	John Doudell	2	10	165	4-in. V	E. 20	1,500	800	20			
1342	A. Gagliardo				4-in. V	E. 15			20			
1343	Southern Pacific Co.				4-in. V	E. 10					20	
1344	P. Brono				4-in. V	E. 7½					5	
1345	J. Macora				4-in. V				20			
1346	R. Ornato				5-in. V	E. 5					5	
1347	B. Hall				4-in. V	20					20	
1353	J. F. Barry	2								20		
1354	Oak Hill Improvement Co.				Plunger 8 by 24	S. 75		444				Used for Oak Hill Cemetery.
1355	Albert Joseph				3-in. V	E. 20				4		
1357	Antone Pierson	1	10	97	3-in. V	E. 10	700		10	10		
1358	J. J. Carothers	2	10	190				600	19			
1359	do							600	30			
1360	T. H. Derby	3	10	136, 160, 183	6-in. V	E. 35			102	4		
1361	T. C. Price	3	8		5-in. V							
1362	do	3	8		5-in. V	G. 30						
1363	—— Webber	2			4-in. V	E. 25						
1364	John Hensell	1	10	228	4-in. V	E. 15			21			
1365	Wm. H. Sheldon	1	10	117	5-in. V							Power not in.
1366	Mrs. John Robinson	1	10	120	5-in. V	G. 25			10		10	
1367	J. S. Burns								10			
1368	P. G. Goodman								25			
1371	E. Tully								16		68	
1373	Wm. Maher	1	10	161	4-in. V	G. 15	1,038				18	
1374	J. Barzoni										70	

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			Inches.	*Feet.*				*Gallons.*	*Acres.*	*Acres*	*Acres.*	
