GEOLOGIC FEATURES AND GROUND-WATER STORAGE CAPACITY OF THE SUTTER-YUBA AREA, CALIFORNIA

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INTRODUCTION

Purpose and Scope of Report

The Sutter-Yuba Area, as identified in this report, includes the parts of Sutter and Yuba Counties that are within the Sacramento Valley and the lower foothills of the Sierra Nevada, an area of 750 square miles. Its general physical and geomorphic features are shown by Plate 1. It is bounded on the east by the rugged Sierra Nevada, on the west by the Sacramento River, and is divided into two nearly equal parts by the southward flowing Feather River. Its importance as an agricultural area and its dependence on surface-water and ground-water supplies for existence and future development have been discussed in the main report by the California Division of Water Resources.

This report on the geology and ground-water storage capacity of the Sutter-Yuba Area has been prepared at the request of the Division of Water Resources, as one of the investigations of ground-water basins of the State now being made by the Geological Survey in accordance with the cooperative agreement with the State Water Resources Board entered into in March, 1948.

The geologic investigation of the Sutter-Yuba Area is in essence a part of a broader reconnaissance investigation of the geology and ground-water storage capacity of the Sacramento Valley which was begun by the Geological Survey in the spring of 1948 at the request of and in cooperation with the California Division of Water Resources. The findings of the valley-wide study are to be published in a separate bulletin under the title of "Geologic features and ground-water storage capacity of the Sacramento Valley, California." That bulletin is now being written.

This appendix has two principal purposes:

First, to describe the geology and general water-bearing character of the rocks. Treatment of the older, nonwater-bearing rocks is general and brief, but is a necessary element of the story because the sediments making up the water-bearing rocks are derived from the weathering and erosion of these older rocks and from their transportation from the Sierra Nevada to the Sacramento Valley. The water-bearing rocks of Tertiary and Quaternary age are described in considerable detail; those deposits are the important sources of ground water. Furthermore, certain geologic events which have uplifted, tilted, or folded the rocks or have produced volcanic deposits have been described because they have caused changes in the texture of sediments being transported to the valley by streams, by mud flows, or through the atmosphere, and thus have been primary factors in deposition of the coarse-grained water-bearing deposits.

Second, to describe the methods used and the results obtained in estimating the water-holding capacity of the water-bearing deposits considered to be within ultimate economic limits for pumping—that is, the deposits constituting the part of the underground reservoir that may be capable of dewatering and resaturation.

This appendix does not treat ground-water occurrence and movement, perennial yield, or chemical character of the ground waters because the hydrologic and water-quality phases of the problem have been carried out entirely by the State Division of Water Resources.

The investigation, which began in October, 1949, has been under the general direction of A. N. Sayre, geologist in charge of the Ground Water Branch, and under the immediate supervision of J. F. Poland, district geologist for California. The field work by the Geological Survey in the Sutter-Yuba area was confined chiefly to geologic mapping, which was done by G. H. Davis and F. H. Olmsted in October and November 1949. The geologic contacts actually traced in the field include the boundaries of the basement complex and of the Tertiary and Quaternary deposits near the basement-complex outcrop. The boundaries of the alluvial deposits of late Tertiary and Quaternary age were mostly drawn or modified on the basis of physiography, and from significant soil-type boundaries mapped by the United States Department of Agriculture, Bureau of Soils. The geology of the Sutter Buttes was taken from H. R. Johnson (1943) * "Marysville Buttes (Sutter Buttes) gas field."

Most of the information on subsurface geology and ground-water storage capacity of the water-bearing deposits was obtained from about 700 logs of water wells supplied by well drillers to the Bureau of Reclamation and the Geological Survey. The logs were turned over to the Division of Water Resources for field location. The cooperation of the well drillers in making available the well logs is greatly appreciated.

Numbers Applied to Wells

In its recent cooperative programs in California, the Geological Survey commonly has assigned well numbers that indicate locations according to the rectangular land surveys. For well 15 N 3E-21C1, for example, the

* References are listed at the end of this appendix alphabetically by the author's name and the year of publication.

first part of the number indicates the township and range (T. 15 N., R. 3 E., Mt. Diablo base line and meridian), the two digits following the hyphen indicate the section (Sec. 21), and the letter indicates the 40-acre subdivision as shown on the accompanying diagram.

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

Within each 40-acre tract the wells are numbered serially as indicated by the final digit or digits of the number. Thus well 21C1 is in the NE ¼ NW ¼ Sec. 21 and is the first well in that tract to be listed.

In the parts of the area that once were public lands, the official Federal land survey is followed. In the few areas that never were Federally surveyed, the net is projected.

GEOLOGY

General Features

North-central California, which includes the Sutter-Yuba Area, comprises parts of four geomorphic provinces as delimited by Jenkins (1943, pp. 83-88): the Great Valley of California, the Sierra Nevada, the Coast Ranges, and the Cascade Range. The area described in this report lies mostly within the Great Valley of California province, but includes a narrow strip of the Sierra Nevada province to the east. The southernmost extension of the Cascade Range lies more than 20 miles to the north, and the eastern margin of the Coast Ranges lies 20 miles to the west of the Sutter-Yuba Area.

The rocks exposed in the area range from Recent alluvial deposits to Mesozoic and Paleozoic crystalline rocks. Their areal extent is shown on Plate B-1 and their subsurface character on Plates B-2, B-3, and B-4. Their stratigraphy and physical and water-bearing character are summarized in the following table. These rocks may be assigned to two broad categories: the basement complex and the superjacent rocks. The basement complex is exposed in the Sierra Nevada and extends beneath the superjacent rocks in the Sacramento Valley. The superjacent rocks cap many of the interstream divides in the Sierra and comprise the thick and extensive deposits of the valley. The water-bearing rocks considered in this report are entirely within the superjacent rocks, although the basement complex yields small amounts of water to wells in weathered and fractured zones.

Pre-Cretaceous Crystalline Rocks

The basement complex consists of metamorphosed igneous and sedimentary rocks of late Paleozoic and early Mesozoic age and a series of igneous rocks ranging in composition from granite to peridotite which were intruded during the late Jurassic or early Cretaceous Nevadan orogeny.

The rocks exposed immediately east of the Sutter-Yuba Area are predominantly greenstones that probably are metamorphosed basic igneous rocks.

Cretaceous and Tertiary Nonwater-bearing Rocks

The older superjacent rocks are Upper Cretaceous and early Tertiary sediments. A section of unnamed Upper Cretaceous siltstone and sandstone totaling 4,350 feet thick crops out in the Sutter Buttes and has been found in gas wells in the Sacramento Valley. These sediments were deposited in a sea which at times extended eastward to or beyond the present western edge of the basement complex outcrop.

Eocene and possible Paleocene sediments underlie most of the Sutter-Yuba Area. A lower and middle Eocene marine section is exposed in the Sutter Buttes. Stewart (1949) has assigned the 300 feet of lower Eocene in the Buttes to the Meganos formation, and the 130 feet of middle Eocene to the Ione formation. The Ione formation, described in some detail by Allen (1929) is exposed in places along the east side of the valley. There it is usually a brackish-water or deltaic deposit consisting largely of light-colored anauxitic clays and sands, dark reddish or brownish ferruginous sandstones, and minor amounts of lignitic material.

The Ione formation interfingers to the east with river gravels deposited by old Sierra Nevada streams. The ancient Yuba River was the main stream entering the Sutter-Yuba Area in Eocene time.

About 250 to 300 feet of upper Eocene or Oligocene rocks, called the Wheatland formation by Clark and Anderson (1938), are exposed along the southeast bank of the Dry Creek flood plain northeast of Wheatland. A fossiliferous conglomerate containing andesitic pebbles is near the base of the formation which lies unconformably on basement complex. Some of the finer-grained sediments above the conglomerate also contain volcanic detritus.

The Upper Cretaceous and Eocene sediments are not significant as ground-water reservoirs in the Sutter-Yuba Area. Probably none of the water wells in the area penetrates Upper Cretaceous rocks. Several water wells near Wheatland apparently penetrate Eocene rocks, but impermeable shale, siltstone, and sandstone predominate, and the water in the more permeable zones is generally of poor quality. How much of the chloride contamination in parts of the area comes from connate waters in the Eocene rocks is not known. In

STRATIGRAPHY OF THE SUTTER-YUBA AREA AND VICINITY, CALIFORNIA

(Generalized section[1])

Geologic age		Rock unit and symbol on pl. B-1		Thickness (feet)	Physical and water-bearing character
QUATERNARY	Recent	Young alluvial deposits	Stream-channel deposits (Qrc)	0 - 130	Sand, gravel, and silt, in large part well-sorted, in present stream channels and beneath flood plains; yield water in large quantities to irrigation wells. Where the Feather and Sacramento Rivers border the Sutter Basin, they have constructed natural levees composed largely of silt and fine sand deposited during flood stages.
QUATERNARY	Recent	Young alluvial deposits	Basin deposits (Qrb)	0 - 100 ±	Largely impervious clays and silts deposited in the overflow basins during flood stages of the Feather and Sacramento Rivers. Thin, discontinuous sands supply small domestic and stock wells in the northern part of Sutter Basin; in the southern part of the basin brackish waters are likely to be encountered in wells of any depth.
QUATERNARY	Recent	Young alluvial deposits	Alluvial fans of the Sutter Buttes (Qrf)	0 - 80	Poorly sorted alluvial deposits of gravel and clay, sandy clay, or silt, of low to moderate permeability; yield small supplies of good quality water to stock and domestic wells along the flanks of Sutter Buttes.
QUATERNARY	Pleistocene	Local unconformity Intermediate alluvial deposits (Qpal) Unconformity		0 - 110+	Silt, sand, and gravel, in part well-sorted; moderately permeable throughout. Tongues and layers of fluviatile sand and gravel are highly permeable and supply large quantities of irrigation water. Deposits are coarsest and most permeable near the present major streams and along abandoned Pleistocene channels of the Yuba and Feather Rivers.
QUATERNARY		Old alluvial deposits (TQal)		0 - 350 ±	Poorly-sorted silt, clay, sand, and gravel of moderate to low permeability supply water of good chemical quality to domestic, stock, and a few small irrigation wells. Essentially impervious strata of cemented sand and gravel are common. Well-sorted permeable alluvial materials are rare.
TERTIARY	Pliocene	Volcanic rocks of the Sutter Buttes	Andesite tuff-breccia (Tat) Unconformity	0 - 800 ±	Andesitic tuffs and tuff-breccias, unsorted and generally of low permeability; some beds may be impermeable. Permeable tongues and stringers of volcanic sand and gravel interbedded with mudflow tuffs and tuff-breccias yield water of good quality to irrigation wells in the Pennington and Sutter City areas.
TERTIARY	Pliocene	Volcanic rocks of the Sutter Buttes	Rhyolite and andesite (Tra) Unconformity		Impervious, hard lavas forming core of Sutter Buttes; possibly could provide small water supplies from fractured zones. No wells are known in these rocks.
TERTIARY	Pliocene Miocene Oligocene	Volcanic rocks from the Sierra Nevada (Tfa) Unconformity		0 - 1,800 ±	Andesitic and rhyolitic tuffs, tuff-breccias, conglomerates, sands, and gravels deposited by inter-volcanic streams from the Sierra Nevada. Sands and gravels yield water of good quality to deep wells in the Marysville and Bear River areas. Fluviatile "black sands" are prolific water producers at many places in the Sacramento Valley. Tuff and tuff-breccia have low permeability and yield little water.
TERTIARY	Eocene	Undivided Eocene sediments (Te) Unconformity		0 - 700 ±	Marine and non-marine clay, shale and sandstone beneath the Sacramento Valley interfingering along the eastern margin of the valley with Eocene river gravels. These gravels ordinarily are cemented and partially decomposed and probably would yield little water. Coarser sediments in southern Yuba and northwestern Placer counties yield saline waters of probable marine origin to some deep wells. In structurally high positions the marine connate waters have been flushed out of the permeable strata and fresh water is found.
CRETACEOUS	Upper Cretaceous	Unnamed Upper Cretaceous sediments (Ku) Unconformity		0 - 4,350	Sandstone, siltstone, and shale; not penetrated by water wells in Sutter-Yuba area. Connate marine water high in chloride could be expected in wells penetrating these sediments in the Sacramento Valley.
PRE-CRETACEOUS		Pre-Cretaceous crystalline rocks (pK)			Hard, impervious metamorphic and igneous rocks. Stock and domestic wells produce small supplies of water of good chemical quality from fractured and partly decomposed zones near the land surface.

[1] Dotted lines are used to separate units that are considered to be contemporaneous.

structurally high positions, for example just west of the outcrops of Wheatland formation, the marine connate waters have been flushed out, and fresh water is found in the more permeable strata.

Tertiary and Quaternary Water-bearing Rocks

Volcanic Rocks From the Sierra Nevada (Eocene-Pliocene)

Tertiary fragmental volcanic rocks having a source near the present crest of the northern Sierra Nevada are exposed at several localities and are encountered in many of the deep wells in the Sutter-Yuba Area. The exposures are found at three principal localities: south of the Yuba River and about 10 miles east of Marysville, on the Camp Beale Military Reservation; at the clay quarries one to two miles northwest of Lincoln; and in an extensive area east of the Southern Pacific railroad and U. S. Highway 99E between Lincoln and Roseville. The last two areas are in Placer County.

Tertiary volcanic rocks do not crop out in the foothill region between Lincoln and the Camp Beale exposure south of the Yuba River. However, many water wells farther west penetrate volcanic rocks, and the original eastward extent of those volcanics was probably greater than it is at present.

GEOLOGIC EVENTS IN SIERRA NEVADA AND ON EAST SIDE OF SACRAMENTO VALLEY
(Read from bottom up)

Recent	Hydraulic mining in Sierra Nevada in late 19th century chokes channels of Feather, Yuba and Bear Rivers with debris. Deposition of stream-channel, alluvial-fan, and basin deposits contemporaneous with mild dissection of intermediate alluvial deposits (Qpal).
Pleistocene	Deposition of intermediate alluvial deposits (Qpal), contemporaneous with moderate to severe dissection of old alluvial deposits (TQal). Several stages of glaciation in Sierra. Truncation and planation of Pliocene alluvial deposits and older rocks, and deposition of thin blanket of course gravel in many areas adjacent to the Sierra Nevada (uppermost part of TQal). Last major uplift of Sierra Nevada with additional regional westward tilting.
Pliocene	Eruptions of Sutter Buttes volcano cover slopes with tuff-breccia deposits from mud-flows. Deposition of old alluvium from Sierra continues. Deposition of old alluvial deposits by streams of low gradient from Sierra Nevada. May be in part contemporaneous with deposition of uppermost Sutter formation and with subsequent volcanic activity at Sutter Buttes. Intrusion of Sutter Buttes central area as plug of plastic andesite porphyry. Andesite mass subsequently intruded by rhyolite porphyry. Valley sediments pierced by volcanic plug are folded and fractured around central area. Great andesitic volcanic activity in Sierra wanes; consequent streams erode volcanic materials and deposit them in Sacramento Valley.
Miocene and Oligocene	Great mud flows of andesitic detritus originating near the crest of the Sierra cover most of the western slope. Old drainage in Sierra almost completely disrupted. Streams begin to erode detritus and deposit it in valley. Faulting and westward tilting of Sierra block during andesite eruptions. Volcanic eruptions near present Sierra crest continue; rhyolitic debris moves westward down canyons, locally damming and diverting streams. Deposition of Sutter formation (non-marine) begins in Sacramento Valley; continues until uplift of Sutter Buttes.
Oligocene or Eocene	Earliest volcanic activity in Sierra Nevada (andesitic and some rhyolitic); sea finally withdraws from Sacramento Valley after extending as far northeast as Wheatland during uppermost Eocene or Oligocene.
Eocene	Marine sedimentation in Sacramento Valley during middle and lower Eocene. Middle Eocene Ione formation, largely non-marine clay and quartzose sand, deposited on the lower slopes of the Sierra Nevada and as deltaic deposits in Sacramento Valley embayment. Moderate uplift of Sierra Nevada or change of base level causes dissection of weathered rocks on west slope of Sierra. Tropical climate and gentle slopes cause deep weathering of rocks in place on west slope of Sierra Nevada.
Upper Cretaceous	Regional upwarping at end of Upper Cretaceous interrupts marine deposition on east side of Sacramento Valley. Great erosion in Sierra Nevada; shallow-water marine deposition in Sacramento Valley.
Lower Cretaceous	At end of Lower Cretaceous—ancestral Coast Ranges formed by folding, faulting, and uplift; Sacramento Valley trough first outlined, though axis somewhat west of present valley. Erosion in ancestral Sierra Nevada.
Lower Cretaceous and/or Upper Jurassic	Formation of folded mountain range of great height, the ancestral Sierra Nevada, by Nevadan orogeny.

The volcanic deposits are chiefly andesitic stream-laid conglomerate and sandstone, and tuff-breccia of mud-flow origin, together with some fine-grained rhyolitic material, all from the Sierra Nevada. As encountered in wells, the conglomerate and sandstone often are loosely consolidated and in such cases are logged by drillers as gravel and sand.

The large area of volcanic rocks at Camp Beale is underlain by andesitic conglomerate, sandstone, and tuff-breccia with interbedded rhyolitic ash. The age of these deposits is probably Eocene, which is somewhat older than most of the other volcanic deposits in the Sutter-Yuba Area on the east side of the Sacramento Valley (Clark and Anderson, 1938).

Andesite tuff-breccia one mile northwest of Lincoln overlies altered rhyolitic ash, and also clay of the Ione formation. The extensive volcanic surface east of U. S. Highway 99E between Lincoln and Roseville is underlain by the same andesite tuff-breccia interbedded with andesitic sandstone and conglomerate. The age of these deposits is not certainly known, but they are believed to be equivalent in age to andesitic deposits in the Mokelumne River Area (the Mehrten formation), which is probably Miocene and may be in part Pliocene (Piper and others, 1939).

The Sutter formation of the Sutter Buttes unconformably overlies Eocene rocks and is in turn overlain unconformably by andesitic and rhyolitic tuffs and breccias of Pliocene age derived from the Buttes volcano. The lower part of the Sutter formation is probably correlative with the volcanic rocks from the Sierra Nevada, although the upper portion may consist of later reworked deposits. The maximum exposed thickness of the Sutter formation is approximately 1,800 feet (Johnson, 1943, p. 614)—considerably thicker than the volcanics from the Sierra Nevada farther east which are probably not over 250 feet thick in outcrop (see Plate B-1). The Sutter rocks are thin-bedded to massive tuff, conglomerate, sand, and clay.

The permeable sand and gravel in the volcanic rocks from the Sierra Nevada probably yield water to deep wells in the Sutter-Yuba Area. Deep wells in Marysville obtain some water from the volcanic sediments, and wells on the Camp Beale Military Reservation 10 miles east of Marysville obtain yields of several hundred gallons a minute from volcanic sands and gravel. Several wells south of the Bear River also produce water from the volcanic rocks from the Sierra Nevada.

Volcanic Rocks of the Sutter Buttes (Pliocene)

The Pliocene volcanic rocks of the Sutter Buttes may be divided into two principal groups: the intrusive rhyolite and andesite and the vent tuffs of the central core; and the andesitic and rhyolitic tuff-breccia that forms the ring encircling the core.

The rocks of the first group are principally porphyritic rhyolite and andesite. These rocks form the sharp peaks in the central area. They are unimportant as a source of ground water.

The tuff-breccia consists of angular blocks of rhyolite and andesite that were swept down the slopes of the old volcano in great mud flows. Many water wells near the periphery of the Buttes encounter the tuff-breccia and intercalated volcanic sediments (see Plates B-1 and B-2). The estimated maximum thickness of the deposits is about 800 feet.

In general, the volcanic sand and gravel yields some water, but the tuff-breccia is tight and nonwater-bearing. North of the Buttes, in the vicinity of Pennington, irrigation wells obtain part of their yield from the volcanic sands and gravels.

Old Alluvial Deposits (Pliocene-Pleistocene)

Location and Extent. The old alluvial deposits, which overlie the volcanics from the Sierra Nevada and older rocks, are exposed in a semicontinuous belt along the east side of the valley, between the outcrop of the basement complex and the volcanics to the east and the younger sediments to the west. A few scattered outliers of old alluvium extend west of the main outcrop from the northern edge of the Sutter-Yuba Area to Wheatland.

Physical Character. The old alluvial deposits are identified physiographically as dissected uplands near the eastern valley margin. Peculiar "hog wallow" topography, consisting of small mounds and undrained or poorly drained depressions often less than 100 feet across, is a common and striking characteristic.

A capping gravel, presumably early Pleistocene in age, and seldom more than 30 feet thick, is extensive near the eastern edge of the outcrops of old alluvium. The underlying silts and sands are presumably Pliocene in age and may be correlative with the Laguna formation to the south, in the Mokelumne Area, described by Gale (Piper and others, 1939).

The gravels almost always have a silty or fine sandy matrix with a distinctive reddish color. Silty and fine-sandy loams, usually with a hardpan layer, are typical soils.

The old alluvial deposits are extremely heterogeneous, and it is difficult to distinguish them in most well logs from younger and older sediments.

Reddish to yellowish-brown silt and silty sand are abundant, but light-gray moderately well-bedded indurated siltstone and fine sandstone are more distinctive and diagnostic. Many of the sand and gravel beds are cross-bedded, indicating fluviatile origin. The gravel is rarely clean or well-sorted; the silty matrix greatly reduces the permeability and porosity. This gravel may be distinguished from that in the underlying volcanics from the Sierra Nevada by the relative scarcity of volcanic rocks, but this distinction is often hard to make, and many drillers do not mention the composition of the pebbles and cobbles.

Water-bearing Character. The poorly-sorted sediments of the old alluvium generally do not yield as much water as the younger deposits. Cementation of the sand and gravel strata is a common feature and many wells are left uncased in the older alluvium; the cemented silt, sand, and gravel strata being sufficiently consolidated to stand without support.

Throughout the Sutter-Yuba Area, enough water can be obtained from the old alluvial deposits to supply domestic and stock wells. It is doubtful, however, that large-capacity irrigation wells could be developed in these deposits. Few wells tap only the old alluvium for sure and yields of these are not known. In the area between the Bear and Yuba Rivers, several irrigation wells produce between 1,000 and 2,000 gallons a minute, but these wells are several hundred feet deep and penetrate the intermediate alluvium, the old alluvium, and presumably the volcanic deposits from the Sierra Nevada. It is believed that the bulk of their yield comes from the volcanic deposits below and the intermediate alluvium above.

Intermediate Alluvial Deposits (Pleistocene)

Location and Extent. The intermediate alluvial deposits which rest on the old alluvium and in places are overlain by the young alluvium of Recent age crop out along a broad belt between the old alluvium on the east and the basin deposits on the west. A few small outliers of intermediate alluvium occur in the American Basin east of the Feather-Sacramento junction.

Physical Character. Topographically these deposits underlie moderately to slightly dissected low plains with a gentle westerly to southwesterly slope. Soils are quite variable but all have some hardpan development. The soils adjacent to the flood basins are fine-grained and dark in color. Soils farther east are coarser, frequently reddish, but almost never gravelly. (See soil surveys, U. S. Dept. Agriculture, in references.)

The intermediate alluvium consists of sand, silt, and gravel, in part well-sorted and well-stratified, deposited by the Feather River and its tributaries in building the low alluvial planes. These deposits are heterogeneous and lenticular in character because of their extremely varied mode of formation. In the eastern part of the area they are largely of alluvial-fan origin; the coarse sand and gravel beds extending 3 to 5 miles west from the present course of the Feather River are probably Pleistocene (Feather) river-channel deposits; and the predominantly fine-grained deposits farther west are chiefly of flood basin or lacustrine origin. Well logs indicate that the material penetrated in the top 100 feet becomes progressively finer toward the Sutter and Butte Basins. Sand and gravel give way to sandy clays and clays, and dark colors predominate. The proportion of sand and gravel to fine sediments in the upper 50 feet decreases from maxima of 80 to 90 percent to 5 to 10 percent. The proportion of blue and dark-gray fine-grained materials—indicative of a non-oxidizing environment—possibly flood-basin or lacustrine deposition—becomes greater as the proportion of fine sediments increases.

In general, the intermediate alluvium is not appreciably consolidated. The beds that are indurated have a high proportion of clay and silt which act as a binder. Hardpan layers, representing buried soil zones, are encountered at various depths. These hard layers usually are cemented with hydrous iron and aluminum silicates, although calcareous cementation is common in areas of high water table adjacent to the flood basins.

The intermediate alluvial deposits are inferred to be correlative with the Victor formation of Pleistocene age in the Mokelumne area described by Gale and Piper (Piper and others, 1939).

Thickness. From drillers' logs, it is inferred that the intermediate alluvial deposits do not exceed 110 feet in thickness in the Sutter-Yuba Area. West of the Feather River, these deposits consist of 50 to 110 feet of sandy clay, sand, and gravel. (See Plate B-2, Section B-B1.) North of Yuba City they overlie brown cemented sands and hard brown clays of the old alluvium. South of Yuba City and in the Marysville area the underlying old alluvium usually is blue clay.

In the area east of the Feather River and north of the Yuba River the intermediate alluvium reaches thicknesses of 70 to 100 feet and rests upon cemented sand, gravel, and clay of the old alluvium that crop out in the dissected uplands to the east.

Few wells penetrate the intermediate alluvium south of the Yuba River but the thickness does not appear to exceed 50 feet.

Water-bearing Character. The intermediate alluvium is moderately permeable throughout, but the tongues and layers of well-sorted sand and gravel are highly permeable and yield large quantities of water to wells. Nearly all the domestic and many small irrigation wells located on the low plains are completed in these deposits. Large wells for irrigation and municipal supply obtain much of their water from this material, but also obtain water from the older deposits at greater depths.

Deposits of this age are coarsest and most permeable near the Yuba and Feather Rivers, and less permeable close to the flood basins where dark colored silt and clay predominate.

Young Alluvial Deposits (Recent)

The Recent deposits of the Sacramento Valley may be defined as those sediments that are still accumulating, or would be accumulating under natural conditions. These deposits would include: silt, sand, and gravel laid down in stream channels during times of decreasing flood flow; silt and sand deposited on natural levees at times of overflow; silt and clay deposited in the flood basins; detritus of the alluvial fans surrounding the Sutter Buttes. In this report, the natural levee sediments are grouped with the stream-channel deposits. The other two types of sediments are called "basin deposits" and "alluvial-fan deposits," respectively. Each of these subdivisions of the Recent sediments has certain unique physiographic, lithologic, and hydrologic characteristics which are discussed below.

Alluvial-fan Deposits of the Sutter Buttes. Alluvial fans of Pleistocene and Recent age form a ring surrounding the Sutter Buttes and extending toward their center in narrow valleys cut into andesite tuff-breccia. Small isolated patches of alluvium occupy valleys high in the Buttes. This alluvium is probably thin and is not continuous with the deposits farther down the flanks.

The fan material consists of volcanic and sedimentary detritus eroded from the Buttes and deposited around their perimeter. The deposits are usually poorly sorted and contain many volcanic fragments as large as boulder size. An average of several logs of wells near Pennington and Sutter City indicates the following proportion of materials: "clay," 70 percent; clay and gravel (including clay and volcanics), 20 percent; sand and gravel, 10 percent. The "clay" is usually yellow and is probably largely silt and fine sand.

Most of the alluvial-fan deposits are poorly sorted and ground-water yields are low. Moderately permeable sand strata yield water of good quality to wells near Pennington and Sutter City, but chances for developing large irrigation wells are generally poor.

Basin Deposits. The basins are nearly flat, poorly drained lands subject to natural overflow of the Sacramento and Feather Rivers during floods. The deposits have formed from the accumulation of silt and clay that were carried in suspension by the flood waters and settled slowly when the current slackened.

Dark-gray clays and clay adobes, often with more than 50 percent clay-size particles, are the chief basin soils. Depth of the soils is usually from three to six feet, and the underlying material is stratified and of lighter color.

Few water wells have been drilled in the basins, so it is difficult to work out the pattern of the subsurface geology from the meager data. Only eight water-well logs were available in Sutter Basin and four logs in the American Basin.

In Sutter Basin soil and yellow clay as much as 48 feet thick are reported above blue clay, blue sand, gray clay, or gravel. The change in color from yellow to blue indicates that the deeper sediments have been in a non-oxidizing environment since deposition. If the blue clay and coarse-grained deposits are Pleistocene in age the basin deposits of Recent age attain a thickness of at least 48 feet in the Sutter Basin and 100 feet in the American Basin.

The Recent basin deposits nearly all consist of relatively impermeable clay and silt. The older sediments, usually at least 50 to 100 feet below land surface, frequently include thin sand and gravel strata which yield moderate amounts of water. Generally, yields from the Sutter Basin deposits are too small to permit economic use of the ground-water for irrigation; and even in the deep wells penetrating permeable strata, poor quality (high chloride content) precludes use of the water. Locally, however, satisfactory deep wells might be developed by casing off strata containing the high-chloride water. Wells in the northern part of the American Basin get fair yields from deep permeable strata (probably in the intermediate alluvial deposits) and apparently do not encounter the chloride contamination present in the Sutter Basin.

Stream-channel Deposits. The stream-channel deposits comprise those sediments which under natural conditions of stream flow would still be in the process of accumulation. They include the sand and gravel deposited in the river channels during times of decreasing flow and the fine sediments deposited on the flood plains and natural levees during floods. The stream-channel deposits range in width from less than one mile to as much as six miles and extend as narrow bands along the major streams of the area.

The river channels are floored with sand and gravel, the flood plains by sand and silt. During stages of moderate flow the rivers occupy only their channels and roll sand and gravel along their beds. During floods muddy water spreads over the flood plain and deposits fine sediments. Flood channels, abandoned river channels, and lakes characterize the flood-plain surface. Natural levees bordering the Sacramento and lower Feather Rivers were deposited during flood stages along the boundary between high velocity flows in the river channels and still waters occupying the flood basins.

The Yuba and Bear Rivers offer a special case. The natural channel deposits of both streams have been completely buried by 15 to 20 feet of hydraulic mining debris deposited since 1870. Levees now confine this debris, which stands as raised channelways subdivided into braided gravelly channels. (See Pl. B-3.) Large quantities of debris choke the lower Feather below the Yuba junction, although the flood plain has not been altered to the same extent as those of the Yuba and Bear Rivers.

Well defined channels of coarse gravel, deposited in trenches excavated in the intermediate alluvial deposits and older sediments, underlie the flood plains of the Feather, Yuba, and Bear Rivers. Coarse gravel deposits from one to two miles in width can be traced beneath the Feather River flood plain from Oroville south 10 miles to the highway bridge east of Gridley. The depth of the base of the gravel is about 30 feet near Oroville, increasing to 105 feet at the Gridley bridge. No subsurface information is available on the river channel deposits between the Gridley bridge and the Feather-Yuba junction. Wells on the Feather River flood plain south of the Yuba-Feather junction encounter gravel between depths of 35 and 90 feet that may correspond to the Recent gravel deposits upstream.

Records of wells drilled on the Yuba River flood plain two miles east of Marysville show coarse gravel deposits to a depth of 110 to 130 feet. (See Pl. B-3.)

Sand and gravel underlies the Bear River flood plain for eight miles downstream from the canyon mouth. This gravel deposit which occurs between 25 and 65 feet beneath the surface near Wheatland is terminated rather abruptly about three miles southeast of Wheatland.

Little is known of the subsurface extent of the Recent deposits of the Sacramento River. Wells drilled on the natural levees pass through varicolored sand, gravel, silt, and clay. Well logs show no systematic changes either laterally or vertically. Lateral discontinuity of beds is a marked feature—even closely spaced wells penetrate completely different sections.

Clean, well-sorted sand and gravel of the stream-channel deposits yield water in large quantity and of good chemical quality to irrigation wells on the flood plains of the Feather, Yuba, and Bear Rivers. A few irrigation wells are bottomed in the Recent deposits but wells of large capacity commonly penetrate older sediments as well.

Wells drilled in the natural-levee deposits of the Feather and Sacramento Rivers obtain large supplies of water from thin, discontinuous tongues of gravel and sand which are buried stream-channel deposits. The fine sand and silt of these deposits supply some small stock and domestic wells.

Yields of Wells

Data on yields of wells in the Sutter-Yuba Area for the period 1933 to 1949 have been furnished by the Pacific Gas and Electric Company. The results of tests are summarized in the following table, which shows averages of discharge and specific capacity for 595 wells in five areas within the area. Specific capacity is obtained by dividing the yield in gallons per minute by the drawdown from static to pumping level in feet. It is a measure of the productivity of the well per foot of drawdown.

Area	*Average discharge (gpm)*	*Average specific capacity (gpm/ft. dd)*	*Number of wells*
1. Eastern Sutter County	728	47	261
2. Northwestern Sutter County	878	54	82
3. Southeastern Sutter County	960	17	121
4. Southern Yuba County	846	18	108
5. Northern Yuba County	838	60	23

The table shows that the wells having the highest specific capacities are in areas two and five. A hasty conclusion (based on this relation) might be drawn that the best irrigation wells are to be obtained in the areas of highest average specific capacity. However, a study of well depths in relation to specific capacity changes the picture somewhat. Drillers' logs of 528 irrigation wells were used to obtain a yield factor that would give a reasonable idea of production per foot of well. The yield factor was computed by the following formula:

$$\text{Yield factor} = \frac{\text{Average specific capacity x 100.}}{\text{Average well depth}}$$

The results are summarized in the following table.

Area	*Number of irrigation wells*	*Total footage drilled*	*Average depth (feet)*	*Yield factor*
1	249	45,270	182	25.7
2	48	15,341	320	16.8
3	104	33,709	324	14.7
4	109	31,828	292	16.7
5	28	5,623	201	29.8

It can be seen from comparison of yield factors that the ratio of well production to depth of wells is higher in areas 1 and 5 than in areas 2, 3, and 4. Plate B-4, showing ground-water storage units, and well-yield areas indicates that areas 1 and 5 lie largely in group A (river flood-plain and channel deposits). Area 2 comprises the Sutter Buttes, the alluvial fans surrounding the Buttes (storage group B) and a large area of basin deposits (storage group D). Only a small part of this area is within storage group A. Most of the wells in area 2 are in the Pennington-Live Oak district, where many wells are 500 feet or more deep.

The other two areas with low yield factors are areas 3 and 4 east of the Feather River in southeastern Sutter and southern Yuba Counties; they embrace extensive areas of low alluvial-plain deposits (storage group B), and smaller areas of basin deposits (storage group D) and dissected alluvial deposits (storage group C). Although area 4 includes large areas of river flood-plain deposits (storage group A) the yield factor approximates that of the poor-yield areas rather than that of high-yield areas as might be expected.

In conclusion, generally speaking, areas of high-yield factor generally correspond to areas of high specific yield as determined from statistical analysis of drillers' logs.

GROUND-WATER STORAGE CAPACITY

Most of the information on ground-water storage capacity of the Sutter-Yuba Area was derived from well logs obtained from water well drillers. In connection with their Sutter-Yuba investigation the Division of Water Resources located in the field about 700 water wells for which drillers' logs were available. The Geological Survey located about 50 wells in western and northwestern Sutter County.

Clay, gravel, sand, and volcanic rocks are usually recognized in the drillers' logs, and the more complete logs mention color, hardness, degree of cementation, and other readily identified lithologic features.

A peg model based on drillers' logs was used to subdivide the shallow sediments of the area into hydrologic units. In constructing the model only the deeper well records were used where wells were located within 1,500 feet of each other. In this way 576 well logs were selected. In order to smooth out the effect of close well spacing in residential districts supplied by domestic wells, only the wells selected for the peg model were used in computing storage capacity.

Selection of Depth Zones

The storage capacity of the Sutter-Yuba Area has been estimated for three depth zones: 20 to 50 feet, 50 to 100 feet, and 100 to 200 feet below the land surface. The only exception to this three-zone treatment was in the area south of Yuba City between the natural levee deposits of the Sacramento River and the channel of the Feather River (storage units A 5 and D 2). Water of poor quality underlies that area at relatively shallow depths, and the California Division of Water Resources believes that it would be impractical in general to draw down the water level below 100 feet without causing saline intrusion. Accordingly, in that area the storage capacity was calculated only for the deposits between depths of 20 and 100 feet.

It is believed that for the Sutter-Yuba Area it would be inefficient to store water in the deposits less than 20 feet below land surface, even where permeable. Also, for economic reasons, it is unlikely that water levels will be lowered below 200 feet. In the near future, drawdown of the water table in the Sutter-Yuba Area probably will not extend below the 100-foot depth.

Classification of Materials in Drillers' Logs

In order to estimate the ground-water storage capacity of the water-bearing deposits it was necessary to classify the drillers' logs into a few general categories to which specific-yield values could be assigned. Although many logs reported only gravel, sand, and clay or gradations between these units, some logs reported as many as 10 to 20 different types of materials. It was decided to group the sediments logged into five general classes, namely: (1) gravel; (2) sand, including gravelly sand and gravel and sand; (3) tight sand, hard sand, sandstone and other materials of similar hydrologic character; (4) cemented gravel, clay and gravel, etc.; and (5) "clay," which included silt, clay, shale, and related materials of low permeability including "lava."

Assignment of Specific-yield Values

The specific yield of a rock is the ratio of (1) the volume of water which, after being saturated, it will yield by gravity to (2) its own volume. This ratio is customarily expressed in percent. The procedure followed in assigning specific-yield values to the various types of material classified in the well logs of the Sacramento Valley is discussed in detail in the valley-wide report now in preparation and has been summarized in an appendix to Bulletin 1 of the State Water Resources Board (Poland and others, 1950). The table below indicates the values assigned:

Material	*Specific yield (percent)*
Gravel	25
Sand, including sand and gravel, and gravel and sand	20
Fine sand, hard sand, tight sand, sandstone, and related deposits	10
Clay and gravel, gravel and clay, cemented gravel, and related deposits	5
"Clay," silt, sandy clay, lava rock, and related fine-grained deposits	3

Subdivision of Sutter-Yuba Area Into Storage Units

For the purpose of estimating underground storage capacity, the Sutter-Yuba Area was divided into four storage groups, and these in turn were subdivided into 14 storage units. (See Pl. B-4). Boundaries of the storage units were first drawn on significant soil and physiographic changes, then were modified on the basis of the subsurface character of the deposits above a depth of 200 feet below land surface. Special emphasis was placed on the hydrologic character of the sediments in the top 100 feet. There are three reasons for this. First, it is believed that the storage units should be representative for the depth range most widely subject to unwatering or resaturation under present conditions. Second, for nearly all the storage units in the valley except the basin deposits, the specific yield is greater above the 100-foot depth than below it. Lastly, with reference to natural or artificial recharge at or near the land surface, the distribution of water-bearing beds in the near-surface deposits is of primary importance. In this respect, the coarse sand and gravel tongues or blankets that are so well defined at shallow depths beneath or near the channels of the Feather, Yuba, and Bear Rivers are noteworthy.

In the table summarizing the ground-water storage capacity of the Sutter-Yuba Area, the 14 storage units have been assembled within the four groups. Briefly summarized, the groups are:

A. River Flood-plain and Channel Deposits. These deposits contain a high proportion of sand and gravel deposited by streams mostly during the Pleistocene and Recent epochs, although some of the sands and gravels in the 100- to 200-foot depth zone may be of Pliocene age. In general, the river flood-plain and channel deposits have the highest specific yield of the four groups in all three depth zones. The specific yield decreases markedly in the 100- to 200-foot depth zone, but still is higher than in the other three storage groups.

B. Low Alluvial-plain and Alluvial-fan Deposits. These deposits are variable in physical character but are generally much less permeable than the river flood-plain and channel deposits, particularly in the top two depth zones. The near-surface sediments in this group include the alluvial fans of the Sutter Buttes, intermediate alluvial deposits (Pleistocene), old alluvial deposits (Pliocene and Pleistocene) and smaller areas of

Recent stream-channel deposits. Most of the low alluvial-plain deposits above the 200-foot depth are old and intermediate alluvial deposits, however.

C. Dissected Alluvial Deposits. This group is represented in Sutter and Yuba Counties by two widely separated small areas—the northern between Honcut Creek and the Yuba River on the east margin of the valley, and the southern in Sutter County east of the American Basin. The specific yield and physical character of the dissected alluvial deposits and the low alluvial-plain and alluvial-fan deposits are similar, and the geologic units contained are essentially the same, although the dissected alluvial deposits contain a somewhat greater percentage of old alluvium.

D. Basin Deposits. These sediments to a depth of 200 feet include the Recent basin deposits, the intermediate alluvial deposits of Pleistocene age and probably some old alluvium. Silt and clay predominate and permeability and specific yield are correspondingly low. The 100- to 200-foot depth zone in the northern part of the American Basin (D1) contains a rather high proportion of sand which may represent buried Sacramento River channels, but the deep zone in the Butte Basin (D3) has fine-grained material of low permeability. The specific yield of the deep zone in the Sutter Basin (D2) was not calculated because of salt-water contamination, but the well logs record mostly fine-grained material.

Summary of Results

The following table summarizes the estimated ground-water storage capacity of the Sutter-Yuba Area for the four storage groups. This summary is followed by a tabulation of storage capacity for each of the 14 storage units, listed by groups.

The summary for the Sutter-Yuba Area by storage groups first gives total storage capacities for all deposits, including those beneath the basin lands. The totals are then given with the storage capacity of the basin deposits eliminated. There are several reasons for omitting the storage capacity of these deposits from consideration. The deposits in the Sutter and Butte Basins are relatively impermeable in all three depth zones, and those in the American Basin in the top two depth zones. Therefore, well yields would be low and it would be difficult to draw down the water level extensively within the basins unless many closely spaced wells were drilled. Although the basin water levels are close to the surface, the altitude of land surface in the basins is lower than that in all the surrounding lands. Because of the low altitude and the low permeability of the basin deposits, it is believed there would not be appreciable dewatering by lateral drainage to adjacent pumped areas. For the same reasons, recharging the basin deposits would be slow and costly. Because of low well yields and the availability of surface water, it is ordinarily more economical to use surface water than ground water for irrigation of the basin lands.

Excluding the basin storage, the estimated ground-water storage capacity for the Sutter-Yuba Area between limits of 20 and 200 feet below the land surface is about 3,900,000 acre-feet. More than half this storage is in the deposits 20 to 100 feet below the surface. As discussed previously, how much of this ground-water storage capacity is economically usable is not known.

ESTIMATED TOTAL GROUND-WATER STORAGE CAPACITY OF SUTTER-YUBA AREA IN ACRE-FEET

Storage unit	Area[1] (acres)	Depth zone						All zones 20-200 feet	
		20-50 feet		50-100 feet		100-200 feet			
		Specific yield (percent)	Storage (acre-feet)	Specific yield (percent)	Storage (acre-feet)	Specific yield (percent)	Storage (acre-feet)	Specific yield (percent)	Storage (acre-feet)
A. River flood-plain and channel deposits	204,590 (164,430)	10.4	640,000	9.4	960,000	7.0	1,140,000	8.4	2,740,000
B. Low alluvial-plain and alluvial-fan deposits	101,590	5.4	160,000	4.9	250,000	4.7	470,000	4.9	880,000
C. Dissected alluvial deposits	30,600	4.5	40,000	5.5	80,000	4.7	150,000	4.9	270,000
D. Basin deposits	143,590 (29,080)	5.4	230,000	5.1	370,000	6.4	180,000	5.4	780,000
TOTALS	480,370 (325,700)	7.4	1,070,000	6.9	1,660,000	6.0	1,940,000	6.6	4,670,000
Percent of total			22.9		35.5		41.6		

ESTIMATED GROUND-WATER STORAGE CAPACITY, EXCLUDING BASIN DEPOSITS

Total (A+B+C)	336,780	810,000	1,290,000	1,760,000	3,890,000
Percent of total	(296,620)	21.6	33.2	45.2	

[1] Figures in parentheses indicate acreage utilized for computing storage in zone 100 to 200 feet below land surface.

SUTTER AND YUBA COUNTIES
ESTIMATED GROUND-WATER STORAGE CAPACITY OF RIVER FLOOD-PLAIN AND CHANNEL DEPOSITS (A)

Storage unit	Area[1] (acres)	Depth zone 20-50 feet		50-100 feet		100-200 feet		All zones 20-200 feet	
		Specific yield (percent)	Storage (acre-feet)	Specific yield (percent)	Storage (acre-feet)	Specific yield (percent)	Storage (acre-feet)	Specific yield (percent)	Storage (acre-feet)
1. Sacramento River	35,680	9.0	96,000	9.8	176,000	8.6	308,000	9.0	580,000
2. East of Feather River north of Yuba River	39,240	10.3	121,000	8.7	170,000	6.0	235,000	7.5	526,000
3. West side Feather River north of Yuba City	35,920	9.8	105,000	8.4	151,000	5.9	214,000	7.3	470,000
4. East side Feather River south of Yuba River, and Bear River	53,590	11.8	189,000	10.8	289,000	7.2	384,000	8.9	862,000
5. West of Feather River south of Yuba City	(40,160)	10.4	126,000	8.9	179,000			9.5	305,000
TOTALS	204,590 (164,430)	10.4	637,000	9.4	965,000	7.0	1,143,000	8.4	2,744,000

[1] Figures in parentheses indicate acreage utilized for computing storage in zone 100 to 200 feet below land surface.

SUTTER AND YUBA COUNTIES
ESTIMATED GROUND-WATER STORAGE CAPACITY OF LOW ALLUVIAL-PLAIN AND ALLUVIAL-FAN DEPOSITS (B)

Storage unit	Area (acres)	Depth zone 20-50 feet		50-100 feet		100-200 feet		All zones 20-200 feet	
		Specific yield (percent)	Storage (acre-feet)	Specific yield (percent)	Storage (acre-feet)	Specific yield (percent)	Storage (acre-feet)	Specific yield (percent)	Storage (acre-feet)
1. Low plains south of Bear River	36,030	6.5	70,000	5.2	93,000	4.2	151,000	4.8	314,000
2. Low plains north of Bear River	47,070	4.7	67,000	4.5	105,000	5.4	253,000	5.0	425,000
3. Low plains west of Feather River	2,560	5.2	4,000	5.6	7,000	4.0	10,000	4.6	21,000
4. Alluvial plains enclosing Sutter Buttes	15,930	4.8	23,000	5.8	46,000	3.7	59,000	4.5	128,000
TOTALS	101,590	5.4	164,000	4.9	251,000	4.7	473,000	4.9	888,000

SUTTER AND YUBA COUNTIES
ESTIMATED GROUND-WATER STORAGE CAPACITY OF DISSECTED ALLUVIAL DEPOSITS (C)

Storage unit	Area (acres)	Depth zone 20-50 feet		50-100 feet		100-200 feet		All zones 20-200 feet	
		Specific yield (percent)	Storage (acre-feet)	Specific yield (percent)	Storage (acre-feet)	Specific yield (percent)	Storage (acre-feet)	Specific yield (percent)	Storage (acre-feet)
1. Deposits between American and Bear Rivers	20,070	4.8	29,000	4.8	48,000	5.2	105,000	5.0	182,000
2. Deposits south of Oroville	10,530	3.9	12,000	7.0	37,000	3.8	40,000	4.7	89,000
TOTALS	30,600	4.5	41,000	5.6	85,000	4.7	145,000	4.9	271,000

SUTTER AND YUBA COUNTIES
ESTIMATED GROUND-WATER STORAGE CAPACITY OF BASIN DEPOSITS (D)

Storage unit	Area[1] (acres)	Depth zone						All zones 20-200 feet	
		20-50 feet		50-100 feet		100-200 feet			
		Specific yield (percent)	Storage (acre-feet)	Specific yield (percent)	Storage (acre-feet)	Specific yield (percent)	Storage (acre-feet)	Specific yield (percent)	Storage (acre-feet)
1. American Basin	17,860	4.6	25,000	5.0	45,000	7.7	137,000	6.4	207,000
2. Sutter Basin	114,510 (0)	5.5	189,000	5.2	295,000	------	------	5.3	484,000
3. Butte Basin	11,220	5.1	17,000	4.6	26,000	4.3	48,000	4.8	91,000
TOTALS	143,590 (29,080)	5.4	231,000	5.1	366,000	6.4	185,000	5.4	782,000

[1] Figures in parentheses indicate acreage utilized for computing storage in zone 100 to 200 feet below land surface.

Best Areas for Ground-water Storage

As can be seen from the ground-water storage table, the best areas for storing water underground are the five river flood-plain and channel deposits units. Excluding basin deposits, about 70 percent of the total storage capacity is in these five areas which include about 40 percent of the Sutter-Yuba Area, and most of the soils and near-surface sediments are sufficiently permeable to permit recharge from the surface. Sand and gravel beds are most continuous in the river-channel deposits of the Feather River, and the deposits west of the river from Yuba City south to the vicinity of Nicolaus seem to be especially favorable for storing ground-water (See Pl. B-2). Unfortunately, however, this area is contaminated with salt water in the lower depth zone, and storage in this zone may not be practicable.

The low alluvial-plain and alluvial-fan deposits and the dissected alluvial deposits are both rather unfavorable for ground-water storage. Soils are generally tight and impervious hardpan is prevalent, and recharge from land surface would be difficult.

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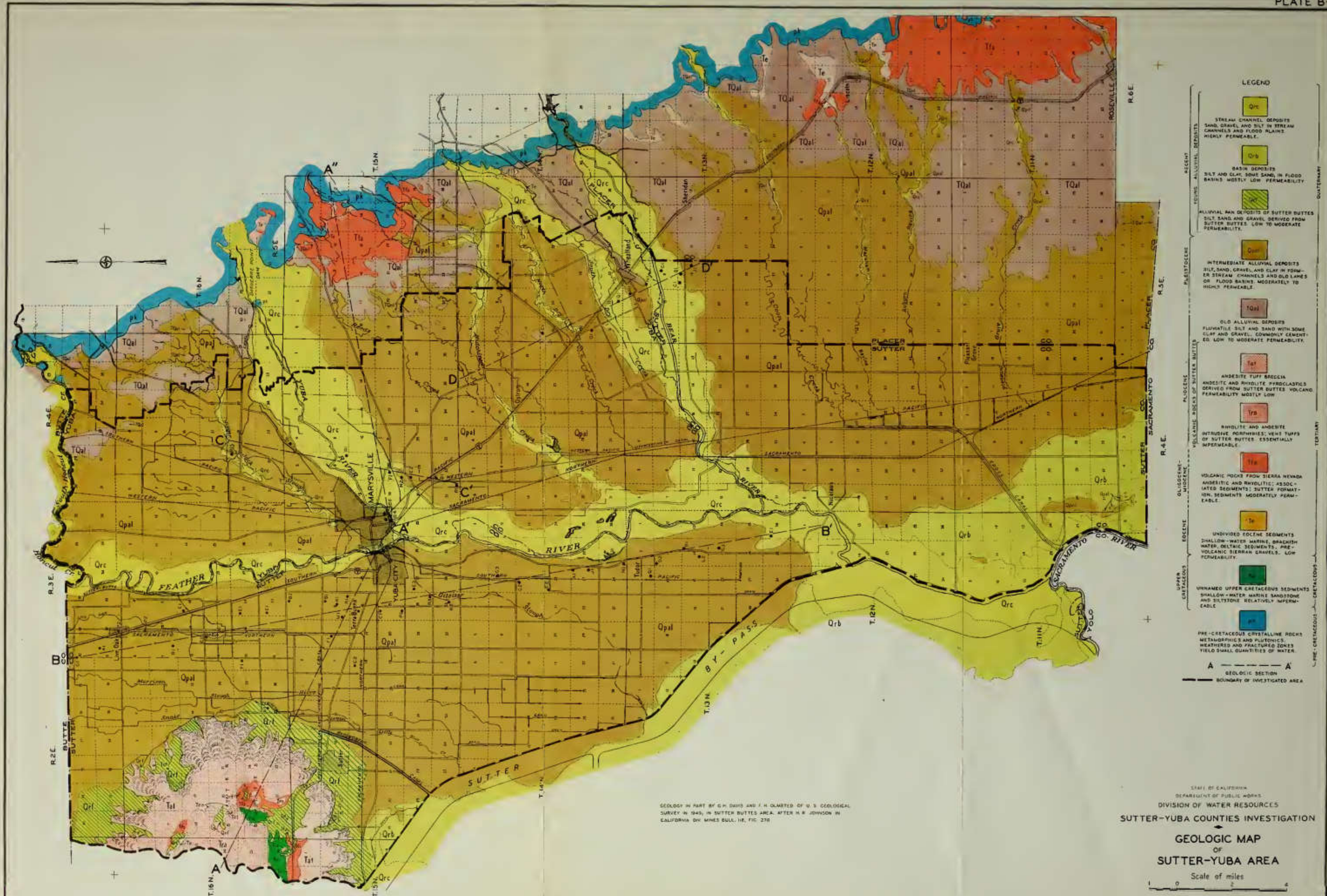
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YOUNG ALLUVIAL DEPOSITS
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Qrb
BASIN DEPOSITS
SILT AND CLAY, SOME SAND, IN FLOOD BASINS MOSTLY LOW PERMEABILITY
Qrf
ALLUVIAL FAN DEPOSITS OF SUTTER BUTTES
SILT, SAND AND GRAVEL DERIVED FROM SUTTER BUTTES. LOW TO MODERATE PERMEABILITY.
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INTERMEDIATE ALLUVIAL DEPOSITS
SILT, SAND, GRAVEL, AND CLAY IN FORMER STREAM CHANNELS AND OLD LAKES OR FLOOD BASINS. MODERATELY TO HIGHLY PERMEABLE.
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STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER RESOURCES
SUTTER-YUBA COUNTIES INVESTIGATION
GEOLOGIC MAP
OF
SUTTER-YUBA AREA
Scale of miles
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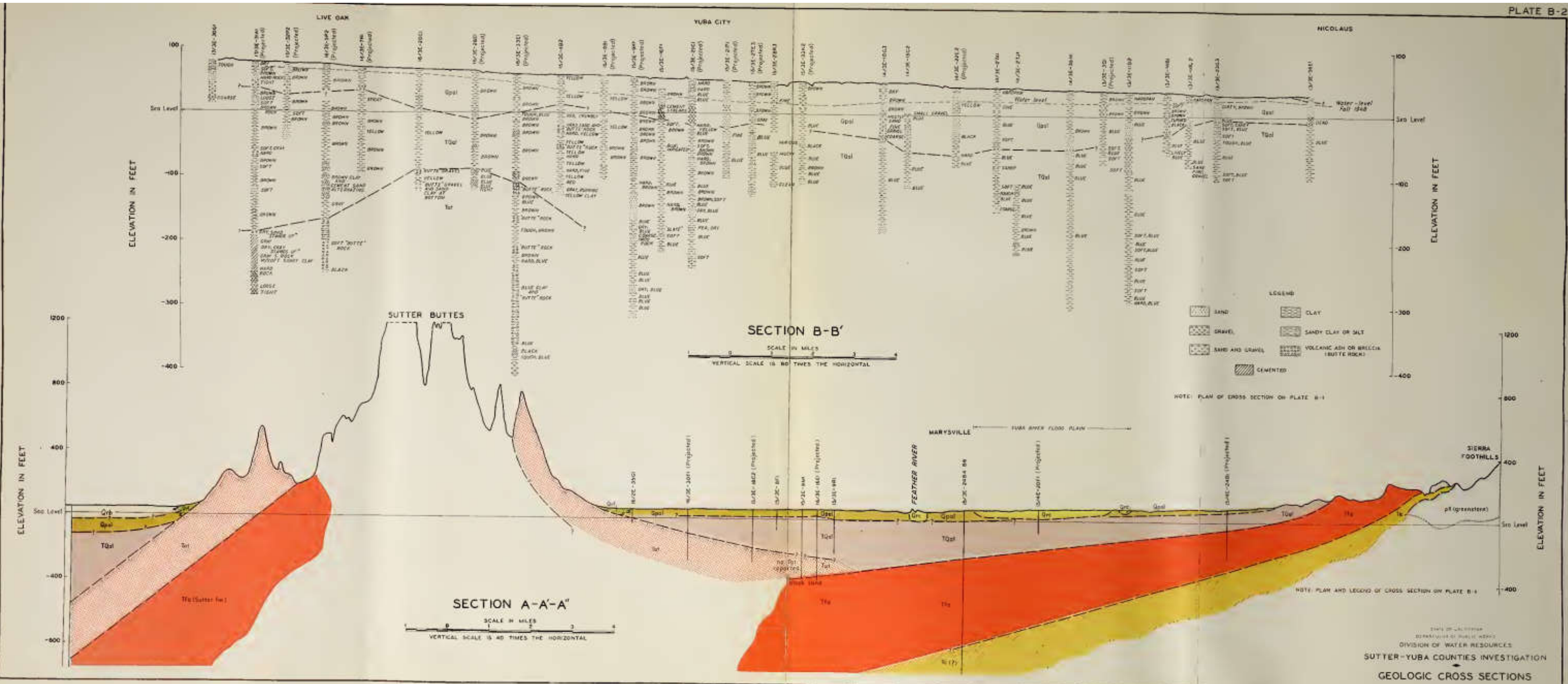
PLATE B-2

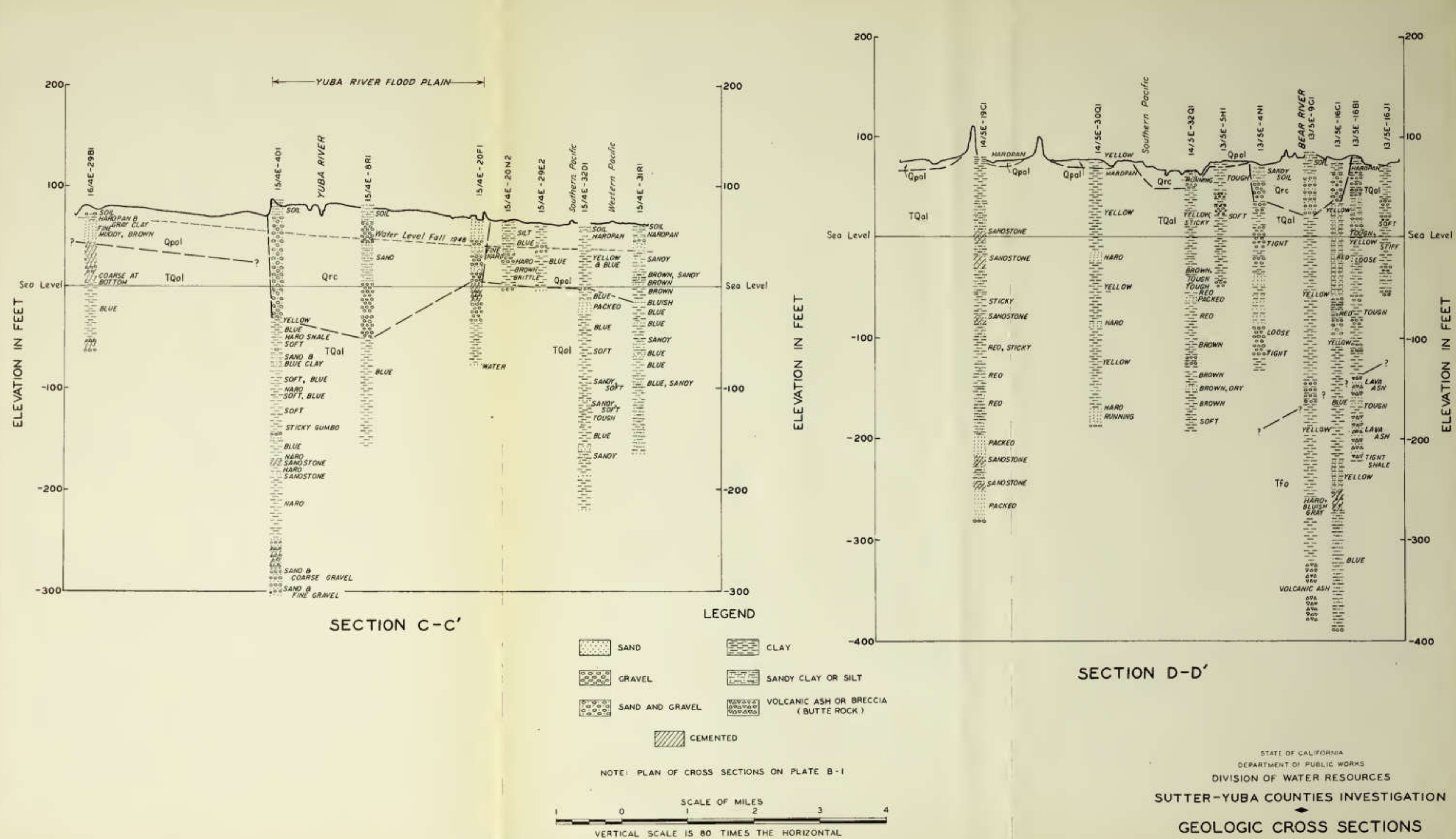


DIVISION OF WATER RESOURCES

SUTTER-YUBA COUNTIES INVESTIGATION

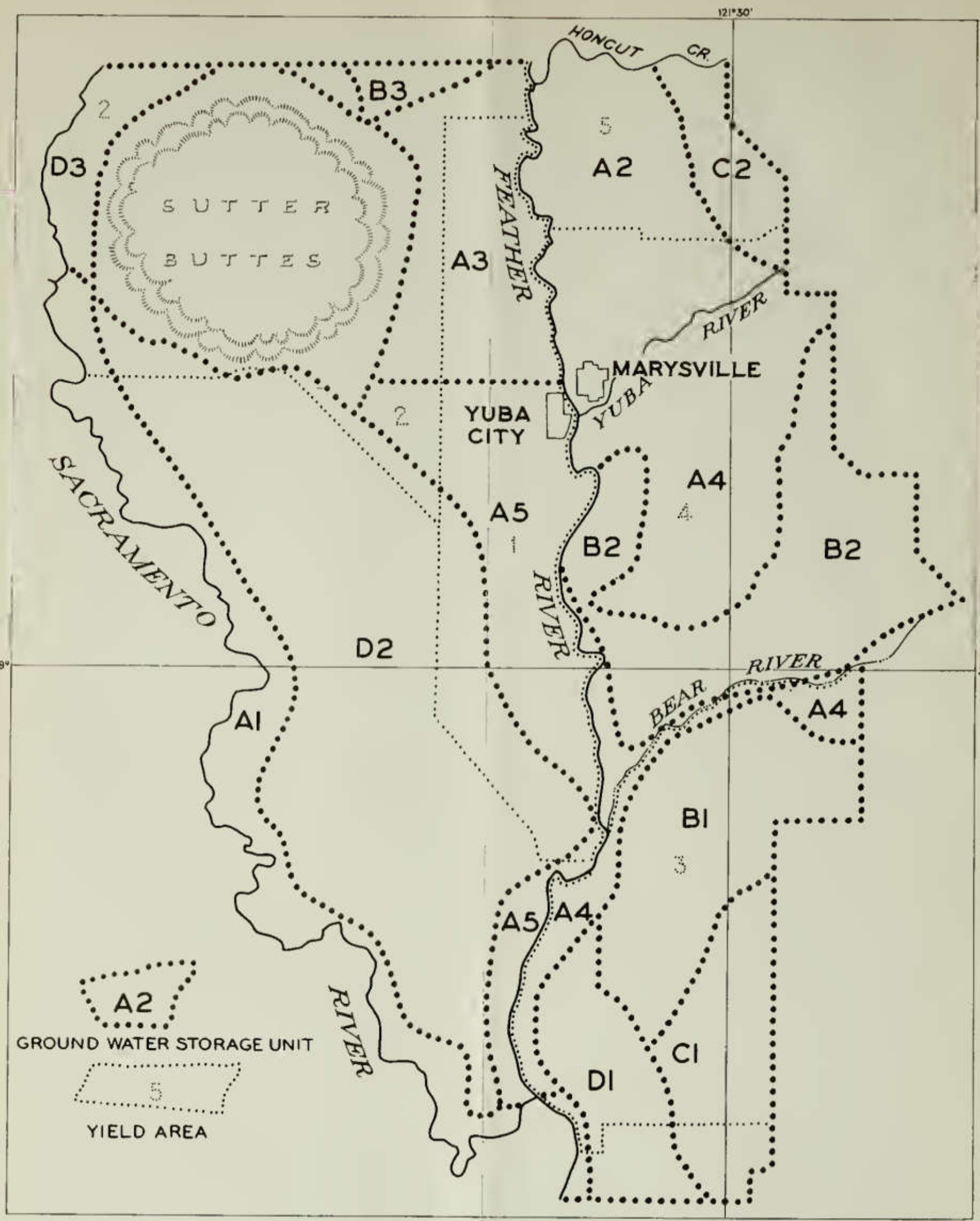
GEOLOGIC CROSS SECTIONS

PLATE B-3



STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER RESOURCES
SUTTER-YUBA COUNTIES INVESTIGATION

GEOLOGIC CROSS SECTIONS



GROUND WATER STORAGE UNITS IN SUTTER AND YUBA COUNTIES

APPENDIX C

RECORD OF MONTHLY PRECIPITATION AT ROBBINS, CALIFORNIA

RECORD OF MONTHLY PRECIPITATION AT ROBBINS, CALIFORNIA

County: Sutter
Date established: 1926
Type of gage: Not recording
Elevation: 20 feet, U.S.G.S. datum

Latitude: 38° 52′
Longitude: 121° 43′
Record obtained from: Reclamation District 1500, Kirkville

(In inches)

Season	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	Total
1925-26											0.55		
1926-27		0.05	Tr.	1.58	7.43	0.81	2.43	5.39	1.69	0.96	0.34	0.45	21.13
1927-28		Tr.	Tr.	1.81	2.05	0.68	1.72	1.61	3.68	0.64	0.03	0.05	12.27
1928-29				0.26	2.51	2.61	0.73	2.01	1.20	0.55	Tr.	1.51	11.38
1929-30				0.10	0.00	4.53	4.12	1.43	2.64	1.07	0.52		14.41
1930-31			0.19	0.42	1.21	1.50	2.65	1.25	0.97	0.20	1.04	0.87	10.30
1931-32		0.02		0.26	2.69	7.65	1.72	1.52	0.49	0.88	0.70		15.93
1932-33	0.05			Tr.	0.27	2.59	3.13	0.65	1.69	0.10	0.48		8.96
1933-34			Tr.	0.76	0.00	5.90	0.24	2.73	0.33	0.54	0.16	0.22	10.88
1934-35			Tr.	1.06	2.62	2.29	5.46	1.56	2.77	3.95	Tr.		19.71
1935-36	Tr.			0.89	1.05	1.71	2.95	5.90	1.01	1.24	0.42	0.43	15.60
1936-37				0.30	0.06	2.50	2.78	5.96	5.39	0.48	0.00	0.14	17.61
1937-38				0.56	2.58	2.97	3.76	7.27	3.77	1.89	0.14	0.05	22.99
1938-39			0.59	1.19	0.58	1.25	2.69	0.63	2.14	0.16	0.44		9.67
1939-40	Tr.		0.27	0.67	0.04	1.71	6.24	7.06	4.11	0.86	0.81		21.77
1940-41			0.06	0.92	1.41	7.76	6.04	6.49	3.31	3.90	2.04	Tr.	31.93
1941-42	Tr.		0.02	1.54	1.77	6.25	4.00	3.75	3.28	5.12	0.59		26.32
1942-43				0.38	2.08	2.87	5.72	2.36	2.73	1.94	0.06	0.05	18.19
1943-44				0.24	0.80	2.42	2.22	7.29	0.55	1.53	1.00	0.01	16.06
1944-45				0.94	4.13	2.31	2.02	1.86	2.97	0.08	0.88	0.16	15.35
1945-46				3.29	2.19	4.75	0.91	0.95	1.64	0.08	0.36		14.17
1946-47	0.09		0.20	0.28	2.27	3.03	0.36	2.24	2.35	0.30	0.29	0.51	11.92
1947-48				2.06	1.06	1.01	0.90	1.41	3.32	3.92	1.82	0.57	16.07
1948-49		0.03	0.30	1.11	0.49	3.97	1.26	1.19	4.67		1.17		14.16
1949-50				0.01	0.70	1.18	3.51	3.28	0.86	1.00	0.15	0.11	10.83
1950-51			0.22	2.48	3.49	4.58	2.24	2.04	0.53	0.76	0.76		17.10
1951-52			0.11	3.01	3.96	3.03	6.57	1.35	2.36	1.05	Tr.	0.43	21.87

APPENDIX D

RECORDS OF DAILY RUNOFF IN SUTTER-YUBA AREA NOT PREVIOUSLY PUBLISHED

TABLE OF CONTENTS

RECORDS OF DAILY RUNOFF IN SUTTER-YUBA AREA NOT PREVIOUSLY PUBLISHED

COON CREEK AT HIGHWAY 99E
1947 AND 1948

(Daily mean flow, in second-feet)

Date	1947		1948											
	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	----	14	12	15	21	34	76	64	6	6	9	24	21	26
2	----	14	16	15	18	33	54	40	6	6	10	24	42	18
3	----	13	39	17	15	77	47	31	7	6	10	22	58	30
4	----	13	32	18	16	80	38	33	8	5	10	22	65	44
5	26	14	30	21	15	113	34	35	10	5	10	22	52	34
6	22	15	29	49	12	125	30	34	15	4	10	26	50	57
7	21	15	46	56	12	49	22	32	12	4	10	21	46	38
8	20	14	178	34	12	55	28	31	17	5	9	21	43	44
9	18	13	54	72	15	101	28	34	21	7	8	21	44	39
10	17	13	42	87	18	490	36	31	27	10	9	24	43	31
11	16	12	34	44	12	157	29	25	25	7	8	24	40	26
12	15	13	29	34	12	96	19	23	22	13	9	31	37	23
13	14	13	25	29	34	71	20	22	20	10	9	31	34	68
14	14	13	22	25	89	65	37	21	13	10	8	30	34	95
15	18	14	21	25	81	58	42	19	7	10	7	32	37	67
16	23	15	20	25	64	61	38	18	7	9	10	33	44	47
17	22	18	18	24	89	156	31	16	7	8	12	30	44	138
18	19	20	13	23	57	81	38	14	8	7	12	21	45	92
19	17	20	18	23	86	55	46	13	9	9	19	17	45	53
20	16	18	17	21	63	44	96	11	7	10	18	14	41	43
21	15	19	16	21	48	42	160	10	6	10	18	15	38	38
22	14	18	16	19	39	96	115	9	4	10	20	15	34	33
23	14	17	15	17	54	57	86	8	3	13	23	15	31	30
24	15	15	18	16	719	43	71	7	4	12	23	15	19	28
25	18	11	17	15	299	36	61	8	6	10	24	11	18	29
26	17	11	15	15	108	32	43	10	7	10	24	11	18	46
27	15	12	15	16	74	30	32	9	6	10	22	11	17	240
28	14	15	15	21	55	31	32	10	5	10	22	12	17	123
29	13	14	15	25	50	57	33	9	5	16	26	12	18	67
30	13	13	15	----	43	107	31	7	4	18	24	13	26	50
31	----	13	15	----	38	----	46	----	5	9	----	17	----	47
Mean	----	14.6	28.2	28.4	73.2	84.4	48.4	21.1	10.0	9.0	14.4	10.6	36.8	56.3
Runoff, in acre-feet	----	897	1,730	1,630	4,499	5,022	2,973	1,258	613	553	859	1,263	2,184	3,459

AUBURN RAVINE AT HIGHWAY 99E
1947 AND 1948

(Daily mean flow, in second-feet)

Date	1947		1948											
	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1		7	36	54	57	81	37	85	69	69	62	11	12	12
2		7	49	52	62	85	15	70	76	76	62	12	17	25
3		7	56	52	56	117	9	54	71	67	62	9	21	39
4		9	42	57	51	118	16	55	66	67	62	7	13	39
5		11	42	66	55	98	15	51	65	67	62	8	10	31
6		11	43	96	50	80	10	52	61	67	72	6	11	47
7		11	75	74	45	62	9	48	60	67	62	3	10	31
8		12	133	64	49	51	14	48	62	69	62	2	10	44
9		14	81	98	54	66	12	52	57	68	63	2	9	31
10		11	78	81	50	64	11	60	60	67	63	2	9	29
11		11	72	68	48	61	7	63	65	68	63	4	8	27
12		11	68	66	48	54	16	56	70	69	62	6	9	28
13	7	9	62	64	68	56	52	47	82	68	61	5	9	70
14	9	8	62	62	86	54	61	49	80	66	61	5	6	32
15	22	8	58	61	89	63	70	57	79	67	63	5	11	71
16	22	8	58	61	86	46	68	58	78	67	62	4	9	52
17	14	44	56	61	82	66	67	62	77	67	50	4	16	108
18	12	42	54	61	70	44	80	62	79	66	51	3	11	70
19	11	37	53	59	102	38	107	66	78	63	52	8	11	51
20	11	44	54	56	77	35	115	62	75	59	45	16	11	47
21	10	44	55	53	61	32	53	58	71	58	24	17	11	43
22	11	40	56	54	55	62	44	55	70	60	22	15	10	41
23	11	38	55	51	56	38	58	63	70	50	23	6	13	40
24	11	35	52	52	289	29	57	55	69	59	22	5	25	40
25	9	32	51	55	192	26	54	59	70	58	15	8	23	38
26	7	33	48	54	117	23	50	71	70	58	16	8	22	52
27	8	33	51	54	83	20	48	67	69	58	15	7	26	108
28	6	33	51	68	53	20	50	67	70	58	12	11	27	70
29	6	34	51	58	82	55	56	66	70	60	11	9	23	54
30	6	35	50		104	56	61	63	69	62	13	9	13	54
31		35	52		92		89		69	62		11		51
Mean	10.7	23.0	58.3	62.5	79.8	56.9	45.5	59.3	70.2	64.3	45.5	7.4	13.4	47.6
Runoff, in acre-feet	386	1,416	3,578	3,594	4,897	3,382	2,799	3,531	4,318	3,947	2,707	452	825	2,926

DRY CREEK NEAR WALDO
1947 AND 1948

(Daily mean flow, in second-feet)

Date	1947		1948											
	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	----	2	2	5	16	37	95	36				e 1	14	8
2	----	2	33	5	10	32	67	30				e 2	26	8
3	----	2	62	5	9	28	58	28				e 3	24	9
4	----	2	20	6	9	27	51	28				e 4	28	16
5	----	2	43	6	9	44	43	28				e 5	14	13
6	----	2	20	26	9	156	38	25				e 6	12	35
7	----	2	388	28	9	105	34	20				e 7	9	24
8	----	2	312	11	9	80	37	19				e 7	8	22
9	----	2	78	66	9	130	38	16				e 8	7	37
10	5	2	37	84	9	556	36	16				e 8	7	23
11	5	3	26	37	9	292	30	16				e 9	7	18
12	5	4	20	24	9	146	27	16				e 9	7	14
13	5	5	18	19	107	100	23	e16				e10	7	73
14	5	6	15	16	189	90	20	e15				e10	7	106
15	5	7	14	14	146	89	20	e14				e11	7	57
16	5	9	13	14	136	101	19	e13				e11	7	42
17	4	9	12	13	159	407	18	e12				e12	7	79
18	4	8	11	13	88	156	33	e11	NO FLOW	NO FLOW	NO FLOW	e12	7	115
19	3	7	10	13	136	100	64	e10				12	7	42
20	3	6	10	12	86	84	103	e10				12	7	23
21	2	5	9	12	56	67	73	e 9				12	7	17
22	2	4	9	11	39	222	44	e 8				12	6	14
23	2	3	8	10	131	174	38	e 7				12	6	12
24	2	2	7	10	727	95	30	e 6				12	6	10
25	2	2	6	9	316	74	28	e 5				12	7	10
26	2	2	6	9	142	67	28	e 4				12	7	10
27	2	2	6	9	92	58	26	e 3				12	7	138
28	2	2	5	9	71	59	26	e 2				12	7	132
29	2	2	5	12	58	112	28	e 1				12	8	48
30	2	2	5	------	44	130	67	e 1				12	8	30
31	------	2	5	------	41	------	49	------				12	------	24
Mean	------	13.6	39.2	18.1	93.0	127.0	41.7	14.2				9.4	9.6	38.9
Runoff, in acre-feet	------	222	2,410	1,008	5,712	7,575	2,561	843				577	571	2,398

e—Estimated.

DRY CREEK NEAR WALDO—1949

(Daily mean flow, in second-feet)

Date	January	February	March	April	May	Date	January	February	March	April	May
1	57	15	34	51	16	16	11	36	162	8	
2	80	15	187	38	12	17	10	33	120	7	
3	40	17	580	32	16	18	10	32	86	4	
4	28	26	475	18		19	11	28	171	4	
5	23	130	390	14		20	18	28	137	4	
6	19	112	335	35	NO RECORD	21	17	38	103	5	NO RECORD
7	18	147	220	37		22	53	32	122	5	
8	16	132	154	16		23	63	57	148	5	
9	14	78	171	15		24	37	67	187	5	
10	13	71	780	12		25	29	59	137	4	
11	12	306	780	8		26	26	44	122	3	
12	12	130	278	5		27	24	57	119	4	
13	12	73	187	5		28	22	48	114	4	
14	12	52	137	5		29	20	------	103	5	
15	11	42	120	6		30	17	------	68	9	
						31	15	------	51	------	
						Mean	24.2	69.9	222.9	12.6	
						Runoff, in acre-feet	1,488	3,878	13,756	728	

SOUTH HONCUT CREEK AT LA PORTE ROAD

1947 AND 1948

(Daily mean flow, in second-feet)

Date	1947		1948											
	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	------	5	6	5	16	46	118	47				------	25	5
2	------	5	122	9	17	38	90	38				------	54	5
3	------	6	104	10	14	95	78	34				------	66	13
4	------	11	114	11	11	122	70	37				------	32	34
5	------	15	132	24	10	147	65	44				------	15	31
6	------	11	61	50	9	132	61	38				------	9	90
7	------	8	472	46	7	80	52	34				------	8	48
8	6	7	224	28	4	73	48	28				------	6	67
9	7	7	77	48	12	430	43	25				------	5	46
10	6	8	130	70	9	580	40	23				------	5	27
11	5	8	38	44	3	271	35	22				------	5	19
12	5	8	34	33	2	158	32	21				8	4	15
13	5	7	30	28	50	118	27	20				5	4	78
14	6	8	27	24	252	115	27	19				3	3	89
15	9	9	25	23	122	132	26	18				4	12	61
16	14	10	24	22	168	127	26	17	NO FLOW	NO FLOW	NO FLOW	5	27	49
17	13	20	22	21	342	406	26	16				6	27	66
18	10	27	21	20	171	158	40	15				7	24	82
19	6	18	20	18	171	115	69	14				6	17	47
20	5	12	19	17	93	95	104	13				6	15	34
21	5	15	19	16	69	85	81	12				5	12	28
22	5	17	25	15	51	250	52	11				5	9	24
23	5	16	21	11	120	143	40	10				5	8	22
24	5	13	21	10	619	101	34	9				5	7	20
25	5	12	21	10	283	81	34	8				5	7	17
26	1	10	13	10	136	70	32	7				6	6	25
27	4	10	12	10	95	64	27	6				5	6	216
28	5	10	11	15	73	73	35	5				3	6	113
29	4	10	10	28	64	132	34	3				5	7	61
30	4	8	7		54	184	63	1				9	7	46
31		7	5		16		69					10	------	38
Mean	6.2	10.9	60.2	24.1	94.5	154.2	51.0	19.9				5.7	14.6	49.0
Runoff, in acre-feet	284	670	3,703	1,341	5,796	9,166	3,130	1,180				226	869	3,007

APPENDIX E

RECORDS OF DEPTHS TO GROUND WATER AT MEASUREMENT WELLS IN SUTTER-YUBA AREA

TABLE OF CONTENTS

RECORDS OF DEPTHS TO GROUND WATER AT MEASUREMENT WELLS IN SUTTER-YUBA AREA

The wells are numbered in accordance with a system adopted by the United States Geological Survey. The numbering system indicates the well locations according to the rectangular land surveys. An explanation of the numbering system is given on page 93 of Appendix B.

Reference point elevations given to the nearest foot have been estimated from United States Geological Survey topographic maps. Reference point elevations given to the nearest 0.1 foot have been established by field surveys.

TABLE 1

DEPTHS TO GROUND WATER AT MEASUREMENT WELLS IN SUTTER-YUBA AREA

Meosurements Made by Division of Water Resources
(Depths to woter in feet meosured from reference point)

10N/3E-1A1—Reference point—top of 12-inch casing, elevation 23 feet. West side of Garden Highway at toe of levee, 0.75 mile southwest of Riego Road. 12/7/48, 15.1; 4/6/49, 10.7; 11/30/49, 15.7; 3/30/50, 6.4; 11/9/50, 15.6; 4/5/51, 10.2; 12/4/51, 14.0; 4/4/52, 0.0.

10N/4E-6K1—Reference point—top of 14-inch casing under pump, elevation 20 feet. 0.06 mile south of Riego Road, 0.47 mile west of Power Line Road. 12/23/47, 10.9; 3/4/48, 11.0; 12/7/48, 10.0; 4/6/49, 5.0; 12/1/49, 8.2; 3/30/50, 6.9; 1/9/50, 8.0; 12/4/51, 7.7; 4/4/52, 6.3.

10N/4E-12A1—Reference point—top of casing, elevation 43.1 feet. 0.10 mile west of Pleasant Grove Road, 0.70 mile south of Riego Road. 12/23/47, 22.0; 3/3/48, 20.6; 12/7/48, 28.1; 4/6/49, 23.2; 11/23/49, 36.1; 12/1/49, 27.2; 3/15/50, 29.5; 3/30/50, 28.7; 11/9/50, 35.0; 4/5/51, 25.9; 12/5/51, 26.7; 4/4/52, 24.4.

10N/5E-6J1—Reference point—top of wooden shoring for pit, 12.5 feet above casing, elevation 46 feet. 0.12 mile south of Riego Road, 0.82 mile east of Pleasant Grove Road. 12/24/47, 27.1; 3/3/48, 27.0; 12/7/48, 33.9 (operating); 4/6/49, 29.6; 12/1/49, 33.6; 3/30/50, 34.9; 11/9/50, 40.3; 4/5/51, 38.2; 12/5/51, 33.1; 4/8/52, 42.4 (operating).

10N/5E-8N1—Reference point—top of casing, elevation 37 feet. 1.5 miles south of Riego Road, 1.06 miles east of Pleasant Grove Road. 12/24/47, 25.3.

11N/3E-1D1—Reference point—hole in side of pump base, elevation 25.6 feet. South side of West Catlett Road, 0.18 mile east of Garwood Road. 12/19/47, 12.0; 3/4/48, 11.6; 12/15/48, 11.0; 3/30/49, 6.5; 5/26/49, 20.1; 6/29/49, 23.4; 7/28/49, 23.1; 8/26/49, 23.4; 12/5/49, 14.5; 3/24/50, 8.3; 11/16/51, 12.5; 4/7/52, 5.9.

11N/3E-2B1—Reference point—top of concrete base, elevation 23.8 feet. South side of West Catlett Road, 0.37 mile west of Garwood Road. 12/19/47, 11.0; 3/4/48, 10.8; 12/15/48, 12.3; 3/3/49, 5.9; 12/5/49, 14.1; 3/24/50, 7.4; 11/6/50, 12.4; 4/2/51, 5.1; 11/16/51, 11.7; 4/8/52, 6.1.

11N/3E-2Q1—Reference point—top of casing, elevation 20 feet. 0.50 mile east of Vernon Road, 0.89 mile south of West Catlett Road. 12/9/48, 11.9; 4/6/49, 5.7; 11/28/49, 14.0; 3/30/50, 7.1; 11/8/50, 11.2; 4/3/51, 5.1; 12/5/51, 11.0.

11N/3E-3C2—Reference point—west side of pump base, elevation 26.1 feet. South side of West Catlett Road, 1.57 miles north of Garwood Road. 12/19/48, 13.4; 3/4/48, 11.4; 12/15/48, 13.1; 3/30/49, 7.5; 12/5/49, 15.2; 3/34/50, 7.6; 11/6/50, 13.0; 4/2/51, 5.0; 4/8/52, 1.7.

11N/3E-3N1—Reference point—hole in pump base, elevation 25 feet. 0.85 mile west of Vernon Road, 0.93 mile south of West Catlett Road. 12/9/48, 13.1; 3/31/49, 6.2; 11/28/49, 14.9; 3/30/50, 5.9; 11/18/50, 13.1; 4/1/52, 0.0.

11N/3E-3P1—Reference point—hole in pump base, elevation 22 feet. 0.74 mile west of Vernon Road, 0.82 mile south of West Catlett Road. 12/9/48, 12.4; 11/8/50, 13.1; 4/3/51, 6.2, 12/5/51, 11.9; 4/1/52, 5.3.

11N/3E-10N1—Reference point—pipe in pump base, elevation 26 feet. 0.80 mile west of Vernon Road, 1.75 miles south of West Catlett Road. 3/31/49, 11.3; 11/28/49, 19.1.

11N/3E-11D1—Reference point—top of casing, elevation 21 feet. 0.14 mile east of Vernon Road, 1.08 miles south of West Catlett Road. 12/9/48, 8.3; 4/6/49, 4.5; 11/28/49, 12.2; 3/30/50, 4.9; 11/8/50, 7.7; 4/3/51, 2.7; 4/2/52, 1.9.

11N/3E-13A1—Reference point—top of casing, elevation 20 feet. 0.70 mile north of north levee of Natomas Cross Canal, 1.15 miles northeast of Garden Highway. 12/9/48, 7.6; 4/6/49, 3.3; 11/29/49, 9.4; 3/30/50, 3.6; 11/8/50, 10.0; 4/2/51, 3.0; 12/5/51, 9.5.

11N/3E-13D1—Reference point—hole in pump base, elevation 20 feet. 1.10 miles north of north levee of Natomas Cross Canal, 0.86 mile northeast of Garden Highway. 12/9/48, 11.9; 4/6/49, 7.4; 11/29/49, 13.0; 3/30/50, 8.5; 11/8/50, 13.5; 4/2/51, 7.5; 12/5/51, 13.0.

11N/3E-13F1—Reference point—hole in pump base, elevation 20 feet. 0.75 mile north of north levee of Natomas Cross Canal, 1.13 miles northeast of Garden Highway. 12/9/48, 12.5; 4/6/49, 8.3; 14/29/49, 14.2.

11N/3E-13P1—Reference point—hole in pump base, elevation 20 feet. At toe of north levee of Natomas Cross Canal, 1.37 miles northeast of Garden Highway. 4/6/49, 7.7; 11/29/49, 11.8.

11N/3E-14N1—Reference point—hole in pump base, elevation 25 feet. 0.14 mile east of Vernon Road, 0.60 mile north of Garden Highway. 12/9/48, 12.7.

11N/3E-15C1—Reference point—hole in pump base, elevation 25 feet. 1.50 miles north of Garden Highway, 0.78 miles west of Vernon Road. 12/24/47, 16.9; 3/4/48, 16.2; 12/9/48, 16.1; 3/31/49, 9.9; 11/28/49, 17.9; 3/30/50, 7.9; 11/8/50, 16.1; 4/3/51, 10.3; 12/4/51, 15.0; 4/1/52, 1.1.

11N/3E-22H1—Reference point—top of casing, elevation 27 feet. North side of Garden Highway, 0.23 mile northwest of Verona. 12/24/47, 18.8; 3/4/48, 18.2; 12/9/48, 18.0; 3/31/49, 11.6; 11/28/49, 18.2; 3/30/50, 9.9; 11/8/50, 16.2; 4/3/51, 11.4; 12/5/51, 15.7; 4/1/52, 3.3.

11N/3E-22H2—Reference point—top of casing, elevation 29 feet. Northeast side of Garden Highway, east side of Vernon Road. 11/7/29, 24.3; 9/27/30, 24.3; 12/15/31, 24.3; 11/23/32, 25.2; 12/21/33, 21.6; 10/27/34, 27.3; 11/28/34, 20.3; 11/25/36, 24.8; 11/6/37, 23.8; 1/10/39, 20.8.

11N/3E-22H3—Reference point—top of casing, elevation 29 feet. 300 feet north of Garden Highway, west side of Vernon Road. 12/20/40, 19.9.

11N/3E-23E2—Reference point—top of casing, elevation 27 feet. 100 feet north of Garden Highway, 0.07 mile east of Vernon Road. 11/11/47, 19.7; 12/16/48, 19.0; 12/9/49, 19.0; 11/13/50, 19.3; 12/6/51, 5.9.

11N/3E-23L1—Reference point—top of casing, elevation 29 feet. 0.12 mile north of Garden Highway, 0.47 mile southeast of Vernon Road. 12/23/47, 12.3; 3/4/48, 11.9; 12/9/48, 10.9; 3/31/49, 3.9; 11/28/49, 12.9.

11N/3E-23R1—Reference point—top of casing, elevation 20 feet. At toe of south levee of Natomas Cross Canal, 0.11 mile north of Garden Highway. 12/23/47, 12.1; 3/4/48, 16.0; 12/8/48, 15.2; 3/31/49, 6.9; 11/28/49, 16.1.

11N/3E-25C1—Reference point—top of casing, elevation 23 feet. 0.24 mile south of Sankey Road, 0.44 mile east of Garden Highway. 12/9/48, 11.3; 4/6/49, 7.3; 3/30/50, 7.6; 11/9/50, 10.9; 4/5/51, 5.6; 12/5/51, 11.3; 4/4/52, 4.4.

11N/3E-25P1—Reference point—top of casing, elevation 25 feet. 265 feet northwest of Garden Highway, 1.27 miles north of Riego Road. 11/7/29, 19.0; 9/27/30, 19.3; 12/15/31, 19.5; 11/23/32, 20.2; 12/21/33, 16.6; 10/27/34, 18.1; 11/28/34, 15.6; 11/25/36, 19.2; 11/6/37, 14.7; 1/10/39, 15.6; 12/20/40, 15.0; 11/11/47, 15.5; 12/23/47, 16.6; 3/4/48, 16.0; 12/1/49, 15.6; 4/6/49, 11.9; 11/13/50, 13.5; 12/6/51, 8.3.

11N/4E-1F1—Reference point—top of casing, elevation 49.3 feet. 0.80 mile south of Catlett Road, 0.25 mile east of Pleasant Grove Road. 12/22/47, 21.5; 3/22/48, 19.3; 12/18/48, 23.3; 3/29/49, 19.5; 12/2/49, 25.9; 3/27/50, 22.8; 11/8/50, 27.0; 11/16/51, 27.0; 4/8/52, 17.5.

TABLE 1—Continued

DEPTHS TO GROUND WATER AT MEASUREMENT WELLS IN SUTTER-YUBA AREA

Measurements Made by Division of Water Resources
(Depths to water in feet measured from reference point)

11N/4E-1M1—Reference point—concrete floor of pump house, elevation 45 feet. 0.55 mile north of Howsley Road, 0.12 mile east of Pleasant Grove Road. 11/8/29, 13.8; 9/26/30, 13.3; 12/10/31, 14.9; 11/23/32, 14.3; 12/20/33, 15.9; 10/27/34, 16.2; 11/23/36, 13.9; 11/1/37, 12.3; 1/10/39, 11.3; 1/4/41, 11.4; 11/11/47, 22.9; 12/16/48, 22.1; 12/9/49, 24.4; 11/13/50, 24.2; 12/6/51, 27.8.

11N/4E-1R1—Reference point—joint in cover plate around casing, elevation 50 feet. North side of Howsley Road, 1.0 mile east of Pleasant Grove Road. 12/23/47, 24.7; 3/3/48, 22.6; 12/8/48, 25.1; 3/31/49, 22.8; 11/30/49, 25.9; 11/14/50, 28.7.

11N/4E-2M1—Reference point—top of casing, elevation 40 feet. West side of Western Pacific Railroad, 0.29 mile north of Howsley Road. 3/15/48, 11.9; 12/8/48, 15.5; 3/29/49, 9.5; 12/2/49, 16.4.

11N/4E-3P1—Reference point—hole in base of pump, elevation 33 feet. 0.15 mile north of Howsley Road, 0.47 mile east of Pacific Avenue. 12/22/47, 19.8; 3/15/48, 18.1; 12/18/48, 21.1; 3/29/49, 14.4; 12/2/49, 21.3; 3/24/50, 16.3; 11/8/50, 21.6; 4/2/51, 12.3; 11/19/51, 20.8; 4/8/52, 13.2.