1375	Fair Bros	2	10	152	5-in. V	G. 25	$1,500		60			
1376	V. Majore								35			
1377	F. C. Wood				3-in. V	G. 10			30			
1378	I. G. Tredwell				5-in. V	E. 20			60			
1379	Henry Hoover				7-in. V	E. 15			40			
1381	Pyle Canning Co				4-in. V	G. 25					130	
1382	P. A. Anderson				3-in. V	E			20			
1386									10		21	
1387	Quinn Estate				3½-in. V	G. 10	1,000	350	30			
1388	do				4-in. V	E. 15	1,050		40			
1391	M. T. Sequeira	1	10	115	3-in. V	E. 7½	750		8			
1392	Rudolph Wiltz								70			
1393	M. Maher	1	12	170	4-in. V	G. 15	1,500		58			
1394	James Fair	2	10	107	10-in. V				40			
1395	H. W. White	2	10	85	4-in. V	G. 18			15			
1396	William Provan	1	10	100	4-in. V	G. 12	600		12			
1497	P. A. Schultz	3	7	75, 90, 105	3-in. V	G. 15		400			20	
1403	Mrs. K. C. W. Post	2	10		4-in. V	G. 10			50			
1404		2	10		6-in. V	G. 16					40	
1405	H. H. Edmunds	2	6	80	4-in. H	G. 6			5		5	
1406	F. W. Osteman	1	10	110	3½-in. V	G. 12		250			10	
1407	—— Jennings	1	10	106	3-in. V				10			
1408	F. Eisenmann	1	7	113	3½ H	G. 8		400		6		
1411	O. E. Shepard	1	10	125	3½ H	G. 6	500		10			
1412	Farrari Gardens				3½ H	E. 7					15	
1413	J. C. Booth				3½ H	E. 7½				8		
1414	Nelly Clements	2	10									Have not been used for several years.
1415	H. Menzel	1	10	158	3½ H	E. 7½	550		11			
1416	D. Navarra	1	7	100	3½ H	7½			5			
1417	A. R. Denike				3½-in. V	E. 7½				14		
1421											30	
1422	J. O. Hansen	1	10	185								
1423	Frank Joseph	1	7		3-in. H	E. 5			8	3		
1424	W. A. Pyle								15	5		
1425	A. Hansen				4-in. V	G. 20			40			
1426	M. Freitas	1	12	250	T					40		
1428	J. A. Moreland								30	10		
1431	B. B. Bradshaw	1	10	200	5-in. V	E. 20				80		
1432	M. Freitas	1	10	250			1,600	600		50		
1436	—— Howard										10	
1437											40	
1441	L. D. Tibbits & Son	1	10	200	4-in. V	G. 12			26			
1442	W. L. Edwards	1		195	4-in. V	G. 15			30			
1443									20			
1445	E. Fuller	2	10	100	4-in. V	G. 12			60			
1446	L. Delosso	2	10-12	225	4-in. V	G. 20			22			
1447	C. W. Stevens			200	4-in. V				20			
1448	W. H. Farthing	1	10	250	V	G. 12			20			
1451	A. R. McClany	2	10	261	5-in. V	G. 32			100		15	
1452	E. E. Chase					G. 25			25			
1453	C. M. Brodie		10		4-in. V				10			
1454	W. H. Farthing	1	12	250	4-in. V	G. 12			20			
1455	Fred Martin			200	5-in. V	E. 30			16			
1461	J. Trearix			280					20			
1462	A. H. Washburn	2	12	210	10-in. T	G. 25			15			
1464	D. Novana	1	10	200	4-in. V	G. 25			25			
1472	E. B. Mayer	2	10	73-105		G. ?				11½		
1473	—— Heidland										10	
1475	J. S. Nelson									10		
1476	J. Remsen									15		
1478	L. C. Bradshaw	1	10	110	4-in. V	G. 10		400		37		
1481	Wm. Prusch	1	10	203	5-in. V		1,200	500		30		
1482	George Brevis	1	10	103						12		
1483	A. Kammerer	2	10		4-in. V	E. 15			45	10		
1484	—— Bareau									15		
1485	G. A. Casey	1	7	195	2-in. H	G. 3		150		10		
1487	—— Vierra									40?		
1488	C. Perry	1	10	293	4-in. V	G. 12	1,200			13		
1491	Yama Kawa	2	10		4.in. V	E. 15				36		
1492	H. Emanuel	2	10	150	4-in. V	E. 15			27			
1493	Becket & Carothers	2	10	150	5-in. V	E. 20		800	70			
1495	J. Hemrich	1	7	154	2-in. H	G. 8				3		
1496	A. Azevedo		10		4-in. V	E. 20				37		
1497	Mrs. Martin				5-in. V	E. 20						
1498	P. Doherty				6-in. V							
1501	H. Meinzer				4-in. V	G. 15			10	25		
1502	George Walker	2	10		2-in. H				10			
1504	G. Giannotta	2	16-24	143	4-in. V	E. 30			60			
1505	do			175	10-in. Discharge	G. 40			30			
1506	John Massina			80	3-in. V	E. 20			22			
1508	J. F. Pyle & Son		24		10-in. T	E. 30			90			
1513	—— San Filippo	2	10	150	4-in. V	G. 19			24			
1514	C. L. Lamson		7	85	4-in. V	E. 15			24			
1515	M. Hannon				4-in. V	E. 20		550	20			

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			Inches.	*Feet.*				*Gallons.*	*Acres.*	*Acres.*	*Acres.*	
1516	J. Ferriar				4-in. V	E. 20			26			
1517	A. Lopez				4-in. V	E. 20			14			
1518	D. Hobson	2	10	170	5-in. V	E. 30		800	75			
1521	L. Lundy		10	120	4-in. V	G. 30			90			
1523	V. Nola								40			
1524	H. A. Thomason			183								New well, no equipment.
1525	E. C. Gould	1	12	195	2 stage 4-in. V	G. 40			4		30	
1526	John Pistano		8		3½ V	E. 20			23			
1527	F. Ferrara				4-in. V	E. 25			40			
1528	J. W. Dickson		10	240	4-in. V	E. 50			40			
1531	J. Basile				2 stage V	E. 60						
1532	Catherine Miller		10	175	4-in. V	E. 35			29			
1533	E. L. Moody	2	10	100	5-in. V	G. 40 / E. 35			75			
1534	J. W. Shaw	2	10	102	4-in. V	G. 20			20			
1535	F. DeFiore	1	24	133	T	E. 40	$2,500		28			
1536	J. H. Flickinge Cannery Co.	5	10	150–160	6-in. V	E. 40			320			
1537	L. Rossi	2	10	100–120	4-in. V	E. 15			25			
1538	Vennun Bros	2	10	125–225	5-in. V	E. 20			90			
1541	O. Cali								19			
1542	Phillip Faber	2	10	143	4-in. V	E. 15	1,200	250	22			
1543	R. Vennun								115			
1544	Moran Estate								100			
1547	do				3-in. V	E. 15					40	
1551	S. F. Lieb	2	12	325–350	10-in. H	E. 50		1,200–1,500	300	10		Yield depends on water level.
1552	O. G. Marlin	1	7	275	3-in. H	G. 6			13	3		
1554										40		
1557	M. Ernst	2	7–10	95–110	3-in. V	E. 15			5	14		
1558	A. Foster				3-in. V	G. 10					10	
1561	J. H. Stainer	1	10	95	9-in. T	E. 15	900	150				
1562	G. Martella		10	342	3-in. V	E. 7½				40		
1563	do	2	10	155–293	4-in. V	E. 15				40		
1564	Eugene Benona & Co				3-in. V	E. 5				10	10	
1565					5-in. V	E. 20			40			
1568	D. Lundy								15			
1572	Mrs. McNell										40	
1573	D. M. Bowen								25			Irrigate mostly from flow.
1597	J. D. Phelan											Do.
1598	do											Do.
1601	do									16		
1616	Mrs. J. H. M. Townsend			300	4-in. H	E. 10				80		Flowing, considerable pressure.
1618	M. Lynn				3-in. H	E. 7½						
					4-in. H	E. 5				20	6	
1643	F. R. & M. E. Schallenberger				3-in. H	E. 7½	550		7	35	3	
1644	do	1	7	275						20		
1687	M. Zgragen	2		190–275					30	30		
1693	Clara C. Bray								125			
1694	A. Block Fruit Co	2							55			
1695	R. T. Pierce	3	10	250–300	5-in. V				125			
1696	A. Block Fruit Co										30	
1697	G. C. Kircher	2	10	120					180			
1701	George E. Hamilton					E. 30	1,700			40		
1702	Mrs. Gripenstraw	2	10	329	5-in. V				80			
1703	A. Block Fruit Co								25	100		
1704	John Webber				6-in. H					70	15	
1705	C. D. Kent	2	7–10	60–400	5-in. V	E. 30				16		
1706	—— Smith	2	7–10	175–300						30		
1707	C. E. Jackson	1	10	400	5-in. V	E. 20	2,500	1,050	12	25	50	
1708	W. S. Bennett	1	10	405	5-in. V	E. 30	2,000		30	20		
1712	Henry Lillick									20		
1713	W. Kiely				5-in. V	E. 30				15		
1714	Mrs. D. F. Wittenburg	1	10	334	5-in. V	E. 20		1,000	30		5	
1716	M. E. Grimes								90			
1717	Dolphane & Rosenthal								80			
1721	R. Butcher	2	10	450					40			
1722	M. Ellis								13			
1723	R. MacMillan	2	10	160	4-in. V	G. 12			40			
1724	A. C. Butcher	2	10	150	4-in. V				130			
1725	—— Cochran								85			
1726	X. E. Burns								120			
1727	—— Frank								100			
1728	C. R. Forgo	1	16	160	T				20			
1732	J. Evans	1	10	140	5-in. V	G. 12			80			
1733	N. J. Buck	2	10	220	4-in. V	E. 50	2,500		25			
1736	C. N. Miller	1	10	130	5-in. V	E. 20			46			
1737	W. J. Gardner	2	12	200	5 in. V	G. 40	3,000		320			Orchard and alfalfa.
1738	C. Wolf	1	24	255	T	E. 50	4,200	700	72			
1741	Mrs. J. J. Morrison	1	16	264	5-in. V	E. 50			20			
1743	J. E. Coobet	1	60	230		G. 50			100			
1744	Chas. Christensen	2	10	210	5-in. V	S. 50			20			
1746	H. Matson	1	10	210	5-in. V	G. 12			40			
1747	G. Carpenter	1	10	210	7-in. V	E. 50			130			Water not abundant.
1748	Mrs. W. T. Wright	2	10	185	5-in. V	E. 50			150			
1749	H. G. Sturling	2	10	150	7-in. V	E. 50			497			
1751	H. E. Losse	1	10	250	V	E. 75			43			
1752	F. C. Wilson	1	24	220								

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[b] E.=electric; G.=gasoline; O.=oil; S.=steam.