11N/4E-4R1—Reference point—top of casing, elevation 30 feet. 0.03 mile north of Howsley Road, 0.16 mile west of Pacific Avenue. 12/23/47, 14.7; 3/15/48, 13.1; 12/15/48, 10.2; 2/30/49, 3.9; 12/2/49, 15.9; 3/24/50, 9.8; 11/8/50, 16.0; 4/2/51, 8.0; 11/19/51, 14.7; 4/6/52, 6.1.

11N/4E-5A1—Reference point—top of casing, elevation 27 feet. 1.10 miles north of Natomas Cross Canal. 12/18/47, 9.9; 12/15/48, 9.9; 3/30/49, 3.8; 5/26/49, 18.1; 7/29/49, 20.1.

11N/4E-6B1—Reference point—hole in pump base, elevation 30 feet. South side of West Catlett Road, 1.50 miles west of Electric Avenue. 12/18/47, 11.5; 12/15/48, 15.1; 3/24/50, 7.9; 11/19/51, 14.0.

11N/4E-7H1—Reference point—edge of pump base, elevation 23 feet. 0.47 mile north of Natomas Cross Canal, 3 miles northeast of Garden Highway. 4/6/49, 10.1; 11/30/49, 12.3; 3/30/50, 10.6; 11/8/50, 14.5; 4/2/51, 9.3.

11N/4E-9C1—Reference point—top of casing, elevation 27 feet. 0.56 mile west of Sacramento Northern Railroad, 0.21 mile south of Howsley Road. 5/5/48, 37.0 (operating); 5/31/48, 10.8; 7/2/48, 49.0 (operating); 7/23/48, 50.5 (operating); 4/6/49, 7.7; 11/30/49, 14.0.

11N/4E-9L1—Reference point—top of casing, elevation 26 feet. 0.45 mile west of Sacramento Northern Railroad crossing on Howsley Road, 0.57 mile south of Howsley Road. 5/5/48, 48.2 (operating) 5/31/48, 12.7; 7/23/48, 50.5 (operating); 4/6/49, 8.8; 11/30/49, 14.2.

11N/4E-11C1—Reference point—top of casing, elevation 41 feet. 0.35 mile east of Western Pacific Railroad, 0.16 mile south of Howsley Road. 3/3/48, 19.9; 3/31/49, 18.8.

11N/4E-11C2—Reference point—top of casing, elevation 45 feet. 0.18 mile south of Howsley Road, 0.40 mile east of Western Pacific Railroad. 12/22/47, 23.1; 12/8/48, 25.1; 3/31/49, 21.0; 11/30/49, 25.8; 3/30/50, 21.2; 11/9/50, 28.1; 4/5/51, 19.2; 12/4/51, 27.1; 1/4/52, 17.6.

11N/4E-11N1—Reference point—top of casing, elevation 38 feet. North side of Fifield Road, west side of Western Pacific Railroad. 12/23/47, 21.2; 3/3/48, 18.6; 12/8/48, 25.5; 4/6/49, 18.0; 11/30/49, 25.1.

11N/4E-12C1—Reference point—top of casing, elevation 46 feet. 0.03 mile east of Pleasant Grove Road, 0.03 mile south of Howsley Road. 11/26/48, 27.2.

11N/4E-12C2—Reference point—top of casing, elevation 50.0 feet. 0.12 mile east of Pleasant Grove Road, 0.02 mile south of Howsley Road. 12/22/47, 23.4; 3/3/48, 20.9; 12/8/48, 23.6; 3/31/49, 22.1; 11/30/49, 23.9.

11N/4E-12H1—Reference point—top of casing, elevation 56.8 feet. 0.76 mile east of Pleasant Grove Road, 0.57 mile south of Howsley Road. 12/7/48, 27.8.

11N/4E-12J2—Reference point—top of casing, elevation 56.8 feet. 0.58 mile south of Howsley Road, 0.78 mile east of Pleasant Grove Road. 12/23/47, 27.3; 3/3/48, 25.2; 12/8/48, 28.2; 3/31/49, 24.7; 11/17/49, 30.8; 11/30/49, 28.9; 3/30/50, 28.0; 4/11/50, 26.9; 11/8/50, 32.5; 11/14/50, 32.4; 4/5/51, 28.9; 11/15/51, 34.0; 4/3/52, 29.2; 4/4/52, 29.6.

11N/4E-12M1—Reference point—slot in base, elevation 44.7 feet. 0.62 mile south of Howsley Road, 0.07 mile west of Pleasant Grove Road. 12/23/47, 22.8; 3/3/48, 19.8; 12/8/48, 24.6; 3/31/49, 20.4; 5/26/49, 26.2; 6/29/49, 25.1; 7/28/49, 32.8; 11/30/49, 27.2; 3/30/50, 23.1; 11/6/50, 28.2; 4/10/51, 23.5; 11/14/51, 35.0; 4/4/52, 23.2.

11N/4E-13D1—Reference point—top of casing, elevation 47.6 feet. West side of Pleasant Grove Road, 0.09 mile south of Fifield Road. 12/8/48, 28.5; 4/6/49, 18.0; 11/30/49, 27.0; 3/15/50, 23.3; 3/30/50, 24.1; 11/8/50, 30.1; 4/5/51, 25.0; 11/14/51, 32.6; 4/4/52, 29.5; 4/10/52, 25.2.

11N/4E-13M1—Reference point—top of casing in pit, elevation 46 feet. 0.12 mile west of Pleasant Grove Road, 0.37 mile north of Keys Road. 12/23/47, 15.9; 12/8/48, 19.1; 3/31/49, 14.0; 11/30/49, 21.7.

11N/4E-14B1—Reference point—top of casing, elevation 40 feet. 0.10 mile south of Howsley Road, 0.52 mile west of Pleasant Grove Road. 12/23/47, 25.8; 3/3/48, 21.8; 12/8/48, 27.8; 3/31/49, 21.1; 11/30/49, 29.6.

11N/4E-14D1—Reference point—top of casing, elevation 36.5 feet. 0.21 mile west of Western Pacific Railroad, 0.26 mile south of Fifield Road. 12/23/47, 21.2; 3/3/48, 18.6; 12/8/48, 25.5; 4/6/49, 18.0; 11/30/49, 25.1.

11N/4E-15C1—Reference point—top of casing, elevation 31.2 feet. South side of Fifield Road, 0.11 mile west of Sacramento Northern Railroad. 12/23/47, 16.9; 3/3/48, 14.9; 12/8/48, 20.0; 4/6/49, 12.9; 11/30/49, 18.8; 3/30/50, 14.4; 11/8/50, 19.5; 4/3/51, 11.0; 12/4/51, 19.1; 4/4/52, 7.2.

11N/4E-15Q1—Reference point—hole in pump base, elevation 33.6 feet. 0.80 mile west of Sacramento Northern Railroad, 0.22 mile north of Keys Road. 12/23/47, 18.5; 3/3/48, 16.8; 12/8/48, 23.5; 4/6/49, 16.0; 11/30/49, 22.2; 3/30/50, 17.9; 11/8/50, 23.5; 4/3/51, 14.7; 12/5/51, 23.0; 4/4/52, 12.6.

11N/4E-21R1—Reference point—top of casing, elevation 24.9 feet. 1.06 miles east of Burns Road, 0.22 mile north of Sankey Road. 12/23/47, 9.9; 3/3/48, 9.6; 12/8/48, 12.3; 4/6/49, 8.0.

11N/4E-22A1—Reference point—top of casing, elevation 32.7 feet. 0.18 mile west of Sacramento Northern Railroad crossing. 12/8/48, 23.5; 4/6/49, 15.2; 11/30/49, 22.6.

11N/4E-23C1—Reference point—top of casing, elevation 37 feet. 0.09 mile south of Keys Road, 0.09 mile east of Western Pacific Railroad. 12/23/47, 21.0; 3/3/48, 18.6; 11/30/49, 26.6; 3/30/50, 22.1; 11/8/50, 28.7; 4/3/51, 20.3; 12/4/51, 28.0; 4/4/52, 20.1.

11N/4E-23H1—Reference point—top of casing, elevation 53.1 feet. 0.02 mile west of Pleasant Grove Road, 0.46 mile south of Keys Road. 12/23/47, 19.5; 3/3/48, 18.0; 12/8/48, 24.1; 4/6/49, 19.8; 11/30/49, 32.2; 3/30/50, 24.6; 11/8/50, 30.7; 4/5/51, 21.6; 12/4/51, 29.2.

11N/4E-23N1—Reference point—top of concrete pit wall, elevation 33 feet. 0.06 mile west of Sacramento Northern Railroad, 0.11 mile north of Sankey Road. 12/23/47, 21.3.

11N/4E-25M1—Reference point—hole in base, elevation 37 feet. 0.58 mile south of Sankey Road, 0.06 mile east of Pleasant Grove Road. 12/23/47, 19.0; 3/3/48, 20.2; 12/8/48, 24.9; 4/6/49, 21.0; 12/1/49, 34.6; 3/30/50, 29.9; 4/4/50, 34.9.

11N/4E-26F1—Reference point—hole in base of pump, elevation 37 feet. 0.40 mile south of Sankey Road, 0.05 mile west of Sacramento Northern Railroad. 12/8/48, 28.0; 4/6/49, 23.0; 12/8/48, 11.9; 3/30/50, 29.9; 11/9/50, 29.1; 12/6/51, 37.0.

TABLE 1—Continued

DEPTHS TO GROUND WATER AT MEASUREMENT WELLS IN SUTTER-YUBA AREA

Measurements Made by Division of Water Resources
(Depths to water in feet measured from reference point)

11N/4E-28J1—Reference point—top of casing, elevation 34.3 feet. 0.70 mile south of Sankey Road, 0.40 mile west of Pacific Avenue. 3/4/48, 20.4; 12/8/48, 23.6; 4/6/49, 19.2; 12/1/49, 25.3; 3/30/50, 22.5; 11/9/50, 29.1; 4/5/51, 21.4; 12/6/51, 30.5; 4/4/52, 22.8.

11N/4E-33J1—Reference point—top of casing, elevation 25.6 feet. 0.03 mile west of Pacific Avenue, 0.28 mile north of Riego Road. 3/4/48, 13.4; 12/7/48, 15.7; 4/6/49, 12.2; 5/26/40, 11.0; 12/1/49, 17.4; 3/30/50, 14.0; 11/9/50, 14.6; 4/5/51, 12.7; 12/6/51, 14.1; 4/4/52, 14.9.

11N/4E-36E1—Reference point—top of concrete pit wall, elevation 39 feet. 0.07 mile east of Pleasant Grove Road, 0.70 mile north of Riego Road. 12/24/47, 22.3; 3/3/48, 23.0; 12/7/48, 28.9; 4/6/49, 24.9; 12/1/49, 38.7; 3/30/50, 23.2; 11/9/50, 44.4; 4/4/52, 19.0.

11N/5E-6N1—Reference point— top of casing, elevation 50 feet. North side Howsley Road, 0.80 mile east of Pleasant Grove Road. 12/23/47, 24.7; 3/3/48, 22.6; 12/8/48, 25.1; 3/31/49, 22.8; 11/30/49, 25.9; 11/14/50, 28.7; 3/22/51, 26.2.

11N/5E-18N1—Reference point— top of casing, elevation 50 feet. North side of Keys Road, 0.85 mile east of Pleasant Grove Road. 12/24/47, 27.3; 3/3/48, 26.5; 12/8/48, 30.1; 11/30/49, 31.8; 11/14/50, 33.1; 3/22/51, 31.2.

11N/5E-30M1—Reference point—top of casing, elevation 47 feet. 1.05 miles east of Pleasant Grove Road, 0.59 mile south of Sankey Road. 12/24/47, 18.8; 3/3/48, 18.7; 12/8/48, 22.4; 12/1/49, 23.4; 3/30/50, 24.4; 11/9/50, 23.4; 12/5/51, 23.4; 4/4/52, 32.5.

12N/3E-1E1—Reference point—top of casing, elevation 33 feet. 0.10 mile northeast of Garden Highway, 0.20 mile northwest of Sutter Avenue. 12/4/47, 13.6; 3/10/48, 10.0; 12/11/48, 13.2; 3/16/49, 8.3; 12/6/49, 12.6; 3/29/50, 7.5; 11/15/51, 11.1; 4/4/52, 5.9.

12N/3E-1L1—Reference point—top of casing, elevation 31 feet. 150 feet northwest of Sutter Avenue, 0.12 mile northeast of Garden Highway. 12/4/47, 12.6; 3/10/48, 12.1; 12/11/48, 12.9; 3/16/49, 8.0; 12/6/49, 12.5; 11/3/50, 13.2; 4/2/51, 5.3; 11/3/51, 13.2; 4/4/52, 3.3.

12N/3E-2B1—Reference point—top of casing, elevation 31 feet. 0.08 mile east of Garden Highway, 0.49 mile north of Chandler Road. 12/4/47, 9.1; 3/10/48, 9.4; 12/11/48, 9.7; 3/16/49, 6.5; 12/6/49, 8.6.

12N/3E-2E1—Reference point—top of casing, elevation 29 feet. North side of Chandler Road, 0.48 mile west of Garden Highway. 12/4/47, 9.9; 3/10/48, 5.8; 5/11/48, 4.7; 12/11/48, 8.8; 3/16/49, 4.1; 5/26/49, 3.1; 6/29/49, 3.2; 7/27/49, 2.6; 8/25/49, 3.3. Well destroyed.

12N/3E-2J1—Reference point—top of casing, elevation 30 feet. South side of Garden Highway, 0.30 mile northwest of Sutter Avenue. 12/4/47, 12.2; 3/10/48, 8.9; 12/11/48, 12.8; 3/16/49, 8.3; 12/6/49, 11.7.

12N/3E-2K1—Reference point—top of casing, elevation 30 feet. South side of Garden Highway, 0.54 mile west of Sutter Avenue. 12/4/47, 12.2; 3/10/48, 4.9; 5/11/48, 6.7; 3/16/49, 4.8; 12/6/49, 7.5.

12N/3E-3K1—Reference point—top of casing, elevation 25 feet. 0.89 mile west of Garden Highway, 0.08 mile south of Chandler Road. 11/7/29, 8.0; 9/27/30, 6.4; 12/12/31, 6.5; 11/25/32, 10.1; 12/20/33, 8.3; 11/10/34, 9.1; 11/25/36, 10.8; 11/24/37, 5.0; 1/25/39, 9.6; 1/13/41, 4.6; 11/7/47, 8.5; 12/15/48, 8.3; 12/6/49, 9.2.

12N/3E-3K2—Reference point—top of casing, elevation 25 feet. 0.20 mile south of Chandler Road, 0.89 mile west of Garden Highway. 11/13/50, 24.7; 12/6/51, 3.9.

12N/3E-3Q1—Reference point—hole in base of pump, elevation 32 feet. 0.32 mile south of Chandler Road, 0.89 mile west of Garden Highway. 11/6/50, 27.4; 4-2-51, 4.8.

12N/3E-12C1—Reference point—top of casing, elevation 30 feet. 0.15 mile southwest of west end of Nicolaus bridge. 12/9/47, 14.9; 3/11/48, 11.9; 12/11/48, 15.0; 12/6/49, 14.7.

12N/3E-13G1—Reference point—top of casing, elevation 30 feet. 0.68 mile north of Lee Road, 0.38 mile southeast of Garden Highway. 12/5/47, 14.3; 3/15/48, 12.4; 12/14/48, 13.8; well destroyed.

12N/3E-13M1—Reference point—top of pit wall, elevation 29 feet. 0.45 mile southwest of Garden Highway, 0.37 mile northwest of Lee Road. 12/5/47, 14.4; 3/11/48, 13.8; 3/25/49, 12.5; well destroyed.

12N/3E-14H1—Reference point—top of pit wall, elevation 30 feet. East side of Garden Highway, 0.99 mile northeast of Lee Road. 12/5/47, 14.7; 3/15/48, 14.2; 12/11/48, 15.0; 3/25/49, 10.1; 12/6/49, 16.1.

12N/3E-14Q1—Reference point—top of casing, elevation 26 feet. South side of Lee Road, 0.12 mile southeast of Garden Highway. 12/5/47, 14.2; 3/11/48, 13.1; 12/11/48, 14.1; 3/25/49, 9.3; 12/6/49, 14.7; 3/29/50, 9.8.

12N/3E-22R1—Reference point—top of casing, elevation 26 feet. East side of Garden Highway, 1.30 miles south of Lee Road. 11/7/29, 12.0; 9/27/30, 12.7; 12/15/31, 13.0; 11/25/32, 14.9; 12/21/33, 11.3; 10/27/34, 14.5; 11/25/36, 14.1; 11/6/37, 13.5; 1/10/39, 11.1; 12/20/40, 8.4; 11/10/47, 14.1.

12N/3E-22R2—Reference point—top of casing, elevation 26 feet. East side of Garden Highway, 1.30 miles south of Lee Road. 12/16/48, 12.3; 12/9/49, 14.0.

12N/3E-22R3—Reference point—top of casing, elevation 26 feet. 0.15 mile southeast of Garden Highway, 1.30 miles south of Lee Road. 11/13/50, 12.8; 12/6/51, 5.5.

12N/3E-23N1—Reference point—top of casing, elevation 25 feet. 0.09 mile east of Garden Highway, 1.10 miles south of Lee Road. 12/19/47, 12.6; 3/4/48, 11.2; 12/15/48, 12.3; 3/30/49, 6.6; 12/5/49, 15.9; 3/24/50, 5.8; 11/6/50, 12.6; 4/2/51, 6.6; 11/16/51, 11.4.

12N/3E-24A1—Reference point—top of casing, elevation 25 feet. South side of Lee Road, 0.58 mile west of Power Line Road. 12/5/47, 12.4; 3/11/48, 11.2; 12/11/48, 12.6; 3/25/49, 9.4; 12/6/49, 13.3.

12N/3E-24Q1—Reference point—top of casing, elevation 25 feet. 0.10 mile north of Striplin Road, 0.30 mile east of Garwood Road. 12/18/47, 11.6; 3/4/48, 10.8; 12/15/48, 12.9; 3/30/49, 7.9; 12/5/49, 14.1; 3/24/50, 9.1; 11/8/50, 12.1; 4/2/51, 4.3; 11/16/51, 12.8; 4/7/52, 3.5.

12N/3E-26N1—Reference point—lower end of flange around discharge pipe, elevation 22 feet. 0.08 mile southwest of Worth Road, 0.90 mile west of Garwood Road. 12/19/47, 11.1; 3/4/48, 9.9; 12/15/48, 14.1; 3/30/49, 7.9; well destroyed.

12N/3E-27Q1—Reference point—hole in base of pump, elevation 22 feet. 0.10 mile east of Garden Highway, 1.30 miles north of Catlett Road. 11/6/50, 12.5; 4/2/51, 7.0.

12N/4E-1B1—Reference point—top of casing, elevation 58 feet. South side of Cornelius Avenue, 0.54 mile east of Pleasant Grove Road. 12/22/47, 21.7; 3/11/48, 20.0; 12/15/48, 21.4; 3/18/49, 20.3; 12/7/49, 26.2.

12N/4E-2B1—Reference point—hole in base of pump, elevation 53 feet. 0.05 mile south of Cornelius Avenue, 0.50 mile north of Pleasant Grove Road. 12/22/47, 19.8; 3/11/48, 21.8; 12/13/48, 27.2; 3/29/49, 20.8; 12/7/49, 26.2; 3/27/50, 22.1; 11/6/50, 30.9; 4/5/51, 24.0; 4/4/52, 24.0.

12N/4E-2Q1—Reference point—hole in base of pump, elevation 51 feet. 0.46 mile north of Trowbridge Road, 0.34 mile west of Pleasant Grove Road. 3/11/48, 15.7; 5/5/48, 13.3; 5/31/48, 14.7; 6/17/48, 35.2; 6/23/48, 38.0; 7/2/48, 20.3; 12/15/48, 17.9; 3/28/49, 11.6; 5/26/49, 19.5; 6/29/49, 20.9; 7/28/49, 21.7; 8/26/49, 21.2; 12/7/49, 19.0; 3/27/50, 15.4; 11/6/50, 23.9; 4/5/51, 15.5; 4/4/52, 13.2.

TABLE 1—Continued

DEPTHS TO GROUND WATER AT MEASUREMENT WELLS IN SUTTER-YUBA AREA

Measurements Made by Division of Water Resources
(Depths to water in feet measured from reference point)

12N 4E-3A1—Reference point—top of casing, elevation 52.4 feet. Southwest corner of intersection of Cornelius Avenue and Pleasant Grove Road. 3/11/48, 19.9; 12/14/48, 22.5; 3/29/49, 19.8; 12/7/49, 24.5.

12N 4E-3B1—Reference point—top of casing, elevation 49 feet. South side of Cornelius Avenue, 0.55 mile east of Pacific Avenue. 12/22/47, 21.4; 12/14/48, 23.7; 3/29/49, 19.9; 12/7/49, 24.2.

12N 4E-4A1—Reference point—top of casing, elevation 47 feet. Southwest corner of intersection of Cornelius Avenue and Pacific Avenue. 12/21/40, 19.1; 12/4/47, 24.5; 12/16/48, 26.0; 12/8/51, 31.4.

12N 4E-4A2—Reference point—top of casing, elevation 47 feet. 70.0 feet south of southwest corner of Cornelius Avenue and Pacific Avenue. 11/7/47, 23.7; 12/16/48, 24.8; 12/9/49, 26.0; 11/10/50, 30.0; 12/8/51, 29.8.

12N 4E-4D1—Reference point—top of casing, elevation 42 feet. 0.06 mile south of Cornelius Avenue, 0.12 mile east of Electric Avenue. 12/9/47, 24.1; 3/11/48, 24.2; 5/11/48, 22.4; 12/14/48, 24.9; 3/28/49, 23.4; 12/6/49, 25.8.

12N 4E-4M1—Reference point—top of casing, elevation 40 feet. 0.24 mile east of Electric Avenue, 0.25 mile north of Watts Avenue. 3/11/48, 21.9; 12/14/48, 24.6; 3/28/49, 21.8; 12/7/49, 24.8.

12N 4E-5B1—Reference point—top of wooden pit, elevation 38 feet. South side of Cornelius Avenue, 0.36 mile west of Electric Avenue. 12/9/47, 20.9; 3/11/48, 20.8; 12/14/48, 22.1; 3/28/49, 19.4; 12/6/49, 22.5.

12N 4E-6B1—Reference point—top of wooden pit, elevation 32 feet. 0.29 mile west, 0.14 mile south of west end of Cornelius Avenue. 12/8/47, 14.2; 3/25/48, 12.0; 12/18/48, 13.9; 3/28/49, 8.4; 12/7/49, 15.2.

12N 4E-6Q1—Reference point—top of casing, elevation 30 feet. 1.50 miles west of Electric Avenue, 0.18 mile north of Nicolaus Avenue. 12/8/47, 15.7; 3/25/48, 14.1; 3/16/49, 12.9; 12/6/49, 16.8.

12N 4E-6R1—Reference point—top of casing, elevation 36 feet. 0.22 mile north of Nicolaus Avenue, 1.16 miles west of Electric Avenue. 12/8/47, 6.8; 12/14/48, 7.5; 3/16/49, 4.7; 12/6/49, 8.7.

12N 4E-7B1—Reference point—hole in base of pump, elevation 30 feet. South side of Nicolaus Avenue, 1.41 miles west of Electric Avenue. 12/8/47, 14.8; 5/11/48, 9.8; 12/13/48, 14.5; 3/16/49, 11.4; 6/30/49, 15.0; 7/27/49, 17.1; 12/6/49, 15.8; 3/25/50, 11.1; 11/6/50, 16.5; 4/2/51, 6.6; 11/16/51, 15.7; 4/4/52, 5.5.

12N 4E-7N2—Reference point—bottom of 6" x 14" plank bridge over pit, elevation 30 feet. 0.41 mile southeast of Garden Highway, 0.19 mile southwest of Markham Road. 12/5/47, 14.6; 3/15/48, 12.8; 12/11/48, 14.3; 3/25/49, 10.8; 12/6/49, 15.0.

12N 4E-7P2—Reference point—top of wooden pit, elevation 28 feet. 0.67 mile southeast of Garden Highway, 0.06 mile southwest of Markham Road. 12/5/47, 11.1; 3/11/48, 13.0; 5/11/48, 11.1; 12/11/48, 14.2; 3/25/49, 11.0; 12/6/49, 15.0.

12N 4E-8A1—Reference point—top of casing, elevation 37 feet. South side of Nicolaus Avenue, 0.07 mile west of Electric Avenue. 12/8/47, 19.2; 3/11/48, 17.4; 12/14/48, 19.6; 3/16/49, 17.4; 12/6/49, 20.4.

12N 4E-8C1—Reference point—top of casing, elevation 36 feet. 0.05 mile south of Nicolaus Avenue, 0.50 mile west of Electric Avenue. 12/8/47, 18.6; 3/11/48, 17.3; 5/11/48, 16.0; 12/14/48, 19.0; 3/16/49, 17.1; 12/6/49, 20.2; 3/29/50, 17.0; 11/6/50, 23.1; 4/2/51, 13.8; 11/16/51, 22.2; 4/4/52, 13.1.

12N 4E-8D1—Reference point—hole in base of pump, elevation 32 feet. 0.16 mile south of Nicolaus Avenue, 0.80 mile west of Electric Avenue. 12/8/47, 20.8; 3/25/48, 18.2; 12/11/48, 22.0.

12N 4E-9A1—Reference point—top of casing, elevation 44 feet. West side of Pacific Avenue, 0.24 mile south of Nicolaus Avenue. 12/23/47, 19.4; 3/11/48, 18.1; 12/14/48, 20.9; 3/28/49, 16.6; 12/7/49, 20.3; 3/27/50, 17.5; 11/6/50, 27.6; 4/2/51, 16.7; 11/16/51, 26.0; 4/4/52, 16.6.

12N 4E-9D1—Reference point—hole in pump base, elevation 40 feet. South side of Nicolaus Avenue, 0.13 mile east of Electric Avenue. 3/11/48, 17.9; 12/14/48, 20.0; 3/28/49, 17.3; 5/25/49, 21.0; 6/29/49, 22.7; 7/27/49, 23.9; 8/31/49, 25.1; 12/7/49, 20.6; 3/27/50, 18.2; 11/6/50, 24.8; 4/2/51, 16.1; 11/16/51, 24.0; 4/4/52, 15.8.

12N 4E-9J1—Reference point—top of casing, elevation 42 feet. 0.11 mile west of Pacific Avenue, 0.53 mile south of Nicolaus Avenue. 3/11/48, 18.7; 12/14/48, 21.1; 3/28/49, 16.7; 12/7/49, 20.5.

12N 4E-9J2—Reference point—top of casing, elevation 42 feet. 0.13 mile west of Pacific Avenue, 0.53 mile south of Nicolaus Avenue. 3/11/48, 19.1; 12/14/48, 21.4; 3/28/49, 16.9; 12/7/49, 20.8.

12N 4E-10A1—Reference point—hole in base of pump, elevation 50 feet. 0.09 mile south of Nicolaus Avenue, 0.90 mile east of Pacific Avenue. 3/11/48, 17.4; 4/2/48, 15.8; 5/5/48, 15.6; 5/31/48, 17.0; 6/17/48, 42.5; 7/2/48, 23.2; 12/15/48, 20.0; 3/28/49, 14.1; 7/1/49, 46.7 (operating); 8/1/49, 47.0 (operating); 8/31/49, 46.8 (operating); 12/7/49, 20.6; 3/27/50, 15.3; 11/6/50, 26.1; 4/5/51, 17.5; 4/4/52, 17.5.

12N 4E-10C1—Reference point—top of casing, elevation 47 feet. South side of Nicolaus Avenue, 0.51 mile east of Pacific Avenue. 3/11/48, 18.6; 12/14/48, 21.3; 3/28/49, 16.6; 12/7/49, 21.1.

12N 4E-11H1—Reference point—hole in base of pump, elevation 46 feet. 0.04 mile south of Trowbridge Road, 0.20 mile west of Pleasant Grove Road. 11/19/51, 22.9.

12N 4E-12D1—Reference point—top of casing, elevation 52 feet. West side of Pleasant Grove Road, 0.24 mile north of Trowbridge Road. 12/22/47, 13.4; 3/11/48, 12.5; 12/14/48, 14.0; 3/28/49, 6.9; 12/7/49, 15.8.

12N 4E-13C1—Reference point—hole in base of pump, elevation 51 feet. 0.11 mile south of Marcum Road, 0.53 mile east of Pleasant Grove Road. 3/11/48, 13.4; 12/14/48, 14.3; 12/22/48, 12.6; 3/29/49, 9.3; 11/10/49, 18.0; 3/15/50, 13.9; 3/27/50, 13.8; 4/10/50, 13.4; 11/6/50, 19.6; 11/14/50, 19.9; 3/23/51, 12.3; 11/19/51, 23.5; 4/4/52, 14.6; 4/10/52, 14.6.

12N 4E-13D1—Reference point—top of casing, elevation 50 feet. Southeast of intersection of Pleasant Grove Road and Marcum Road. 12/22/47, 12.1; 3/11/48, 12.3; 12/14/48, 12.2; 3/29/49, 6.6; 2/7/49, 13.9.

12N 4E-14P1—Reference point—top of casing, elevation 43 feet. 1.72 miles south of Trowbridge Road, 0.53 mile west of Pleasant Grove Road. 3/11/48, 9.1; 12/18/48, 8.8; 3/29-49, 3.3; 12/7/49, 10.8; 3/27/50, 7.1; 11/6/50, 4.3; 4/5/51, 5.3; 4/4/52, 4.3.

12N 4E-16A2—Reference point—top of casing, elevation 40 feet. 0.07 mile west of Pacific Avenue, 1.30 miles south of Nicolaus Avenue. 12/23/47, 16.1; 3/11/48, 15.2; 5/11/48, 17.7; 12/14/48, 16.5; 3/28/49, 12.0; 3/27/50, 13.8; 11/6/50, 22.6; 4/2/51, 11.8; 11/16/51, 26.6; 4/4/52, 11.6.

12N 4E-16L1—Reference point—top of 16-inch casing, elevation 34 feet. 0.50 mile east of Electric Avenue, 0.60 mile south of Markham Road. 3/11/48, 13.1; 12/14/48, 12.9; 3/28/49, 8.7; 12/7/49, 16.1; 11/6/50, 19.9; 4/2/51, 8.4.

12N 4E-16L2—Reference point—top of casing, elevation 34 feet. 0.25 mile east of Electric Avenue, 0.50 mile south of Markham Road. 3/11/48, 11.0; 12/13/48, 21.6; 3/28/49, 7.2; 12/7/49, 13.9.

12N 4E-17C1—Reference point—top of 16-inch casing under pump, elevation 35 feet. 0.25 mile south of Markham Road, 0.50 mile west of Electric Avenue. 12/8/47, 16.5; 3/25/48, 15.0; 12/11/48, 16.1; 3/28/49, 13.1; 12/7/49, 17.5.

TABLE 1—Continued

DEPTHS TO GROUND WATER AT MEASUREMENT WELLS IN SUTTER-YUBA AREA

Measurements Made by Division of Water Resources
(Depths to water in feet measured from reference point)

12N/4E-17J1—Reference point—top of 16-inch casing, elevation 32 feet. 300 feet west of Electric Avenue, 0.52 mile south of Markham Road. 12/8/47, 13.0; 3/11/48, 12.6; 5/11/48, 12.6; 12/11/48, 13.2; 3/28/49, 9.1; 5/26/49, 14.2; 6/29/49, 15.7; 7/27/49, 16.4; 8/26/49, 17.2; 12/7/49, 15.3; 11/16/51, 18.2; 4/4/52, 6.1.

12N/4E-18A1—Reference point—top of 12-inch casing under pump, elevation 30 feet. 600 feet south of Markham Road, 0.50 mile east of Power Line Road. 12/5/47, 14.3; 3/11/48, 14.9; 12/11/48, 14.7; 3/28/49, 12.4; 12/7/49, 15.6; 3/29/50, 13.3; 11/6/50, 17.1; 4/2/51, 6.4; 11/16/51, 16.4; 4/4/52, —3.0.

12N/4E-18D1—Reference point—top of concrete pit wall, south side, elevation 30 feet. 0.56 mile southeast of Garden Highway, 300 feet southwest of road. 12/5/47, 16.2; 12/11/48, 15.9; 3/25/49, 13.1; 12/6/49, 16.5; 11/6/50, 18.1; 4/2/51, 6.4.

12N/4E-18P1—Reference point—bottom of 4″ x 12″ plank across wooden pit, elevation 25 feet. 0.27 mile west of Power Line Road, 460 feet north of Lee Road. 12/5/47, 13.4; 3/11/48, 12.2; 12/11/48, 15.2; 3/25/49, 10.8; 12/6/49, 13.9.

12N/4E-19A1—Reference point—top of 14-inch casing, elevation 28 feet. 0.44 mile east of junction of Power Line and Lee Roads. 12/5/47, 12.9; 3/15/48, 12.1; 12/11/48, 13.1; 3/28/49, 10.0; 12/6/49, 14.2; 3/29/50, 11.9; 11/6/50, 13.1; 4/2/51, 4.5; 11/16/51, 15.5.

12N/4E-19C1—Reference point—hole in pump base, elevation 25 feet. 100 feet south of Lee Road, 200 feet west of Power Line Road. 12/5/47, 15.6; 3/11/48, 14.3; 3/25/49, 11.8; 12/6/49, 14.8.

12N/4E-19F1—Reference point—top of casing, elevation 27 feet. 300 feet west of Power Line Road, 0.40 mile south of Lee Road. 12/20/47, 14.6; 3/4/48, 14.0; 12/15/48, 14.8; 3/31/49, 11.3; 12/5/49, 15.9.

12N/4E-20A1—Reference point—top of casing, elevation 30 feet. 150 feet east of Electric Avenue, 0.76 mile north of Striplin Road. 12/20/47, 12.6; 3/4/48, 12.5; 12/15/48, 13.8; 3/30/49, 8.1; 12/2/49, 19.3.

12N/4E-20J1—Reference point—slot in concrete base, elevation 30 feet. 100 feet west of Electric Avenue, 0.42 mile north of Striplin Road. 5/5/48, 11.9; 5/31/48, 63.0 (operating); 7/2/48, 62.0 (operating); 12/15/48, 12.8; 4/13/49, 8.5; 6/30/49, 31.4; 8/1/49, 57.0 (operating); 8/31/49, 56.0 (operating); 12/7/49, 16.6; 3/24/50, 12.3; 11/8/50, 19.6; 4/2/51, 8.2; 11/19/51, 19.0; 4/7/52, 5.7.

12N/4E-20Q1—Reference point—top of 14-inch casing, elevation 30 feet. 0.35 mile west of Electric Avenue on Striplin Road. 5/5/48, 9.9; 5/31/48, 16.2; 12/15/48, 10.8; 4/13/49, 7.0; 6/2/49, 20.6; 8/1/49, 47.6 (operating); 8/31/49, 62.0 (operating); 12/7/49, 14.9.

12N/4E-20R1—Reference point—slot in concrete base, elevation 30 feet. 100 feet west of Electric Avenue, 0.21 mile west of Striplin Road. 5/5/48, 12.4; 5/31/48, 42.0 (operating); 7/2/48, 43.0 (operating); 12/15/48, 13.3; 4/13/49, 9.6; 6/2/49, 28.9; 6/30/49, 33.3; 8/1/49, 52.0 (operating); 8/31/49, 66.0 (operating); 12/7/49, 18.6.

12N/4E-21M1—Reference point—top of 16-inch casing outside of pump house, elevation 32 feet. 0.25 mile east of Electric Avenue, 0.80 mile north of Striplin Road. 12/23/47, 12.4; 3/15/48, 12.4; 12/15/48, 12.8; 3/30/49, 6.7; 12/2/49, 17.9.

12N/4E-24A1—Reference point—top of 14-inch casing, elevation 56 feet. South side of Lee Road, 0.5 mile west of Power Line Road. 12/20/48, 16.5; 4/1/49, 13.4; 11/10/49, 21.8; 3/15/50, 18.0; 4/10/50, 17.8; 10/2/50, 29.5; 11/13/50, 23.8; 3/21/51, 17.8; 5/9/51, 26.6; 11/14/51, 27.9; 3/13/52, 21.1.

12N/4E-24F1—Reference point—top of 14-inch casing, elevation 49 feet. 0.50 mile east of Pleasant Grove Road, 0.75 mile north of Striplin Road. 5/31/48, 11.3; 12/18/48, 13.1; 3/29/49, 8.7; 12/2/49, 16.2; 4/10/50, 13.2; 11/13/50, 18.2; 3/21/51, 11.7; 11/16/51, 21.4.

12N/4E-24M1—Reference point—top of 14-inch casing, elevation 50.9 feet. 75 feet east of Pleasant Grove Road, 0.25 mile north of Striplin Road. 12/22/47, 12.9; 3/22/48, 13.1; 12/18/48, 14.2; 3/29/49, 9.2; 5/26/49, 14.0; 6/29/49, 19.4; 7/28/49, 17.6; 8/26/49, 18.0; 12/2/49, 17.2; 3/15/50, 14.4; 3/27/50, 14.6; 11/6/50, 18.8; 4/5/51, 12.1; 11/16/51, 20.9; 11/19/51, 20.9; 4/8/52, 12.5; 4/10/52, 12.2.

12N/4E-25F1—Reference point—top of 16-inch casing, elevation 50 feet. 0.50 mile east of Pleasant Grove Road, 0.44 mile south of Striplin Road. 11/16/51, 27.1.

12N/4E-25M1—Reference point—hole in pump base, elevation 51.3 feet. 250 feet east of Pleasant Grove Road, 0.70 mile south of Striplin Road. 12/22/47, 15.7; 3/22/48, 15.1; 12/18/48, 17.4; 3/29/49, 13.3; 12/2/49, 20.6; 3/27/50, 17.5; 11/8/50, 22.8; 4/5/51, 15.7; 11/19/51, 29.0; 4/8/52, 19.8.

12N/4E-26M1—Reference point—hole in pump base, elevation 41 feet. 0.75 mile west of Pleasant Grove Road, 1.0 mile north of Catlett Road. 3/22/48, 12.9; 12/18/48, 14.8; 3/29/49, 10.6; 12/2/49, 18.5; 11/8/50, 19.4; 4/5/51, 12.7; 4/8/52, 11.3.

12N/4E-28F1—Reference point—hole in pump base, elevation 32 feet. 0.50 mile west of Pacific Avenue, 0.36 mile south of Striplin Road. 3/15/48, 11.0; 12/18/48, 12.5.

12N/4E-28H1—Reference point—hole in top of discharge pipe, elevation 36 feet. West of Pacific Avenue, 0.36 mile south of Striplin Road. 12/22/47, 11.1; 3/15/48, 11.0; 12/18/48, 11.2; 3/24/50, 11.1; 11/8/50, 15.7; 4/2/51, 8.1; 11/19/51, 11.9; 4/7/52, 8.0.

12N/4E-29A1—Reference point—north side base of pump, elevation 31 feet. 200 feet south of Striplin Avenue, 450 feet west of Electric Avenue. 12/18/47, 12.3; 3/14/48, 12.7; 12/15/48, 11.7; 3/30/49, 6.2; 12/2/49, 17.6; 3/24/50, 12.4; 11/8/50, 18.2; 4/2/51, 9.4; 11/19/51, 19.9; 4/7/52, 4.9.

12N/4E-29R1—Reference point—pump base at hole in concrete, elevation 30 feet. 300 feet west of Electric Avenue, 0.75 mile north of Catlett Road. 12/18/47, 10.2; 3/4/48, 10.8; 12/5/49, 20.8; 3/24/50, 8.0; 11/8/50, 13.5; 4/2/51, 5.6; 11/19/51, 14.0; 4/7/52, 3.9.

12N/4E-30F1—Reference point—pump base, elevation 25 feet. 100 feet east of Power Line Road, 0.50 mile south of Striplin Road. 12/20/47, 11.1; 3/4/48, 10.4; 12/15/48, 11.8; 3/30/49, 4.9; 12/5/49, 12.2; 3/27/50, 8.1; 11/8/50, 10.6; 4/2/51, 3.7; 11/16/51, 10.9; 4/8/52, 4.8.

12N/4E-32K1—Reference point—top of 16-inch casing, elevation 28 feet. 1,500 feet west of Electric Avenue, 0.52 mile north of West Catlett Road. 3/30/49, 3.2.

12N/4E-33E1—Reference point—top of 18-inch casing, elevation 30 feet. 150 feet north of Catlett Road, 1,000 feet east of Electric Avenue. 3/15/48, 10.6; 12/18/48, 10.4.

12N/4E-33L3—Reference point—top of casing, elevation 31 feet. At dwelling south side of road, 300 feet east of Catlett Station, Sacramento Northern Railroad. 11/8/29, 15.4; 9/28/30, 16.0; 12/10/31, 16.4; 12/5/32, 12.2; 12/20/33, 15.6; 9/27/34, 16.3; 11/23/36, 12.5; 11/24/37, 9.4; 1/10/39, 8.9; 1/13/41, 3.4; 11/10/47, 11.5; 12/16/48, 11.0; 12/9/49, 13.4; 11/10/50, 13.0; 12/6/51, 12.0.

12N/4E-33R1—Reference point—top of 8-inch casing, elevation 31 feet. 100 feet west of Pacific Avenue, 0.32 mile south of Catlett Road. 12/22/47, 11.2; 3/18/48, 10.9; 12/18/48, 11.9; 3/30/49, 6.0; 12/2/49, 13.2; 3/24/50, 9.3; 11/8/50, 12.7; 4/2/51, 7.9; 11/19/51, 13.9; 4/8/52, 5.1.

12N/4E-34J1—Reference point—top of 4-inch casing, elevation 36 feet. Windmill 100 feet south of Catlett Road, 1.0 mile east of Pacific Avenue. 12/22/47, 14.8; 3/22/48, 13.7; 12/18/48, 15.9; 3/29/49, 9.8; 12/2/49, 17.9; 3/27/50, 13.8; 11/8/50, 16.7; 4/5/51, 10.2; 11/19/51, 22.0.

TABLE 1—Continued

DEPTHS TO GROUND WATER AT MEASUREMENT WELLS IN SUTTER-YUBA AREA

Measurements Made by Division of Water Resources
(Depths to water in feet measured from reference point)

12N 4E-35H1—Reference point—top of 16-inch casing, elevation 48.8 feet, 0.1 mile west of Pleasant Grove Road, 0.2 mile north of Catlett Road. 12/22/47, 13.3; 3/22/48, 12.0; 12/18/48, 15.2; 3/29/49, 12.0; 12/2/49, 18.3; 3/27/50, 16.4; 11/8/50, 20.1; 4/5/51, 13.3; 5/10/51, 16.7; 7/11/51, 25.1; 8/22/51, 28.2; 9/26/51, 27.3; 11/16/51, 22.2; 11/19/51, 24.7; 4/8/52, 15.2; 4/10/52, 13.6.

12N 4E-36Q1—Reference point—top of casing in bottom of pit, elevation 48 feet, ground surface. 0.47 mile south of Catlett Road, 0.63 mile east of Pleasant Grove Road. 4/11/51, 22.0; 11/16/51, 28.9.

12N 5E-18P1—Reference point—top of 14-inch casing, elevation 61 feet, 0.50 mile west of Brewer Road, 1.0 mile south of Marcum Road. 3/22/48, 15.4.

13N 3E-2C1—Reference point—top of air gage hole, elevation 42.7 feet, 50 feet west of Garden Highway, 0.25 mile north of Tudor Road. 11/13/47, 25.6; 3/24/48, 21.0; 3/29/48, 19.7; 11/10/48, 20.4; 1/24/49, 19.2; 3/23/49, 16.9; 6/30/49, 30.3; 7/27/49, 29.0; 8/25/49, 25.2; 12/6/49, 21.2; 3/29/50, 17.5; 11/7/50, 23.1; 3/25/51, 12.2; 11/15/51, 22.6; 4/3/52, 9.1.

13N 3E-2H1—Reference point—hole in pump base, elevation 43.4 feet, 150 feet south of Shannon Road, 0.5 mile east of Garden Highway. 11/13/47, 21.4; 3/8/48, 19.4; 11/10/48, 18.0; 3/23/49, 14.5; 12/6/49, 19.5; 3/29/50, 13.4; 11/7/50, 19.0; 3/29/51, 12.2; 11/15/51, 18.3; 4/3/52, 6.2.

13N 3E-2L1—Reference point—top of 10-inch casing, elevation 41.2 feet, 0.5 mile west of Garden Highway, 0.1 mile south of Tudor Road. 1/19/48, 18.3; 5/6/48, 15.9; 6/1/48, 15.1; 6/3/48, 25.8; 8/2/48, 16.1; 9-1-48, 21.8; 3/23/49, 16.9.

13N 3E-2P1—Reference point—hole in pump base, elevation 39.9 feet, 200 feet west of Garden Highway, 0.3 mile south of Tudor Road. 11/13/47, 19.9; 3/8/48, 26.0; 11/10/48, 18.0; 3/23/48, 15.9; 12/6/49, 19.8.

13N 3E-3D1—Reference point—hole in pump base, elevation 38.9 feet, 50 feet east of State Highway 24, 0.3 mile north of Tudor Road. 11/14/47, 20.9; 3/8/48, 20.8; 3/29/48, 19.5; 11/10/48, 21.1; 1/24/49, 19.7; 3/25/49, 18.1; 6/1/49, 28.6; 6/28/49, 25.4; 7/29/49, 32.3; 8/30/49, 26.1; 12/6/49, 23.3.

13N 3E-3F1—Reference point—hole in pump base, elevation 38.9 feet, 0.15 mile north of Tudor Road, 0.4 mile east of State Highway 24. 11/14/47, 20.8; 3/18/48, 22.9; 11/10/48, 21.3; 3/25/49, 19.2; 12/6/49, 23.4; 3/29/50, 20.6; 11/7/50, 24.6; 3/29/51, 19.0; 11/15/51, 22.9; 4/3/52, 9.0.

13N 3E-4B1—Reference point—top of wood pit east edge, elevation 36 feet, 0.45 mile west of State Highway 24, 0.4 mile north of Tudor Road. 11/14/47, 18.1; 3/8/48, 14.8; 11/10/48, 20.7; 3/25/49, 17.5; 12/6/49, 23.1.