Pumping plants used for irrigation in the Santa Clara Valley—Continued.

No.	Owner.	Wells.			Size and type of pump.[a]	Kind of power[b] and amount in horsepower.	Cost of plant.	Yield per minute.	Area irrigated.			Remarks.
		Number.	Diameter.	Depth.					Orchard.	Alfalfa.	Miscellaneous.	
			Inches.	*Feet.*				*Gallons.*	*Acres.*	*Acres.*	*Acres.*	
1753	A. Clay	2	12	100	5-in. V	G. 50			40			
1754	J. C. Kircher	3	10	220	6-in. V	S. 40		550	30			
1758	L. E. Walters	1	16	256	Wood propeller; auger pump.	O. 60	$3,200	840				
1759	George McComb	3	10	232					40			
1761	A. F. Fluger			164								New; well has not been used.
1768	E. F. Whiting	1	7	111	Small plunger pump							
1772	Wm. P. Wright	2	10		4-in. V	E. 20			20			
1774	W. F. Bubb	1	18	323	14-in. T	E. 50		854	100			Current-meter measurement.
1775	Ehrhorn estate	2	10	135-240	5-in. V	E. 35	3,500	900	48			
1776	J. E. McCarty	2	10	243-280	5-in. V	E. 35			50			
1777	H. H. Martens								20			
1778	Mercer Bros				2 stage 4-in. V	E. 35	3,300	750	90		40	
1779												
1781	J. N. Levin Tract Irrigation Co.	2	12	165-287	5-in. V	E. 50	3,000	650	135			
1782	Z. T. Croop								40			
1783	E. R. Freeman	1	16	178	T				80			
1784	H. E. Losse	2	10	215	5-in. V	E. 75			350			
1785	Ira Van Maren	2	10	130					100			
1786											20	
1788	Calkins & Spaulding	1	(c)	105		E. 100	6,600	2,185	250			
1792	A. C. Butcher	2	10	450					65			
1793	A. E. Smith	2		250					40			
1794	H. Martens								55			
1795	C. H. Clement	2	10	200	5-in. V	E. 30	2,000	1,000	30			Has irrigated 300 acres of orchard.
1796	City of Sunnyvale	1	(d)	365	Plunger 12 in. by 36							Pump, 16 strokes; can be run 32 strokes in case of fire.
1797	T. F. Crosby								20			
1798	C. L. Stowell	2	10	135	2 stage 5-in. V	E. 50		1,600	121			
1800	A. Dechman	2	10	145	5-in. V	E. 30			100			
1801	C. O. Bocks								40			
1802	B. Maginnis	2		150	3-in. V	G. 19			20			
1803	James Panner	2	10	144	4-in. V	E. 30		750	49			
1804	J. Christensen	2	10	140					30			
1805	A. Dechman	2		160				800	100			
1806	—— Antonole	2	10	190					40			
1807	E. J. Nelson	1	10	120					40			
1808	J. E. Brown	2	10	185	5-in. V	E. 30	2,750	800	30			
1811	E. R. Freeman								40			
1812	Bernardo Ave. Water Co.	2	10	260-360	5-in. V	E. 50	2,200	800	100			
1813	J. B. Amarel	1	10	220					20			
1814	A. S. Dutro	2	10	260-346					50			
1815					5-in. V						55	
1816	P. L. Nielsen								5			
1818	S. I. Imai										20	
1821	.....do										30	
1824	Mrs. A. Toney				4-in. H				30	5		
1827	Frank Vargas	2	10	190-260						25		
1823	William Ramsay								20			
1830	A. W. Ehrhorn								30			
1831									30		10	
1832	—— James								30			
1835											10	
1838	H. P. Hansen	1	7	348	3-in. H				10			
1839	C. L. Stowell	2	10	185-256	6-in. V	E. 40			48			
1840	A. C. Simpson	1	7	338	2½ V	E. 5					8	
1843	Joshua Hendy Iron Works	2 7	7 10	120 230	2 plunger pumps							Pump 1, plunger 6 by 8, 57 strokes a minute; pump 3, plunger 6 by 8, 28 strokes a minute. New; no equipment.