13N 3E-4P1—Reference point—top of 12-inch casing, elevation 34.7 feet, 0.05 mile west of Hobbs Road, 0.3 mile south of Tudor Road. 12/12/47, 14.6; 3/10/48, 14.7; 3/12/48, 14.6; 11/18/48, 16.5; 3/24/49, 13.8; 3/29/50, 15.9.

13N 3E-4P2—Reference point—top of casing, elevation 34 feet, 100 feet west of Hobbs Road, 0.4 mile south of Tudor Road. 11/7/50, 22.9; 3/29/51, 15.8.

13N 3E-5B1—Reference point—top of 4" x 12" plank bridge over earth pit, elevation 39.1 feet, 50 feet east of Bailey Road, 750 feet south of Tudor Road. 12/12/47, 14.3; 3/10/48, 16.9; 3/12/48, 17.1; 3/29/18, 16.7; 11/8/48, 18.3; 3/21/49, 15.4; 12/5/49, 18.6.

13N 3E-5E1—Reference point—top of 2" x 6" sill, north wall of wooden pit, elevation 38.4 feet, 300 feet east of George Washington Boulevard, 1,000 feet north of Tudor Road. 12/12/47, 14.2; 3/10/48, 11.8; 11/8/48, 13.0; 3/21/49, 12.5; 3/29/50, 12.5; 11/7/50, 17.8; 3/29/51, 13.1; 11/15/51, 15.8; 4/3/52, 10.4.

13N 3E-5J1—Reference point—top of 16-inch casing, elevation 27 feet, 0.1 mile south of Tudor Road, 0.5 mile west of Hobbs Road. 12/12/47, 13.7; 3/10/48, 12.8; 3/12/48, 12.8; 12/5/49, 17.0.

13N/3E-5L1—Reference point—top of 12-inch casing, elevation 37.4 feet, 50 feet south of State Highway 24, 650 feet west of Bailey Road. 12/12/47, 15.6; 3/10/48, 15.6; 3/12/48, 15.6; 5/12/48, 15.1; 11/8/48, 16.3; 1/19/49, 14.8; 3/24/49, 14.9; 6/1/49, 16.7; 6/28/49, 21.2; 7/27/49, 22.0; 8/25/49, 20.4; 12/2/49, 17.3.

13N/3E-6K1—Reference point—top of 16-inch casing, elevation 34 feet, South side of Tudor Road, 0.5 mile west of George Washington Boulevard. 12/15/48, 9.0; 12/9/49, 9.7; 11/10/50, 12.7; 12/6/51, 13.3.

13N/3E-6M1—Reference point—top of 12-inch casing, elevation 34 feet, 400 feet south of Tudor Road, 0.34 mile east of Roberts Road. 12/11/47, 9.9; 3/10/48, 8.2; 3/12/48, 8.3; 11/8/48, 6.2; 3/24/49, 6.6; 12/2/49, 9.0.

13N/3E-7A1—Reference point—top of casing, 20 feet north of pump house, elevation 35.2 feet, 250 feet south of Thompson Road, 300 feet west of State Highway 24. 12/12/47, 10.8; 3/10/48, 11.1; 3/12/48, 11.2; 11/8/48, 11.7; 3/24/49, 10.5; 12/2/49, 12.3.

13N/3E-7J1—Reference point—top of 8-inch casing, elevation 35.1 feet, 0.45 mile north of Everglade Road, 0.15 mile west of George Washington Boulevard, 250 feet south to well. 12/11/47, 9.7; 3/10/48, 10.5; 3/12/48, 10.7; 11/3/48, 12.0; 1/24/49, 11.7; 3/24/49, 10.3; 12/2/49, 12.8.

13N/3E-8B1—Reference point—top of 16-inch casing, elevation 35 feet, 0.05 mile south of Thompson Road, 0.8 mile west of Hobbs Road. 12/12/47, 10.8; 3/10/48, 13.9; 3/12/48, 14.0; 11/18/48, 15.1; 3/25/49, 13.0; 12/5/49, 17.1.

13N/3E-8M1—Reference point—top of wood floor under pump, elevation 35.9 feet, 0.2 mile east of George Washington Boulevard, 0.7 mile south of Thompson Road. 12/11/47, 10.3; 3/10/48, 10.8; 3/12/48, 10.8; 11/8/48, 13.1; 3/24/49, 11.0; 12/2/49, 13.8.

13N/3E-9C1—Reference point—hole in pump base, elevation 36.2 feet, 150 feet west of Hobbs Road, 0.60 mile south of State Highway 24. 12/12/47, 15.4; 3/10/48, 15.8; 3/12/48, 15.7; 11/8/48, 17.7; 1/24/49, 16.3; 3/24/49, 14.8; 6/1/49, 19.1; 6/28/49, 20.9; 7/27/49, 21.8; 8/30/49, 22.4; 12/5/49, 19.8.

13N/3E-9H1—Reference point—top of east wall of concrete pit, elevation 35 feet, 200 feet west of Sawtelle Avenue, 0.57 mile south of Tudor Road. 12/12/47, 16.8; 3/10/48, 17.9; 3/17/48, 18.0; 11/8/48, 19.2; 3/24/49, 16.3.

13N/3E-11A1—Reference point—hole in pump base, elevation 40 feet, 350 feet north of O'Conner Road, 0.55 mile east of Garden Highway. 11/13/47, 20.1; 3/8/48, 20.8; 11/10/48, 19.0; 1/24/49, 18.6; 3/23/49, 15.5; 12/5/49, 20.7.

13N/3E-11L1—Reference point—top of casing, elevation 38 feet, 0.05 mile west of Garden Highway, 1.1 miles south of Tudor Road. 11/14/47, 16.4.

13N/3E-11M1—Reference point—top of casing, elevation 36 feet, 0.4 mile west of Garden Highway, 0.2 mile north of Wilkie Avenue. 1/20/48, 17.5.

13N 3E-11Q2—Reference point—hole in pump base, elevation 39.3 feet, 50 feet west of Garden Highway, 0.15 mile south of Wilkie Avenue. 11/19/47, 16.5; 3/9/48, 19.8; 5/11/48, 13.4; 11/4/48, 16.1; 1/19/49, 15.3; 3/8/49, 14.8; 6/1/49, 17.2; 6/29/49, 23.9; 8/3/49, 23.7; 8/25/49, 19.1; 12/8/49, 17.2.

13N/3E-12L1—Reference point—hole in pump base, elevation 41 feet, 300 feet north of Wilkie Avenue, 0.7 mile east of Garden Highway. 11/14/47, 18.2; 3/8/48, 19.0; 11/10/48, 16.7; 3/23/49, 12.1; 12/5/49, 17.9; 11/7/50, 17.1; 3/29/51, 11.3; 11/15/51, 16.3; 4/3/52, 6.9.

13N/3E-12N1—Reference point—top of casing, elevation 39.5 feet, 0.2 mile south of Wilkie Avenue, 0.45 mile east of Garden Highway. 11/19/47, 15.4; 3/9/48, 18.2; 5/12/48, 10.3; 11/4/48, 16.3; 3/8/49, 13.7; 12/8/49, 16.2.

TABLE 1—Continued

DEPTHS TO GROUND WATER AT MEASUREMENT WELLS IN SUTTER-YUBA AREA

Measurements Made by Division of Water Resources
(Depths to water in feet measured from reference point)

13N/3E-13C1—Reference point—hole in pump base, elevation 42.3 feet. 0.7 mile east of Garden Highway, 0.25 mile south of Wilkie Avenue. 11/19/47, 16.9; 3/9/48, 20.3; 11/4/48, 17.0; 3/8/49, 13.8; 12/8/49, 17.9; 3/29/50, 10.8; 11/7/50, 17.1; 3/29/51, 16.7; 11/15/51, 16.7; 4/2/52, 7.3.

13N/3E-13D1—Reference point—edge of pump base, elevation 39 feet. 0.55 mile east of Garden Highway, 0.25 mile south of Wilkie Avenue. 5/5/48, 9.4; 6/1/48, 9.3; 2/6/52, 6.0.

13N/3E-13E1—Reference point—hole in pump base, elevation 37 feet. 0.5 mile east of Garden Highway, 0.75 mile south of Wilkie Avenue. 11/19/47, 15.4; 3/25/48, 14.7; 11/4/48, 15.1; 3/8/49, 13.3; 12/8/49, 15.9.

13N/3E-13L1—Reference point—top of casing, elevation 38 feet. 0.75 mile east of Garden Highway, 0.95 mile south of Wilkie Avenue. 11/19/47, 15.5; 3/9/48, 19.0; 11/4/48, 14.1; 3/8/49, 13.3; 12/7/49, 16.0.

13N/3E-14C1—Reference point—hole in pump base, elevation 35 feet. 0.25 mile west of Garden Highway, 0.35 mile south of Wilkie Avenue. 11/26/29, 15.4; 9/27/30, 15.6; 12/12/31, 15.4; 12/2/32, 15.2; 12/20/33, 16.3; 11/10/34, 16.7; 11/25/36, 13.4; 11/24/37, 11.8; 1/25/39, 10.8; 1/13/41, 8.2; 11/6/47, 15.3; 11/19/47, 15.9; 5/12/48, 13.9; 11/4/48, 15.7; 12/16/48, 14.7; 3/8/49, 14.9; 12/8/49, 16.6; 12/9/49, 16.0; 11/10/50, 16.0; 12/6/51, 13.4.

13N/3E-14G1—Reference point—hole in pump base, elevation 30.8 feet. 50 feet west of Garden Highway, 0.65 mile south of Wilkie Avenue. 3/25/48, 8.8; 11/4/48, 8.9; 3/8/49, 7.9; 12/8/49, 9.9; 3/29/50, 7.5; 11/7/50, 10.3; 3/39/51, 6.7; 11/15/51, 8.9; 4/2/52, 0.2.

13N/3E-14L3—Reference point—hole in pump base, elevation 34.9 feet. 50 feet south of Wilson Road, 0.1 mile west of Garden Highway. 11/19/47, 12.1; 3/25/48, 12.2; 11/4/48, 10.2; 3/8/49, 10.9; 12/7/49, 13.0; 4/2/52, 3.8.

13N/3E-14M2—Reference point—hole in pump base, elevation 35.7 feet. 0.1 mile south of Wilson Road, 0.4 mile west of Garden Highway. 11/19/47, 16.9; 3/9/48, 16.2; 11/5/48, 14.1; 3/8/49, 12.9; 12/7/49, 14.8.

13N/3E-14P1—Reference point—top of casing, elevation 35.6 feet. 0.25 mile west of Garden Highway, 0.4 mile south of Wilson Road. 11/19/47, 11.1; 3/9/48, 14.1; 11/4/48, 12.9; 3/8/49, 11.7; 12/7/49, 13.8.

13N/3E-14Q1—Reference point—top of casing, elevation 35.1 feet. 350 feet west of Garden Highway, 0.45 mile south of Wilson Road. 11/19/47, 14.9; 3/8/49, 11.0; 12/7/49, 12.8.

13N/3E-14R1—Reference point—hole in pump base, elevation 38.4 feet. 0.4 mile east of Garden Highway, 1.0 mile south of Wilkie Avenue. 11/19/47, 15.9; 3/9/48, 17.8; 11/4/48, 14.2; 3/8/49, 12.5; 12/7/49, 14.8.

13N/3E-15C2—Reference point—top of casing, elevation 36.1 feet. 0.3 mile north of Wilson Road, 100 feet west of Southern Pacific Railroad tracks. 12/18/47, 15.1; 3/11/48, 15.6; 11/4/48, 18.2; 3/16/49, 15.0.

13N/3E-15H1—Reference point—top of wooden pit, north side, elevation 37.8 feet. 0.2 mile north of Wilson Road, 0.6 mile west of Garden Highway. 12/18/47, 16.2; 3/11/48, 17.8; 11/4/48, 17.0; 3/8/49, 15.5.

13N/3E-15P1—Reference point—bottom of 2″ x 12″ over pit, elevation 34.0 feet. 0.25 mile east of Sawtelle Avenue, 100 feet southeast of most southerly corner of Wilson Road. 12/18/47, 13.2; 3/11/48, 13.0; 11/4/48, 6.7; 3/8/49, 12.9; 12/7/49, 14.7; 3/29/50, 12.8. Well destroyed.

13N/3E-15Q1—Reference point—top of casing, elevation 37 feet. 0.15 mile east of Southern Pacific Railroad tracks, 0.5 mile south of Wilson Road. 3/11/48, 13.2; 11/4/48, 13.6; 3/16/49, 11.7; 12/7/49, 13.1.

13N/3E-15R1—Reference point—top of plug in "T" discharge pipe, elevation 36 feet. 0.65 mile west of Garden Highway, 0.5 mile south of Wilson Road. 3/11/48, 14.5; 11/4/48, 13.6; 3/16/49, 13.2; 12/7/49, 14.3.

13N/3E-16A1—Reference point—top of casing, elevation 35 feet. South of Everglade Road, west of Sawtelle Avenue at intersection. 12/12/47, 15.7; 3/10/48, 14.7; 3/12/48, 14.7; 11/8/48, 17.1; 3/25/49, 14.6; 12/5/49, 16.3; 3/29/50, 15.1; 11/7/50, 17.0; 3/29/51, 11.7; 11/15/51, 15.4; 4/3/52, 9.5.

13N/3E-16H1—Reference point—hole in pump base, elevation 36.8 feet. 0.25 mile south of Everglade Road on west side of Sawtelle Ave. 12/18/47, 16.6; 3/4/48, 17.8; 11/4/48, 18.7; 1/24/49, 16.5; 3/8/49, 15.7; 12/7/49, 18.2.

13N/3E-16R1—Reference point—hole in pump base, elevation 38.1 feet. 60 feet west of Sawtelle Avenue, 0.9 mile south of Everglade Road. 12/18/47, 16.4; 3/11/48, 17.3; 11/4/48, 16.3; 3/16/49, 15.2; 12/7/49, 17.7; 3/29/50, 14.7; 11/7/50, 15.2; 3/29/51, 10.8; 11/15/51, 14.0; 4/2/52, 8.0.

13N/3E-17A1—Reference point—top of casing, elevation 31 feet. 0.1 mile south of Everglade Road, 0.9 mile east of George Washington Boulevard. 12/18/47, 9.4; 3/11/48, 9.8; 11/4/48, 8.3; 3/16/49, 6.6; 12/7/49, 10.3.

13N/3E-17B1—Reference point—top of casing, elevation 34.1 feet. 200 feet south of Everglade Road, 0.7 mile east of George Washington Boulevard. 12/12/47, 6.7; 3/10/48, 8.1; 3/12/48, 8.1; 11/8/48, 12.2; 12/5/49, 12.0.

13N/3E-17D1—Reference point—top of casing, elevation 30 feet. South side of Everglade Road, 0.2 mile east of George Washington Boulevard. 12/18/47, 7.9; 3/11/48, 8.7. Well destroyed.

13N/3E-18A1—Reference point—top of casing, elevation 30 feet. 0.25 mile south of Everglade Road, 0.2 mile west of George Washington Boulevard. 12/18/47, 10.2; 3/11/48, 10.7; 11/4/48, 10.7. Well destroyed.

13N/3E-23B1—Reference point—top of concrete pit, elevation 34 feet. 0.1 mile east of Garden Highway, 0.15 mile north of Central Avenue. 11/19/47, 12.3; 3/25/48, 12.3; 11/4/48, 11.9; 3/8/49, 11.2; 12/7/49, 12.7.

13N/3E-23D1—Reference point—top of concrete, elevation 38.3 feet. 0.4 mile west of Garden Highway, 0.25 mile north of Central Avenue. 11/19/47, 14.8; 3/9/48, 16.7; 5/11/48, 13.0; 11/4/48, 16.0; 3/8/49, 14.6.

13N/3E-23F1—Reference point—hole in pump base, elevation 34 feet. 0.15 mile west of Garden Highway, 0.1 mile south of Central Avenue. 11/20/47, 12.8; 3/10/48, 15.1; 11/4/48, 13.7; 3/8/49, 11.3; 12/7/49, 13.1.

13N/3E-23L1—Reference point—hole in pump base, elevation 35 feet. 0.15 mile west of Garden Highway, 0.4 mile south of Central Avenue. 11/20/47, 13.3; 3/10/48, 16.0; 5/11/48, 11.0; 11/4/48, 13.7; 1/24/49, 13.6; 3/8/49, 12.7; 6/7/49, 16.3; 6/29/49, 17.2; 7/27/49, 16.9; 8/25/49, 17.8; 12/7/49, 14.6; 3/29/50, 12.2; 11/7/50, 14.1; 3/29/51, 9.4; 11/15/51, 11.6; 4/2/52, 6.0.

13N/3E-24C2—Reference point—bottom of pump base, elevation 39.6 feet. 0.25 mile north of Central Avenue, 0.8 mile east of Garden Highway. 11/20/47, 15.4; 3/9/48, 16.0; 11/4/48, 14.7; 3/8/49, 13.1; 3/29/50, 11.5; 11/7/50, 15.3; 3/29/51, 7.6; 11/16/51, 14.6; 4/2/52, 7.6.

13N/3E-24D1—Reference point—hole in concrete base, elevation 36.5 feet. 0.45 mile east of Garden Highway, 0.45 mile south of Wilson Road. 11/19/49, 12.2; 3/25/48, 11.9; 5/11/48, 9.1; 11/4/48, 11.9; 3/8/49, 10.6; 6/1/49, 12.0; 8/25/49, 15.4; 12/7/49, 13.1

13N/3E-24E1—Reference point—top of casing, elevation 35 feet. 0.2 mile south of Central Avenue, 0.6 mile east of Garden Highway. 11/20/47, 10.8; 3/9/48, 11.4; 11/5/48, 11.4.

13N/3E-24G1—Reference point—top of casing, elevation 39 feet. 100 feet south of Central Avenue, 1.05 miles east of Garden Highway. 11/20/47, 24.2; 3/9/48, 18.9; 11/4/48, 20.7; 1/24/49, 18.8; 3/8/49, 17.1; 12/7/49, 19.9.

TABLE 1—Continued

DEPTHS TO GROUND WATER AT MEASUREMENT WELLS IN SUTTER-YUBA AREA

Measurements Made by Division of Water Resources
(Depths to water in feet measured from reference point)

13N 3E-25N1—Reference point—top of casing, elevation 35 feet. 200 feet north of Oak Avenue, 0.7 mile east of Garden Highway. 11/20/47, 10.9; 3/10/48, 11.9; 11/4/48, 9.3; 1/24/49, 9.3; 3/8/49, 7.6; 12/7/49, 11.0.

13N 3E-26J1—Reference point—top of casing, elevation 35 feet. 300 feet south of Cypress Avenue, 0.4 mile east of Garden Highway. 11/20/47, 9.2; 3/10/48, 9.9.

13N 3E-35H1—Reference point—hole in casing, elevation 32 feet. 0.1 mile north of Laurel Avenue, 0.45 mile east of Garden Highway. 11/20/47, 9.7; 3/10/48, 8.0; 11/4/48, 8.8; 1/24/49, 9.0; 3/8/49, 7.0; 12/7/49, 10.4.

13N 3E-36N1—Reference point—top of 2" x 4" at top of west side of pit, elevation 33 feet, 0.3 mile south of Laurel Avenue, 0.55 mile east of Garden Highway. 12/5/47, 11.9; 3/10/48, 12.2; 5/11/48, 7.0; 12/11/48, 11.6; 3/16/49, 8.2; 12/6/49, 12.8; 3/29/50, 7.7; 11/3/50, 12.0; 4/3/51, 5.2; 11/16/51, 10.2; 4/4/52, 3.6.

13N 4E-1P1—Reference point—top of 14-inch casing, elevation 62 feet. 100 feet west of farm road, 1.1 miles south of Dairy Road. 11/28/47, 18.8.

13N 4E-1Q1—Reference point—bottom of slot inside of casing by air line, elevation 63.2 feet. 800 feet east of farm road, 1.1 miles south of Dairy Road. 11/28/47, 19.4; 2/11/48, 17.5; 2/21/48, 18.1; 3/29/48, 17.4; 5/5/48, 15.2; 6/3/48, 17.9; 7/2/48, 66.0 (operating); 11/12/48, 21.0; 3/24/49, 17.0; 11/28/49, 24.2.

13N 4E-2A1—Reference point—top of 12-inch casing, bottom of pit, elevation 52 feet. Ground elevation 66 feet, 300 feet south of Dairy Road, 2.2 miles southwest of U. S. Highway 99E. 11/28/47, 13.4; 3/2/48, 11.0; 11/12/48, 14.8; 3/25/49, 11.3; 11/23/49, 17.3; 3/28/50, 14.3; 11/8/50, 19.1; 4/4/51, 12.8; 11/30/51, 29.4.

13N 4E-2C1—Reference point—top of 14-inch casing, elevation 64 feet. West of Pleasant Grove Road (Forty Mile Road) about 1.5 miles southeast of Plumas School. 11/28/47, 28.0; 3/1/48, 26.2; 3/22/48, 28.3; 3/29/48, 26.4; 5/5/48, 24.5; 8/13/48, 78.8 (operating); 11/8/48, 29.4; 1/25/49, 27.7; 3/25/49, 26.1; 11/23/49, 31.8.

13N 4E-2K1—Reference point—lower left hole in pump base, elevation 66 feet, 100 feet southeast of Leach Road, 200 feet west of Pleasant Grove Road (Forty Mile Road). 11/29/47, 29.0; 3/1/48, 26.6; 4/8/48, 29.9; 3/25/49, 26.7; 11/23/49, 26.7; 3/28/50, 32.3; 11/6/50, 34.0; 4/3/51, 26.9; 11/30/51, 33.1; 4/1/52, 30.0.

13N 4E-3F1—Reference point—top of concrete pit, elevation 57 feet. West of Hoffman Road, 1.4 miles south of Plumas School. 11/8/48, 30.1.

13N 4E-3G1—Reference point—slot in side of casing, elevation 58 feet. East of Hoffman Road, 1.4 miles south of Plumas School. 11/28/47, 25.6; 11/8/48, 27.0; 11/25/49, 28.7; 3/28/50, 26.0; 11/6/50, 30.4; 4/4/51, 26.0; 12/5/51, 32.8; 4/1/52, 25.9.

13N 4E-4J1—Reference point—top of casing, bottom of pit, elevation 47 feet, ground elevation 52.0 feet. 250 feet west of farm road, 0.75 mile north of Leach Road. 11/29/47, 18.3; 3/1/48, 16.8; 11/8/48, 20.5; 3/25/49, 15.9; 11/26/49, 21.1.

13N 4E-4J2—Reference point—hole in side of casing, elevation 52 feet. 100 feet west of farm road, 0.75 mile north of Leach Road. 11/8/48, 26.1; 3/25/49, 21.1; 11/26/49, 26.0.

13N 4E-7E1—Reference point—hole in pump base, elevation 39 feet. 0.05 mile west of Feather River Boulevard, 2.9 miles south of Country Club Avenue. 11/17/47, 14.3; 3/9/48, 13.1; 5/5/48, 9.1; 5/31/48, 9.1; 7/2/48, 42.0 (operating); 8/1/48, 49.1 (operating); 9/2/48, 44.0 (operating); 9/30/48, 13.5; 11/10/48, 13.9; 1/24/49, 13.8; 3/22/49, 10.8; 6/1/49, 10.8; 6/29/49, 12.8; 7/28/49, 14.2; 8/26/49, 15.8; 12/2/49, 15.3; 3/29/50, 9.7; 11/6/50, 11.7; 3/30/51, 7.8; 11/16/51, 13.7; 4/1/52, 5.5.

13N 4E-9A1—Reference point—top of 14-inch casing, elevation 52 feet. West of farm road, 0.45 mile north of Leach Road. 11/29/47, 19.8; 3/1/48, 17.9; 11/8/48, 20.5; 3/25/49, 17.0; 11/26/49, 22.1; 3/28/50, 19.0; 11/6/50, 23.0; 4/3/51, 16.4; 12/6/51, 22.4; 4/1/52, 18.0.

13N 4E-9R1—Reference point—top of casing, elevation 50 feet. 0.30 mile south of Leach Road. 11/8/48, 21.4; 3/25/49, 17.2; 11/26/49, 24.1; 3/28/50, 18.7; 11/6/50; 25.4; 4/4/51, 14.8; 12/5/51, 23.0; 4/1/52, 14.9.

13N 4E-10D1—Reference point—top of 14-inch casing, elevation 54 feet. 0.25 mile east of farm road, 0.50 mile north of Leach Road. 11/29/47, 25.0; 3/1/48, 23.0; 11/8/48, 26.5; 3/25/49, 22.4; 11/26/49, 27.4; 4/1/52, 24.6.

13N 4E-10J1—Reference point—slot in side of casing, elevation 55 feet. 200 feet south of Leach Road. 11/8/48, 25.6; 3/25/49, 23.0; 11/26/49, 27.6; 3/28/50, 23.5; 11/6/50, 29.6; 4/3/51, 21.5; 4/1/52, 21.0.

13N 4E-11J1—Reference point—bottom of slot in top of casing, elevation 61.3 feet. 200 feet west of Pleasant Grove Road, 0.75 mile north of Four Corners. 12/2/47, 19.6; 2/11/48, 17.8; 2/21/48, 17.7; 3/8/48, 26.5; 3/22/48, 26.4; 3/29/48, 17.8; 5/5/48, 16.0; 6/3/48, 17.8; 9/30/48, 27.2; 11/15/48, 21.2; 1/26/49, 19.5; 3/31/49, 18.3; 12/2/49, 23.6; 3/29/50, 19.6; 11/8/50, 25.5; 4/3/51, 18.6; 11/20/51, 24.4; 4/4/52, 15.7.

13N 4E-12C2—Reference point—top of flange in bottom of pit, elevation 44 feet. Ground elevation 55 feet, 1,000 feet north of Wheatland-Rio Oso Road, 0.45 mile east of Pleasant Grove Road (Forty Mile Road). 11/25/47, 9.2; 2/11/48, 6.9; 2/21/48, 6.0; 3/29/48, 4.8; 11/12/48, 10.5; 3/24/49, 5.5; 6/6/49, 14.0; 7/1/49, 17.4; 8/1/49, 21.6; 8/31/49, 45.0 (operating); 11-26-49, 13.4.

13N 4E-12E1—Reference point—top of 14-inch casing, elevation 60 feet. 150 feet west of Wheatland-Rio Oso Road, 300 feet east of Pleasant Grove Road (Forty Mile Road). 11/29/47, 18.9.

13N 4E-12E2—Reference point—bottom of slot in top of 14-inch casing, elevation 60.8 feet. 100 feet west of Wheatland-Rio Oso Road, 400 feet east of Pleasant Grove Road (Forty Mile Road). 11/29/47, 18.5; 2/11/48, 16.2; 2/21/48, 16.0; 3/2/48, 16.6; 3/11/48, 16.6; 3/29/48, 14.9; 5/18/48, 13.2; 11/12/48, 19.7; 3/24/49, 15.2; 11/23/49, 24.5; 3/29/50, 16.6; 11/8/50, 23.0; 4/3/51, 14.0; 12/3/51, 24.2; 4/2/52, 10.8.

13N 4E-12G1—Reference point—hole in pump base, elevation 65 feet. Nouth of Wheatland-Rio Oso Road, 0.85 mile east of Pleasant Grove Road (Forty Mile Road). 11/28/47, 22.1.

13N 4E-12H1—Reference point—hole in pump base, elevation 67.3 feet. 100 feet north of Wheatland-Rio Oso Road, 1.0 mile east of Pleasant Grove Road (Forty Mile Road). 11/28/47, 22.6; 2/11/48, 20.5; 2/21/48, 21.0; 3/29/48, 21.0; 11/12/48, 23.8; 3/24/49, 19.4; 11/26/49, 26.8.

13N 4E-12H2—Reference point—top of slot in pump base, elevation 67.2 feet. 100 feet north of Wheatland-Rio Oso Road, 0.90 mile east of Pleasant Grove Road (Forty Mile Road). 11/28/47, 22.2; 3/29/48, 19.8; 11/12/48, 23.4; 3/24/49, 19.0; 11/26/49, 26.6.

13N 4E-12H3—Reference point—top of 8-inch casing, elevation 68 feet. 200 feet south of Wheatland-Rio Oso Road, 1.0 mile east of Pleasant Grove Road (Forty Mile Road). 12/2/47, 24.2; 3/8/48, 25.4.

13N 4E-12K1—Reference point—groove in base plate, elevation 69.4 feet. 0.30 mile south of Wheatland-Rio Oso Road, 0.50 mile east of Pleasant Grove Road (Forty Mile Road). 12/2/47, 24.6; 3/8/48, 28.2; 3/29/48, 22.4; 11/15/48, 25.7; 3/31/49, 21.9; 12/2/49, 28.4.

13N 4E-12K2—Reference point—top ridge on base plate, elevation 70 feet. 1,000 feet south of Wheatland-Rio Oso Road, 0.75 mile east of Pleasant Grove Road (Forty Mile Road). 12/2/47, 24.4; 3/8/48, 29.6.

TABLE 1—Continued

DEPTHS TO GROUND WATER AT MEASUREMENT WELLS IN SUTTER-YUBA AREA

Measurements Made by Division of Water Resources
(Depths to water in feet measured from reference point)

13N/4E-12L1—Reference point—pipe in base, elevation 65.6 feet, 1,100 feet south of Wheatland-Rio Oso Road, 0.25 mile east of Pleasant Grove Road (Forty Mile Road). 12/2/47, 23.2; 3/8/48, 30.9; 3/22/48, 32.7; 3/29/48, 21.6; 5/5/48, 19.2; 6/3/48, 21.2; 9/30/48, 30.7; 11/15/48, 24.8; 1/26/49, 23.0; 12/2/49, 27.6.

13N/4E-12L2—Reference point—slot in top of casing, elevation 65.1 feet, 800 feet south of Wheatland-Rio Oso Road, 0.30 mile east of Pleasant Grove Road (Forty Mile Road). 12/2/47, 21.6; 3/8/48, 28.3; 3/22/48, 29.0; 3/29/48, 19.9; 9/30/48, 29.3; 11/15/48, 23.4; 3/31/49, 22.8.

13N/4E-12Q1—Reference point—pipe in concrete base, elevation 70.5 feet, 0.30 mile north of Bear River Drive, 0.70 mile east of Pleasant Grove Road. 12/3/47, 26.0; 3/30/48, 24.4; 11/4/48, 27.9; 3/31/49, 23.5; 12/2/49, 30.2.

13N/4E-12R1—Reference point—hole in pump base, elevation 72.4 feet, 0.30 mile north of Bear River Drive, 0.90 mile east of Pleasant Grove Road. 12/3/47, 45.5; 3/30/48, 24.9; 11/4/48, 28.9; 1/26/49, 26.6; 3/31/49, 24.4; 12/2/49, 31.3.

13N/4E-13A1—Reference point—hole in pump base, elevation 71.6 feet, 1,200 feet north of Bear River Drive, 0.75 mile east of Pleasant Grove Road. 12/3/47, 26.5; 3/8/48, 31.6; 3/30/48, 24.9; 11/4/48, 28.3; 3/31/49, 24.0; 12/2/49, 30.8.

13N/4E-13B1—Reference point—hole in pump base, elevation 70 feet, 850 feet north of Bear River Drive, 0.60 mile east of Pleasant Grove Road. 11/4/48, 28.3.

13N/4E-13C1—Reference point—top of 14-inch casing, elevation 69.2 feet, 900 feet north of Bear River Drive, 0.40 mile east of Pleasant Grove Road. 12/3/47, 25.7; 11/4/48, 27.7; 3/31/49, 23.3; 12/2/49, 30.0.

13N/4E-13E1—Reference point—top of 14-inch casing, elevation 60.7 feet, 150 feet south of Bear River Drive, 700 feet east of Four Corners. 12/3/47, 19.5; 3/8/48, 24.2; 3/30/48, 18.1; 11/4/48, 21.6; 3/31/49, 17.0; 12/2/49, 23.6; 3/30/50, 19.8; 11/8/50, 25.4; 11/20/51, 23.1; 4/4/52, 16.7.

13N/4E-13F1—Reference point—bottom of pump base, elevation 62.9 feet, 150 feet south of Bear River Drive, 0.25 mile east of Four Corners. 12/2/47, 21.2; 3/10/48, 31.2; 11/4/48, 23.5; 3/31/49, 19.0; 12/2/49, 25.6.

13N/4E-13F2—Reference point—top of casing, elevation 65.5 feet. North side Bear River Drive, 0.30 mile east of Four Corners. 12/2/47, 23.2; 3/30/48, 21.8; 5/14/48, 19.5; 11/4/48, 25.5; 1/26/49, 23.0; 3/31/49, 21.0.

13N/4E-13F3—Reference point—top of 12-inch casing, elevation 66.9 feet. South side Bear River Drive, 0.50 mile east of Four Corners. 12/2/47, 23.6; 3/8/48, 28.2; 11/4/48, 25.5; 3/31/49, 21.2; 12/2/49, 27.9.

13N/4E-13G1—Reference point—top of 12-inch casing, elevation 67.8 feet, 200 feet south of Bear River Drive, 0.50 mile east of Four Corners. 12/2/47, 24.2; 3/8/48, 27.3; 11/4/48, 25.7; 3/31/49, 21.6; 12/2/49, 28.2.

13N/4E-13G2—Reference point—top of 14-inch casing, elevation 69.1 feet. South side Bear River Drive, 0.70 mile east of Four Corners. 12/2/47, 24.6; 3/10/48, 28.1; 3/30/48, 23.2; 11/4/48, 25.9; 3/31/49, 22.0; 12/2/49, 28.5; 3/30/50, 24.8; 11/8/50, 30.9; 4/3/51, 20.7; 11/20/51, 24.4; 4/4/52, 16.7.

13N/4E-13H1—Reference point—slot in concrete base, elevation 66 feet, 150 feet south of Bear River Drive, 0.95 mile east of Four Corners. 12/3/47, 22.4; 11/4/48, 24.4; 3/31/49, 21.7; 12/2/49, 27.1.

13N/4E-13K1—Reference point—top of twin holes in pump base, elevation 63 feet, 0.40 mile north of Gallagher Road, 0.50 mile east of Pleasant Grove Road. 12/5/47, 18.7.

13N/4E-13M1—Reference point—top of concrete foundation, elevation 60.8 feet, 700 feet east of Pleasant Grove Road, 0.30 mile north of Gallagher Road. 12/5/47, 19.6; 3/8/48, 25.7; 11/15/48, 21.6; 3/31/49, 17.7; 11/30/49, 25.1.

13N/4E-13M2—Reference point—top of casing, elevation 62.2 feet, 0.25 mile east of Pleasant Grove Road, 0.30 mile north of Gallagher Road. 12/5/47, 21.9; 3/8/48, 22.5; 3/31/48, 20.1; 11/15/48, 22.9; 4/1/49, 17.5; 11/30/49, 25.5.

13N/4E-13P1—Reference point—top of 14-inch casing, elevation 20.2 feet, 900 feet north of Gallagher Road, 0.40 mile east of Pleasant Grove Road. 12/5/47, 18.2; 3/8/48, 23.4; 11/5/48, 20.8; 4/1/49, 17.2; 11/30/49, 23.2.

13N/4E-13R1—Reference point—top of 14-inch casing, elevation 69.3 feet, 0.50 mile east of end of Gallagher Road, 1.00 mile east of Pleasant Grove Road. 12/8/47, 25.6; 3/10/48, 27.8; 3/31/48, 24.3; 11/5/48, 28.4; 4/1/49, 24.0; 11/30/49, 31.3; 3/30/50, 27.1; 11/9/50, 34.0; 4/4/51, 25.0; 11/21/51, 33.7.

13N/4E-14A1—Reference point—bottom of cutout in top of casing, elevation 59.28 feet, 900 feet north of Bear River Drive, 1,000 feet west of Pleasant Grove Road. 12/3/47, 19.1; 11/15/48, 20.4; 3/31/49, 16.7; 12/1/49, 22.9.

13N/4E-14D1—Reference point—bottom edge of pump base, elevation 55.0 feet, 900 feet east of Warren Road, 0.25 mile north of Bear River Drive. 12/3/47, 14.8; 2/10/48, 14.6; 3/31/48, 12.4; 11/15/48, 15.3; 3/31/49, 10.5; 12/1/49, 17.2.

13N/4E-14F1—Reference point—top of 12-inch casing, elevation 55.0 feet, 350 feet north of Bear River Drive, 0.30 mile east of Warren Road. 12/3/47, 17.7; 3/8/48, 20.0; 11/15/48, 18.6; 3/31/49, 14.2; 12/1/49, 20.8; 3/30/50, 15.9; 11/9/50, 22.2; 4/3/51, 13.0; 11/20/51, 19.2; 4/4/52, 6.0.

13N/4E-14F3—Reference point—top of casing, elevation 55.2 feet, 250 feet south of Bear River Drive, 0.40 mile east of Warren Road. 12/4/47, 17.4; 11/15/48, 18.9; 3/31/49, 14.8; 12/1/49, 21.3.

13N/4E-14J1—Reference point—hole in pump base, elevation 54 feet, 1,000 feet west of Pleasant Grove Road, 0.30 mile south of Bear River Drive. 12/4/47, 17.4; 11/15/48, 19.4; 3/31/49, 15.4; 12/1/49, 22.3.

13N/4E-14N1—Reference point—top of 14-inch casing in bottom of pit, elevation 48.5 feet, 400 feet east of Warren Road, 0.40 mile south of Bear River Drive. 12/4/47, 14.5; 3/31/48, 12.9; 11/15/48, 15.2; 3/31/49, 10.7; 12/1/49, 17.1.

13N/4E-14N2—Reference point—top of 14-inch casing, elevation 54.4 feet, 1,200 feet east of Warren Road, 0.35 mile south of Bear River Drive. 12/4/47, 21.0; 3/31/48, 19.5; 11/15/48, 21.8; 3/31/49, 17.2; 12/1/49, 23.9.

13N/4E-14Q1—Reference point—top of 14-inch casing, elevation 56 feet, 0.45 mile west of Pleasant Grove Road, 0.50 mile south of Bear River Drive. 12/4/47, 22.5; 11/15/48, 23.9; 3/31/49, 18.7; 12/1/49, 26.3.

13N/4E-14Q2—Reference point—top of 12-inch casing, elevation 59.1 feet, 0.25 mile west of Pleasant Grove Road, 0.25 mile north of Betz Road. 12/5/47, 23.2; 3/10/48, 33.3; 11/15/48, 24.6.

13N/4E-14R1—Reference point—hole in pump base, elevation 60.4 feet. West side Pleasant Grove Road, 1,000 ft. north of Gallagher Road. 12/5/47, 21.2; 3/8/48, 25.1; 3/31/48, 19.5; 5/8/48, 17.3; 11/5/48, 23.6; 11/15/48, 22.4; 1/26/49, 20.3; 3/31/49, 18.1; 11/30/49, 25.4.

13N/4E-14R2—Reference point—top of concrete pit, elevation 60.1 feet. West side Pleasant Grove Road, 1,100 feet north of Gallagher Road. 12/5/47, 21.8; 3/8/48, 21.5; 11/5/48, 23.6.

13N/4E-15A1—Reference point—top of pump base, elevation 54.7 feet, 350 feet west of Warren Road, 0.30 mile north of Bear River Drive. 12/3/47, 17.9; 3/8/48, 19.5; 3/31/48, 16.2; 11/15/48, 19.1; 3/31/49, 14.2; 12/1/49, 21.1.

13N/4E-15J2—Reference point—bottom edge of pump base, elevation 53.2 feet. South side Bear River Drive, 100 feet west of Warren Road. 12/4/47, 19.2; 3/10/48, 19.0.

TABLE 1—Continued

DEPTHS TO GROUND WATER AT MEASUREMENT WELLS IN SUTTER-YUBA AREA

Meosurements Mode by Division of Woter Resources
(Depths to woter in feet meosured from reference point)

13N 4E-15K1—Reference point—hole in pump base, elevation 51.8 feet. North side Bear River Drive, 1,200 feet northeast of Swanson Road. 12/4/47, 16.4; 3/30/48, 14.2; 5/5/48, 12.2; 6/3/48, 13.8; 7/2/48, 56.2; 11/15/48, 17.2; 1/26/49, 15.3; 3/31/49, 12.0; 5/25/49, 18.1; 6/29/49, 25.9; 8/26/49, 24.7; 12/1/49, 19.4.

13N 4E-15N1—Reference point—bottom of pump base, elevation 50.8 feet. North side Bear River Drive, 0.40 mile southwest of Swanson Road. 12/4/47, 19.2; 3/10/48, 18.2; 11/15/48, 19.0; 3/31/49, 12.5; 12/1/49, 21.3.

13N 4E-15N2—Reference point—hole in pump base, elevation 52.9 feet. 350 feet south of Bear River Drive, 0.30 mile southwest of Swanson Road. 12/4/47, 21.2; 3/10/48, 20.9; 11/15/48, 21.0; 3/31/49, 14.4; 12/1/49, 23.2.

13N 4E-15P1—Reference point—bottom of pump base, elevation 54.3 feet. 350 feet west of Swanson Road, 1,000 feet south of Bear River Drive. 12/4/47, 22.3; 3/10/48, 21.4; 11/15/48, 22.2; 3/31/49, 15.9; 12/1/49, 24.4.

13N 4E-15P2—Reference point—hole in pump base, elevation 51 feet. 200 feet north of junction of Swanson Road and Bear River Drive. 12/4/47, 17.0; 3/31/48, 14.2; 11/15/48, 17.0; 3/31/49, 11.1; 12/1/49, 18.8; 3/30/50, 11.6; 11/20/50, 19.1; 4/4/52, 5.9.

13N 4E-15R1—Reference point—bottom of slot in concrete base, elevation 54 feet. 100 feet west of Warren Road, 0.45 mile south of Bear River Drive. 12/4/47, 21.4; 3/8/48, 24.0; 11/15/48, 21.7; 3/31/49, 17.0; 12/1/49, 24.0.

13N 4E-16N1—Reference point—hole in pump base, elevation 43.7 feet. 600 feet west of Fourth Avenue, 0.75 mile north of Rio Oso Road. 12/6/47, 14.4; 3/30/48, 9.8; 5/5/48, 7.3; 5/31/48, 7.4; 11/16/48, 12.7; 4/1/49, 6.0; 5/25/49, 11.3; 6/2/49, 9.3; 7/1/49, 11.6; 8/1/49, 17.0; 8/31/49, 16.7; 11/30/49, 16.0; 3/30/50, 7.0; 11/9/50, 15.8; 4/3/51, 4.9; 11/20/51, 13.7; 4/4/52, 3.4.

13N 4E-17A1—Reference point—hole in base of pump, elevation 41 feet. 250 feet west of farm road, 1.25 miles north of Feather River Boulevard at Bear River Bridge. 11/21/47, 11.9; 3/10/48, 10.5; 12/8/49, 14.4.

13N 4E-17G2—Reference point—hole in base of pump, elevation 40 feet. 0.35 mile northeast of Feather River Boulevard at a point 0.60 mile northwest of Bear River Bridge. 11/21/47, 14.1; 3/10/48, 14.9; 11/5/48, 13.6; 3/15/49, 8.3; 12/7/49, 15.8.

13N 4E-17P1—Reference point—bottom of pump base, elevation 39 feet. 300 feet south of Feather River Boulevard, 0.60 mile northwest of Bear River Bridge. 11/20/47, 13.9; 3/10/48, 11.9; 5/8/48, 6.9; 11/5/48, 11.2; 1/24/49, 10.4; 3/15/49, 7.9; 6/1/49, 7.9; 7/29/49, 15.0; 8/26/49, 15.2; 12/8/49, 13.8; 3/29/50, 6.9; 11/6/50, 13.7; 3/30/51, 11.9; 11/16/51, 11.9.

13N 4E-17Q1—Reference point—top of floor board, elevation 42 feet. 800 feet east of Feather River Boulevard at a point 0.45 mile northwest of Bear River Bridge. 11/21/47, 13.1; 3/10/48, 11.9; 3/15/49, 7.2; 12/8/49, 14.9.

13N 4E-18F1—Reference point—hole in base of pump, elevation 35 feet. South side of curve in Feather River Boulevard, approximately 2.0 miles northwest of Bear River Bridge. 3/9/48, 13.0; 5/5/48, 9.0; 5/31/48, 9.9; 11/5/48, 11.5; 1/24/49, 13.0; 3/15/49, 11.3; 12/8/49, 15.9; 3/29/50, 10.6; 11/6/50, 15.1; 3/30/51, 7.5; 11/16/51, 13.8.

13N 4E-18L1—Reference point—top of tin casing, elevation 35 feet. 100 feet south of farm road, 1,200 feet southwest of Feather River Boulevard. 11/20/47, 11.8; 3/9/48, 13.3; 11/5/48, 14.7; 3/15/49, 11.1; 12/8/49, 15.8.

13N 4E-19Q1—Reference point—top of concrete under pump, elevation 35 feet. 0.25 mile northwest of Levee Road, 1.1 miles southwest of Feather River Boulevard at Bear River Bridge. 11/21/47, 13.7; 11/5/48, 15.7; 3/15/49, 9.9; 12/7/49, 17.0; 3/29/50, 10.1; 11/8/50, 15.6; 3/30/51, 10.2.

13N 4E-20B1—Reference point—top of casing, elevation 42 feet. Northeast of Feather River Boulevard just across Bear River Bridge. 11/21/47, 16.4; 3/10/48, 15.8; 11/5/48, 15.0.

13N 4E-20F1—Reference point—top of concrete under pump, elevation 39 feet. 900 feet west of Levee Road, 0.30 mile southwest of Feather River Boulevard at Bear River Bridge. 11/21/47, 12.3; 11/5/48, 12.2; 3/15/49, 7.0; 12/7/49, 13.7.

13N 4E-20G1—Reference point—base of pump, elevation 41 feet. 300 feet west of Levee Road, 700 feet southwest of Feather River Boulevard at Bear River Bridge. 11/21/47, 13.6; 11/5/48, 15.1; 3/15/49, 8.2; 12/7/49, 15.7.

13N 4E-20J1—Reference point—top of casing, elevation 41 feet. 400 feet south of Feather River Boulevard, 500 feet west of Sacramento Northern Railroad. 11/21/47, 12.9; 3/10/48, 11.9; 11/5/48, 11.8; 1/24/49, 10.4; 3/15/49, 6.6; 12/8/49, 14.3; 3/29/50, 6.9; 11/8/50, 14.4; 3/30/51, 3.8; 11/16/51, 12.2.

13N 4E-20N1—Reference point—top of casing, elevation 37 feet. North side of the west levee of Bear River, 0.99 mile south of Feather River Boulevard at Bear River Bridge. 11/21/47, 14.8; 11/5/48, 14.3; 3/15/49, 8.6; 12/7/49, 16.0.

13N 4E-20R2—Reference point—hole in pump base, elevation 41 feet. West of Sacramento Northern Railroad, 0.35 mile south of Rio Oso Road. 11/21/47, 15.9; 3/10/48, 14.9; 5/11/48, 11.4; 3/15/49, 11.0; 12/8/49, 16.3.

13N 4E-21A1—Reference point—bottom edge of pump base, elevation 50 feet. 500 feet south of west end of Bear River Drive. 12/4/47, 19.2; 3/10/48, 18.3; 3/31/48, 15.9; 11/15/48, 19.9; 1/26/49, 17.6; 3/31/49, 11.8; 12/1/49, 21.4; 3/30/50, 12.0; 11/9/50, 21.0; 4/3/51, 9.2; 11/20/51, 18.7; 4/4/52, 6.6.

13N 4E-21B1—Reference point—pipe elbow in casing, elevation 47.8 feet. 0.25 mile west of west end of Bear River Drive. 12/4/47, 16.7; 3/10/48, 19.0; 11/15/48, 16.6; 3/31/49, 9.8; 12/1/49, 18.8; 11/20/51, 16.3; 4/4/52, 5.9.

13N 4E-21C1—Reference point—bottom of flanged coupling, elevation 45.1 feet. 630 feet east of Fourth Avenue, 0.25 mile north of Rio Oso Road. 12/6/47, 17.0; 3/9/48, 15.3; 11/16/48, 15.9; 4/1/49, 8.9; 11/30/49, 18.4.

13N 4E-21D1—Reference point—top of flanged coupling, elevation 43 feet. West side of Fourth Avenue, 0.25 mile north of Rio Oso Road. 12/6/47, 15.0; 3/9/48, 12.8; 3/31/48, 11.7; 11/16/48, 13.5; 4/1/49, 7.9; 11/30/49, 16.4.

13N 4E-21E1—Reference point—top of 12-inch casing, elevation 42 feet. 250 feet north of Rio Oso Road, 800 feet west of Fourth Avenue. 12/6/47, 17.1; 3/11/48, 16.3.

13N 4E-21F1—Reference point—top of 14-inch casing, elevation 43 feet. 600 feet north of Rio Oso Road, 0.2 mile east of Fourth Avenue. 12/6/47, 17.4.

13N 4E-21H1—Reference point—hole in pump base, elevation 46.2 feet. 250 feet north of Rio Oso Road, 800 feet west of Pacific Avenue. 12/5/47, 17.1; 3/9/48, 15.4; 3/31/48, 14.6; 5/8/48, 11.5; 11/16/48, 16.9; 4/1/49, 10.0; 11/29/49, 18.8.

13N 4E-21L1—Reference point—top of 12-inch casing, elevation 42.5 feet. East side of Fourth Avenue, 250 feet south of Rio Oso Road. 12/8/47, 15.6; 3/9/48, 13.8; 11/15/48, 14.7; 4/1/49, 9.6; 11/30/49, 17.0.

13N 4E-21P1—Reference point—bottom of flanged coupling, elevation 36.1 feet. 250 feet east of Fourth Avenue, 300 feet north of Kempton Road. 12/8/47, 9.6; 3/9/48, 8.6.

13N 4E-21P2—Reference point—edge of pump base, elevation 44.7 feet. 600 feet north of Kempton Road, 0.25 mile east of Fourth Avenue. 12/8/47, 17.4; 3/9/48, 16.5; 3/31/48, 15.3; 11/16/48, 17.2; 4/1/49, 12.1; 11/30/49, 19.2; 3/30/50, 13.4; 11/9/50, 20.1; 1/3/51, 9.1; 11/21/51, 18.1; 4/4/52, 8.3.

13N 4E-21R1—Reference point—top of 8-inch casing, elevation 45 feet. 350 feet north of Kempton Road, 650 feet west of Pacific Avenue. 12/16/47, 20.7; 3/10/48, 19.9; 11/16/48, 21.2; 4/1/49, 17.0; 11/29/49, 23.2.

TABLE 1—Continued

DEPTHS TO GROUND WATER AT MEASUREMENT WELLS IN SUTTER-YUBA AREA

Measurements Made by Division of Water Resources
(Depths to water in feet measured from reference point)

13N/4E-22A1—Reference point—top of 16-inch casing, elevation 51 feet, 350 feet west of Warren Road, 700 feet north of Betz Road. 12/5/47, 22.6; 3/31/48, 21.1.

13N/4E-22E1—Reference point—top of 12-inch casing, bottom of pit, elevation 40.4 feet, 1,000 feet north of Rio Oso Road, 0.35 mile west of Swanson Road. 12/5/47, 10.4; 3/9/48, 8.8.

13N/4E-22F1—Reference point—hole in pump base, elevation 53.1 feet, 300 feet west of Swanson Road, 500 feet north of Rio Oso Road. 12/5/47, 22.2; 3/10/48, 21.6; 11/16/48, 22.1; 4/1/49, 16.9; 11/30/49, 24.4.

13N/4E-22G1—Reference point—top of 12-inch casing, elevation 55.1 feet. North side of Rio Oso Road, 700 feet east of Swanson Road. 12/5/47, 23.9; 3/9/48, 23.6; 11/16/48, 23.8; 4/1/49, 19.8; 11/30/49, 26.5; 3/30/50, 21.5; 11/9/50, 27.5; 4/4/51, 18.7; 11/20/51, 25.7; 4/3/52, 16.9.

13N/4E-23B1—Reference point—bottom of pump base, elevation 58.6 feet. South side of Gallagher Road, 0.30 mile west of Pleasant Grove Road. 12/5/47, 21.3; 3/10/48, 27.8; 3/31/48, 20.8; 11/15/48, 23.0; 3/31/49, 19.0; 11/30/49, 25.7.

13N/4E-23C1—Reference point—hole in pump base, elevation 55 feet, 0.25 mile north of Betz Road, 0.30 mile east of Warren Road. 12/5/47, 22.7; 3/8/48, 26.9; 3/31/48, 21.9; 11/15/48, 23.6; 3/31/49, 19.6; 11/30/49, 26.2.

13N/4E-23D1—Reference point—bottom of pump base, elevation 51 feet. East side of Warren Road, 1,000 feet north of Betz Road. 12/5/47, 23.4; 3/10/48, 27.6; 11/15/48, 23.8; 3/31/49, 19.5; 11/30/49, 26.4.

13N/4E-23Q1—Reference point—top of 14-inch casing, elevation 62.7 feet, 500 feet north of Kempton Road, 0.25 mile west of Pleasant Grove Road. 12/16/47, 26.2; 3/9/48, 26.2; 5/8/48, 22.9; 11/5/48, 27.3; 1/26/49, 25.4; 4/1/49, 24.0; 11/30/49, 30.0; 3/30/50, 26.9; 11/9/50, 33.1; 4/3/51, 26.5; 11/20/51, 31.4; 4/3/52, 26.8.

13N/4E-24D1—Reference point—top of 14-inch casing, elevation 61.8 feet, 800 feet south of Gallagher Road, 1,000 feet east of Pleasant Grove Road. 12/5/47, 21.0; 3/10/48, 25.2; 3/31/48, 19.8; 11/5/48, 23.8; 3/31/49, 19.4; 11/30/49, 26.1; 3/30/50, 22.4; 11/9/50, 28.5; 4/4/51, 20.6; 11/21/51, 26.4; 4/4/52, 18.0.

13N/4E-24Q1—Reference point—top of 12-inch casing, bottom of pit, elevation 53.8 feet, 100 feet north of Kempton Road, 0.75 mile east of Pleasant Grove Road. 12/8/47, 11.8.

13N/4E-26B1—Reference point—top of 14-inch casing, elevation 58 feet, 200 feet south of Kempton Road, 0.45 mile west of Pleasant Grove Road. 3/9/48, 25.3; 11/5/48, 25.6; 4/1/49, 21.3; 11/30/49, 27.4.

13N/4E-26H1—Reference point—hole in pump base, elevation 57 feet, 350 feet west of Pleasant Grove Road, 0.45 mile south of Kempton Road. 11/8/47, 24.2; 3/9/48, 24.6; 11/16/48, 26.4; 4/4/49, 22.0; 11/30/49, 28.5.

13N/4E-26R1—Reference point—top of 14-inch casing, elevation 59 feet. West side of Pleasant Grove Road, 0.85 mile south of Kempton Road. 12/8/47, 25.5; 3/8/48, 24.9; 3/31/48, 24.2; 11/16/48, 28.1; 1/26/49, 26.5; 4/4/49, 23.7; 5/25/49, 34.0; 6/29/49, 42.4; 7/29/49, 48.8; 8/26/49, 49.0; 11/30/49, 29.6; 3/30/50, 26.4; 11/9/50, 33.9; 11/21/51, 33.7; 4/3/52, 26.9.

13N/4E-27C1—Reference point—bottom of flanged coupling, bottom of pit, elevation 46 feet, 400 feet south of Kempton Road, 0.40 mile east of Pacific Avenue. 12/16/47, 18.0.

13N/4E-27N1—Reference point—hole in pump base, elevation 51 feet, 250 feet east of Pacific Avenue, 0.90 mile south of Kempton Road. 12/16/47, 24.0; 3/11/48, 25.2.

13N/4E-28D1—Reference point—top of 12-inch casing, bottom of pit, elevation 27.7 feet, 600 feet south of Kempton Road, 700 feet west of Fourth Avenue. 12/8/47, 2.7; 3/11/48, 1.3; 3/31/48, 0.4; 11/16/48, 2.4; 4/1/49, —2.8; 11/30/49, 3.9.

13N/4E-28F1—Reference point—access hole to casing in bottom of pit, elevation 32.7 feet, 100 feet east of Fourth Avenue, 0.25 mile south of Kempton Road. 12/8/47, 6.8; 4/1/49, 2.6.

13N/4E-28R1—Reference point—hole in base, elevation 46 feet, 250 feet west of Pacific Avenue, 0.80 mile south of Kempton Road. 12/16/47, 23.2; 3/10/48, 22.4; 11/16/48, 25.1; 4/5/49, 21.5; 11/29/49, 26.1; 11/21/51, 27.9; 4/3/52, 22.5.

13N/4E-29F1—Reference point—top of east concrete wall, elevation 36 feet, 400 feet west of junction of Mark Hopkins Avenue and Berry Road. 11/21/47, 14.7; 3/10/48, 13.1; 11/5/48, 14.3; 1/24/49, 12.5; 3/15/49, 9.5; 5/25/49, 10.5; 6/29/49, 14.5; 7/28/49, 18.3; 8/26/49, 18.4; 12/7/49, 15.7; 3/29/50, 9.5; 11/8/50, 16.4; 3/30/51, 6.2; 11/16/51, 14.8.

13N/4E-29G1—Reference point—top of casing, elevation 37 feet, 0.10 mile southeast of Berry Road, 0.20 mile northeast of Mark Hopkins Avenue. 11/21/47, 13.2; 3/10/48, 11.8; 5/11/48, 8.9; 11/5/48, 13.1; 3/15/49, 8.4; 12/8/49, 14.4.

13N/4E-29M2—Reference point—bottom 2″ x 6″ floor, elevation 34 feet, 150 feet northwest of Berry Road, 0.25 mile southwest of Mark Hopkins Avenue. 11/21/47, 15.4; 3/10/48, 13.1; 11/5/48, 14.5; 12/7/49, 16.0.

13N/4E-30R2—Reference point—top of casing, elevation 33 feet, 400 feet south of southwest end of Berry Road. 11/21/47, 15.1; 3/11/48, 13.8; 11/5/48, 15.1; 3/16/49, 13.6; 12/8/49, 16.0.

13N/4E-31J1—Reference point—top of casing, elevation 52 feet, 0.25 mile north of Cornelius Avenue, 0.70 mile west of Mark Hopkins Avenue. 12/8/47, 14.8; 3/11/48, 13.1; 5/11/48, 9.2; 12/14/48, 15.6; 3/28/49, 10.2; 12/7/49, 15.8.

13N/4E-32B1—Reference point—top of south concrete wall, elevation 34 feet, 100 feet north of Cramer Road, 150 feet west of Mark Hopkins Avenue. 12/9/47, 14.9; 3/11/48, 13.2; 12/15/48, 16.9; 3/16/49, 12.9; 12/7/49, 16.1.

13N/4E-32D1—Reference point—top of east concrete wall, elevation 34 feet, 200 feet north of Cramer Road, 0.50 mile west of Mark Hopkins Avenue. 12/9/47, 15.1; 3/11/48, 13.2; 12/15/48, 16.9; 3/16/49, 12.3; 12/7/49, 16.1.

13N/4E-32H1—Reference point—top of north concrete wall, elevation 40 feet. East side of Mark Hopkins Avenue, 0.55 mile north of Cornelius Avenue. 12/8/47, 13.6; 3/11/48, 12.8; 5/11/48, 11.1; 12/13/48, 13.9; 3/16/49, 20.3; 12/6/49, 18.0; 3/29/50, 14.6; 11/6/50, 21.0; 3/30/51, 13.5; 11/16/51, 20.8; 4/4/52, 13.4.

13N/4E-32L1—Reference point—top of south concrete wall, elevation 35 feet, 0.25 mile west of Mark Hopkins Avenue, 0.40 mile north of Cornelius Avenue. 12/8/47, 20.6; 3/11/48, 19.4; 12/14/48, 21.9; 3/28/49, 18.4; 12/7/49, 22.3.

13N/4E-33A2—Reference point—pipe in base, elevation 50 feet, 200 feet west of Pacific Avenue, 0.9 mile north of Cornelius Avenue. 12/16/47, 25.6; 3/10/48, 24.6; 3/31/48, 25.7; 11/16/48, 27.9; 1/26/49, 26.0; 4/5/49, 24.4; 11/29/49, 28.7; 3/30/50, 25.7; 11/9/50, 31.6; 4/3/51, 24.0; 11/21/51, 31.8; 4/3/52, 24.1.

13N/4E-33G1—Reference point—bottom of pump base, elevation 47 feet, 0.4 mile west of Pacific Avenue, 0.5 mile north of Cornelius Avenue. 12/16/47, 28.6; 3/10/48, 27.5; 3/31/48, 27.3; 5/11/48, 26.7; 11/16/48, 30.9; 4/5/49, 27.5; 11/29/49, 31.3.

13N/4E-33L1—Reference point—top of casing, elevation 45 feet, 0.3 mile north of Cornelius Avenue, 0.5 mile east of Electric Avenue. 3/29/49, 24.1.

13N/4E-33P1—Reference point—hole in pump base, elevation 45 feet, 0.5 mile east of Electric Avenue, 0.2 mile north of Cornelius Avenue. 3/11/48, 22.1; 12/14/48, 24.7; 3/29/49, 22.3; 12/7/49, 22.6; 3/27/50, 25.7; 11/6/50, 32.0; 4/2/51, 25.9; 11/16/51, 30.6; 4/3/52, 24.6.

TABLE 1—Continued

DEPTHS TO GROUND WATER AT MEASUREMENT WELLS IN SUTTER-YUBA AREA

Measurements Made by Division of Water Resources
(Depths to water in feet measured from reference point)

13N 4E-33R1—Reference point—top of concrete pit, elevation 46 feet. 200 feet west of Pacific Avenue, 600 feet north of Cornelius Avenue. 11/8/29, 21.5; 9/8/30, 20.6; 12/30/30, 20.9; 12/10/31, 21.6; 12/11/32, 20.9; 12/20/33, 21.3; 10/27/34, 21.3; 11/23/36, 23.5; 11/24/37, 25.6; 1/30/39, 19.8; 12/22/47, 24.2; 3/11/48, 22.5; 3/31/48, 22.6; 12/14/48, 26.1; 3/29/49, 23.6; 12/7/49, 26.4; 3/27/50, 24.2; 11/6/50, 29.7; 4/2/51, 23.5; 11/16/51, 23.3; 12/6/51, 31.4; 1/4/52, 24.3.

13N 4E-34L1—Reference point—top of casing, elevation 48 feet. 0.2 mile east of Pacific Avenue, 0.4 mile north of Cornelius Avenue. 12/16/47, 23.6; 3/10/48, 22.8; 3/31/48, 22.7; 10/16/48, 26.1; 4/5/49, 23.2; 11/29/49, 27.1; 3/30/50, 24.5; 11/9/50, 30.6; 4/3/51, 24.1; 11/21/51, 30.5; 4/3/52, 24.5.

13N 4E-35J1—Reference point—top of floor of pit, elevation 42 feet. 0.4 mile north of Cornelius Avenue, 0.02 mile west of Pleasant Grove Road. 12/8/47, 8.8; 3/31/48, 7.2; 11/16/48, 11.6; 4/4/49, 8.4; 11/30/49, 13.8; 3/30/50, 11.3; 11/9/50, 19.0.

13N 4E-35Q1—Reference point—top of casing, elevation 56.6 feet. 0.4 mile west of Pleasant Grove Road, 132 feet north of Cornelius Avenue. 3/11/48, 19.9; 12/13/48, 25.1; 3/29/49, 21.1; 12/7/49, 26.0; 11/19/51, 30.4.

13N 4E-36G1—Reference point—top of casing, elevation 58 feet. 528 feet north of Hicks Road, 0.6 mile east of Pleasant Grove Road. 12/16/47, 23.8; 3/9/48, 22.6; 11/16/48, 26.7; 4/4/49, 24.2; 11/30/49, 29.1.

13N 5E-3Q1—Reference point—top of casing at bottom of 10.6-foot pit, elevation 84 feet. 0.25 mile northeast of U. S. Highway 99E, 0.20 mile southeast of Bear River. 11/25/47, 4.4; 3/5/48, 5.5; 11/7/49, 6.0; 4/4/50, 4.9; 11/14/50, 5.7; 3/27/51, 2.0; 11/19/51, 6.3.

13N 5E-4J1—Reference point—top of pump base, elevation 83 feet. 0.2 mile southwest of U. S. Highway 99E at a point 0.45 mile northwest of Bear River bridge. 11/24/47, 14.8; 3/29/48, 12.7; 5/14/48, 11.9; 11/12/48, 15.6; 3/23/49, 12.9; 11/26/49, 17.3; 3/29/50, 14.1; 11/8/50, 17.5; 4/4/51, 12.5; 12/3/51, 16.6; 4/2/52, 11.3.

13N 5E-4J2—Reference point—top of casing, elevation 80 feet. 0.25 mile southwest of U. S. Highway 99E at a point 0.3 mile northwest of Yuba-Placer county line. 4/1/48, 9.2; 5/5/48, 7.9; 6/3/48, 8.5; 7/2/48, 64.0 (operating); 7/1/49, 60.7 (operating); 8/1/49, 65.8 (operating); 8/31/49, 28.8.

13N 5E-4L1—Reference point—hole in pump base, elevation 82.6 feet. 0.3 mile southwest of U. S. Highway 99E in Wheatland on south side of T. H. Richards' farm road. 11/24/47, 19.9; 3/4/48, 21.1; 11/12/48, 21.0; 3/24/49, 27.0; 11/26/49, 22.7.

13N 5E-4N1—Reference point—top of concrete base, elevation 79.9 feet. At T. H. Richards' ranch house, 0.8 mile southwest of Wheatland. 11/25/47, 17.7; 3/5/48, 21.6; 3/29/48, 15.4; 11/12/48, 18.7; 3/24/49, 14.9; 11/26/49, 20.4.

13N 5E-4R1—Reference point—top of concrete crib, south of pump, elevation 81 feet. 0.35 mile southwest of U. S. Highway 99E at a point 0.2 mile northwest of Yuba-Placer county line. 11/24/47, 13.7; 5/14/48, 10.2; 11/12/48, 14.1; 1/26/49, 13.4; 3/23/49, 10.8; 11/26/49, 15.3.

13N 5E-5B1—Reference point—top of casing, elevation 69.9 feet. 0.1 mile northeast of Oakley Avenue, 0.45 mile northwest of Wheatland Avenue. 11/24/47, 15.2; 3/5/48, 14.1.

13N 5E-5C1—Reference point—hole in pump base, elevation 68.1 feet. 0.25 mile northeast of Oakley Avenue, 0.45 mile northwest of Wheatland Road. 11/22/47, 14.5; 3/5/48, 13.4; 3/29/48, 12.2; 5/14/48, 11.6; 11/11/48, 16.0; 1/26/49, 14.2; 3/23/49, 12.1; 11/28/49, 18.5; 3/29/50, 14.9; 11/8/50, 20.7; 4/4/51, 11.5; 11/29/51, 19.3; 4/2/52, 8.2.

13N 5E-5C2—Reference point—top of pump base, elevation 72.2 feet. 0.15 mile northeast of Oakley Avenue, 0.35 mile northwest of Wheatland Road. 11/20/47, 18.5; 3/5/48, 17.4.

13N 5E-5D1—Reference point—top of concrete pit, elevation 66.5 feet. 0.1 mile southwest of Oakley Avenue, 0.6 mile northwest of Wheatland Road. 11/20/47, 15.7; 3/5/48, 15.1.

13N 5E-5L1—Reference point—top of casing, elevation 80.6 feet. Southeast side of Wheatland Road, 0.15 mile southwest of Oakley Avenue. 11/20/47, 27.5; 3/8/48, 27.5; 11/11/48, 30.6; 3/24/49, 24.1; 11/26/49, 31.1.

13N 5E-5L2—Reference point—top of concrete curb around casing, elevation 68.1 feet. Southeast side of Wheatland Road, 0.15 mile southwest of Oakley Avenue. 11/20/47, 15.6; 3/8/48, 14.3; 11/11/48, 17.3; 3/24/49, 11.7.

13N 5E-5L3—Reference point—top of casing, elevation 78.1 feet. 300 feet southwest of Oakley Avenue, 0.1 mile northwest of Wheatland Road. 11/20/47, 24.3; 3/5/48, 23.2; 11/11/48, 25.9; 3/25/49, 21.0; 11/28/49, 28.6.

13N 5E-5N1—Reference point—top of concrete crib nearest pump, elevation 70.4 feet. 0.2 mile southeast of Wheatland Road, 0.45 mile southwest of Oakley Avenue. 11/21/47, 19.2; 3/29/48, 16.0; 11/12/48, 21.9; 3/24/49, 15.2; 11/26/49, 23.5.

13N 5E-5P1—Reference point—top of pump base, elevation 71.1 feet. 0.2 mile southwest of Oakley Avenue, 0.25 mile southeast of Wheatland Road. 11/20/47, 17.6; 3/8/48, 18.3; 3/24/49, 14.2; 11/26/49, 21.2.

13N 5E-5Q1—Reference point—top of casing, elevation 75 feet. Southwest side of Oakley Avenue, 0.3 mile southeast of Wheatland Road. 11/20/47, 23.4; 3/8/48, 21.1; 3/24/49, 18.0.

13N 5E-6E1—Reference point—hole in west side pump base, elevation 63.0 feet. 0.7 mile northwest of Wheatland Road, 1.05 miles southwest of Oakley Avenue. 11/21/47, 17.8; 2/21/48, 15.6; 11/12/48, 19.5; 1/26/49, 17.0; 3/24/49, 15.1; 11/23/49, 22.9; 3/20/50, 18.4; 11/8/50, 25.2; 4/3/51, 14.8; 11/30/51, 24.3; 4/2/52, 23.1.

13N 5E-6E2—Reference point—hole in pump base, elevation 63.3 feet. 0.9 mile northwest of Wheatland Road, 1.0 mile southwest of Oakley Avenue. 11/21/47, 19.4; 2/21/48, 16.7; 5/5/48, 13.7; 6/3/48, 15.1; 7/2/48, 21.4; 11/12/48, 21.0; 3/24/49, 16.5; 5/3/49, 21.2; 6/2/49, 22.0; 7/1/49, 51.6 (operating); 8/1/49, 30.1; 8/31/49, 28.8; 11/28/49, 24.3.

13N 5E-6J1—Reference point—top of casing, elevation 67.6 feet. 0.15 mile northwest of Wheatland Road, 0.55 mile southwest of Oakley Avenue. 11/21/47, 19.1; 11/12/48, 21.0; 3/24/49, 15.4; 11/26/49, 23.5.

13N 5E-6L1—Reference point—top of casing, elevation 61.9 feet. 0.5 mile northwest of Wheatland Road, 0.8 mile southwest of Oakley Avenue. 11/21/47, 20.1; 3/5/48, 20.1; 11/12/48, 21.7; 3/24/49, 16.6; 11/26/49, 24.8.

13N 5E-7B1—Reference point—notch in concrete casing, elevation 72.2 feet. Northwest side of Wheatland Road, 0.9 mile southwest of Oakley Avenue. 11/21/47, 24.5; 3/5/48, 26.1; 11/12/48, 25.7; 3/24/49, 20.5; 11/26/49, 28.8; 3/9/50, 23.4; 11/18/50, 30.0; 1/3/51, 19.3; 12/3/51, 29.3; 4/2/52, 16.5.

13N 5E-7C1—Reference point—top of casing, elevation 71.4 feet. Northwest side of Wheatland Road, 1.3 mile southwest of Oakley Avenue. 11/28/47, 24.3; 3/2/48, 25.9; 11/12/48, 25.4; 3/24/49, 20.9.

13N 5E-7C2—Reference point—hole in top of pump base, elevation 68.3 feet. Northwest side of Wheatland Road, 1.2 miles southwest of Oakley Avenue. 11/21/47, 21.5; 3/8/48, 25.1; 3/29/48, 18.6; 5/5/48, 16.3; 6/3/48, 17.5; 7/2/48, 33.0; 11/12/48, 22.7; 3/24/49, 18.1; 6/2/49, 29.8; 8/1/49, 48.1; 8/31/49, 36.3; 11/26/49, 25.7.

13N 5E-7E1—Reference point—slot in casing, elevation 69 feet. Northwest side of Wheatland Road, 1.5 miles southwest of Oakley Avenue. 11/28/47, 23.6; 3/2/48, 26.9; 11/12/48, 24.8; 3/24/49, 20.2; 11/23/49, 28.9.

TABLE 1—Continued

DEPTHS TO GROUND WATER AT MEASUREMENT WELLS IN SUTTER-YUBA AREA

Measurements Mode by Division of Woter Reso:rces
(Depths to woter in feet meosured from reference point)

13N/5E-7G1—Reference point—top of casing, elevation 80.5 feet. At Bear River north levee, 0.35 mile southeast of Wheatland Road, 1.1 miles southwest of Oakley Avenue. 11/21/47, 31.7; 3/5/48, 37.6; 3/29/48, 28.4; 5/14/48, 25.5; 11/12/48, 31.5; 1/26/49, 29.5; 3/24/49, 27.2; 11/23/49, 34.4.

13N/5E-7F1—Reference point—top of concrete base, elevation 77.3 feet. At Bear River north levee, 0.35 mile southeast of Wheatland Road, 1.3 miles southwest of Oakley Avenue. 11/21/47, 29.3; 3/8/48, 33.7; 11/12/48, 30.3; 3/24/49, 26.1; 11/23/49, 34.9; 3/29/50, 28.6; 11/6/50, 35.9; 4/3/51, 25.0; 12/3/51, 33.7; 4/2/52, 22.7.

13N/5E-7H1—Reference point—bottom of pump base, elevation 80.4 feet. 0.3 mile southeast of Wheatland Road, 0.9 mile southwest of Oakley Avenue. 11/21/47, 31.1; 3/5/48, 35.7; 11/12/48, 31.8; 3/24/49, 27.3; 11/23/49, 34.0

13N/5E-7K1—Reference point—hole in pump base, elevation 74.9 feet. West side of Huffaler Road, 0.55 mile north of Bear River Drive. 12/3/47, 26.4; 3/8/48, 29.4; 11/8/48, 27.9; 3/31/49, 23.2; 12/6/49, 30.3; 3/30/50, 26.0; 11/8/50, 33.0; 4/3/51, 21.7; 4/3/52, 18.7.

13N/5E-7L1—Reference point—edge of pump base, elevation 74.8 feet. 0.5 mile north of Bear River Drive on west side of Hudson Road extended. 12/3/47, 27.5; 3/30/48, 25.2; 11/4/48, 29.5; 3/30/49, 25.0; 12/2/49, 33.9.

13N/5E-7M1—Reference point—top of casing, elevation 73.4 feet. At Bear River north levee, 0.25 mile south of Wheatland Road, 1.1 miles east of Pleasant Grove Road. 12/24/47, 28.1; 3/8/48, 33.7; 3/29/48, 25.9; 11/15/48, 29.1; 3/31/49, 25.1; 12/2/49, 31.9.

13N/5E-8B1—Reference point—hole in pump base, elevation 76.7 feet. 0.1 mile southwest of Oakley Avenue, 0.5 mile southeast of Wheatland Road. 11/21/47, 20.6; 3/5/48, 21.3; 11/11/48, 23.3; 3/24/49, 17.3; 11/26/49, 24.2; 3/29/50, 20.1; 11/8/50, 24.5; 4/3/51, 16.6; 12/3/51, 22.2; 4/2/52, 13.2.

13N/5E-8G1—Reference point—hole in pump base, elevation 81.3 feet. At Bear River north levee, 0.1 mile southwest of Oakley Avenue, 11/21/37, 20.1; 3/5/48, 19.3; 11/11/48, 20.1; 3/24/49, 16.3. Well filled.

13N/5E-8H1—Reference point—hole in pump base, elevation 83.7 feet. At Bear River north levee, 0.1 mile northeast of Oakley Avenue. 11/25/47, 21.5; 3/5/48, 21.4; 3/29/48, 19.4; 11/12/48, 22.3; 3/24/49, 18.2; 11/26/49, 23.8.

13N/5E-8J1—Reference point—hole in pump base, elevation 84.4 feet. 0.7 mile north of Bear River Drive, 0.85 mile east of Brewer Road. 11/26/47, 26.6; 3/22/48, 25.5; 11/4/48, 28.5; 3/30/49, 24.0; 12/6/49, 30.3; 3/30/50, 17.9; 11/9/50, 31.0; 4/3/51, 24.0; 11/20/51, 29.8; 4/3/52, 14.6.

13N/5E-8L1—Reference point—hole in pump base, elevation 75 feet. 0.25 mile east of Brewer Road, 0.75 mile north of Bear River Drive. 11/26/47, 26.7; 3/22/48, 23.9; 11/4/48, 26.8; 3/30/49, 22.3; 12/6/49, 29.2.

13N/5E-8N1—Reference point—bottom of pump base by air line, elevation 76.4 feet. 0.15 mile east of Brewer Road, 0.5 mile north of Bear River Drive. 11/26/47, 25.0; 3/22/48, 23.0; 11/4/48, 25.8; 3/30/49, 21.8; 12/6/49, 28.0.

13N/5E-8P1—Reference point—top of casing, elevation 76.6 feet. 0.4 mile north of Bear River Drive, 0.5 mile east of Brewer Road. 11/26/47, 20.6; 3/22/48, 19.0; 3/30/48, 18.2; 11/4/48, 22.1; 3/30/49, 17.7; 12/6/49, 24.6.

13N/5E-8R1—Reference point—pipe in concrete base, elevation 75 feet, 0.5 mile north of Bear River Drive, 0.75 mile east of Brewer Road. 11/4/48, 25.1; 3/30/49, 20.4; 12/6/49, 27.1.

13N/5E-9C1—Reference point—slot in concrete base, elevation 76.8 feet. 0.1 mile north of Bear River north levee, 0.3 mile southeast of T. H. Richards' ranch house, 0.8 mile southwest of Wheatland. 11/25/47, 11.9; 3/5/48, 12.1; 3/29/48, 9.7; 11/12/48, 12.5; 3/24/49, 9.4; 11/26/49, 14.0.

13N/5E-9D1—Reference point—top of base under air line, elevation 82.3 feet. At Bear River north levee, 0.4 mile southeast of T. H. Richards' ranch house, 0.8 mile southwest of Wheatland. 11/25/47, 13.9; 3/5/48, 13.4; 3/29/48, 12.3; 11/12/48, 14.0; 3/24/49, 11.5; 11/26/49, 14.6; 3/29/50, 11.2; 11/8/50, 14.0; 4/3/51, 9.9; 12/3/51, 13.7; 4/2/52, 8.6.

13N/5E-9E1—Reference point—inside edge of tapered base, elevation 83.5 feet. At Bear River north levee, 0.45 mile south of T. H. Richards' ranch house, 0.8 mile southwest of Wheatland. 11/25/47, 18.1; 3/5/48, 17.6; 11/12/48, 18.2; 3/24/49, 15.2. Well destroyed.

13N/5E-9G1—Reference point—hole in pump base, elevation 85.1 feet. 0.3 mile west of Placer Road, 0.75 mile north of Bear River Drive. 11/26/47, 15.9; 11/4/48, 17.2; 3/30/49, 14.2; 12/6/49, 20.4.

13N/5E-9H1—Reference point—top of casing, elevation 86.4 feet. 1.0 mile north of Bear River Drive, 500 feet west of Placer Road extended. 11/26/47, 15.3; 11/4/48, 15.8; 3/30/49, 14.4; 11/7/49, 18.8; 12/6/49, 18.4; 11/9/50, 19.8. Well destroyed.

13N/5E-9H2—Reference point—hole in pump base, elevation 86.4 feet. 1.0 mile north of Bear River Drive, 600 feet west of Placer Road extended. 11/20/51, 20.1; 4/3/52, 13.5.

13N/5E-9P1—Reference point—hole in pump base, elevation 80.4 feet. 0.5 mile north of Bear River Drive, 0.7 mile west of Placer Road. 12/26/47, 17.6; 11/4/47, 19.5; 3/30/49, 15.6; 12/6/49, 21.0.

13N/5E-9R1—Reference point—hole in pump base, elevation 83.6 feet. West side of Placer Road, 0.5 mile north of Bear River Drive. 11/26/47, 15.7; 3/22/48, 14.5; 3/30/48, 13.8; 5/8/48, 12.9; 11/4/48, 17.2; 1/26/49, 16.7; 2/18/49, 16.3; 3/16/49, 15.7; 3/30/49, 14.8; 7/29/49, 50.5 (operating); 11/7/49, 19.9; 12/6/49, 19.6; 2/15/50, 17.6; 3/15/50, 17.2; 4/4/50, 16.7; 5/9/50, 18.1; 6/7/50, 20.0; 8/3/50, 21.9; 10/3/50, 22.2; 11/14/50, 20.3; 12/14/50, 16.5; 1/4/51, 15.2; 2/7/51, 13.2; 3/7/51, 12.8; 3/27/51, 12.6; 7/16/51, 23.7; 8/22/51, 24.9; 9/26/51, 19.5; 11/19/51, 19.6; 2/28/52, 13.5; 4/4/52, 12.0.

13N/5E-16D1—Reference point—hole in casing, elevation 78 feet. North side of Bear River Drive, 0.8 mile west of Placer Road. 11/26/47, 18.1; 3/22/48, 17.8; 3/30/48, 16.2; 5/8/48, 15.0; 11/4/48, 21.2; 1/26/49, 18.3; 3/30/49, 16.0; 6/29/49, 26.3; 7/27/49, 28.4; 8/26/49, 27.8; 12/6/49, 22.9; 3/30/50, 18.7; 11/9/50, 24.6; 4/3/51, 15.9; 11/20/51, 22.2; 4/3/52, 12.9.

13N/5E-16E1—Reference point—hole in pump base, elevation 75.9 feet. 0.1 mile south of Bear River Drive, 0.85 mile west of Placer Road. 11/26/47, 16.5; 3/22/48, 18.2; 11/4/48, 19.9; 3/30/49, 14.3; 12/6/49, 21.4.

13N/5E-17D1—Reference point—top of concrete base, elevation 71.2 feet. 0.15 mile east of Brewer Road, 0.2 mile north of Bear River Drive. 11/26/47, 18.3; 3/22/48, 19.7; 11/4/48, 22.3; 3/30/49, 18.9; 12/6/49, 25.1; 3/30/50, 22.2; 11/9/50, 27.2; 4/3/51, 18.9; 11/20/51, 25.6; 4/3/52, 15.6.

13N/5E-17J2—Reference point—hole in pump base, elevation 70 feet. 0.4 mile south of Bear River Drive, 1.0 mile west of Placer Road. 11/4/48, 19.3; 3/30/49, 13.4; 12/6/49, 21.1.

13N/5E-17R1—Reference point—hole in pump base, elevation 70 feet. 0.7 mile south of Bear River Drive, 0.8 mile east of Brewer Road. 11/4/48, 24.9; 3/30/49, 19.2; 12/6/49, 27.6; 3/30/50, 22.9; 11/9/50, 30.4; 4/4/51, 20.8; 11/20/51, 27.0; 4/3/52, 22.3.

13N/5E-18B1—Reference point—top of casing, elevation 70.8 feet. 1.5 miles east of Pleasant Grove Road, 0.25 mile north of Bear River Drive. 12/3/47, 23.3; 3/8/48, 27.4; 3/30/48, 21.1; 11/4/48, 25.1; 3/30/49, 20.6; 12/6/49, 28.0.

13N/5E-18B2—Reference point—hole in top of pump base, elevation 69.3 feet. North side of Bear River Drive, 0.3 mile west of Brewer Road. 12/17/47, 21.3; 3/22/48, 20.3; 3/30/48, 19.5; 5/14/48, 17.1; 11/4/48, 23.3; 1/26/49, 21.0; 3/30/49, 19.0; 11/30/49, 26.4.

TABLE 1—Continued

DEPTHS TO GROUND WATER AT MEASUREMENT WELLS IN SUTTER-YUBA AREA

Measurements Made by Division of Water Resources
(Depths to water in feet measured from reference point)

13N/5E-18C1—Reference point—top of casing, elevation 69.6 feet. 0.25 mile north of Bear River Drive, 0.7 mile west of Brewer Road. 12/3/47, 22.5; 3/30/48, 20.3; 11/4/48, 24.0; 3/31/49, 19.8.

13N/5E-18F1—Reference point—top of casing, elevation 60.8 feet. South side of Bear River Drive, 0.6 mile west of Brewer Road. 12/3/47, 14.3; 3/8/48, 15.2; 3/30/48, 12.1; 5/14/48, 14.0; 11/4/48, 20.3; 3/31/49, 15.9; 5/25/49, 21.3; 8/3/49, 31.1; 12/6/49, 23.4.

13N/5E-18R1—Reference point—hole in casing, elevation 69 feet. West side of Brewer Road, 0.75 mile south of Bear River Drive. 12/17/47, 24.2; 3/22/48, 23.7; 3/30/48, 23.0; 5/8/48, 21.4; 11/5/48, 28.4; 3/30/49, 23.5; 11/30/49, 32.8; 3/30/50, 28.0; 11/20/51, 31.4; 4/3/52, 25.7.

13N/5E-19C1—Reference point—bottom of pump base, elevation 71.6 feet. 0.75 mile south of Bear River Drive, 1.2 miles east of Pleasant Grove Road. 12/8/47, 27.7; 3/10/48, 27.0; 3/31/48, 26.0; 5/8/48, 24.5; 11/5/48, 30.0; 1/26/49, 27.4; 4/1/49, 25.2.

13N/5E-19N1—Reference point—top of casing, elevation 68.3 feet. North side of Kempton Road, 1.1 miles east of Pleasant Grove Road. 12/8/47, 24.8; 3/9/48, 25.9; 3/31/48, 23.6; 5/8/48, 22.2; 11/5/48, 28.6; 1/26/49, 25.9; 4/1/49, 24.0; 5/25/49, 42.0; 6/29/49, 54.2; 7/27/49, 45.0; 8/26/49, 58.0; 11/30/49, 31.1; 3/30/50, 27.3; 11/9/50, 34.3; 4/3/51, 26.8; 4/3/52, 22.1.

13N/5E-19P1—Reference point—top of casing, elevation 70.0 feet. North side of Kempton Road, 1.4 miles east of Pleasant Grove Road. 12/8/47, 25.5; 3/9/48, 25.5; 3/31/48, 24.1; 5/8/48, 23.7; 11/5/48, 29.6; 1/26/49, 27.0; 4/1/49, 25.1; 11/30/49, 32.3.

13N/5E-19R1—Reference point—top of casing, elevation 72.5 feet. 100 feet north of Kempton Road, 0.05 mile west of Brewer Road. 12/17/47, 26.6; 3/9/48, 26.8; 11/5/48, 30.5; 4/1/49, 25.9; 11/30/49, 33.3; 3/30/50, 29.7; 11/9/50, 37.1; 4/3/51, 28.5; 11/20/51, 35.7; 4/3/52, 28.5.

13N/5E-28A1—Reference point—slot in concrete base, elevation 80 feet. South side of Kempton Road, 1.8 miles east of Brewer Road. 11/5/48, 28.2; 4/4/49, 22.4; 5/12/49, 25.1; 7/1/49, 29.5; 7/29/49, 31.4; 8/25/49, 32.8; 9/29/49, 31.1; 11/10/49, 29.4; 11/30/49, 28.7; 2/15/50, 26.3; 3/14/50, 25.9; 3/30/50, 25.3; 4/5/50, 25.2; 5/8/50, 27.5; 6/7/50, 31.5; 7/7/50, 34.2; 8/1/50, 36.5; 9/6/50, 38.0; 10/3/50, 34.0; 11/9/50, 31.5; 11/14/50, 31.2; 1/4/51, 25.8; 2/7/51, 26.0; 3/27/51, 24.3; 5/9/51, 24.8; 11/15/51, 31.3; 11/20/51, 31.1; 2/28/52, 25.4; 3/31/52, 24.0; 4/3/52, 24.0.

13N/5E-28C1—Reference point—top of casing, elevation 76 feet. South side of Kempton Road, 1.3 miles east of Brewer Road. 12/17/47, 22.0; 3/9/48, 21.4; 11/5/48, 29.5; 4/4/49, 24.4; 11/10/49, 32.7; 11/30/49, 31.7; 3/30/50, 27.7; 11/9/50, 34.9; 3/27/51, 27.2; 11/20/51, 33.8; 4/3/52, 26.4.

13N/5E-28N1—Reference point—top of casing, elevation 80.7 feet. North side of Waltz Road, 1.25 miles east of Brewer Road. 11/5/48, 29.8; 1/26/49, 26.6; 4/1/49, 25.0; 11/10/49, 33.8; 3/15/50, 28.7; 3/30/50, 28.2; 4/5/50, 28.1; 9/5/50, 43.9; 10/3/50, 39.0; 11/10/50, 35.7; 11/14/50, 35.3; 12/14/50, 32.6; 1/4/51, 32.2; 3/23/51, 28.7; 11/15/51, 36.8; 11/21/51, 36.3; 3/31/52, 29.7; 4/3/52, 29.1.

13N/5E-28R1—Reference point—top of casing, elevation 84.7 feet. 0.1 mile north of Waltz Road, 2.0 miles east of Brewer Road. 11/5/48, 27.4; 4/1/49, 22.0; 9/29/49, 30.3; 11/9/49, 28.1; 2/15/50, 25.2; 3/15/50, 24.7; 4/5/50, 24.1; 5/9/50, 25.1; 6/7/50, 28.0; 7/7/50, 30.2; 8/1/50, 32.2; 9/5/50, 35.4; 10/3/50, 31.2; 11/14/50, 30.0; 12/11/50, 27.7; 1/4/51, 27.2; 3/23/51, 24.8; 5/9/51, 25.7; 6/5/51, 33.1; 7/16/51, 38.0; 8/22/51, 40.6; 9/26/51, 36.8; 11/15/51, 32.9; 2/28/52, 27.3; 3/31/52, 26.3.

13N/5E-29Q1—Reference point—top of casing, elevation 75.8 feet. North side of Waltz Road, 0.6 mile east of Brewer Road. 4/5/50, 28.5.

13N/5E-30A1—Reference point—top of casing, elevation 68 feet. Southwest of corner of Kempton and Brewer Roads. 4/1/49, 27.2.

13N/5E-30C1—Reference point—top of casing, elevation 70.3 feet. South side of Kempton Road, 0.6 mile west of Brewer Road. 12/8/47, 25.9; 3/9/48, 26.3; 3/31/48, 24.5; 11/5/48, 29.9; 4/1/49, 25.3; 11/30/49, 32.6.

13N/5E-30J1—Reference point—hole in pump base, elevation 69 feet. West side of Brewer Road, 0.3 mile north of Waltz Road. 3/22/49, 25.8.

13N/5E-30R1—Reference point—top of casing, elevation 70 feet. Northwest corner of Brewer and Waltz Roads. 11/5/48, 29.5; 4/4/49, 24.8; 11/9/49, 33.2; 11/30/49, 33.4; 2/15/50, 29.5; 3/14/50, 29.0; 3/30/50, 28.3; 4/5/50, 28.2; 11/10/50, 36.1; 11/15/51, 34.7; 11/21/51, 34.7; 3/31/52, 28.7; 4/3/52, 28.5.

13N/5E-31G1—Reference point—top of casing, elevation 69 feet. North side of Hicks Road, 0.35 mile west of Brewer Road. 12/16/47, 22.6; 3/9/48, 21.7; 3/31/48, 21.1; 11/5/48, 27.3; 1/26/49, 24.3; 4/4/49, 22.3; 11/10/49, 30.9; 11/30/49, 30.4; 2/16/50, 27.5; 3/14/50, 26.8; 3/30/50, 26.1; 11/3/50, 33.5; 11/10/50, 33.5; 4/3/52, 26.6.