1844											80	
1845	A. Tognazzini				5-in. V	E. 30			30			
1846	Mrs. Albee								30			
1847	L. E. Grave	1	16	259	T		3,000	800	10	20		
1848	—— Genardini				T				28	24		
1851	S. Genardini	1	12	460	T	E. 30	2,000			22		
1852	W. O. Grippenstraw	1	10	219	5-in. V	E. 30	1,200	500	4	18		
1853	Arthur Freeman	1	10	190						25		
1854	A. P. Freeman									50		
1856	Jack Eaton	3	10	90 202 280						7		
1857	D. Broggini	1	10	190	5-in. V	G. 32				60		
1858	C. R. Arques				5-in. V	E.				25		
1863	F. C. Andrews				3½-in. V						10	10 acres strawberries irrigated.
1864	—— Enright								15			
1865	Bracher Trust Co	1	7	220	3-in. H	G. 8			60			
1866	.....do	1	7	364	5-in. V	E. 25	1,000				20	
1867	.....do		7	368	3-in. H	E. 10			56			
1871	Wilcox Fruit Co	2	10	643	5-in. V	E. 20						

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[b] E.=electric; G.=gasoline; O.=oil; S.=steam.
[c] 26 inches to 100 feet, then 12 inches to 105 feet.
[d] 16 inches to 100 feet, then 12 inches to 365 feet.

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Pumping plants used for irrigation in the Santa Clara Valley—Continued.

No.	Owner.	Wells. Number.	Wells. Diameter.	Wells. Depth.	Size and type of pump.[a]	Kind of power[b] and amount in horsepower.	Cost of plant.	Yield per minute.	Area irrigated. Orchard.	Area irrigated. Alfalfa.	Area irrigated. Miscellaneous.	Remarks.
			Inches.	*Feet.*				*Gallons.*	*Acres.*	*Acres.*	*Acres.*	
1872	Wilcox Fruit Co								84			
1876	F. B. Westen								40			
1877										20	20	
1878	Morse Seed Co				4-in. H	G. 8			35			
1902	O. Oaks Co	2	8	315					40	4	20	
1904										30		
1905										50		Well used in connection with No. 1902.
1906	O. Oaks Co											
1907	Ida L. Oaks								30			Irrigates altogether from flow.
1962	—— Tertles	1	10	770							25	Do.
1965	M. A. Rose	1	10	445	4-in	G. 25			25			
1966	J. Brank	2	10	180–300		E. 10			20			
1967	Stephen Massina				4-in. V	E. ?			40			
1968	Mrs. A. Katz				3½-in. V	G. 10			15			
1971	M. S. Nunes	1	10		3½-in. V	G. ? 8?					10	
1972	A. M. Foster	2	10	175	3-in. V	E. 15	$1,000	275	45			
1973	J. W. Smith	1	10	180	3½-in. V	G. 15			20			
1974	Kawata & Morita	1	10		5-in. V	E. 15					8	
1975	J. S. Rodriques		10		5-in. V	G. 25		350	84			
1976	A. Machado		10	200	5-in. V	E. 40		800	32			
1977				150	4-in. V	E. 40			30			
1978	F. Yager	2	10	80	3½-in. V	G. 20			32			
1981	A. Orlando	1	24–16 12	165	T. No. 5	E. 40		1,200?	30			
1982	H. F. Curry	2	10	107	4-in. V	E. 30		600	100			New; well has not been used
1983	—— Moore				T. 2 stage							Well has not been used for some time.
1984									40			
1985	C. Gladawitz	2	10	167–190	5-in. V	E. 50			68	18		
1986	W. K. Lewis	2	10	135–145	2 stage, 4-in. V	E. 35			70			
1987	C. H. Max				4-in. V	E. 30			15			
1988	F. H. Holmes	4	10–12	200	6-in. V	E. 50			160			
1991	A. Cataldi		10	180	4-in. V	G. 32		400	118			
1992	J. S. Nunes	1	24	209	T. No. 5	G. 40			25			
1993	F. DeFiore		10	220	4-in. V	E. 30		400	55			
1994	J. P. Cabral	2	7–10	170–308	2 stage, 4-in. V	E. 30		300	15			
1995	B. Herrington	2	10		5-in. V	G. 25			20		80	
1996	.....do											
1997	.....do	2	10		4-in. V	G. 25					30	Well not very good.