13N/5E-32C1—Reference point—top of casing, elevation 74 feet. South side of Waltz Road, 0.35 mile east of Brewer Road. 2/25/49, 29.6; 4/1/49, 25.6; 5/12/49, 30.1; 6/27/49, 36.2; 7/29/49, 39.8; 8/25/49, 41.4; 9/29/49, 37.1; 11/9/49, 33.8; 2/15/50, 30.2; 3/15/50, 29.5; 4/5/50, 29.0; 5/9/50, 30.5; 6/7/50, 35.7; 7/7/50, 40.3; 8/1/50, 43.2; 9/5/50, 45.3; 10/3/50, 40.6; 11/14/50, 37.1; 12/14/50, 34.8; 1/4/51, 34.4; 3/23/51, 27.9; 5/9/51, 33.1; 6/5/51, 36.7; 7/11/51, 39.5; 3/22/51, 42.2; 9/26/51, 38.9; 11/15/51, 35.8; 2/28/52, 31.1; 3/31/52, 29.9.

13N/5E-33L1—Reference point—top of casing, elevation 80.1 feet. 0.35 mile north of Cornelius Avenue, 1.3 miles east of Brewer Road. 12/22/48, 27.5; 3/18/49, 25.3; 11/10/49, 34.3; 4/6/50, 28.2; 5/8/50, 28.9; 11/13/50, 35.0; 3/27/51, 29.1; 11/15/51, 37.8; 4/7/52, 30.6.

13N/5E-33P1—Reference point—top of casing, elevation 79.3 feet. 100 feet north of Cornelius Avenue, 1.3 miles east of Brewer Road. 12/22/48, 26.0; 3/18/49, 24.2; 11/10/49, 32.2; 4/6/50, 27.3; 11/13/50, 34.5; 3/27/51, 28.9; 11/15/51, 37.0; 4/7/52, 30.3.

14N/2E-2D2—Reference point—top of casing, elevation 39 feet. 0.15 mile south of Bogue Road, 0.6 mile east of Schlag Road. 12/15/47, 5.3; 3/8/48, 6.4; 11/12/48, 5.2; 3/21/49, 1.8; 11/29/49, 5.4; 3/24/50, 4.3; 11/2/50, 3.9; 3/28/51, 3.5; 11/16/51, 4.2; 4/1/52, 4.0.

14N/2E-10F1—Reference point—top of casing, elevation 35 feet. West side of Schlag Road, 0.55 mile north of Oswald Road. 11/27/29, 9.8; 10/6/30, 9.0; 12/12/31, 9.0; 11/30/32, 9.6; 11/10/34, 9.6; 11/28/36, 9.6; 1/25/39, 10.1; 1/13/41, 5.0.

14N/2E-10L1—Reference point—top of casing, elevation 37 feet. West side of Schlag Road, 0.5 mile north of Oswald Road. 12/20/33, 12.2; 11/10/34, 12.7; 11/11/36, 12.6; 11/24/37, 12.8.

14N/2E-10R1—Reference point—top of casing, elevation 30 feet. North side of Oswald Road, 0.45 mile east of Schlag Road. 11/6/47, 8.9; 12/15/48, 10.5; 12/9/49, 10.6; 11/10/50, 9.4; 12/8/51, 3.4.

14N/2E-12H1—Reference point—top of pipe in base, elevation 41 feet. 150 feet west of Township Road, 0.6 mile north of Oswald Road. 12/15/47, 9.5; 3/9/48, 10.6; 11/12/48, 9.7; 3/21/49, 8.2; 11/29/49, 10.6.

14N/2E-13A1—Reference point—top of casing, elevation 42.1 feet. 0.05 mile south of Oswald Road, 0.1 mile west of Township Road. 12/15/47, 8.9; 3/8/48, 10.3; 11/12/48, 6.1; 3/21/49, 7.0; 11/29/49, 8.4.

14N/2E-13C1—Reference point—top of casing, elevation 39 feet. 100 feet south of Oswald Road, 0.7 mile west of Township Road. 12/15/47, 5.5; 3/8/48, 6.6; 11/12/48, 4.7; 3/21/49, 3.1; 11/29/49, 6.0.

TABLE 1—Continued

DEPTHS TO GROUND WATER AT MEASUREMENT WELLS IN SUTTER-YUBA AREA

Measurements Made by Division of Water Resources
(Depths to water in feet measured from reference point)

14N/2E-13R1—Reference point—top of casing, elevation 37 feet. 0.1 mile west of Township Road, 0.4 mile south of Pierce Road. 12/15/47, 10.9; 3/8/48, 11.7; 10/8/48, 8.0; 11/12/48, 9.5; 1/18/49, 11.0; 3/21/49, 8.5; 6/6/49, 10.4; 6/30/49, 6.7; 7/27/49, 5.4; 8/25/49, 5.5; 11/29/49, 11.1; 3/24/50, 10.9; 11/2/50, 10.2; 3/28/51, 9.0; 11/16/51, 11.2; 4/1/52, 6.5.

14N/2E-14E1—Reference point—top of casing, elevation 34 feet. 0.4 mile south of Oswald Road, 0.4 mile west of Boulton Road. 12/15/47, 5.5; 3/8/48, 6.6; 11/12/48, 4.7; 3/21/49, 3.1; 11/29/49, 6.0.

14N/2E-14J1—Reference point—top of stone casing, elevation 36 feet. 0.1 mile south of Pierce Road, 0.3 mile east of Boulton Road. 12/15/47, 4.7; 3/8/48, 6.0; 10/8/48, 2.2; 11/12/48, 3.9.

14N/2E-26R1—Reference point—top of casing, elevation 33 feet. 0.2 mile north of O'Banion Road, 1.1 miles west of Township Road. 12/11/47, 7.4; 3/10/48, 7.6; 11/8/48, 6.4; 3/24/49, 3.9; 12/2/49, 7.7.

14N/3E-1H1—Reference point—top of casing, elevation 54 feet. 0.20 mile west of Feather River Boulevard, 1.70 miles north of Ella Avenue. 11/12/47, 21.2; 3/5/48, 20.0; 5/8/48, 15.8; 10/7/48, 23.8; 11/11/48, 22.3; 1/27/49, 20.9; 3/22/49, 17.6; 6/1/49, 25.2; 7/3/49, 25.5; 8/26/49, 25.5; 12/1/49, 23.5; 3/28/50, 17.2; 11/21/51, 22.7; 4/5/52, 10.8.

14N/3E-1R1—Reference point—top of casing, elevation 53 feet. 0.20 mile west of Feather River Boulevard, 1.20 miles north of Ella Avenue. 11/12/47, 20.5; 3/5/48, 20.2; 11/11/48, 20.1; 3/22/49, 17.9; 12/1/49, 23.5.

14N/3E-2G1—Reference point—hole in base of pump, elevation 49 feet. 0.36 mile north of Stewart Road, 0.45 mile east of Garden Highway. 11/11/47, 32.3; 3/24/48, 24.0; 10/6/48, 27.7; 11/15/48, 24.4; 3/17/49, 21.4; 11/30/49, 29.8.

14N/3E-2Q1—Reference point—hole in base of pump, elevation 53.9 feet. 0.07 mile south of Stewart Road, 0.10 mile east of Garden Highway. 11/10/47, 26.8; 3/4/48, 33.9; 11/15/48, 28.8; 3/17/49, 21.7; 11/30/49, 23.2; 3/27/50, 21.4; 11/3/50, 26.7; 3/29/51, 17.9; 11/20/51, 27.2.

14N/3E-3A1—Reference point—hole in side of pump, elevation 50 feet. 0.19 mile south of Bogue Road, 0.25 mile east of Highway 24. 11/10/47, 36.1; 3/23/48, 35.5; 10/6/48, 36.3; 11/15/48, 31.0; 3/7/49, 29.3; 11/30/49, 35.0; 3/27/50, 30.5; 11/3/50, 33.5; 3/28/51, 27.2; 11/16/51, 32.2.

14N/3E-3C2—Reference point—hole in base of pump, elevation 53.1 feet. 0.05 mile south of Bogue Road, 0.11 mile west of State Highway 24. 3/12/48, 43.8; 10/6/48, 35.6; 11/11/48, 33.9; 1/18/49, 32.8; 3/7/49, 32.1; 6/1/49, 37.6; 6/28/49, 45.0; 7/27/49, 47.5; 8/25/49, 42.3; 12/1/49, 35.4.

14N/3E-3C3—Reference point—bottom of pump base, elevation 53.1 feet. 0.27 mile south of Bogue Road, 0.06 mile west of State Highway 24. 3/29/48, 36.4; 11/15/48, 33.9; 3/7/49, 32.7; 11/30/49, 35.0.

14N/3E-3F1—Reference point—top of casing, elevation 51.3 feet. 0.2 mile west of State Highway 24, 0.45 mile south of Bogue Road. 11/18/47, 31.6; 3/23/48, 39.2; 10/6/48, 34.0; 11/11/48, 32.8; 3/17/49, 30.9; 11/30/49, 34.4.

14N/3E-3G1—Reference point—hole in pump base, elevation 52 feet. 0.17 mile east of State Highway 24, 0.54 mile south of Bogue Road. 3/4/48, 37.5; 11/16/48, 32.8; 3/17/49, 29.7; 11/30/49, 32.9.

14N/3E-3N1—Reference point—top of casing, elevation 55.4 feet. 0.09 mile south of Stewart Road, 0.40 mile west of State Highway 24. 11/10/47, 38.7; 3/4/48, 41.5; 11/15/48, 39.7; 3/17/49, 37.1; 11/30/49, 43.7.

14N/3E-3N2—Reference point—hole in base of pump, elevation 48 feet. South side of Stewart Road, 0.30 mile west of State Highway 24. 3/12/48, 40.4; 11/15/48, 34.7.

14N/3E-3P1—Reference point—top of pit, elevation 50 feet. 0.10 mile north of Reed Road, 0.17 mile west of State Highway 24. 11/26/29, 28.3; 9/27/30, 32.4; 12/12/31, 33.8; 12/1/32, 32.4; 12/15/33, 33.4; 11/10/34, 34.1; 11/25/36, 28.4; 11/24/37, 26.2; 1/26/39, 20.4; 1/13/41, 24.0; 11/6/47, 33.8; 12/15/48, 34.2; 12/9/49, 36.0; 11/10/50, 39.1.

14N/3E-3R2—Reference point—slot in base, elevation 51.3 feet. 0.19 mile south of Stewart Road, 0.35 mile east of Garden Highway. 11/10/47, 31.1; 11/15/48, 28.4; 3/17/49, 25.2; 11/30/49, 30.7.

14N/3E-4E3—Reference point—top of casing, elevation 47 feet. 0.05 mile south of Star Road, 0.20 mile east of Grove Avenue. 12/16/47, 30.6; 3/24/48, 31.7; 11/12/48, 33.3; 3/18/49, 30.0; 11/29/49, 35.8.

14N/3E-4G1—Reference point—hole in pump base, elevation 50.1 feet. 0.20 mile east of Walton Avenue, 0.48 mile south of Bogue Road. 11/18/47, 33.8; 3/12/48, 35.4; 10/6/48, 37.0; 11/11/48, 35.1; 3/18/49, 33.1; 11/30/49, 37.1.

14N/3E-4Q1—Reference point—hole in base of pump, elevation 47 feet. 0.10 mile north of Reed Road, 0.04 mile east of Walton Avenue. 11/10/47, 32.9; 3/4/48, 34.0; 3/12/48, 36.7; 3/29/48, 32.3; 11/15/48, 33.9; 3/18/49, 31.2; 11/29/49, 35.6; 3/27/50, 33.2; 11/3/50, 38.5; 3/28/51, 32.9; 11/16/51, 36.2.

14N/3E-5A2—Reference point—top of concrete pit, elevation 49 feet. West side of Grove Avenue, 0.15 mile south of Bogue Road. 12/16/47, 29.9; 3/9/48, 32.7; 10/7/48, 34.8; 11/12/48, 32.5; 3/18/49, 29.0; 11/29/49, 34.0.

14N/3E-5C1—Reference point—hole in base of pump, elevation 50 feet. 0.07 mile south of Bogue Road, 0.50 mile east of George Washington Boulevard. 12/16/48, 30.4; 3/9/48, 28.8; 10/7/48, 31.2; 11/12/48, 29.0; 3/18/49, 26.1; 6/1/49, 32.8; 7/27/49, 41.8; 8/25/49, 39.0; 11/29/49, 30.2; 3/27/50, 27.1; 11/3/50, 33.5; 3/28/51, 23.6; 4/1/52, 23.8.

14N/3E-5D1—Reference point—invert of pipe in base, elevation 48.1 feet. South side of Bogue Road, 0.15 mile east of George Washington Boulevard. 12/20/47, 23.4; 3/5/48, 25.3; 10/4/48, 26.6; 11/18/48, 24.8; 3/29/49, 22.0.

14N/3E-5K1—Reference point—hole in base of pump, elevation 46 feet. 0.14 mile north of Stewart Road, 0.47 mile west of Grove Avenue. 3/9/48, 27.3; 3/30/48, 28.4; 11/12/48, 31.0; 12/9/49, 31.7.

14N/3E-6G1—Reference point—slot in concrete base, elevation 45 feet. 0.45 mile west of George Washington Boulevard, 0.38 mile south of Bogue Road. 12/16/47, 13.9; 3/9/48, 14.7; 11/12/48, 14.6; 12/9/49, 15.0.

14N/3E-6M1—Reference point—hole in base of pump, elevation 40 feet. 0.50 mile north of Reed Road, 0.06 mile east of Township Road. 12/15/47, 10.8; 3/24/48, 13.2; 10/8/48, 7.3; 11/12/48, 9.3; 1/18/49, 10.9; 3/21/49, 9.2; 6/6/49, 6.1; 6/28/49, 6.7; 7/27/49, 6.6; 8/25/49, 6.0; 11/29/49, 10.1; 3/24/50, 9.9; 11/2/50, 10.0; 3/28/51, 8.7; 11/16/51, 9.2; 4/1/52, 7.9.

14N/3E-7A1—Reference point—hole in base of pump, elevation 45 feet. 0.12 mile south of Reed Road, 0.25 mile west of George Washington Boulevard. 12/17/47, 19.5; 3/9/48, 20.2; 11/12/48, 20.6; 3/21/49, 18.6; 11/29/49, 21.3.

14N/3E-7M1—Reference point—top of casing under pump, elevation 42 feet. 0.10 mile east of Township Road, 0.52 mile north of Oswald Avenue. 12/15/47, 11.2; 3/9/48, 12.3; 11/12/48, 11.8; 3/21/49, 10.2; 11/29/49, 11.2; 3/24/50, 10.8; 11/2/50, 11.8; 3/28/51, 9.0; 11/16/51, 11.1; 4/2/52, 10.1.

14N/3E-8B1—Reference point—hole in base of pump, elevation 45 feet. South side of Reed Road, 0.52 mile west of Walton Avenue. 12/17/47, 26.3; 3/9/48, 25.6; 11/12/48, 30.2; 3/21/49, 25.0; 11/29/49, 31.1; 3/27/50, 26.1; 11/3/50, 35.3; 3/28/51, 24.3; 11/16/51, 31.6; 4/2/52, 27.7.

14N/3E-8D1—Reference point—hole in base of pump, elevation 46.6 feet. South side of Reed Road, 0.15 mile east of George Washington Boulevard. 12/17/47, 23.2; 3/9/48, 23.5; 3/21/49, 21.6.

TABLE 1—Continued

DEPTHS TO GROUND WATER AT MEASUREMENT WELLS IN SUTTER-YUBA AREA

Measurements Made by Division of Water Resources
(Depths to water in feet measured from reference point)

14N 3E-8J1—Reference point—hole in base of pump, elevation 45 feet. 0.03 mile west of Grove Avenue, 0.45 mile north of Oswald Avenue. 12/16/47, 27.8; 3/4/48, 29.0; 11/12/48, 30.8; 3/18/49, 27.3; 11/29/49, 33.1; 3/27/50, 29.4; 11/3/50, 36.2; 3/28/51, 29.1; 11/19/51, 33.8; 4/2/52, 23.8.

14N 3E-8K1—Reference point—hole in base of pump, elevation 45 feet. 0.40 mile west of Grove Avenue, 0.35 mile north of Oswald Road. 12/16/47, 26.9; 3/24/48, 28.3; 11/12/48, 30.9; 3/18/49, 26.8; 11/29/49, 32.1.

14N 3E-8M3—Reference point—top of casing, elevation 45 feet. 0.20 mile east of George Washington Boulevard, 0.50 mile north of Oswald Road. 12/17/47, 22.7; 3/9/48, 21.1; 10/7/48, 28.0; 11/12/48, 25.6; 1/18/49, 23.1; 3/21/49, 21.8; 6/1/49, 25.0; 6/30/49, 26.3; 7/27/49, 34.5; 8/25/49, 31.5; 11/29/49, 26.7.

14N 3E-8N1—Reference point—top of casing, elevation 44.8 feet. North side of Oswald Avenue, 0.15 mile east of George Washington Boulevard. 12/16/47, 21.5; 3/9/48, 16.4; 3/12/48, 21.8; 11/12/48, 23.8; 3/21/49, 20.7; 11/29/49, 24.9; 3/24/50, 21.4; 11/2/50, 29.3; 3/28/51, 18.9; 11/19/51, 25.5; 4/2/52, 13.5.

14N 3E-9A2—Reference point—top of concrete pit, south edge, elevation 40 feet. 0.1 mile south of Reed Road, 0.35 mile east of Walton Avenue. 11/19/47, 32.0; 3/4/48, 32.3; 5/12/48, 31.1; 11/15/48, 32.1; 11/18/49, 32.1; 3/18/49, 31.0; 11/30/49, 35.2.

14N 3E-9D1—Reference point—hole in base of pump, elevation 46 feet. 0.10 mile south of Reed Road, 0.45 mile west of Walton Road. 12/16/47, 31.4; 3/9/48, 33.8.

14N 3E-9K1—Reference point—top of casing, elevation 45 feet. South side of Barry Road, 0.25 mile east of Walton Avenue. 11/8/47, 33.2; 3/4/48, 34.9; 3/12/48, 34.1; 3/29/48, 32.5; 10/6/48, 35.6; 11/15/48, 34.3; 3/17/49, 32.0; 11/30/49, 35.8.

14N 3E-9Q1—Reference point—hole in base of pump, elevation 42 feet. North side of Oswald Road, 0.25 mile east of Walton Avenue. 3/12/48, 29.0; 11/15/48, 23.4; 3/17/49, 21.3.

14N 3E-10B1—Reference point—top of casing, elevation 50 feet. 0.17 mile east of State Highway 24, 0.33 mile north of Barry Road. 11/19/47, 29.4; 10/6/48, 31.3; 11/30/49, 31.2; 11/3/50, 33.5; 11/20/51, 31.7.

14N 3E-10B2—Reference point—top of casing, elevation 49 feet. 0.32 mile south of Stewart Road, 0.18 mile east of State Highway 24. 11/19/47, 29.4; 3/4/48, 32.0; 10/6/48, 31.3; 11/15/48, 31.5; 3/7/49, 26.3; 11/30/49, 31.2; 3/27/50, 28.4; 11/3/50, 33.5; 3/29/51, 24.8; 11/20/51, 31.7.

14N 3E-10F1—Reference point—top of casing at bottom of pit, elevation 27 feet. 0.70 mile west of State Highway 24, 0.80 mile north of Barry Road. 11/18/47, 35.1; 3/4/48, 34.1; 3/12/48, 33.9; 11/15/48, 34.8; 3/17/49, 31.7; 11/29/49, 36.6.

14N 3E-10N1—Reference point—top of concrete base, elevation 18.6 feet. 0.08 mile north of Oswald Avenue, 0.36 mile west of State Highway 24. 11/8/47, 30.1; 3/12/48, 32.1; 3/29/48, 29.1; 5/12/48, 27.0; 10/6/48, 32.2; 11/15/48, 31.3; 1/18/49, 29.4; 3/17/49, 28.5; 11/30/49, 32.2; 3/29/50, 30.0; 11/3/50, 33.9; 3/29/51, 28.6; 11/20/51, 32.3.

14N 3E-11D2—Reference point—top of casing, elevation 49 feet. 0.10 mile north of Barry Road, 0.63 mile east of State Highway 24. 11/19/47, 27.3; 3/4/48, 30.6; 3/29/48, 31.3; 5/12/48, 23.4; 10/6/48, 34.1; 11/16/48, 27.7; 11/18/49, 25.8; 3/17/49, 24.4; 6/1/49, 31.6; 6/28/49, 39.2; 8/3/49, 38.9; 8/25/49, 34.8; 11/30/49, 29.1.

14N 3E-11F2—Reference point—hole in base of pump, elevation 51.7 feet. 0.17 mile north of Barry Road, 0.95 mile east of State Highway 24. 11/10/47, 27.4; 3/23/48, 27.8; 11/16/48, 21.2; 3/17/49, 20.7; 11/30/49, 26.4; 3/27/50, 19.6; 11/3/50, 26.1; 3/29/51, 16.0; 11/20/51, 25.0.

14N 3E-12F1—Reference point—top of casing, elevation 52 feet. 0.65 mile north of Ella Road, 0.50 mile east of Feather River Boulevard. 3/28/50, 17.0; 11/6/50, 23.6; 3/30/51, 18.4; 4/5/52, 20.6.

14N 3E-12M1—Reference point—hole in base of pump, elevation 50 feet. 0.22 mile north of Ella Avenue, 0.84 mile west of Feather River Boulevard. 11/12/47, 20.4; 3/6/48, 20.5; 11/15/48, 20.2; 3/22/49, 16.8; 12/1/49, 22.1; 3/28/50, 17.6; 11/6/50, 72.1; 11/21/51, 20.8; 4/5/52, 9.5.

14N 3E-12Q1—Reference point—hole in base of pump, elevation 53.6 feet. 0.23 mile north of Ella Avenue, 0.29 mile west of Feather River Boulevard. 11/11/49, 21.7; 3/5/48, 23.0; 5/8/48, 19.5.

14N 3E-13B1—Reference point—top of casing, elevation 50.9 feet. 0.17 mile south of Ella Avenue, 0.44 mile west of Feather River Boulevard. 11/12/47, 20.7; 3/5/48, 22.8; 11/11/48, 20.2; 3/2/49, 18.0; 12/1/49, 22.1; 3/28/50, 21.7; 11/6/50, 21.8; 3/30/51, 13.0; 11/20/51, 21.8; 4/5/52, 12.1.

14N 3E-13N1—Reference point—hole in base of pump, elevation 48.3 feet. 0.11 mile north of Plumas Road, 0.81 mile west of Feather River Boulevard. 3/6/48, 24.1; 5/8/48, 16.0; 11/11/48, 19.8; 1/27/49, 18.4; 3/21/49, 16.9; 12/1/49, 21.1; 3/29/50, 17.4; 11/6/50, 20.9; 4/5/52, 10.0.

14N 3E-14E1—Reference point—hole in base of pump, elevation 47 feet. 0.20 mile west of Garden Highway, 0.75 mile north of Messick Road. 11/18/47, 25.3; 3/23/48, 22.1; 11/15/48, 22.2; 3/17/49, 19.6; 11/29/49, 22.4.

14N 3E-14E2—Reference point—top of casing, elevation 47 feet. 0.11 mile west of Garden Highway, 0.75 mile north of Messick Road. 11/10/47, 20.6; 3/5/48, 23.7; 5/12/48, 13.9; 10/6/48, 21.6; 11/15/48, 20.2; 1/27/49, 19.2; 3/17/49, 17.1; 6/1/49, 19.5; 6/30/49, 26.7; 7/27/49, 28.0; 8/25/49, 25.7; 11/29/49, 23.3; 3/29/50, 16.4; 11/3/50, 23.3; 3/29/51, 12.7; 11/20/51, 20.8.

14N 3E-14N1—Reference point—hole in base of pump, elevation 46 feet. 0.27 mile north of Messick Road, 0.13 mile east of Garden Highway. 11/18/47, 19.1; 3/5/48, 27.7; 11/15/48, 19.4; 3/17/49, 16.6; 11/29/49, 21.6.

14N 3E-14R1—Reference point—hole in base of pump, elevation 49.4 feet. 1.07 miles west of Feather River Boulevard, 0.67 mile north of Broadway. 11/11/47, 24.3; 3/6/48, 25.8; 11/11/48, 20.9; 3/21/49, 17.9; 12/1/49, 22.1; 3/29/50, 17.9; 11/6/50, 22.3; 3/30/51, 13.4; 11/20/51, 21.1; 4/5/52, 10.9.

14N 3E-15A2—Reference point—slot in base of pump, elevation 47 feet. 0.57 mile south of Barry Road, 0.41 mile east of State Highway 24. 11/19/47, 27.6; 3/23/48, 27.8; 11/15/48, 29.7; 3/17/49, 24.8; 11/29/49, 28.8.

14N 3E-15B1—Reference point—top of casing, elevation 47 feet. 0.18 mile south of Oswald Avenue, 0.04 mile east of State Highway 24. 11/8/47, 39.0; 3/5/48, 33.8; 3/12/48, 32.5; 11/15/48, 28.5; 3/17/49, 35.1; 11/29/49, 33.2.

14N 3E-15B2—Reference point—top of casing, elevation 48 feet. 1.0 mile north of Messick Road, 0.17 mile east of State Highway 24. 11/18/47, 26.9.

14N 3E-15E1—Reference point—hole in base of pump, elevation 17.2 feet. 0.48 mile south of Oswald Road, 0.43 mile west of State Highway 24. 3/23/48, 27.9; 10/6/48, 29.0; 11/15/48, 27.0; 3/17/49, 25.9; 11/30/49, 29.4.

14N 3E-15P1—Reference point—top of casing, elevation 45 feet. 0.38 mile north of Messick Road, 0.02 mile west of State Highway 24. 3/23/48, 29.2; 11/15/48, 17.2; 3/17/49, 25.9; 11/29/49, 28.5.

14N 3E-16C1—Reference point—hole in base of pump, elevation 48.9 feet. 0.10 mile west of Walton Avenue, 0.22 mile south of Oswald Road. 12/16/47, 32.3; 3/20/48, 30.6; 3/26/48, 29.9; 3/30/48, 29.9; 5/12/48, 28.1; 11/15/48, 31.8; 3/18/49, 29.6; 11/29/49, 34.7.

TABLE 1—Continued

DEPTHS TO GROUND WATER AT MEASUREMENT WELLS IN SUTTER-YUBA AREA

Measurements Made by Division of Water Resources
(Depths to water in feet measured from reference point)

14N/3E-16E1—Reference point—top of casing, elevation 47.7 feet. 0.25 mile east of Carlson Road, 0.40 mile south of Oswald Road. 12/16/47, 27.1; 3/20/48, 29.0; 10/7/48, 30.2; 11/15/48, 28.9; 3/18/49, 26.8; 11/29/49; 35.8; 3/27/50, 28.6; 11/3/50, 32.6; 3/29/51, 30.2; 11/19/51, 30.6; 4/2/52, 22.2.

14N/3E-16J1—Reference point—top of casing, elevation 46.4 feet. 0.77 mile west of State Highway 24, 0.64 mile south of Oswald Avenue. 11/7/47, 28.4; 3/5/48, 25.2; 3/12/48, 25.3; 10/6/48, 28.2; 11/15/48, 26.8; 1/27/49, 26.1; 3/17/49, 25.4; 3/29/50, 26.6; 11/3/50, 24.2; 3/29/51, 25.1.

14N/3E-17B1—Reference point—top of "I" beam pump support, elevation 44 feet. 0.35 mile west of Carlson Road, 0.06 mile south of Oswald Road. 12/16/47, 31.9; 3/9/48, 24.2; 3/12/48, 24.7; 11/12/48, 26.9; 3/18/49, 24.0; 11/29/49, 29.0.

14N/3E-17Q1—Reference point—top of casing under pump, elevation 42.5 feet. 0.30 mile west of Carlson Road, 0.25 mile north of Best Road. 12/16/47, 22.7; 3/8/48, 23.5; 3/12/48, 23.2; 10/7/48, 26.3; 11/15/48, 24.9; 1/27/49, 23.9; 3/18/49, 23.1; 11/29/49, 29.7.

14N/3E-17R1—Reference point—top of casing, elevation 45.9 feet. West side of Carlson Road, 0.23 mile north of Best Road. 3/30/48, 24.5; 11/15/48, 27.3; 3/18/49, 25.8.

14N/3E-18D1—Reference point—top of casing, elevation 43 feet. Southeast corner of Oswald Avenue and Township Road. 11/26/29, 9.3; 10/6/30, 7.2; 12/12/31, 11.0; 11/30/32, 10.3; 12/20/33, 12.5; 11/10/34, 10.1; 11/28/36, 8.7; 11/24/37, 8.6; 1/25/39, 8.5; 1/13/41, 1.3; 11/6/47, 6.9; 12/15/48, 7.9; 12/9/49, 7.9; 11/10/50, 7.7; 12/8/51, 5.8.

14N/3E-18F1—Reference point—top of casing, elevation 40 feet. 0.41 mile south of Oswald Avenue, 0.23 mile east of Township Road. 12/15/47, 11.3; 3/8/48, 6.1; 10/8/48, 5.1; 11/12/48, 5.1; 3/2/49, 5.0; 11/29/49, 5.8; 3/27/50, 5.2; 11/2/50, 6.7; 3/28/51, 4.8; 11/16/51, 6.7; 4/2/52, 5.0.

14N/3E-18H3—Reference point—top of concrete pit, elevation 41 feet. West side George Washington Boulevard, 0.44 mile south of Oswald Avenue. 12/16/47, 19.6; 3/8/48, 18.2; 10/7/48, 20.9; 11/12/48, 20.1; 3/21/49, 18.0; 11/29/49, 20.6.

14N/3E-18R1—Reference point—top of casing, elevation 40 feet. 0.10 mile north of Best Road, 0.26 mile west of George Washington Boulevard. 12/15/47, 16.9; 3/8/48, 17.1; 11/12/48, 18.5; 3/21/49, 16.8; 11/29/49, 19.6

14N/3E-19L1—Reference point—hole in pump base, elevation 37 feet. 0.50 mile west of George Washington Boulevard, 0.69 mile south of Best Boad. 12/5/47, 10.9; 3/8/48, 11.6; 10/8/48, 15.8; 11/12/48, 13.8; 3/18/49, 12.7; 11/29/49, 14.9; 3/27/50, 13.1; 11/2/50, 15.8; 3/28/51, 10.6; 11/16/51, 14.5; 4/2/52, 6.0.

14N/3E-19P1—Reference point—top of pipe in base, elevation 38 feet. 0.50 mile west of George Washington Boulevard, 0.83 mile north of Best Road. 12/11/47, 13.2; 3/24/48, 14.0; 11/8/48, 13.7; 3/24/49, 12.2; 12/2/49, 14.6.

14N/3E-20A2—Reference point—hole in casing, elevation 44.5 feet. 0.10 mile south of Best Road, east side of George Washington Boulevard. 12/16/47, 22.7; 3/8/48, 21.6; 11/15/48, 25.3; 3/18/49, 24.0; 11/29/49, 26.9; 3/27/50, 25.4; 11/3/50, 32.6; 3/28/51, 25.2; 11/19/51, 26.4; 4/2/52, 18.4.

14N/3E-20E1—Reference point—top of casing, elevation 40 feet. 0.27 mile south of Best Road, 0.20 mile east of George Washington Boulevard. 12/16/47, 17.9; 3/8/48, 20.0; 3/29/48, 18.0; 11/12/48, 20.1; 3/18/49, 18.3; 11/29/49, 21.7.

14N/3E-20F1—Reference point—top of casing, elevation 40 feet. 0.49 mile east of George Washington Boulevard, 0.51 mile north of Hutchinson Road. 12/16/47, 20.8; 3/8/48, 23.7; 3/12/48, 23.6; 10/7/48, 24.0; 11/15/48, 23.1; 3/18/49, 21.4; 11/29/49, 24.8; 3/27/50, 22.6; 11/2/50, 26.4; 3/28/51, 20.6; 11/19/51, 24.2; 4/2/52, 15.7.

14N/3E-20Q1—Reference point—top of concrete pit, elevation 42 feet. 0.54 mile west of George Washington Boulevard, 0.14 mile north of Hutchinson Road. 12/13/47, 20.1; 3/10/48, 21.3; 3/12/48, 21.5; 11/8/48, 24.9; 3/23/49, 20.5; 12/5/49, 24.0; 3/24/50, 21.5; 11/7/50, 26.7; 3/28/51, 21.8; 11/15/51, 22.7; 4/3/52, 14.8.

14N/3E-21M1—Reference point—top of casing, elevation 44.3 feet. 0.46 mile north of Hutchinson Road, west side of Carlson Road. 12/16/47, 21.8; 3/8/48, 23.0; 3/20/48, 23.4; 3/26/48, 22.2; 3/30/48, 21.7; 10/7/48, 24.2; 11/15/48, 24.0; 3/18/49, 23.2; 11/29/49, 25.7.

14N/3E-21Q1—Reference point—hole in pump base, elevation 42 feet. North side of Hutchinson Road, 0.48 mile west of State Highway 24. 11/15/47, 21.9; 3/8/48, 23.9; 3/12/48, 27.4; 3/26/48, 22.0; 3/29/48, 21.9; 5/12/48, 21.2; 11/9/48, 25.0; 1/18/49, 24.0; 3/23/49, 22.8; 6/1/49, 21.8; 6/28/49, 30.4; 8/3/49, 20.1; 8/25/49, 28.6; 12/6/49, 26.0.

14N/3E-22B2—Reference point—bottom of pump base, elevation 48.3 feet. North side of Messick Road, 0.50 mile west of Garden Highway. 11/7/47, 25.9; 3/5/48, 26.1; 3/12/48, 26.6; 3/29/48, 25.2; 10/6/48, 28.5; 11/15/48, 25.8; 3/17/49, 24.4; 11/30/49, 27.6; 3/29/50, 25.2; 11/3/50, 28.0; 3/29/51, 22.3; 11/20/51, 26.3.

14N/3E-22E2—Reference point—bottom of pump base, elevation 47.8 feet. South of Messick Road, 0.1 mile east of State Highway 24. 11/7/47, 26.6; 3/5/48, 26.2; 3/12/48, 27.8; 11/15/48, 25.3; 3/17/49, 23.8; 11/29/49, 27.5.

14N/3E-22H1—Reference point—top of casing, elevation 47.2 feet. 0.03 mile west of Garden Highway, 0.16 mile south of Messick Road. 3/5/48, 22.1; 10/6/48, 19.8; 11/15/48, 20.7.

14N/3E-22R1—Reference point—hole in concrete base, elevation 45.2 feet. West side Garden Highway, 0.15 mile north of Hutchinson Road. 11/15/47, 20.9; 3/8/48, 26.4; 3/29/48, 19.0; 5/12/48, 16.5; 11/10/48, 20.7; 1/24/49, 19.9; 3/23/49, 17.9; 12/6/49, 22.4.

14N/3E-23D2—Reference point—top of concrete base, elevation 48.1 feet. 0.2 mile east of Garden Highway, 0.03 mile south of Messick Road. 11/7/47, 20.6; 3/23/48, 21.1; 10/6/48, 23.3; 11/15/48, 22.2; 3/17/49, 20.9; 11/29/49, 23.0; 3/29/50, 18.8; 11/3/50, 22.9; 3/29/51, 16.3; 11/20/51, 22.3.

14N/3E-24B1—Reference point—hole in pump base, elevation 50.8 feet. 0.01 mile south of Plumas Road, 0.26 mile west of Feather River Boulevard. 11/11/47, 23.1; 3/6/48, 22.6; 5/8/48, 20.7; 10/7/48, 24.2; 11/11/48, 22.0; 3/21/49, 19.9; 6/1/49, 24.6; 7/3/49, 31.0; 7/28/49, 28.8; 8/26/49, 30.0; 12/1/49, 23.4; 3/29/50, 22.2; 11/6/50, 24.5; 3/30/51, 14.4; 11/20/51, 23.9; 4/5/52, 14.6.

14N/3E-24G1—Reference point—top of casing at pit bottom, elevation 39.4 feet. 0.10 mile north of Broadway, 0.31 mile east of Feather River Boulevard. 11/11/47, 14.2; 3/6/48, 12.1; 11/11/48, 12.0; 3/21/49, 9.4; 12/1/49, 13.4.

14N/3E-25B2—Reference point—hole in side of pump, elevation 47 feet. South of Anderson Road, 0.31 mile west of Feather River Boulevard. 11/17/47, 22.5; 3/8/48, 19.7; 5/8/48, 17.3; 11/10/48, 20.1; 1/24/49, 18.9; 3/23/49, 17.6; 12/2/49, 21.3.

14N/3E-25C1—Reference point—top of casing, elevation 49.5 feet. 0.15 mile south of Anderson Road, 0.71 mile west of Feather River Boulevard. 11/17/47, 22.3; 3/8/48, 19.8; 11/10/48, 22.0; 3/23/49, 19.8; 12/2/49, 22.7; 3/29/50, 18.6; 11/6/50, 22.6; 3/30/51, 15.9; 11/6/51, 21.5; 4/1/52, 15.4

14N/3E-25K2—Reference point—top of casing, elevation 46.1 feet. 0.01 mile south of Country Club Road, 0.26 mile west of Feather River Boulevard. 11/17/47, 17.8; 3/8/48, 18.5; 3/23/49, 15.6; 12/2/49, 19.1.

14N/3E-26M2—Reference point—hole in base of pump, elevation 44 feet. 0.32 mile north of O'Banion Road, 0.22 mile east of Garden Highway. 11/14/47, 21.0; 3/8/48, 23.4; 5/6/48, 14.4; 6/1/48, 14.7; 7/3/48, 52.4 (operating); 11/10/48, 20.9; 3/23/49, 16.8; 12/6/49, 22.4.

TABLE 1—Continued

DEPTHS TO GROUND WATER AT MEASUREMENT WELLS IN SUTTER-YUBA AREA

Measurements Made by Division of Water Resources
(Depths to water in feet measured from reference point)

14N/3E-27D1—Reference point—top of casing, elevation 42 feet. East side of State Highway 24, 0.10 mile south of Hutchinson Road. 11/15/47, 21.7; 3/8/48, 22.0; 3/12/48, 28.1; 5/12/48, 20.8; 11/9/48, 24.2; 3/23/49, 21.8; 12/6/49, 25.4; 3/29/50, 23.2; 11/7/50, 26.1; 3/29/51, 19.9; 11/15/51, 26.4; 4/3/52, 13.5.

14N/3E-27J1—Reference point—hole in base of pump, elevation 43 feet. West side of Garden Highway, 0.36 mile north of O'Banion Road. 11/14/47, 21.4; 3/8/48, 30.7; 5/5/48, 15.0; 11/10/48, 20.6; 3/23/49, 17.1; 6/1/49, 21.5; 8/30/49, 26.6; 12/6/49, 22.1; 3/29/50, 17.6; 11/7/50, 22.3; 3/29/51, 13.8; 11/15/51, 21.1; 4/3/52, 9.0.

14N/3E-27M2—Reference point—hole in base of pump, elevation 41 feet, 0.06 mile east of State Highway 24, 0.33 mile north of O'Banion Road. 11/15/47, 22.3; 3/8/48, 24.1; 11/9/48, 23.1; 3/23/49, 20.6; 12/6/49, 24.8.

14N/3E-28G2—Reference point—top of casing, elevation 41 feet, 0.28 mile west of State Highway 24, 0.45 mile south of Hutchinson Road. 1/16/48, 21.4.

14N/3E-28M1—Reference point—top of wooden platform under pump, elevation 43.6 feet, 0.31 mile north of O'Banion Road, 0.15 mile east of Carlson Road. 12/13/47, 21.6; 3/9/48, 25.4; 3/12/48, 25.6; 11/8/48, 25.6; 3/24/49, 22.3; 12/5/49, 26.6.

14N/3E-28R1—Reference point—top of casing, elevation 40 feet, 0.16 mile west of State Highway 24, 0.16 mile north of O'Banion Road. 11/14/47, 21.3; 3/24/48, 21.9; 11/9/48, 23.8; 3/23/49, 20.4; 12/6/49, 30.3; 3/29/50, 22.5; 11/2/50, 26.7; 3/29/51, 19.5.

14N/3E-29A1—Reference point—hole in base of pump, elevation 43.5 feet, 0.16 mile west of Carlson Road, 0.24 mile south of Hutchinson Road. 12/13/47, 22.6; 3/10/48, 24.0; 3/12/48, 24.6; 11/8/48, 25.1; 3/24/49, 22.2; 12/5/49, 26.3.

14N/3E-29L1—Reference point—top of casing, elevation 41 feet, 0.48 mile east of George Washington Boulevard, 0.27 mile north of O'Banion Road. 12/13/47, 20.0; 3/9/48, 20.0; 11/8/48, 21.3; 3/24/49, 18.9; 5/31/49, 28.1; 6/30/49, 31.3; 8/1/49, 32.0; 12/5/49, 22.4.

14N/3E-29R1—Reference point—hole in pump base, elevation 43.5 feet. West side of Carlson Road, 0.19 mile north of O'Banion Road. 5/21/48, 22.1; 11/8/48, 25.6; 3/24/49, 22.5; 12/5/49, 26.4; 3/29/50, 23.5; 11/7/50, 28.0; 3/29/51, 21.6; 11/15/51, 26.9; 4/3/52, 16.0.

14N/3E-30E1—Reference point—top of casing, elevation 36 feet, 0.22 mile east of Township Road, 0.40 mile south of Hutchinson Road. 12/11/47, 12.1; 3/10/48, 8.6; 3/12/48, 8.5; 11/8/48, 8.3; 3/24/49, 6.4; 12/2/49, 9.1

14N/3E-30H1—Reference point—top of casing, elevation 38 feet, 0.28 mile south of Hutchinson Road, 0.03 mile west of George Washington Boulevard. 12/11/47, 14.9; 3/10/48, 14.6; 3/12/48, 14.5; 11/8/48, 16.1; 3/24/49, 14.0; 12/2/49, 17.5.

14N/3E-30M1—Reference point—top of concrete pit (west wall), elevation 37 feet, 0.38 mile north of O'Banion Road, 0.03 mile east of Township Road. 12/11/47, 8.5; 3/10/48, 9.6; 3/12/48, 9.6; 11/8/48, 9.3; 3/24/49, 6.0; 12/2/49, 9.0.

14N/3E-31B1—Reference point—top of casing, elevation 38 feet, 0.06 mile south of O'Banion Road, 0.36 mile west of George Washington Boulevard. 12/11/47, 12.6; 3/10/48, 13.1; 3/12/48, 13.1; 3/29/48, 12.9; 11/8/48, 12.2; 1/24/49, 13.1; 3/21/49, 11.4; 12/2/49, 13.4; 3/29/50, 12.0; 11/7/50, 15.3; 3/29/51, 10.7; 11/15/51, 14.3; 4/3/52, 7.7.

14N/3E-31L1—Reference point—top of casing, elevation 35 feet, 0.24 mile east of Township Road, 0.66 mile south of O'Banion Road. 12/11/47, 12.3; 3/10/48, 7.9; 3/12/48, 7.9; 11/8/48, 9.5; 3/25/49, 8.7.

14N/3E-31R1—Reference point—top of casing, elevation 36 feet, 0.12 mile west of George Washington Boulevard, 0.78 mile south of O'Banion Road. 12/12/47, 15.9; 3/10/48, 16.3; 3/12/48, 16.1; 11/8/48, 14.2; 3/24/49, 13.5; 12/5/49, 16.3.

14N/3E-32D1—Reference point—hole in base of pump, elevation 40 feet, 0.11 mile south of O'Banion Road, 0.09 mile east of George Washington Boulevard. 12/2/47, 16.7; 3/10/48, 17.5; 3/12/48, 17.4; 5/12/48, 16.2; 11/8/48, 16.7; 3/24/49, 14.8; 6/30/49, 20.8; 8/25/49, 19.2; 12/5/49, 17.9.

14N/3E-33D3—Reference point—hole in base of pump, elevation 40 feet, 0.18 mile south of O'Banion Road, 0.03 mile west of Burch Road. 12/12/47, 26.1; 3/9/48, 21.2; 3/12/48, 20.8; 3/29/48, 19.7; 5/29/48, 18.2; 11/8/48, 12.7; 1/19/49, 20.6; 3/24/49, 19.0; 6/1/49, 21.7; 6/28/49, 44.2; 7/27/49, 28.4; 8/25/49, 23.6.

14N/3E-33M2—Reference point—top of 2" x 4" plank over earth pit, elevation 27.8, 0.67 mile south of O'Banion Road, 0.15 mile west of Burch Road. 12/12/47, 15.8; 3/24/48, 16.9.

14N/3E-34C1—Reference point—top of casing, elevation 39 feet, 0.21 mile east of State Highway 24, south side of O'Banion Road. 11/14/47, 20.4; 3/8/48, 24.2; 3/29/48, 21.4; 5/12/48, 19.4; 11/9/48, 23.5; 1/19/49, 21.7; 3/23/49, 20.6; 12/6/49, 25.3.

14N/3E-34L1—Reference point—hole in side of pump, elevation 40 feet, 0.43 mile east of State Highway 24, 0.51 mile south of O'Banion Road. 11/14/47, 26.9; 3/8/48, 24.5; 11/10/48, 28.4; 3/25/49, 22.7; 12/6/49, 21.7.

14N/3E-35Q1—Reference point—hole in side of pump, elevation 43 feet, 0.35 mile east of Garden Highway, 0.57 mile north of Tudor Road. 11/14/47, 21.2; 3/8/48, 17.2; 11/10/48, 17.3; 3/23/49, 11.4; 12/6/49, 18.9.

14N/3E-36C1—Reference point—top of casing, elevation 50 feet, 0.51 mile south of Country Club Road, 0.72 mile east of Feather River Boulevard. 11/17/47, 17.7; 3/9/48, 16.7; 5/8/48, 9.2; 11/10/48, 18.2; 1/24/49, 17.6; 3/23/49, 11.8; 12/2/49, 18.6; 3/29/50, 10.7; 11/6/50, 18.0; 3/30/51, 11.0; 11/16/51, 16.2; 4/1/52, 6.4.

14N/4E-2F1—Reference point—top of casing outside shed, elevation 67.8 feet, 0.1 mile west of Virginia Road, 0.3 mile south of junction of Earle and Spenceville Roads. 12/4/47, 20.8; 3/18/48, 19.6; 11/22/48, 23.4; 3/21/49, 22.3.

14N/4E-2K1—Reference point—top of casing under pump, elevation 65.9 feet, 200 feet east of Virginia Road, 0.7 mile south of Spenceville Road. 12/4/47, 17.2; 5/18/48, 16.7; 11/22/48, 21.0; 11/23/49, 26.8.