1998	.....do										80	
2002	A. F. Cunha				4-in. V	G. 25			30			New; never been used.
2003	Carson Bros		10	200	3-in. V	G. 25					45	
2107					4-in. H					?	25	
2108					4-in. H					?		
2111					3-in. H	G. 6				?		
2115	E. W. Kenney	1	10	375	4-in. V	E. 20	1,800			30		
2128	T. Mannix	1	10	256	4-in. V	E. 3			22			
2131	J. G. Gwartney				5-in. V			600	25		10	
2135	—— Snell	2	8		5-in. V	G. 10			18			
2136	Wheeler & Pratt	2			2-in. V	E. 5			10			
2138	James Center	1	10	452	5-in. V	G. 25					40	
2139	.....do	2	10	320–350	4-in. V	G. 25	2,300				55	
2142	—— Anderson									10		
2174	L. Marengo	1	10	290	3½ H	E. 5						
2181	Chas. Woog	1	10	175	4-in. V	E. 15	1,200	500	20		35	
2182	F. Toft	1	10	185	3-in. V	E. 15	1,200		15			
2185	Mrs. Boag	2	10	189	2 stage, 5-in. V	E. ?			90			
2186	J. E. Youngberg	1	10	200	Plunger pump	G. 15						New well.
2187	Mrs. Distel	2	10	(?)	4-in. V	E. ?			40?			
2191	C. L. Kennedy	1	16	250	12-in. T	E. 30	3,000	542	14			Current-meter measurement.
2192	E. Poppleton	2		172–221	4-in. V	G. 30	3,300	500	90			Cost includes a third well which spoiled.
2193					5-in. V	E. 30						
2195		2	10	250				700		15	30	
2196	J. W. Seitz	2	10	150	4-in. V	G. 20	1,600	350	90		20	
2198	Miller & Lux										37	
2201	A. C. Paul	2	10	87–177	4-in. V	G. 15		150				
2202	M. Rafferty	2	7–10	300–400	5-in. V	E. 40	2,500	700			70	
2206	—— Quinlan								48			
2208	C. T. Powell	1	10	193	2-in. H	E. 5			7			
2213	Edward Barron estate	2	10	500	6-in. V	G. 15		600		50		
2223	City of Palo Alto											
2224	—— (Chinaman)										20	
2225	.....do				3-in. V	E. 5					30	
2226	.....do										20	
2238	Thomas Cardoza									20		
2241	Peter Faber	3	12	40	5-in. H	E. 15		600		30		
2243					4-in. V	E. 15				20		
2252	Thomas Fitzgerald	1	12	230	8-in. Auger	E. 20					30	
2253	—— Madero				8-in. Auger	E. 20				70		
2254	W. C. Wilber				3½-in. V	E. 10		400			9	
2256	City of Palo Alto											
2257	T. Hopkins	3	10		5-in. V	G. 36		488				Current-meter measurement.
2261	James Flood							420				Do.

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Pumping plants used for irrigation in the Santa Clara Valley—Continued.

No.	Owner.	Wells. Number.	Wells. Diameter.	Wells. Depth.	Size and type of pump.[a]	Kind of power[b] and amount in horsepower.	Cost of plant.	Yield per minute.	Area irrigated. Orchard.	Area irrigated. Alfalfa.	Area irrigated. Miscellaneous.	Remarks.
			Inches.	*Feet.*				*Gallons.*	*Acres.*	*Acres.*	*Acres.*	
2268	Sharon estate	8	10-12	145-210	Plunger 4½ by 24 in. for each well.	G. 5; E. 3		40-50				
2347	Joseph Silveira				4-in. V	E. 15						Well poor.
2356	J. D. Grant	1	12	276								
2357	.....do	1	9	265								
2358	.....do	1	12	48								
2361	.....do	1	12	282						75	235	
2362	.....do	1	12	108								
2363	.....do	1	12	112								
2364	.....do	1	12	110								
2365	.....do	1	12	275								
2386	J. S. Leal	1	12	141	6-in. Propeller	E. 20		116			60	
2388	A. Piexoto	1	12	169							60	
2391	M. E. Dee	1			Propeller			260				
2392	——Nunes	2	10	84	5-in. V	G. 20	$1,600	235			40	
2393	——Chadbourne	1	12	124	8-in. Propeller	E. 35		675			135	
2401	John Stevenson	1	12	89	4-in. V	E. 20		382			40	Weir measurement.
2404	F. W. Blacow	1	12	90				400			35	
2417	Union Water Co				4-in. V	E. 15						
2419	.....do											
2439	A. B. Brown				4-in. H	E. 15						
2440	Antone Rivers	1	10	110								
2454	A. B. Brown		12		4-in. H	E. 15						
2459	S. F. Brown		12	84	4-in. V	E. 15				25		
2460	F. H. Sayles	1	12	88	4-in V	E. 15						
2472	Mrs. R. G. Rose	2	10	69	5-in. V	E. 15						
2473	S. F. Brown			90								
2489	R. G. Rose	2	10	60	4-in. V	E. 10				10		
2489A	H. A. Bettencourt		10		Propeller	E. 15						
2490	M. E. Dee	1	12	(?)	Propeller 7 in	G. 16					40?	
2494A	Alice Eggers	1	12	105	9 by 24 Plunger	E. 10					60	Tomatoes irrigated.
2495	M. M. Lopez											
2497	E. H. Stevenson	2	12	100-108	5-in. V	E. 20	1,200				120	
2499	A. J. Bunting				4-in. V	E. 20		157				
2500	.....do				8 in. Propeller	E. 35		482				
2501	W. W. Walton			70	3-in. V							
2505	F. W. Blacow				5-in. V	G. 30				40		
2507	——Calhoun	1	10	81								
2513	J. C. Shinn	2		150-200	4-in. H	E. 15			50	16		
2514	H. J. Tildon											
2522	Dora O. Swaine				4-in. V	E. 15					15	
2533	Ames Manufacturing Co							184				
2537	R. & B. Driscol							551			30	
2543	J. Carr	2	12	98	Propeller	G. 16						
2545	J. H. Peterson				5-in. V			630	18	7		Flume measurement.
2546	——Dyer				6-in. V	G. 20					60	
2554	California Nursery	2	6	150	5-in. V	E. 30		792				Do.
2556	B. C. Mickel				5-in. V				100			
2557	.....do				5-in. V				72		40	
2565	John Avila Boim	1	10	67	4-in. H	G. 20				34		Same engine used both wells.
2566	.....do.	2	10	64	4-in. H	G. 20						
2567	Joseph S. Cardoza		10	80								
2569	A. A. Bittencourt		10	75	4-in. H	G. 18				14		
2577	F. S. Rodericks					G						New; no equipment.
2580	A. P. Machado	1	10	88	Propeller			145			15	
2586	M. Joseph											Do.
2592	August May	1	12	134	6-in. Propeller	G 12		299	30		25	Weir measurement; portable engine.
2597	Lowrie Bros	1	8	264	4-in. V	E. 5						
2599	Mrs. S. H. Harvy	1	10	79								Pump not in use.
2634	Peoples Water Co	30-40										Not all in use. Pump about 8,000,000 gallons per day 1913.
2641	Oliver Salt Co	2	10	80	11-in. H	E. 10		500				
2643	Alameda Sugar Co	10										The 10 wells pump approximately 1,500,000 gallons per day during season of 90 days.
2647	J. E. Anderson			13	4-in. Plunger. Pit well	G. 4½						
2656	J. Meister			11	2-in. H	G. 4				10		
2658	Mrs. Helwig				Big pit					40	40	
2664	San Lorenz Water Co	2			Air lift							Supplying the town of Haywards.
2682	Oliver Salt Co				8-in. 400, 3½ H	G. 7½		300				

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[b] E.=electric; G.=gasoline; O.=oil; S.=steam.

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