14N/4E-2R1—Reference point—top of casing under pump, elevation 68.9 feet, 250 feet north of Earle Road, 0.2 mile east of junction of Virginia Road and Spenceville Roads. 12/3/47, 21.5; 3/18/48, 21.3; 11/19/48, 25.9; 3/21/49, 24.2; 11/23/49, 32.3.

14N/4E-4A1—Reference point—hole in side of pump, elevation 65 feet, 0.9 mile north of Hale Road, 1.0 mile east of U. S. Highway 99E. 12/1/47, 29.1; 3/18/48, 27.4; 11/19/48, 31.3; 3/23/49, 29.2; 11/23/49, 35.0; 3/27/50, 32.3; 11/3/50, 36.2; 4/5/51, 30.8; 11/21/51, 37.2; 4/4/52, 32.1.

14N/4E-4C1—Reference point—vertical hole in side of pump, elevation 63 feet, 0.6 mile east of U. S. Highway 99E, 0.9 mile north of Hale Road. 11/19/48, 28.4; 3/23/49, 26.1; 11/23/49, 31.6.

14N/4E-4M1—Reference point—top of hole in pump base, elevation 60 feet, 0.2 mile west of U. S. Highway 99E, 0.7 mile north of McGowan Road. 12/1/47, 21.3; 3/17/48, 19.9; 11/19/48, 23.9; 3/21/49, 21.7; 12/7/49, 26.7; 3/27/50, 24.5; 11/3/50, 28.5; 4/5/51, 24.6; 11/21/51, 33.7; 4/2/52, 26.2.

14N/4E-5A1—Reference point—top of casing under pump, elevation 60 feet, 0.05 mile west of U. S. Highway 99E, 1.3 miles north of McGowan Road. 12/1/47, 23.2; 3/17/48, 21.4.

14N/4E-5C1—Reference point—top tin, casing under pump, elevation 58 feet, 1.3 miles north of McGowan Road, 0.5 mile west of U. S. Highway 99E. 12/1/47, 22.8; 3/15/48, 22.1.

TABLE 1—Continued

DEPTHS TO GROUND WATER AT MEASUREMENT WELLS IN SUTTER-YUBA AREA

Measurements Made by Division of Water Resources
(Depths to water in feet measured from reference point)

14N/4E-5J1—Reference point—top of casing under pump, elevation 62 feet, 0.3 mile west of U. S. Highway 99E, 0.8 mile north of McGowan Road. 12/1/47, 20.8; 3/15/48, 19.7.

14N/4E-5L1—Reference point—top of casing, elevation 60 feet, 0.1 mile west of U. S. Highway 99E, 1.9 miles north of McGowan Road. 12/1/47, 22.1; 3/15/48, 21.5; 11/19/48, 24.1; 3/21/49, 23.0; 12/7/49, 26.5; 4/3/52, 23.8.

14N/4E-7A1—Reference point—top of casing, 2.5 feet above ground, elevation 55 feet, 0.15 mile west of Arboga Road, 0.80 mile north of Ella Road. 11/12/47, 22.3; 3/15/48, 20.9; 5/14/48, 22.0; 10/17/48, 27.2; 11/11/48, 23.0; 3/21/49, 21.0; 12/1/49, 24.6; 3/29/50, 22.7; 11/6/50, 26.2; 3/30/51, 20.7; 11/20/51, 25.4; 4/5/52, 20.6.

14N/4E-7A2—Reference point, top of casing, elevation 58 feet, 264 feet west of Arboga Road, 0.81 mile north of Ella Road. 3/5/48, 21.5; 5/14/48, 21.6; 3/21/49, 19.5; 12/1/49, 25.0; 3/29/50, 21.2; 11/6/50, 27.9.

14N/4E-7D1—Reference point—top of casing at bottom of 9-foot pit, elevation 52 feet, 500 feet east of Feather River Boulevard, 0.85 mile north of Ella Road. 11/12/47, 12.3; 3/5/48, 11.0; 10/7/48, 13.8; 11/11/48, 11.5; 3/22/49, 10.5; 12/1/49, 15.2.

14N/4E-7F1—Reference point—top of discharge flange, elevation 53 feet, 0.4 mile east of Feather River Boulevard, 0.7 mile north of Ella Avenue. 11/12/47, 16.1; 3/5/48, 19.0; 11/11/48, 19.7; 3/22/49, 17.4; 12/1/49, 20.5.

14N/4E-8C1—Reference point—top of casing, concrete box, elevation 57 feet, 0.9 mile west of U. S. Highway 99E, 0.4 mile north of McGowan Road. 12/1/47, 28.2.

14N/4E-9B1—Reference point—top of casing, elevation 62 feet, 200 feet west of U. S. Highway 99E, 0.3 mile north of McGowan Road 12/2/47, 28.6; 3/17/48, 27.3; 11/19/48, 30.6; 3/21/49, 28.5; 11/23/49, 33.9.

14N/4E-9F1—Reference point—hole in pump base, elevation 60 feet, 50 feet north of McGowan Road, 0.7 mile west of U. S. Highway 99E. 11/19/48, 28.2; 1/25/49, 27.0; 3/18/49, 25.5; 11/23/49, 31.5; 3/28/50, 28.2; 11/3/50, 33.3; 4/5/51, 28.1.

14N/4E-9L1—Reference point—top of casing under pump, elevation 61 feet, 0.3 mile south of McGowan Road, 0.8 mile west of U. S. Highway 99E. 12/2/47, 23.7; 3/17/48, 21.4.

14N/4E-9Q1—Reference point—top of casing, elevation 52 feet, 0.7 mile west of U. S. Highway 99E, 0.3 mile south of McGowan Road. 12/2/47, 20.9; 3/17/48, 10.4; 11/19/48, 13.5; 3/18/49, 10.0; 11/23/49, 16.9; 4/2/52, 9.5.

14N/4E-10H2—Reference point—top of concrete pit, north edge, elevation 63 feet, 1.1 miles east of U. S. Highway 99E, 0.6 mile north of Ostrom Road. 12/3/47, 23.9; 3/18/48, 23.5; 11/19/48, 27.6; 3/21/49, 25.1; 11/23/49, 32.5; 3/22/50, 28.2; 11/3/50, 33.8; 4/5/51, 28.4; 11/23/51, 24.2; 4/4/52, 17.2.

14N/4E-10L1—Reference point—top of casing under pump, elevation 60 feet, 0.1 mile east of U. S. Highway 99E, 0.4 mile north of Slaughter House Road. 12/3/47, 16.9; 3/17/48, 15.4.

14N/4E-10M1—Reference point—top of casing 2 feet above ground line, elevation 58 feet, 0.2 mile west of U. S. Highway 99E, 0.4 mile north of Slaughter House Road. 11/19/48, 16.4.

14N/4E-10R1—Reference point—top of casing under pump, elevation 62 feet, 50 feet north of Ostrom Road, 0.5 mile east of U. S. Highway 99E. 12/3/47, 23.7; 3/18/48, 22.3; 11/19/48, 27.7; 11/23/49, 31.3.

14N/4E-11C1—Reference point—top of casing, elevation 68.6 feet, 2.0 miles east of U. S. Highway 99E, 0.7 mile south of Virginia Road. 11/18/48, 24.7.

14N/4E-11C2—Reference point—top of casing, elevation 68 feet, 1.9 miles east of U. S. Highway 99E, 0.7 mile south of Virginia Road. 11/18/48, 26.1; 3/21/49, 24.2; 11/23/49, 31.6.

14N/4E-11H1—Reference point—top of casing, elevation 72 feet, 1.0 mile west of Bradshaw Road, 0.6 mile north of Ostrom Road. 11/18/48, 29.4; 3/21/49, 27.7; 11/24/49, 35.9; 3/27/50, 33.2; 11/2/50, 38.6; 4/5/51, 34.6; 11/23/51, 40.6; 4/4/52, 37.2.

14N/4E-11J1—Reference point—top of casing, elevation 69.8 feet, 0.4 mile north of Ostrom Road, 1.1 miles west of Bradshaw Road. 11/18/48, 30.1; 3/21/49, 28.3; 11/23/49, 36.4.

14N/4E-11Q1—Reference point—top of casing, elevation 71 feet, 50 feet north of Ostrom Road, 1.5 miles west of Bradshaw Road. 11/18/48, 30.0; 11/23/49, 34.8.

14N/4E-12A1—Reference point—hole in pump base, elevation 75 feet, 100 feet west of Bradshaw Road, 1.0 mile north of Ostrom Road. 11/18/48, 31.4; 1/18/48, 28.8; 3/29/49, 28.1; 11/23/49, 36.6; 3/30/50, 33.6; 11/2/50, 40.5; 4/5/51, 43.2; 4/4/52, 37.1.

14N/4E-12B1—Reference point—hole in pump base, elevation 72 feet, 0.4 mile west of Bradshaw Road, 1.0 mile north of Ostrom Road. 11/18/48, 29.0; 4/5/51, 34.7.

14N/4E-12E1—Reference point—top of casing, elevation 70 feet, 0.7 mile north of Ostrom Road, 100 feet east of Virginia Road. 10/7/48, 29.55; 11/18/48, 28.9; 1/18/49, 28.0; 3/21/49, 27.15; 11/23/49, 35.4.

14N/4E-12R1—Reference point—top of casing, elevation 78 feet, 100 feet northwest of the intersection of Bradshaw and Ostrom Roads. 10/7/48, 35.0; 11/18/48, 33.0; 3/18/49, 30.8; 11/23/49, 39.8; 3/22/50, 36.7; 11/2/50, 44.2; 4/5/51, 39.0; 11/23/51, 47.4; 4/3/52, 40.8.

14N/4E-13A1—Reference point—top of casing, elevation 79.4 feet, 50 feet west of Bradshaw Road, 0.2 mile south of Ostrom Road. 3/24/48, 29.8; 10/7/48, 37.4; 11/18/48, 35.1; 1/18/48, 33.8; 3/18/49, 32.8; 11/23/49, 41.8; 3/27/50, 38.4.

14N/4E-13B1—Reference point—top of casing, elevation 75.5 feet, 0.3 mile west of Bradshaw Road, 100 feet south of Ostrom Road. 11/18/46, 31.6.

14N/4E-13C1—Reference point—top of casing, elevation 73.5 feet, 100 feet south of Ostrom Road, 0.6 mile west of Bradshaw Road. 10/7/48, 30.6; 11/18/48, 29.0; 1/18/49, 28.0; 3/18/49, 27.0; 11/23/49, 34.9; 3/27/50, 32.0; 11/2/50, 38.4; 4/5/51, 33.4; 11/23/51, 39.8; 4/3/52, 35.1.

14N/4E-13Q1—Reference point—top of casing under pump, elevation 71 feet, 0.9 mile south of Ostrom Road, 0.5 mile east of Virginia Road. 12/3/47, 30.4; 3/18/48, 29.1; 10/7/48, 34.7; 11/18/48, 33.6; 3/18/49, 31.6; 11/23/49, 39.0; 3/27/50, 36.7; 11/3/50, 41.8; 4/5/51, 37.9.

14N/4E-13R1—Reference point—top of casing, elevation 80 feet, 50 feet west of Bradshaw Road, 1 mile south of Ostrom Road. 11/18/48, 39.1; 3/18/49, 36.5; 11/24/49, 57.7.

14N/4E-14C1—Reference point—top of casing, elevation 70 feet, 20 feet south of Ostrom Road, 0.8 mile east of U. S. Highway 99E. 10/7/48, 30.7; 11/18/48, 29.0; 1/18/49, 28.0; 3/18/49, 29.1; 11/24/49, 33.9; 3/27/50, 31.5; 11/2/50, 36.2; 4/5/51, 31.6; 11/23/51, 38.4; 4/4/52, 33.6.

14N/4E-14J1—Reference point—top of casing, elevation 62 feet, 200 feet west of Virginia Road, 0.5 mile south of Ostrom Road. 12/3/47, 23.8; 3/18/48, 22.6; 10/7/48, 27.5; 11/18/48, 27.0; 3/18/49, 25.4.

14N/4E-14R1—Reference point—top of casing, elevation 70 feet, 200 feet west of Virginia Road, 0.4 mile north of U. S. Highway 99E. 3/18/49, 30.4.

14N/4E-15C1—Reference point—hole in pump base, elevation 64.6 feet, 200 feet south of Slaughter House Road, 0.4 mile west of U. S. Highway 99E. 12/2/47, 23.9; 3/17/48, 22.6; 10/7/48, 30.5; 11/19/48, 25.9; 3/18/49, 23.3; 11/23/49, 29.6; 3/28/50, 26.5; 11/3/50, 31.0; 4/5/51, 26.0; 11/21/51, 33.1; 4/2/52, 28.9.

14N/4E-15C2—Reference point—top of casing under pump, elevation 65 feet, 500 feet south of Slaughter House Road, 0.3 mile west of U. S. Highway 99E. 12/2/47, 23.1; 3/17/48, 20.8.

TABLE 1—Continued

DEPTHS TO GROUND WATER AT MEASUREMENT WELLS IN SUTTER-YUBA AREA

Measurements Made by Division of Water Resources
(Depths to water in feet measured from reference point)

14N 4E-15C3—Reference point—top of casing, 1 foot below ground, elevation 62.7 feet, 250 feet north of Slaughter House Road, 0.2 mile west of U. S. Highway 99E. 11/22/29, 16.4; 9/18/30, 15.9; 12/11/31, 16.4; 12/10/32, 15.7; 12/21/33, 11.0; 11/23/34, 10.7; 11/22/37, 15.8; 11/27/39, 12.1; 12/21/40, 15.3; 11/7/47, 23.2; 12/16/48, 24.3; 12/7/49, 28.2; 11/10/50, 29.7; 12/5/51, 31.3.

14N 4E-15C4—Reference point—top of 1-inch pipe to jet, elevation 65.2 feet, 0.1 mile north of Slaughter House Road, 0.3 mile west of U. S. Highway 99E. 11/19/48, 26.6; 3/18/49, 24.1; 11/23/49, 30.3.

14N 4E-15D1—Reference point—top of casing, elevation 55.9 feet, 200 feet southwest of Slaughter House Road, 0.7 mile due west of U. S. Highway 99E. 12/2/47, 15.8; 3/17/48, 14.1; 11/19/48, 17.5.

14N 4E-15L1—Reference point—top of casing under pump, elevation 66 feet, 0.8 mile west of U. S. Highway 99E, 0.4 mile south of Slaughter House Road. 12/2/47, 25.6; 3/17/48, 24.4; 10/7/48, 29.5; 11/19/48, 27.6; 1/25/49, 26.6; 3/18/49, 25.2; 5/25/49, 33.1; 6/29/49, 34.5; 7/29/49, 35.5; 11/23/49, 31.4; 3/28/50, 28.4; 11/3/50, 32.8; 4/5/51, 28.2; 11/21/51, 37.0; 4/2/52, 29.0.

14N 4E-16M1—Reference point—top of casing, elevation 55 feet, 1.3 miles south of McGowan Road, 0.4 mile east of Western Pacific Railroad tracks. 12/3/47, 22.5; 3/18/48, 20.3; 11/19/48, 20.9; 3/13/49, 18.4.

14N 4E-17C1—Reference point—top of casing under pump, elevation 55 feet, 0.5 mile south of McGowan Road, 100 feet west of Western Pacific Railroad. 12/2/47, 23.9; 3/18/48, 20.6; 11/19/48, 23.6; 3/18/49, 21.1; 11/22/49, 25.3; 3/28/50, 22.8; 11/3/50, 26.7; 4/5/51, 20.8.

14N 4E-17D1—Reference point—hole in side of casing, elevation 54 feet, 0.5 mile south of McGowan Road, 0.3 mile west of Western Pacific Railroad. 3/18/49, 21.0; 3/28/50, 22.5.

14N 4E-17D2—Reference point—top of casing under pump, elevation 54 feet, 0.5 mile south of McGowan Road, 0.3 mile west of Western Pacific Railroad. 12/1/47, 22.3.

14N 4E-17P1—Reference point—top of casing under pump, elevation 58.7 feet, 500 feet west of Western Pacific Railroad, 1.4 miles south of McGowan Road. 12/3/47, 23.2; 3/18/48, 21.8; 5/14/48, 23.2; 11/19/48, 24.4; 3/18/49, 21.9; 11/23/49, 25.8; 3/28/50, 23.0; 11/31/50, 26.6; 4/5/51, 20.9; 4/3/52, 23.2.

14N 4E-18C1—Reference point—hole in top of casing, elevation 53.1 feet, 200 feet south of Ella Road, 0.4 mile east of Feather River Boulevard. 11/11/47, 20.9; 3/5/48, 19.7; 10/7/48, 27.5; 11/11/48, 19.5; 1/27/49, 18.7; 3/21/49, 17.8; 12/1/49, 20.4; 3/28/50, 19.1; 11/6/50, 23.5; 3/30/51, 15.1; 11/20/51, 23.3; 4/5/52, 15.7.

14N 4E-18H1—Reference point—bottom of pump, elevation 54.1 feet, 400 feet west of Arboga Road, 0.5 mile south of Ella Road. 11/11/47, 21.2; 3/5/48, 19.8; 10/7/48, 24.9; 11/11/48, 21.0; 3/21/49, 19.6; 12/1/49, 21.6.

14N 4E-18J1—Reference point—top of suction flange, elevation 45.6 feet, 400 feet west of Arboga Road, 0.6 mile south of Ella Road. 11/11/47, 17.6; 3/5/48, 14.2; 11/11/48, 16.3; 3/21/49, 14.8; 12/1/49, 22.0.

14N 4E-19E1—Reference point—top of casing, 4 feet below ground in pit, elevation 52 feet, 0.2 mile east of Feather River Boulevard, 0.1 mile north of Broadway. 11/8/29, 8.0; 9/26/30, 8.7; 12/11/31, 8.6; 12/31/32, 8.6; 12/21/33, 8.9; 11/20/34, 9.1; 11/27/36, 9.1; 11/24/37, 11.1; 1/30/39, 6.6; 12/21/40, 8.1.

14N 4E-19L1—Reference point—top of casing, 0.6 foot above ground, elevation 48 feet, 0.4 mile east of Feather River Boulevard, 0.1 mile south of Broadway. 11/7/47, 20.6; 12/16/48, 20.7; 12/9/49, 21.8; 11/10/50, 23.6; 12/5/51, 21.2.

14N 4E-19P1—Reference point—top of casing, top of concrete floor, elevation 50.4 feet, 0.3 mile south of Broadway, 0.5 mile east of Feather River Boulevard. 11/17/47, 33.6; 3/9/48, 18.4; 11/10/48, 19.7; 3/23/49, 17.5; 12/2/49, 21.4; 3/29/50, 18.9; 11/6/50, 22.3; 3/30/51, 18.7; 11/16/51, 22.1; 4/1/52, 9.5.

14N 4E-20D1—Reference point—top of casing under pump, elevation 53 feet, 200 feet north of Broadway, 0.6 mile west of Arboga Road. 12/3/47, 24.9; 3/18/48, 23.3.

14N 4E-20E1—Reference point—pump base hole, elevation 54.3 feet, 150 feet north of Broadway, 1.0 mile east of Feather River Boulevard. 11/11/48, 20.9; 3/21/49, 18.2.

14N 4E-20M1—Reference point—bottom of pump mount, blocked up from concrete, elevation 52.2 feet, 50 feet south of Broadway, 0.95 mile east of Feather River Boulevard. 11/11/47, 22.4; 3/6/48, 20.0; 10/7/48, 22.8; 11/11/48, 21.5; 1/24/29, 20.6; 3/21/49, 19.7; 12/1/49, 23.0; 3/29/50, 20.9; 11/6/50, 23.1; 11/20/51, 23.3; 4/5/52, 17.4.

14N 4E-20M2—Reference point—hole in side of pump, elevation 52.8 feet, 400 feet south of Broadway, 1.0 mile east of Feather River Boulevard. 11/11/47, 18.7; 3/6/48, 20.0; 10/7/48, 21.7; 11/11/48, 19.5; 3/2/49, 16.9; 12/1/49, 21.2; 3/29/50, 18.5; 11/6/50, 22.1; 3/30/51, 18.0; 11/20/51, 21.7; 4/5/52, 16.1.

14N 4E-22F1—Reference point—hole in top of pump base, elevation 60 feet, 100 feet west of Forty Mile Road, 1.35 miles south of Slaughter House Road. 12/1/47, 22.6; 3/1/48, 21.3; 3/31/48, 20.8; 10/7/48, 25.6; 11/8/48, 24.0; 1/25/49, 23.0; 3/18/49, 21.5; 11/23/49, 27.7.

14N 4E-22F2—Reference point—hole in base of pump, elevation 58.4 feet, 200 feet west of Forty Mile Road, 1.2 miles south of Slaughter House Road. 12/2/47, 18.7; 3/17/48, 17.4.

14N 4E-22F3—Reference point—access pipe in concrete base, elevation 61.9 feet, 150 feet west of Forty Mile Road, 1.3 miles south of Slaughter House Road. 12/2/47, 23.6; 3/17/48, 22.2; 11/19/48, 24.9; 3/18/49, 21.9; 11/23/49, 27.0; 3/28/50, 25.6; 11/2/50, 30.1; 4/5/51, 28.9; 11/21/51, 32.4; 4/2/52, 25.5.

14N 4E-22M1—Reference point—top of casing, elevation 61.8 feet, 0.4 mile west of Forty Mile Road, 1.25 miles north of Plumas School. 12/1/47, 21.7; 3/1/48, 20.5; 10/7/48, 25.1; 11/8/48, 23.5; 3/25/49, 20.5; 11/23/49, 26.4; 3/28/50, 23.1; 11/3/50, 28.1; 12/3/51, 28.1; 4/1/52, 23.9.

14N 4E-22P1—Reference point—top of concrete curb around open pit well, elevation 64.9 feet, 50 feet west of Forty Mile Road, 1.2 miles north of Plumas School. 11/21/47, 26.9.

14N 4E-23A1—Reference point—top of casing, elevation 60 feet, 300 feet southwest of U. S. Highway 99E, 1.5 miles southeast of Slaughter House Road. 12/3/47, 31.7; 3/18/48, 30.2; 11/18/48, 33.8; 3/18/49, 32.2; 11/23/49, 38.2; 3/29/50, 36.5; 11/3/50, 40.4; 11/21/51, 43.4; 4/2/52, 41.0.

14N 4E-23B1—Reference point—top of casing, elevation 70 feet, 0.07 mile southwest of U. S. Highway 99E, 0.38 mile northwest of Virginia Road. 12/3/47, 30.7; 3/18/48, 29.5.

14N 4E-23G1—Reference point—top of pump base, elevation 70 feet, 0.70 mile west of U. S. Highway 99E, at a point 2.02 miles southeast of Slaughter House Road. 12/1/47, 30.9; 10/7/48, 33.2; 11/8/48, 32.9; 3/29/49, 30.9; 11/25/49, 37.2.

14N 4E-23Q1—Reference point—top of casing, elevation 72 feet, 1.98 miles south of Slaughter House Road, 1.05 miles east of Forty Mile Road. 11/21/47, 32.6; 3/3/48, 29.2.

14N 4E-23R1—Reference point—top of casing, elevation 67 feet, 4.98 miles south of Slaughter House Road, 1.48 miles east of Forty Mile Road. 11/21/47, 30.5; 3/31/47, 29.7; 11/11/48, 33.0; 3/29/49, 30.6; 11/25/49, 36.1.

14N 4E-24B1—Reference point—top of pump base, elevation 75 feet, 0.80 mile east of Virginia Road, 1 mile south of Ostrom Road. 3/18/49, 28.3.

14N 4E-24H1—Reference point—top of pump base, elevation 85 feet, 4.3 miles south of Ostrom Road, 0.14 mile west of Bradshaw Road. 11/18/48, 36.9; 3/18/49, 34.0; 11/23/49, 42.9; 3/27/50, 39.8; 11/2/50, 45.8; 4/5/51, 41.3; 11/30/51, 51.7; 4/3/52, 43.7.

TABLE 1—Continued

DEPTHS TO GROUND WATER AT MEASUREMENT WELLS IN SUTTER-YUBA AREA

Measurements Made by Division of Water Resources
(Depths to water in feet measured from reference point)

14N/4E-24M1—Reference point—top of casing, elevation 70 feet. 0.05 mile southwest of U. S. Highway 99E, 0.38 mile southeast of Virginia Road. 11/21/47, 22.5; 3/2/48, 28.7; 11/11/48, 31.1; 3/23/49, 28.3; 11/25/49, 34.5.

14N/4E-24P1—Reference point—top of pump base, elevation 70 feet. West side of U. S. Highway 99E, 0.68 mile southeast of Virginia Road. 11/21/47, 32.7; 3/2/48, 30.5; 11/9/48, 33.7; 1/25/49, 31.9; 3/23/49, 30.5; 5/25/49, 40.3; 7/1/49, 44.8; 11/25/49, 38.5; 3/28/50, 35.1; 11/3/50, 40.6; 4/4/51, 35.8; 12/6/51, 39.6; 4/2/52, 41.9.

14N/4E-25R1—Reference point—top of casing, elevation 74 feet. 0.53 mile northwest of Dairy Road, 0.67 mile southwest of U. S. Highway 99E. 12/2/47, 29.4; 3/2/48, 27.6; 10/7/48, 32.8; 11/11/48, 31.2; 3/29/49, 28.0; 11/23/49, 34.7.

14N/4E-26A1—Reference point—hole in base of pump, elevation 65 feet, 1.03 miles southeast of Virginia Road, 0.98 mile west of U. S. Highway 99E. 11/11/48, 33.2; 3/29/49, 30.2.

14N/4E-26C1—Reference point—top of casing, elevation 66 feet. 1.45 mile north of Levee Road, 0.95 mile east of Forty Mile Road. 12/1/47, 18.2; 3/3/48, 16.7; 11/11/48, 19.7; 3/29/49, 17.5; 11/25/49, 22.4; 3/29/50, 20.9; 11/8/50, 24.8; 4/4/51, 20.8; 5/5/51, 23.5; 4/2/52, 23.0.

14N/4E-27D1—Reference point—top of casing, elevation 60 feet. 1.20 miles north of Levee Road, 0.40 mile west of Forty Mile Road. 11/21/47, 24.8.

14N/4E-27L1—Reference point—pipe in base, elevation 64.1 feet. 2.60 miles south of Slaughter House Road, west side of Forty Mile Road. 12/1/47, 24.8; 3/1/48, 23.4; 3/29/48, 23.5; 10/7/48, 30.0; 11/8/48, 28.1; 1/25/49, 26.7; 3/25/49, 25.6; 11/23/49, 29.6; 3/28/50, 28.0; 11/3/50, 32.5; 11/30/51, 23.0; 4/1/52, 28.5.

14N/4E-27R1—Reference point—top of casing, elevation 60 feet. 2.85 miles south of Slaughter House Road, 0.52 mile east of Forty Mile Road. 12/2/47, 30.3; 3/1/48, 28.7; 11/8/48, 31.7; 3/25/49, 28.8; 11/23/49, 33.6.

14N/4E-28N1—Reference point—top of casing, elevation 49 feet. 2.05 miles south of Slaughter House Road, 1.50 miles west of Forty Mile Road. 11/8/29, 10.5; 9/26/30, 10.4; 12/11/31, 11.0; 12/5/32, 11.1; 12/21/33, 11.2; 11/20/34, 11.5; 11/27/36, 11.9; 11/24/37, 12.0; 11/30/39, 9.2; 12/21/40, 10.9; 11/7/47, 13.1; 12/16/48, 13.8; 12/9/49, 15.9; 11/10/50, 15.0; 12/5/51, 15.9.

14N/4E-28R1—Reference point—pipe in base of pump, elevation 60.2 feet. 0.55 mile north of Levee Road, 0.68 mile west of Forty Mile Road. 12/2/47, 25.2; 3/1/48, 24.1; 11/8/48, 25.6; 3/25/49, 23.6; 11/23/49, 27.4; 3/28/50, 25.6; 11/3/50, 29.1; 4/4/51, 21.7; 11/30/51, 34.1; 4/1/52, 24.6.

14N/4E-30E1—Reference point—hole in base of pump, elevation 48.6 feet. 0.11 mile east of Feather River Boulevard, 0.25 mile south of Anderson Road. 11/17/47, 23.5; 3/9/48, 19.3; 11/10/48, 20.3; 3/23/49, 18.1; 12/2/49, 21.8.

14N/4E-30F1—Reference point—top of casing, elevation 45 feet. 0.15 mile north of Country Club Road, 0.46 mile east of Feather River Boulevard. 11/17/47, 16.9; 3/9/48, 16.9; 11/10/48, 17.9.

14N/4E-30K1—Reference point—top of casing, elevation 45.0 feet. South side of Country Club Boulevard, 0.51 mile east of Feather River Boulevard. 11/17/47, 14.5; 3/8/48, 14.5; 5/8/48, 12.0; 11/10/48, 15.4; 1/29/49, 14.4; 3/23/49, 12.1; 6/1/49, 22.6; 6/29/49, 24.0; 7/28/49, 25.7; 8/26/49, 30.1; 3/29/50, 13.5; 11/6/50, 17.2; 3/30/51, 12.2; 11/16/51, 16.8; 4/1/52, 12.2.

14N/4E-31E1—Reference point—top of casing, elevation 38.5 feet. 0.06 mile east of Feather River Boulevard, 0.80 mile south of Country Club Road. 11/10/48, 11.9; 3/22/49, 8.9; 12/2/49, 11.8.

14N/4E-32L1—Reference point—top of casing, elevation 45 feet. 1.0 mile south of Country Club Avenue, 1.24 miles east of Feather River Boulevard. 11/17/47, 18.0; 3/9/48, 18.2; 11/10/48, 17.3; 3/29/49, 15.4; 12/2/49, 19.3.

14N/4E-33K1—Reference point—top of casing, elevation 51 feet. 1.50 mile west of Forty Mile Road, 0.55 mile north of Levee Road. 12/1/47, 19.7; 11/8/48, 20.6; 3/25/49, 18.0.

14N/4E-33M1—Reference point—top of casing, elevation 51 feet. 3.73 miles south of Slaughter House Road, 0.21 mile east of Western Pacific Railroad. 11/17/47, 14.3; 3/9/48, 13.1; 5/5/48, 9.1; 5/31/48, 9.1; 11/10/48, 13.9; 1/24/49, 13.8; 3/22/49, 10.8; 6/1/49, 10.8; 6/29/49, 12.8; 7/28/49, 14.2; 8/26/49, 15.8; 12/2/49, 15.3; 3/29/50, 9.7; 11/6/50, 14.7; 11/16/51, 13.7; 4/1/52, 5.5.

14N/4E-34C1—Reference point—top of concrete pit, elevation 63.4 feet. 3.05 miles south of Slaughter House Road, 0.05 mile west of Forty Mile Road. 12/1/47, 27.8; 3/1/48, 26.5; 5/5/48, 25.1; 6/3/48, 26.8; 6/24/48, 32.2 (operating); 7/8/48, 29.2 (operating).

14N/4E-35N1—Reference point—slot in base, elevation 62 feet. West side of Forty Mile Road, 0.60 mile northwest of Dairy Road. 11/28/47, 25.7; 3/1/48, 24.4; 3/21/48, 24.2; 3/29/48, 23.8; 5/5/48, 22.5; 5/13/48, 61.5 (operating); 11/8/48, 27.5; 1/26/49, 25.6; 3/25/49, 24.0; 11/23/49, 30.3; 3/28/50, 27.3; 11/6/50, 32.1; 4/4/51, 26.3; 11/30/51, 33.1; 4/1/52, 27.4.

14N/4E-36G1—Reference point—top of casing, elevation 70 feet. 0.20 mile northwest of U. S. Highway 99E. 12/2/47, 30.5; 3/2/48, 28.5; 3/29/48, 28.0; 10/7/48, 33.6; 11/11/48, 32.4; 1/25/49, 31.8; 3/25/49, 29.0; 11/23/49, 36.7; 3/28/50, 32.6; 11/8/50, 37.6; 4/4/51, 30.8; 12/3/51, 41.0.

14N/5E-5A1—Reference point—top of casing, elevation 90.2 feet. 400 feet south of Spenceville Road, 1.0 mile west of South Beale Road. 12/5/49, 39.1; 11/2/50, 46.9; 4/5/51, 41.9; 4/4/52, 41.5.

14N/5E-6B1—Reference point—top of 12-inch casing, elevation 78.5 feet. 150 feet south of Spenceville Road, 2.25 miles west of South Beale Road. 11/28/48, 26.0; 1/18/49, 25.2; 3/21/49, 24.9; 11/24/49, 32.4; 3/27/40, 30.3; 11/2/50, 37.6; 4/5/51, 32.8; 11/30/51, 37.6; 4/4/52, 34.6.

14N/5E-6D1—Reference point—top of 8-inch casing, elevation 76.4 feet. 600 feet south of Spenceville Road, 1.75 miles east of Virginia Road. 12/24/47, 22.4; 3/24/48, 22.3; 3/21/49, 23.7; 11/24/49, 33.7.

14N/5E-6D2—Reference point—top of 6-inch casing, elevation 73.6 feet. 800 feet south of Spenceville Road, 1.75 miles east of Virginia Road. 11/18/48, 23.9.

14N/5E-8A1—Reference point—top of 16-inch casing, elevation 90 feet, 0.40 mile northwest of South Beale Road at a point 0.70 mile northeast of Ostrom Road. 11/18/48, 24.7.

14N/5E-8D1—Reference point—top of casing, elevation 82 feet. 1.0 mile north of Ostrom Road, 1.0 mile east of Bradshaw Road. 3/18/49, 31.2.

14N/5E-8R1—Reference point—top of 14-inch casing, elevation 89.6 feet. 0.15 mile northeast of intersection of Ostrom Road and South Beale Road. 11/18/48, 30.5; 3/18/49, 30.1; 11/23/49, 39.7; 4/5/52, 39.2.

14N/5E-15D1—Reference point—top of casing, elevation 111 feet. 500 feet east of Ostrom Road, 0.25 mile south of Ostrom Road. 12/9/49, 42.3; 11/2/50, 46.4; 12/8/51, 47.3.

14N/5E-16C1—Reference point—top of brick casing, elevation 99 feet. 100 feet south of Ostrom Road, 100 feet west of Jasper Lane. 11/22/29, 26.3; 9/8/30, 25.5; 12/11/31, 27.5; 12/10/32, 26.7; 12/21/33, 27.6; 11/20/34, 27.8; 11/23/36, 26.4; 11/22/37, 25.6; 1/27/39, 25.5; 1/13/41, 30.0; 11/7/47, 30.0; 12/23/47, 29.7; 3/24/48, 30.0; 10/7/48, 31.2; 11/18/48, 31.2; 12/16/48, 31.9; 1/18/49, 31.7; 3/18/49, 31.2.

14N/5E-16C2—Reference point—top of casing, elevation 100 feet. 40 feet west of Jasper Lane, 40 feet south of Ostrom Road. 12/5/51, 41.9.

TABLE 1—Continued

DEPTHS TO GROUND WATER AT MEASUREMENT WELLS IN SUTTER-YUBA AREA

Measurements Made by Division of Water Resources
(Depths to water in feet measured from reference point)

14N 5E-17B1—Reference point—top of 12-inch casing, elevation 85.7 feet. 100 feet south of Ostrom Road, 0.30 mile west of South Beale Road. 12/23/47, 28.0; 3/24/48, 24.7; 10/7/48, 31.3; 11/18/48, 30.7; 3/18/49, 29.8; 11/23/49, 40.7; 4/3/52, 40.1.

14N 5E-17B2—Reference point—top of 16-inch casing, elevation 90.4 feet. Northwest side of South Beale Road, 1,000 feet southwest of Ostrom Road intersection. 11/19/48, 34.6; 3/18/49, 33.4; 11/23/49, 42.6.

14N 5E-17D1—Reference point—top of 12-inch casing, elevation 86.8 feet. 600 feet south of Ostrom Road, 0.80 mile west of South Beale Road. 11/18/48, 37.1; 1/18/49, 36.0; 3/18/49, 35.2; 11/23/49, 48.3.

14N 5E-18A1—Reference point—top of casing, elevation 87.0 feet. 750 feet south of Ostrom Road, 0.80 mile west of South Beale Road. 12/23/47, 33.7; 3/24/48, 32.9; 10/7/48, 39.0; 11/18/48, 37.5; 1/18/49, 36.4; 3/18/49, 35.6; 11/23/49, 45.1; 3/27/50, 41.8; 11/2/50, 50.1; 4/5/51, 44.4; 11/23/51, 50.5; 1/3/52, 45.8.

14N 5E-18B1—Reference point—top of 12-inch casing, elevation 78.1 feet. South side of Ostrom Road, 0.35 mile east of Bradshaw Road. 12/23/47, 25.7; 3/2/48, 28.5; 10/7/48, 33.5; 11/18/48, 31.7; 3/18/49, 28.0; 5/25/49, 36.6; 6/29/49, 40.4; 8/1/49, 42.7; 8/30/49, 51.2; 11/23/49, 39.7.

14N 5E-21R1—Reference point—top of casing, elevation 93 feet. 200 feet northeast of Jasper Lane at a point 1.9 miles south of Ostrom Road. 11/25/47, 21.5.

14N 5E-26P1—Reference point—top of concrete crib, elevation 119.7 feet. 0.25 mile southeast of Wheatland-Spenceville Road at a point 0.85 mile northeast of Jasper Lane. 11/25/47, 28.5; 3/6/48, 28.2; 11/9/48, 28.8; 3/23/49, 27.5; 12/9/49, 31.0; 3/29/50, 29.9; 11/8/50, 33.7; 4/5/51, 29.9.

14N 5E-27K1—Reference point—top of concrete crib, elevation 84.7 feet. 0.25 mile northeast of Jasper Lane at a point 0.85 mile northwest of Wheatland-Spenceville Road. 11/25/47, 12.0; 3/6/48, 11.8; 11/9/48, 13.2; 3/23/49, 11.3; 6/29/49, 12.7; 7/28/49, 13.3; 8/30/49, 13.9; 11/28/49, 16.8.

14N 5E-27L1—Reference point—top of 14-inch casing at bottom of pit, elevation 81.2 feet. 900 feet northeast of Jasper Lane at a point 1.1 miles northwest of Wheatland-Spenceville Road. 27L2 replaces 27L1 after 4/4/51. 11/25/47, 6.7; 3/6/48, 6.3; 11/9/48, 7.9; 3/23/49, 6.0; 11/28/49, 9.1; 3/29/50, 7.1; 11/8/50, 12.2; 4/4/51, 5.4.

14N 5E-27L2—Reference point—top of casing, elevation 92 feet. 900 feet northeast of Jasper Lane at a point 1.1 miles northwest of Wheatland-Spenceville Road. 11/21/51, 32.2; 4/2/52, 27.5.

14N 5E-28M1—Reference point—top of casing pit, elevation 86.5 feet. 1.0 mile southwest of Jasper Lane at a point 1.15 miles northwest of Wheatland-Spenceville Road. 11/26/47, 25.7; 3/6/48, 21.6; 11/9/48, 26.9; 3/29/49, 24.5; 11/28/49, 30.4; 3/29/50, 27.7; 11/28/49, 30.4; 3/29/50, 27.7; 11/8/50, 34.0; 4/4/51, 29.0; 11/21/51, 31.2; 4/2/52, 28.2.

14N 5E-30J1—Reference point—top of 14-inch casing, elevation 81.8 feet. 0.30 mile northeast of U. S. Highway 99E at a point 1.8 miles northwest of Wheatland Road. 11/25/47, 38.8; 11/9/48, 32.8; 3/29/49, 29.1; 12/8/49, 36.0.

14N 5E-30Q1—Reference point—top of 16-inch casing, elevation 76.6 feet. 100 feet southwest of Oakley Lane, 0.10 miles northwest of Dairy Road. 11/24/47, 30.4; 3/5/48, 28.6; 3/29/48, 27.9; 5/8/48, 27.0; 11/11/48, 32.5; 1/25/49, 31.0; 3/23/49, 29.5; 11/23/49, 35.9; 3/28/50, 35.7; 11/8/50; 39.5; 4/4/51, 34.5; 12/6/51, 39.0; 1/2/52, 36.1.

14N 5E-31B1—Reference point—hole in casing, elevation 76.8 feet. 150 feet northwest of Dairy Road, 500 feet southwest of Oakley Lane. 11/22/47, 28.1; 3/5/48, 27.1; 11/11/48, 30.2; 3/25/49, 26.8; 11/25/49, 33.6.

14N 5E-31J1—Reference point—top of 8-inch casing at bottom of pit, elevation 59.8 feet. 100 feet southwest of Oakley Lane, 0.45 mile southeast of Dairy Road. 11/22/47, 11.2; 3/5/48, 9.5; 11/11/48, 13.1; 3/25/49, 9.3; 11/28/49, 16.1.

14N 5E-32F1—Reference point—top of 14-inch casing, elevation 71.0 feet. Southwest of U. S. Highway 99E, 0.35 mile southeast of Dairy Road. 11/22/47, 17.1; 3/5/48, 16.6; 3/29/48, 15.6; 11/11/48, 19.4; 1/26/49, 18.0; 3/24/49, 16.0; 11/23/49, 22.5.

14N 5E-32M1—Reference point—top of 12-inch casing, elevation 67.2 feet. 0.25 mile northeast of Oakley Lane, 0.60 mile southeast of Dairy Road. 11/22/47, 14.7; 3/5/48, 13.6; 11/11/48, 16.2; 3/23/49, 12.5; 11/28/49, 19.7.

14N 5E-32N1—Reference point—top of casing at bottom of pit, elevation 63.2 feet. Southwest side of Oakley Lane, 0.70 miles southeast of Dairy Road. 11/20/47, 11.7; 3/5/48, 10.7; 11/11/48, 13.3; 3/25/49, 9.3; 11/23/49, 17.2; 3/29/50, 12.7; 11/8/50, 18.5; 4/4/51, 9.9; 12/3/51, 17.6; 4/2/52, 8.5.

14N 5E-32R1—Reference point—top of concrete base, elevation 73.8 feet. 400 feet southwest of U. S. Highway 99E at a point 0.55 mile northwest of Wheatland Road. 12/24/47, 16.9; 3/5/48, 15.7; 11/11/48, 17.5; 3/30/49, 15.0; 5/3/49, 16.9; 6/2/49, 19.8; 7/2/49, 21.1; 8/31/49, 24.0; 11/28/49, 20.3.

14N 5E-32R2—Reference point—top of 14-inch casing, elevation 74.8 feet. 100 feet southwest of U. S. Highway 99E, 0.55 mile northwest of Wheatland Road. 11/24/47, 17.3; 3/5/48, 16.2; 11/11/48, 18.5; 3/30/49, 15.2; 6/2/49, 24.9; 7/2/49, 27.6; 8/31/49, 28.0; 11/24/49, 21.1; 3/29/50, 18.0; 11/8/50, 23.1; 4/4/51, 15.1; 11/21/51, 23.2; 4/2/52, 13.0.

14N 5E-33K1—Reference point—bottom of slot in casing, elevation 78.3 feet. 0.40 mile northwest of Wheatland-Spenceville Road at a point 0.45 mile northeast of U. S. Highway 99E. 11/25/47, 14.0; 3/6/48, 13.3; 11/9/48, 15.5; 3/23/49, 11.4; 11/28/49, 17.6; 3/29/50, 13.9; 11/8/50, 19.5; 11/21/51, 19.5; 4/2/52, 10.4.

14N 5E-33M1—Reference point—top of casing at bottom of pit, elevation 65.8 feet. 0.15 mile northeast of U. S. Highway 99E at a point 0.55 mile northwest of Wheatland Road. 11/25/47, 6.0; 3/6/48, 5.6; 12/6/48, 6.8.

14N 5E-33Q1—Reference point—top of concrete well curb, elevation 86 feet. Northwest of the northeast corner of town of Wheatland, 1,000 feet north of school house east side. 11/22/29, 22.2; 9/18/30, 23.6; 12/11/31, 23.3; 12/10/32, 22.1; 12/21/33, 22.7; 11/20/34, 23.5; 11/23/36, 23.4; 11/22/37, 22.0; 1/27/39, 20.8; 1/2/40, 20.4; 11/7/47, 27.0; 12/16/48, 26.3; 12/9/49, 29.0; 11/8/50, 31.3; 12/5/51, 28.8.

14N 5E-34F1—Reference point—top of casing, elevation 90.2 feet. 500 feet northwest of Wheatland-Spenceville Road, 0.25 mile southwest of Jasper Lane. 11/25/47, 19.0; 3/6/48, 18.1; 11/9/48, 20.2; 3/23/49, 17.4; 11/28/49, 22.5.

14N 5E-34H1—Reference point—base of pump, elevation 99.7 feet. 600 feet southeast of Wheatland-Spenceville Road, 1,000 feet northeast of Jasper Lane. 11/25/47, 20.6; 3/6/48, 20.4; 11/9/48, 21.2; 3/23/49, 19.8; 11/28/49, 23.4.

15N 1E-12A1—Reference point—hole in pump base, elevation 150 feet. 1.05 miles north of South Butte Road, 2.1 miles west of Irwin Avenue. 12/2/48, 83.0 (operating).

15N 1E-12H1—Reference point—hole in pump base, elevation 80 feet. 0.75 mile north of South Butte Road, 2.1 miles west of Irwin Avenue. 12/2/48, 13.2.

15N 1E-3A1—Reference point—hole in pump base, elevation 57 feet. 0.1 mile north of South Butte Road, 2.1 miles west of Irwin Avenue. 12/22/49, 25.1; 3/4/48, 21.8; 3/29/49, 19.4; 11/15/49, 24.0; 3/23/50, 13.3; 11/2/50, 27.2; 4/3/52, 27.1.

15N 1E-13B1—Reference point—hole in cement pipe base, elevation 55 feet. 0.15 mile north of South Butte Road, 2.3 miles west of Irwin Avenue. 12/2/48, 31.8; 11/2/50, 33.2; 3/26/51, 63.8 (operating).

TABLE 1—Continued

DEPTHS TO GROUND WATER AT MEASUREMENT WELLS IN SUTTER-YUBA AREA

Measurements Made by Division of Water Resources
(Depths to water in feet measured from reference point)

15N/1E-14F1—Reference point—bottom of 2" x 4" board under pump, elevation 54 feet. South side of South Butte Road, 0.3 mile east of Sutter Bypass east levee. 12/22/47, 18.5; 3/4/48, 18.3; 5/4/48, 15.5; 6/2/48, 15.8; 7/3/48, 16.6; 8/3/48, 17.7; 9/1/48, 17.9; 12/2/48, 18.9; 12/8/49, 19.0; 3/23/50, 10.9; 11/2/50, 19.6.

15N/1E-14F2—Reference point—top of concrete pit, elevation 47 feet. 0.05 mile south of South Butte Road, 0.2 mile east of Sutter Bypass east levee. 11/27/29, 16.8; 10/6/30, 15.0; 12/16/31, 14.8; 12/8/32, 15.0; 12/15/33, 15.1; 11/2/34, 14.8; 11/23/34, 14.3; 11/27/36, 14.4; 11/15/37, 15.6; 1/25/39, 14.8; 1/11/41, 10.7; 11/4/47, 15.4; 12/13/48, 15.7; 12/8/49, 16.1; 11/10/50, 16.8; 12/7/51, 14.3.

15N/2E-1A1—Reference point—top of concrete pit, elevation 58.0 feet. 100 feet south of Nuestro Road, 0.15 mile west of Township Road. 12/19/47, 11.9; 3/3/48, 12.7; 12/1/48, 12.5; 1/20/49, 12.2; 3/16/49, 12.2; 6/28/49, 10.2; 7/27/49, 9.4; 11/11/49, 13.2; 3/23/50, 13.2; 11/6/50, 13.5; 4/3/51, 9.7; 11/14/51, 12.1; 4/3/52, 6.5.

15N/2E-1C1—Reference point—top of casing, elevation 58.2 feet. 0.1 mile south of Nuestro Road, 0.65 mile west of Township Road. 12/19/47, 10.3; 12/2/48, 11.7; 11/11/49, 11.5.

15N/2E-1H1—Reference point—top of concrete pit, elevation 57.7 feet, 150 feet west of Township Road, 0.35 mile south of Nuestro Road. 12/22/47, 13.3; 3/3/48, 13.6; 12/1/48, 14.0; 3/16/49, 13.7; 11/11/49, 14.6.

15N/2E-2C1—Reference point—top of wooden platform under pump, elevation 60.4 feet, 50 feet west of East Butte Road, 0.15 mile north of Nuestro Road. 12/19/47, 11.8; 3/3/48, 11.8; 12/2/48, 9.5; 3/16/49, 8.0; 11/10/49, 6.5; 3/22/50, 9.4; 11/2/50, 6.8; 4/4/51, 8.6; 11/14/51, 8.1; 4/3/52, 6.3.

15N/2E-2H1—Reference point—top of casing, elevation 57.6 feet. 0.3 mile south of Nuestro Road, 1.1 miles west of Township Road. 12/19/47, 10.4; 3/3/48, 11.3; 12/2/48, 10.0; 3/16/49, 9.0; 11/11/49, 9.2; 3/23/50, 10.1; 11/2/50, 9.1; 4/4/51, 9.7; 11/14/51, 9.0; 4/3/52, 7.9.

15N/2E-3K1—Reference point—top of casing, elevation 57 feet. 0.1 mile east of Mallott Road, 0.8 mile north of Butte House Road. 12/22/47, 10.7; 3/4/48, 11.8; 12/2/48, 10.0; 11/16/49, 9.5.

15N/2E-4Q1—Reference point—top of casing, elevation 86 feet. 0.15 mile east of Acacia Avenue, 0.3 mile north of Butte House Road. 12/22/47, 35.7; 3/4/48, 36.2; 12/2/48, 35.6; 3/29/49, 36.0; 11/16/49, 36.6.

15N/2E-4R1—Reference point—base of pump, elevation 74 feet. 0.3 mile east of Acacia Avenue, 0.35 mile north of Butte House Road. 12/22/47, 34.2; 12/2/48, 35.0; 11/16/49, 37.0; 3/23/50, 36.0; 11/2/50, 38.0; 4/5/51, 34.0; 11/15/51, 37.0; 4/3/52, 31.0.

15N/2E-8J1—Reference point—hole in pump base, elevation 75 feet. 0.2 mile west of Irwin Avenue, 0.45 mile north of South Butte Road. 5/4/48, 33.6; 12/2/48, 34.7; 12/8/49, 34.8; 3/23/50, 34.2; 11/15/51, 35.8; 4/3/52, 34.7.

15N/2E-8Q1—Reference point—hole in pump base, elevation 62 feet. 250 feet north of South Butte Road, 0.25 mile west of Irwin Avenue. 12/22/47, 29.4; 12/2/48, 29.3; 3/29/49, 27.8; 11/15/49, 29.6; 3/23/50, 27.7; 11/2/50, 30.6; 4/5/51, 30.6; 11/15/51, 30.3; 4/3/52, 24.5.

15N/2E-10F1—Reference point—top of casing, elevation 56 feet. 0.1 mile south of Butte House Road, 0.2 mile west of Mallott Road. 12/22/47, 21.2; 3/5/48, 19.1; 3/29/49, 20.0; 11/16/49, 20.5; 3/23/50, 21.4; 11/2/50, 20.5; 3/26/51, 20.1; 11/15/51, 20.1; 4/2/52, 15.5.

15N/2E-11C1—Reference point—top of casing, elevation 53.6 feet. 200 feet north of Butte House Road, 0.15 mile west of East Butte Road. 12/22/47, 9.0; 3/3/48, 10.6; 12/2/48, 7.7; 3/16/49, 9.1; 11/10/49, 7.4; 3/23/50, 8.2; 11/2/50, 7.6; 4/4/51, 9.1; 11/14/51, 6.9; 4/3/52, 7.2.

15N/2E-11N1—Reference point—top of casing, elevation 50 feet. 50 feet west of Humphrey Road, 0.55 mile south of Butte House Road. 12/22/47, 9.9; 3/5/48, 10.8; 9/27/48, 5.1; 11/17/48, 8.9; 3/28/49, 9.1.

15N/2E-12A1—Reference point—top of casing, elevation 55.8 feet. 100 feet southwest of intersection of Township and Pease Roads. 12/21/47, 5.8; 3/3/48, 16.8; 12/1/48, 15.0; 3/16/49, 13.6; 11/11/49, 14.8.

15N/2E-12K1—Reference point—base of pump, elevation 53.8 feet. 100 feet north of Butte House Road, 0.45 mile west of Township Road. 12/22/47, 13.2; 3/3/48, 12.4; 12/2/48, 11.9; 1/20/49, 13.3; 3/17/49, 11.5; 11/10/49, 11.3; 3/23/50, 11.1; 11/1/50, 11.3; 4/4/51, 9.2; 11/14/51, 10.0; 4/3/52, 5.2.

15N/2E-12R1—Reference point—top of casing, elevation 52 feet. 0.1 mile west of Township Road, 0.3 mile south of Butte House Road. 12/19/47, 6.2; 3/24/48, 7.2; 11/18/48, 7.0; 3/28/49, 6.0; 11/23/49, 6.4.

15N/2E-13E1—Reference point—top of wooden planks under pump, elevation 50 feet. 0.3 mile south of Fortuna Road, 0.9 mile west of Township Road. 12/22/47, 7.8; 3/5/48, 9.5; 11/18/48, 11.3; 3/28/49, 7.5; 11/23/49, 9.4.

15N/2E-13J2—Reference point—top of casing at bottom of pit, elevation 46 feet. 250 feet west of Township Road, 0.4 mile north of State Highway 20. 12/19/47, 8.1; 3/5/48, 9.1; 9/27/48, 9.3; 11/18/48, 9.0; 3/28/49, 8.1; 5/26/49, 8.0; 6/28/49, 10.7; 7/27/49, 11.3; 8/26/49, 10.5; 11/23/49, 9.8; 3/23/50, 8.0; 3/27/51, 6.8; 11/14/51, 7.9; 4/1/52, 4.4.

15N/2E-14A1—Reference point—top of brick casing, elevation 51.7 feet. 200 feet south of Fortuna Road, 1 mile west of Township Road. 12/22/47, 10.8; 3/3/48, 10.2; 12/2/48, 10.1; 3/16/49, 9.2; 11/11/49, 9.3; 3/23/50, 9.7; 11/2/50, 9.6; 4/4/51, 7.4; 11/14/51, 7.9; 4/3/52, 5.8.

15N/2E-15C1—Reference point—top of casing at bottom of pit, elevation 39 feet. 200 feet south of South Butte Road, 0.85 mile east of Acacia Road. 12/23/47, 4.0; 3/4/48, 4.5; 12/2/48, 3.3; 12/8/49, 2.4.

15N/2E-15D1—Reference point—top of casing in pit, elevation 44 feet. South side of South Butte Road, 0.5 mile east of Acacia Avenue. 12/23/47, 5.4; 3/4/48, 6.2; 12/2/48, 6.2; 3/29/49, 6.1; 11/16/49, 4.4; 3/23/50, 4.7; 11/2/50, 4.1; 4/1/51, 4.3; 11/15/51, 3.6; 4/2/52, 1.1.

15N/2E-15R1—Reference point—top of casing, elevation 48 feet. 150 feet west of Humphrey Road, 0.1 mile north of State Highway 20. 12/22/47, 9.3; 3/5/48, 10.4; 9/27/48, 3.8; 11/17/48, 5.9; 3/28/49, 4.5; 11/23/49, 5.7; 3/24/50, 5.5; 10/31/50, 4.7; 3/26/51, 3.1; 11/15/51, 4.1; 4/1/52, 2.6.

15N/2E-16E1—Reference point—slot in casing, elevation 56 feet. 200 feet west of Third Avenue, 0.25 mile south of South Butte Road. 12/22/47, 21.4; 3/4/48, 22.2; 12/2/48, 21.15; 3/29/49, 20.7; 11/16/49, 20.0.

15N/2E-17E1—Reference point—slot in casing, elevation 46 feet. 0.3 mile south of South Butte Road, 0.7 mile west of Irwin Avenue. 12/22/47, 14.1; 3/4/48, 14.1; 12/2/48, 14.2; 3/29/49, 12.1; 11/15/49, 14.9; 3/23/50, 12.9; 11/2/50, 15.8; 3/26/51, 35.2 (operating); 11/15/51, 21.0; 4/3/52, 8.9.

15N/2E-21C1—Reference point—top of casing in pit, elevation 38 feet. South west corner of Acacia Road and State Highway 20. 12/22/47, 1.6; 3/4/48, 2.6; 12/2/48, 1.8; 3/29/49, 0.8; 11/16/49, 0.3; 3/24/50, 0.5; 11/2/50, —0.7; 3/26/51, —1.0; 11/15/51, 0.0; 4/2/52, —2.7.

15N/2E-22B1—Reference point—top of casing, elevation 46 feet. 0.2 mile south of State Highway 20, 0.3 mile west of Humphrey Road. 12/23/47, 10.2; 3/4/48, 11.2; 12/2/48, 9.5; 3/24/49, 4.9; 11/16/49, 8.9; 3/23/50, 9.5; 11/2/50, 9.1; 3/26/51, 8.5; 11/15/51, 8.3; 4/2/52, 6.8.

15N/2E-22R1—Reference point—top of casing, elevation 45 feet. 200 feet north of Franklin Road, 0.15 mile west of Humphrey Road. 12/22/47, 8.9; 3/5/48, 9.5; 9/27/48, 6.0; 11/17/48, 8.0; 3/28/49, 4.1.

TABLE 1—Continued

DEPTHS TO GROUND WATER AT MEASUREMENT WELLS IN SUTTER-YUBA AREA

Measurements Made by Division of Water Resources
(Depths to water in feet measured from reference point)

15N 2E-23B1—Reference point—top of casing, elevation 45 feet, 100 feet south of State Highway 20, 0.75 mile east of Humphrey Road. 12/22/47, 6.8; 3/5/48, 7.8; 11/17/48, 6.2; 3/28/49, 5.9; 11/23/49, 6.4; 3/24/50, 6.7; 10/31/50, 7.1; 3/26/51, 5.0; 11/15/51, 5.2; 4/1/52, 2.8.

15N 2E-24B1—Reference point—hole in pump base, elevation 51 feet, 300 feet south of State Highway 20, 0.3 mile west of Township Road. 12/22/47, 13.7; 3/5/48, 14.4; 9/27/48, 12.4; 11/17/48, 13.5; 3/28/49, 13.5; 11/23/49, 8.1; 3/24/50, 13.8; 10/31/50, 14.6; 3/27/51, 11.0; 11/11/51, 12.9; 4/1/52, 7.0.

15N 2E-24N1—Reference point—top of concrete foundation, elevation 47 feet, 0.1 mile north of Franklin Road, 0.8 mile west of Township Road. 11/27/29, 14.0; 10/6/30, 13.0; 12/15/31, 14.0; 11/30/32, 13.0; 12/14/33, 13.9; 11/10/34, 13.6; 11/28/36, 11.2; 11/24/37, 10.9; 1/25/39, 10.3; 1/11/41, 5.6; 11/4/47, 9.4; 12/14/48, 10.9; 12/8/49, 10.4; 11/10/50, 10.4; 12/7/51, 6.6.

15N 2E-25A1—Reference point—top of concrete pit, elevation 48 feet, 0.05 mile south of Franklin Road, 0.2 mile west of Township Road. 12/22/47, 13.4; 3/5/48, 14.6; 11/17/48, 13.5; 3/28/49, 12.2; 11/23/49, 13.5; 3/24/50, 13.1; 10/31/50, 13.4; 3/27/51, 10.7; 11/14/51, 12.0; 4/1/52, 6.9.

15N 2E-25N1—Reference point—top of casing, elevation 49 feet, 0.1 mile north of Lincoln Road, 0.85 mile west of Township Road. 12/22/47, 11.8; 3/5/48, 13.0; 11/17/48, 11.1; 3/28/49, 10.6; 11/23/49, 10.8.

15N 2E-26B1—Reference point—top of concrete pipe casing, elevation 46 feet, 50 feet south of Franklin Road, 0.6 mile east of Humphrey Road. 12/22/47, 7.3; 3/5/48, 8.2; 9/27/48, 3.0; 11/17/48, 6.0; 3/28/49, 5.5; 11/23/49, 6.4; 3/24/50, 6.9; 10/31/50, 5.6; 3/27/51, 5.3; 11/15/51, 5.2; 4/1/52, 4.1.

15N 2E-26E1—Reference point—top of wooden box casing, elevation 42 feet, 250 feet east of Humphrey Road, 0.45 mile south of Franklin Road. 12/22/47, 9.8; 3/5/48, 9.8; 11/17/48, 8.2; 3/28/49, 6.6; 11/23/49, 7.0; 3/24/50, 8.1; well destroyed.

15N 2E-28D1—Reference point—top of casing, elevation 41 feet, 500 feet south of Franklin Road, 0.1 mile west of Wadsworth Canal west levee. 12/22/47, 7.1; 3/4/48, 8.2; 12/2/48, 7.0; 3/29/49, 5.5; 11/16/49, 5.9; 3/23/50, 7.7.

15N 2E-28D2—Reference point—top of casing in pit, elevation 38 feet, 500 feet south of Franklin Road, 0.2 mile west of Wadsworth Canal west levee. 11/2/50, 2.5; 3/26/51, 11.6 (operating); 11/15/51, 2.4; 4/3/52, —0.8.

15N 2E-34D1—Reference point—top of casing, elevation 41 feet. Southeast of intersection of Lincoln and Clements roads. 12/22/47, 7.5; 3/4/48, 8.1; 12/2/48, 7.0; 11/15/49, 5.1.

15N 2E-35B1—Reference point—top of casing in pit, elevation 35 feet, 0.1 mile south of Lincoln Road, 1.4 miles west of Township Road. 12/22/47, 1.6; 3/5/48, 2.6; 10/4/48, 0.5; 11/17/48, 1.5; 3/28/49, —0.6.

15N 2E-35D1—Reference point—hole in pump base, elevation 42 feet, 0.1 mile south of Lincoln Road, 1.8 miles west of Township Road. 12/23/47, 8.7; 3/6/48, 9.5; 11/17/48, 8.1; 3/28/49, 6.2; 11/23/49, 8.3; 3/24/50, 6.8; 11/1/50, 7.2; 3/27/51, 6.8; 11/11/51, 6.2; 4/1/52, 1.7.

15N 2E-35Q1—Reference point—top of casing, elevation 41.6 feet, 0.1 mile north of Bogue Road, 1.3 miles west of Township Road. 12/22/47, 5.0; 3/5/48, 6.1; 10/4/48, 4.7; 11/17/48, 4.4; 3/29/49, 3.0; 11/25/49, 4.1; 3/24/50, 4.1; 11/1/50, 3.3; 3/27/51, 2.9; 11/14/51, 2.5.

15N 2E-36A1—Reference point—top of casing, elevation 46 feet, 100 feet south of Lincoln Road, 0.1 mile west of Township Road. 12/22/47, 12.3; 3/5/48, 13.3; 10/4/48, 10.6; 11/12/48, 11.6; 3/28/49, 11.6; 6/28/49, 6.7; 7/27/49, 7.4; 8/25/49, 7.0; 11/23/49, 11.2; 3/24/50, 11.3; 11/1/50, 10.9; 3/27/51, 9.4; 11/11/51, 10.2; 4/2/52, 6.3.

15N 2E-36H1—Reference point—top of plank in pit, elevation 40 feet, 0.15 mile west of Township Road, 0.45 mile south of Lincoln Road. 12/22/47, 6.3; 3/5/47, 7.5; 11/17/48, 4.1; 3/29/49, 5.0.

15N 2E-36P1—Reference point—top of casing, elevation 43.7 feet, 0.15 mile north of Bogue Road, 0.65 mile west of Township Road. 12/22/47, 7.6; 3/5/48, 8.9; 11/17/48, 6.0; 3/29/49, 3.6; 11/25/49, 5.8; 3/24/50, 6.8.

15N 3E-1C1—Reference point—top of 16-inch casing, elevation 63 feet, 0.3 mile east of State Highway 24, 1.0 mile south of Ellis Road. 11/6/47, 14.5; 3/17/48, 14.0; 11/30/48, 14.9; 1/26/49, 14.2; 3/17/49, 13.0; 11/17/49, 15.7; 3/21/50, 13.1; 11/6/50, 15.9; 3/29/51, 9.9; 11/27/51, 14.6; 4/6/52, 7.5.

15N 3E-1D1—Reference point—hole in pump base, elevation 64 feet, 0.1 mile east of State Highway 24, 0.75 mile south of Ellis Road. 11/6/47, 19.5; 3/20/48, 16.1; 11/30/48, 17.0; 3/17/49, 15.0; 11/16/49, 18.8.

15N 3E-2A1—Reference point—top of 16-inch casing, elevation 64 feet, 0.3 mile west of State Highway 24, 0.85 mile south of Ellis Road. 11/6/47, 25.1; 3/20/48, 18.9; 11/30/48, 21.6; 11/16/49, 22.3; 3/31/50, 16.3; 11/6/50, 22.1.

15N 3E-2A2—Reference point—top of 14-inch casing, elevation 63 feet, 0.25 mile west of State Highway 24, 1.05 miles south of Ellis Road. 11/6/47, 20.4; 11/30/48, 14.7; 3/17/49, 16.9; 11/17/49, 19.0.

15N 3E-2A3—Reference point—hole in base of pump, elevation 65 feet, 0.05 mile west of State Highway 24, 0.5 mile south of Ellis Road. 11/6/47, 18.4; 3/20/48, 18.2; 12/2/48, 17.7; 3/17/49, 15.5; 11/16/49, 19.8.

15N 3E-2B2—Reference point—hole in base of pump, elevation 64 feet, 0.35 mile west of State Highway 24, 0.75 mile south of Ellis Road. 11/6/47, 21.2; 11/30/48, 17.2; 3/17/49, 16.2; 11/16/49, 22.0; 3/29/51, 12.9.

15N 3E-2C1—Reference point—hole in base of pump, elevation 65 feet, 0.85 mile west of State Highway 24, 0.9 mile south of Ellis Road. 11/6/47, 24.5; 3/20/48, 23.5; 11/30/48, 23.3; 3/17/49, 20.4; 11/17/49, 25.3; 3/21/50, 19.2; 11/6/50, 24.3; 3/29/51, 15.1; 11/16/51, 23.5; 4/6/52, 10.2.

15N 3E-2H1—Reference point—bottom of pump base, elevation 63 feet, 0.3 mile west of State Highway 24, 1.25 miles south of Ellis Road. 11/6/47, 20.6; 3/17/48, 19.0; 5/7/48, 17.3; 11/30/48, 19.6; 3/17/49, 17.8; 11/17/49, 21.3.

15N 3E-2J1—Reference point—top of 16-inch casing, elevation 63 feet, 0.4 mile west of State Highway 24, 1.6 miles south of Ellis Road. 11/6/47, 17.8; 3/17/48, 16.8; 5/7/48, 14.8; 11/30/48, 17.4; 1/26/49, 16.7; 3/17/49, 15.5; 11/17/49, 18.4.

15N 3E-3D2—Reference point—top of casing, elevation 63.7 feet, 250 feet south of Eager Road, 0.1 mile west of U.S. Highway 99E. 11/4/47, 25.8.

15N 3E-3G1—Reference point—hole in base of pump, elevation 62 feet, 0.2 mile south of Rednall Road, 0.3 mile east of U.S. Highway 99E. 11/5/47, 28.6; 3/17/48, 28.1; 5/12/48, 23.6; 11/29/48, 28.5; 3/17/49, 25.7; 11/14/49, 30.6; 3/22/50, 24.9; 11/6/50, 29.6; 4/3/51, 21.2; 11/14/51, 27.7; 4/3/52, 19.1.

15N 3E-4C1—Reference point—top of casing, elevation 60.9 feet, 0.20 mile south of Eager Road, 0.65 mile west of Onstott Road. 12/19/47, 23.2; 3/2/48, 27.5; 12/1/48, 22.7; 3/17/49, 21.2; 11/11/49, 25.8; 4/3/51, 18.4.

15N 3E-4C2—Reference point—hole in pump base, elevation 61.5 feet, 0.25 mile south of Eager Road, 0.50 mile west of Onstott Road. 5/4/48, 22.9; 6/3/48, 22.0; 9/1/48, 30.3; 9/30/48, 27.2; 11/29/48, 23.7; 1/20/49, 23.2; 3/17/49, 22.5; 11/11/49, 27.1; 3/22/50, 23.7; 11/1/50, 27.5; 11/14/51, 23.7; 4/3/52, 11.9.

15N 3E-4H1—Reference point—top of concrete base, bottom of pit, elevation 47.2 feet, 0.1 mile west of Onstott Road, 0.6 mile south of Eager Road. 11/4/47, 17.9; 11/20/48, 15.5; 3/17/49, 12.4; 11/14/49, 16.0.

TABLE 1—Continued

DEPTHS TO GROUND WATER AT MEASUREMENT WELLS IN SUTTER-YUBA AREA

Measurements Made by Division of Water Resources
(Depths to water in feet measured from reference point)

15N/3E-4J1—Reference point—top of casing, bottom of pit, elevation 47.7 feet, 0.15 mile west of Onstott Road, 0.85 mile south of Eager Road. 11/4/47, 17.6; 11/29/48, 16.0; 3/17/49, 13.0; 11/14/49, 18.4; 11/14/50, 23.0.

15N/3E-4N1—Reference point—top of casing, elevation 59.4 feet, 0.1 mile north of Pease Road, 0.5 mile east of Terra Buena Road. 12/21/47, 27.1; 3/24/48, 27.1; 12/1/48, 27.6; 3/16/49, 26.5; 5/26/49, 27.0; 6/30/49, 34.0; 11/11/49, 29.6; 3/23/50, 25.9; 11/6/50, 30.7; 4/4/51, 22.6; 11/14/51, 26.8.

15N/3E-5B2—Reference point—hole in base of pump, elevation 62.5 feet, 0.15 mile south and 150 feet east of a point on Eager Road at intersection of Larkin Road. 12/19/47, 21.8; 3/2/48, 22.1; 12/1/48, 20.7; 1/20/49, 20.2; 3/17/49, 19.5; 11/11/49, 23.0.

15N/3E-5D2—Reference point—hole in base of pump, elevation 59.8 feet, 50 feet south of Nuestro Road, 0.4 mile west of Terra Buena Road. 12/19/47, 18.7; 3/24/48, 20.6; 12/1/48, 18.0; 3/16/49, 17.3; 11/11/49, 19.9; 3/23/50, 15.1; 11/6/50, 22.0; 4/3/51, 12.3; 11/14/51, 18.2; 4/3/52, 7.4.

15N/3E-5G1—Reference point—hole in base of pump, elevation 59.5 feet, 0.25 mile east of Terra Buena Road, 0.5 mile north of Pease Road. 12/19/47, 18.9; 3/3/48, 24.2; 12/1/48, 23.0; 3/16/49, 22.0; 11/11/49, 24.7.

15N/3E-6B1—Reference point—top of 2″ x 6″ bridge over concrete pit, elevation 59.8 feet, 200 feet east of Broadway, 0.15 mile west of Nuestro Road. 12/19/47, 16.8; 3/24/48, 17.4; 12/1/48, 16.1; 3/16/49, 13.7; 11/11/49, 18.2.

15N/3E-6C1—Reference point—top of 2″ x 6″ bridge over concrete pit, elevation 58.8 feet, 400 feet north of Nuestro Road, 0.2 mile east of Township Road. 12/19/47, 14.2; 3/3/48, 14.3; 12/1/48, 14.9; 3/16/49, 12.2; 5/26/49, 13.8; 6/28/49, 15.4; 7/27/49, 17.3; 8/25/49, 16.5; 11/11/49, 16.3.

15N/3E-6Q1—Reference point—slot in concrete base, elevation 56.4 feet, 0.2 mile north of Pease Road, 0.4 mile east of Township Road. 12/21/47, 17.8; 3/3/48, 17.6; 12/1/48, 18.2; 3/16/49, 17.0; 11/11/49, 18.7; 3/23/50, 21.9; 11/1/50, 20.8; 4/4/51, 12.0; 11/14/51, 17.4; 4/3/52, 7.5.

15N/3E-7H2—Reference point—top of casing, elevation 57.0 feet, 0.5 mile north of Butte House Road, 0.55 mile west of Terra Buena Road. 12/21/47, 23.9; 3/24/48, 23.6; 12/1/48, 24.8; 3/16/49, 22.5; 11/11/49, 26.1.

15N/3E-7P1—Reference point—hole in base of pump, elevation 55.4 feet, 500 feet south of Butte House Road, 0.35 mile east of Township Road. 12/21/47, 19.8; 3/3/48, 20.8; 12/1/48, 21.0; 3/16/49, 19.5; 11/10/49, 22.1.

15N/3E-7Q1—Reference point—hole in base of pump, elevation 56 feet, 150 feet south of Butte House Road, 0.45 mile east of Towuship Road. 12/19/47, 20.7; 3/24/48, 20.9; 11/18/48, 22.1; 3/28/49, 19.8; 11/23/49, 22.9; 3/23/50, 19.8; 10/31/50, 24.4; 3/27/51, 17.9; 11/14/51, 21.2; 4/1/52, 9.8.

15N/3E-7R1—Reference point—top of discharge pipe, elevation 55.8 feet, 0.1 mile north of Butte House Road, 0.7 mile west of Terra Buena Road. 12/21/47, 23.8; 3/3/48, 22.5; 12/1/48, 24.8; 3/16/49, 22.5; 11/11/49, 26.2; 3/23/50, 19.6; 11/1/50, 23.3; 4/4/51, 19.4; 11/14/51, 24.1; 4/3/52, 12.2.

15N/3E-8C1—Reference point—bottom of pump base, elevation 57.5 feet, 50 feet south of Pease Road, 0.15 mile west of Terra Buena Road. 12/22/47, 23.9; 3/3/48, 24.7; 12/1/48, 24.2; 1/20/49, 23.0; 3/16/49, 22.2; 11/11/49, 25.0; 3/23/50, 21.5; 11/1/50, 28.0; 4/4/51, 17.4; 11/14/51, 23.6; 4/3/52, 11.2.

15N/3E-8J4—Reference point—top of casing, elevation 56.8 feet, 200 feet west of Elmer Avenue, 0.7 mile north of Butte House Road. 12/22/47, 27.9; 3/3/48, 26.9; 3/16/49, 26.0; 11/11/49, 30.7.

15N/3E-9A1—Reference point—top of concrete floor, elevation 59.8 feet, 300 feet south of Pease Road, 0.1 mile west of Onstott Road. 11/4/47, 37.9; 5/12/48, 27.1; 6/1/48, 26.5; 6/30/48, 48.8 operating; 8/2/48, 45.0; 9/30/48, 33.2; 10/21/48, 31.8; 11/30/48, 29.3; 1/20/49, 27.4; 3/17/49, 26.4; 11/14/49, 31.3; 3/22/50, 22.2; 11/1/50, 31.0; 4/4/51, 24.1; 11/14/51, 27.3; 4/3/52, 19.7.

15N/3E-9C1—Reference point—top of casing, elevation 58.1 feet, 0.1 mile south of Pease Road, 0.55 mile west of Onstott Road. 11/4/47, 40.6; 3/17/48, 27.6; 11/29/48, 27.4; 3/17/49, 25.5; 11/14/49, 29.5.

15N/3E-9G1—Reference point—top of pneumatic gage hole, elevation 61.0 feet, 50 feet east of Stabler Lane, 0.45 mile south of Pease Road. 11/4/47, 32.8; 3/17/48, 34.2; 11/29/48, 32.5; 3/17/49, 29.4; 11/14/49, 34.8.

15N/3E-9N1—Reference point—bottom of pump base, elevation 57.6 feet, 100 feet east of Blevin Road, 0.55 mile north of Butte House Road. 12/22/47, 29.8; 3/3/48, 31.6; 12/1/48, 31.0; 3/16/49, 28.0; 11/11/49, 33.3.

15N/3E-9P3—Reference point—top of 12-inch casing, elevation 55 feet, 0.30 mile east of Blevin Road, 0.60 mile north of Butte House Road. 11/18/47, 27.7; 11/18/48, 28.2; 3/23/49, 26.6.

15N/3E-9R2—Reference point—bottom of pump base, elevation 200 feet. West of Onstott Road, 1.4 miles north of Butte House Road. 11/18/47, 35.0; 3/17/48, 35.5; 11/19/48, 36.4; 3/23/49, 32.0; 11/22/49, 37.9; 3/23/50, 34.0; 11/13/51, 34.4; 4/1/52, 32.6.

15N/3E-10G1—Reference point—hole in pump base, elevation 60 feet, 0.05 mile west of U. S. Highway 99E, 0.50 mile south of Pease Road. 11/19/47, 30.2; 3/17/48, 28.3; 11/19/48, 34.6; 3/23/49, 26.6; 11/22/49, 33.4; 3/23/50, 24.3; 11/30/50, 30.8; 3/27/51, 20.9; 11/14/51, 36.1; 4/1/52, 20.3.

15N/3E-11B1—Reference point—top of concrete base, elevation 60 feet, 0.80 mile west of State Highway 24, 2.50 miles south of Ellis Road. 11/7/49, 21.5; 3/7/48, 21.1; 5/19/48, 18.1; 11/30/48, 21.6; 3/17/49, 19.2; 11/17/49, 23.1; 3/21/50, 19.2; 11/6/50, 23.0; 3/29/51, 16.5; 11/16/51, 22.3; 4/6/52, 12.1.

15N/3E-11H1—Reference point—top of casing, elevation 61 feet, 0.45 mile west of State Highway 24, 2.70 miles south of Ellis Road. 11/6/47, 18.5; 3/17/48, 16.8; 11/30/48, 17.8; 3/17/49, 15.6; 11/17/49, 18.2.

15N/3E-11H2—Reference point—top of casing, elevation 61 feet, 0.40 mile west of State Highway 24, 2.70 miles south of Ellis Road. 11/6/47, 16.9; 3/17/48, 16.4; 11/30/48, 16.7; 3/17/49, 13.5; 11/17/49, 17.7.

15N/3E-14M1—Reference point—top of casing, elevation 57 feet, 0.35 mile east of U. S. Highway 99E at a point 0.70 mile north of State Highway 20. 11/19/47, 24.2; 3/17/48, 22.2. Well destroyed.

15N/3E-15B2—Reference point—hole in pump base, elevation 59 feet, 0.05 mile west of U. S. Highway 99E, 1.0 mile north of State Highway 20. 11/19/47, 31.4; 3/17/48, 30.2; 5/12/48, 26.7; 9/27/48, 31.1; 11/19/48, 33.6; 3/23/49, 28.8; 11/22/49, 32.9; 3/23/50, 28.4; 10/30/50, 32.9; 3/27/51, 30.8; 4/1/52, 24.1.

15N/3E-15E2—Reference point—base of pump, elevation 58.6 feet, 400 feet east of Onstott Road, 0.30 mile north of Butte House Road. 11/18/47, 35.3; 3/4/48, 34.8; 3/15/48, 34.8; 11/19/48, 41.8; 3/23/49, 32.7; 11/22/49, 39.3; 3/23/50, 34.6; 11/30/50, 38.7; 3/27/51, 33.9; 3/13/51, 36.1; 4/1/52, 29.7.

15N/3E-16C1—Reference point—hole in pump base, elevation 56 feet, 0.25 mile east of Blevin Road, 0.50 mile north of Butte House Road. 11/19/47, 33.6; 3/17/48, 33.6; 5/13/48, 30.8; 11/19/48, 39.0; 3/23/49, 32.2; 11/29/49, 36.4; 11/3/50, 36.6.

15N/3E-16L1—Reference point—concrete rim of pit, elevation 56 feet, 300 feet east of Tharp Road, 0.1 mile south of Butte House Road. 11/18/47, 34.8; 3/15/48, 34.8; 11/18/48, 37.9; 3/23/49, 32.0; 11/23/49, 36.1; 3/23/50, 33.6; 10/31/50, 38.2; 3/27/51, 31.4; 11/14/51, 35.2; 4/1/52, 24.5.

TABLE 1—Continued

DEPTHS TO GROUND WATER AT MEASUREMENT WELLS IN SUTTER-YUBA AREA

Measurements Made by Division of Water Resources
(Depths to water in feet measured from reference point)

15N 3E-16R2—Reference point—top of casing, elevation 57.1 feet, 300 feet east of Blevin Road, 0.35 mile north of Butte House Road. 12/19/47, 31.0; 3/24/48, 32.9; 9/27/48, 34.5; 11/18/48, 31.7; 3/28/49, 28.9; 11/23/49, 32.7; 3/23/50, 29.7; 11/23/49, 32.7; 3/23/50, 29.7; 10/30/50, 35.2; 3/27/51, 27.2; 11/14/51, 31.9; 4/1/52, 24.8.

15N 3E-17C1—Reference point—top of casing at bottom of pit, elevation 16.8 feet, 200 feet east of Hooper Road, 0.05 mile north of Butte House Road. 12/19/47, 17.5; 3/6/48, 16.0; 9/27/48, 20.9; 11/18/48, 49.0; 3/28/49, 16.0; 11/23/49, 19.3; 3/23/50, 24.8; 10/30/50, 20.7; 3/27/51, 13.5.

15N 3E-17P2—Reference point—top of flanged coupling at bottom of pit, elevation 41.0 feet, 0.05 mile north of State Highway 20, 0.25 mile east of Hooper Road. 12/19/47, 15.1; 3/6/48, 14.6; 9/27/48, 19.6; 11/18/48, 16.9; 3/28/49, 12.8. Well destroyed.

15N 3E-18R1—Reference point—top of casing, elevation 53 feet, 0.1 mile north of State Highway 20, 0.1 mile west of George Washington Boulevard. 12/19/47, 23.3; 3/6/48, 22.8; 11/18/48, 25.6; 3/28/49, 21.9; 11/23/49, 26.2; 10/31/50, 28.2; 3/27/51, 19.7; 11/14/51, 25.3; 4/1/52, 12.7.

15N 3E-19B1—Reference point—2" x 4" on top of concrete pit, elevation 57.3 feet, 0.21 mile south of State Highway 20, 0.54 mile east of Township Road. 12/21/47, 29.2; 3/3/48, 27.6; 12/1/48, 30.0; 1/20/49, 28.7; 3/16/49, 27.0; 11/11/49, 32.3; 3/23/50, 27.5; 11/4/50, 22.4; 4/4/51, 25.6; 11/14/51, 30.6.

15N 3E-20E1—Reference point—top of casing, elevation 37.5 feet, 0.48 mile west of El Margarita Road, 0.53 mile south of State Highway 20. 12/19/47, 9.6; 3/6/48, 9.5; 9/27/48, 13.8; 11/18/48, 11.7; 3/28/49, 8.4; 11/25/49, 11.3.

15N 3E-20G1—Reference point—hole in base of pump, elevation 52 feet, 0.25 mile east of El Margarita Road, 0.50 mile south of State Highway 20. 12/19/47, 30.8; 3/6/48, 31.0; 3/28/49, 28.7; 11/25/49, 29.1; 10/31/50, 36.6; 11/14/51; 39.4; 4/1/52, 23.6.

15N 3E-20R1—Reference point—top of casing, elevation 53.4 feet, 0.20 mile west of Harding Road, 0.05 mile north of Franklin Road. 12/19/47, 29.9; 3/24/48, 30.8; 11/18/48, 33.2; 3/28/49, 28.0; 5/26/49, 33.5; 6/28/49, 35.4; 7/27/49, 38.4; 8/25/49, 38.7; 11/25/49, 33.4; 3/27/50, 30.1; 10/31/50, 35.3; 3/27/51, 28.9; 11/14/51, 36.6; 1/1/52, 25.3.

15N 3E-21C1—Reference point—hole in concrete base, elevation 51 feet, 0.40 mile east of Harding Road, 0.12 mile south of State Highway 20. 3/17/48, 32.8; 11/18/48, 32.5; 3/23/49, 29.2; 11/25/49, 31.4.

15N 3E-21D1—Reference point—hole in concrete base, elevation 55.6 feet, 0.05 mile south of State Highway 20, 0.24 mile east Harding Road. 12/19/47, 30.8; 3/24/48, 31.2; 5/12/48, 31.1; 9/22/48, 37.1; 11/18/48, 32.8; 3/28/49, 28.8; 5/26/49, 37.8; 6/30/49, 45.0; 8/25/49, 41.8; 11/25/49, 31.4.

15N 3E-21F1—Reference point—hole in concrete base, elevation 55 feet, 0.28 mile east of Harding Road, 0.38 mile south of State Highway 20. 11/17/47, 34.3; 3/17/48, 34.8; 11/18/48, 39.3; 3/23/49, 31.5; 11/25/49, 38.9; 10/31/50, 39.0; 3/27/51, 32.5; 11/14/51, 37.3; 4/1/52, 28.4.

15N 3E-21L2—Reference point—top of casing, elevation 55.0 feet, 0.04 mile west of Walton Road, 0.61 mile south of State Highway 20. 12/19/47, 32.2; 3/24/48, 32.7; 11/18/48, 31.5; 3/28/49, 30.3; 11/25/49, 35.9.

15N 3E-21P2—Reference point—slot in casing, elevation 51.3 feet, 0.18 mile north of Franklin Road, 0.48 mile east of Harding Road. 11/18/47, 33.3; 3/15/48, 34.8; 11/18/48, 34.8; 3/23/49, 31.0; 11/25/49, 35.4.

15N 3E-21Q1—Reference point—top of pit, elevation 53 feet. North side of Franklin Road, 0.25 mile east of Walton Road. 1/4/41, 24.5; 11/4/47, 33.6; 12/15/48, 33.5; 12/8/49, 36.1; 11/17/50, 38.4; 12/7/51, 35.8.

15N 3E-21R1—Reference point—top of casing, elevation 53.3 feet, 0.1 mile west of Onstott Road, 0.13 mile north of Franklin Road. 11/17/47, 31.1; 3/17/48, 31.4; 3/29/48, 30.4; 5/12/48, 30.7; 9/27/48, 35.1; 11/18/48, 32.7; 3/23/49, 29.5; 11/25/49, 35.1; 3/27/50, 31.4; 10/31/50, 36.2; 3/27/51, 30.7; 11/13/51, 34.5; 1/1/52, 26.7.

15N 3E-22D1—Reference point—hole in base of pump, elevation 54.8 feet, 0.05 mile east of Onstott Road, 0.17 mile south of State Highway 20. 11/17/47, 31.2; 3/17/48, 31.5; 9/27/48, 31.2; 11/19/48, 32.2; 3/23/49, 29.2; 11/25/49, 34.7.

15N 3E-24N1—Reference point—top of casing, elevation 48.6 feet, 0.38 mile southwest of Western Pacific Railroad crossing of Yuba River, 0.50 mile west of U. S. Highway 99E. 11/14/47, 10.0; 3/19/48, 8.6; 11/23/48, 11.0; 3/24/49, 6.8; 11/22/49, 13.8; 3/28/50, 24.0; 11/20/51, 31.3; 4/2/52, 12.6.

15N 3E-24N2—Reference point—top of casing, elevation 70.9 feet, 0.35 mile southwest of Western Pacific Railroad crossing of Yuba River, 0.50 mile north of U. S. Highway 99E. 11/14/47, 31.5; 3/19/48, 29.9; 11/23/48, 31.7.

15N 3E-24Q1—Reference point—pipe in base, elevation 64.8 feet, 0.04 mile south of Riverside Boulevard, 0.04 mile west of Western Pacific Railroad. 11/12/47, 27.2; 3/19/48, 27.4; 11/22/48, 31.4; 3/24/49, 24.8; 12/13/49, 31.0.

15N 3E-25C1—Reference point—top of casing, elevation 53.4 feet, 0.15 mile west of Riverside Boulevard, 0.55 mile south of Western Pacific Railroad crossing on Yuba River. 11/14/47, 14.6; 3/19/48, 13.2; 3/30/48, 12.5; 11/23/48, 15.0; 3/24/49, 11.2; 11/22/49, 15.1.

15N 3E-25F1—Reference point—top of casing, elevation 61.0 feet, 0.85 mile south of Western Pacific Railroad crossing on Yuba River, 0.27 mile west of Riverside Boulevard. 11/12/47, 24.4; 3/19/48, 23.3; 11/23/48, 25.1; 3/24/49, 21.6; 11/22/49, 26.5; 3/28/50, 20.8; 11/9/50, 25.6; 3/28/51, 15.1; 11/20/51, 24.0; 4/3/52, 15.3.

15N 3E-25H1—Reference point—base of pump, elevation 59.9 feet. South side of Walnut Avenue, 0.15 mile southwest of Garden Avenue. 11/12/47, 22.3; 3/19/48, 22.5; 10/4/48, 24.2; 11/22/48, 23.2; 3/24/49, 19.5; 11/18/49, 23.8.

15N 3E-25H2—Reference point—hole in base of pump, elevation 57.1 feet. West side of Garden Avenue, 0.15 mile south of Walnut Avenue. 11/14/47, 19.3; 11/22/48, 20.8; 3/24/49, 18.0; 11/18/49, 21.5.

15N 3E-25K1—Reference point—hole in base of pump, elevation 61.5 feet, 0.11 mile east of Riverside Boulevard, 0.86 mile north of Feather River Boulevard. 11/12/47, 24.8; 3/19/48, 23.1; 11/23/48, 24.8.

15N 3E-25K2—Reference point—top of casing, elevation 48.0 feet, 0.15 mile east of Riverside Boulevard, 0.82 mile north of Feather River Boulevard. 11/12/47, 10.9; 3/19/48, 9.3; 3/30/48, 8.7; 10/4/48, 21.2; 11/22/48, 19.5; 3/24/49, 16.7; 11/22/49, 21.0.

15N 3E-26M1—Reference point—top of casing, elevation 52 feet, 0.31 mile north of Lincoln Road, 0.24 mile east of Garden Highway. 11/14/47, 23.8; 3/17/48, 23.6; 3/2/48, 20.8; 10/4/48, 26.8; 11/19/48, 24.7; 3/23/49, 21.8; 6/29/49, 29.8; 7/31/49, 32.8; 8/25/49, 31.4; 11/28/49, 25.9; 3/27/50, 21.1; 11/1/50, 26.4; 3/27/51, 23.2; 11/13/51, 28.0; 4/1/52, 17.0.

15N 3E-27C1—Reference point—hole in base of pump, elevation 53 feet, 0.10 mile west of Clark Avenue, 0.14 mile south of Franklin Road. 11/17/47, 29.7; 3/17/48, 29.9; 11/19/48, 31.6; 3/23/49, 30.5.

15N 3E-28B3—Reference point—top of pit, elevation 53 feet, 0.25 mile east of Walton Road, south side of Franklin Road. 11/27/29, 23.8; 9/27/30, 27.8; 12/15/31, 28.8; 12/1/32, 28.4; 12/14/33, 30.5; 11/10/34, 31.3; 11/25/36, 21.5; 11/24/37, 23.6; 1/26/39, 18.3.

15N 3E-28C1—Reference point—top of casing, elevation 54.2 feet, 0.18 mile west of Walton Road, 0.07 mile south of Franklin Road. 12/19/47, 33.1; 3/24/48, 33.4; 5/12/48, 31.3; 9/27/48, 36.4; 11/18/48, 36.6; 3/28/49, 31.5; 11/25/49, 37.1.

TABLE 1—Continued

DEPTHS TO GROUND WATER AT MEASUREMENT WELLS IN SUTTER-YUBA AREA

Measurements Made by Division of Water Resources
(Depths to water in feet measured from reference point)

15N/3E-28G1—Reference point—top of casing, elevation 54.3 feet, 0.09 mile east of Walton Road, 0.37 mile south of Franklin Road. 11/17/47, 33.7; 3/15/48, 33.5; 11/18/48, 36.4; 3/23/49, 32.0; 11/25/49, 36.6; 3/27/50, 34.3; 10/31/50, 39.6; 3/27/51, 33.2; 11/13/51, 37.4; 4/1/52, 28.5.

15N/3E-28Q1—Reference point—base of pump, elevation 52.9 feet, 0.10 mile north of Lincoln Road, 0.18 mile east of Walton Road. 11/17/47, 32.0; 3/15/48, 32.0; 3/29/48, 31.4; 10/4/48, 35.2; 11/18/48, 34.8; 3/23/49, 31.0; 11/28/49, 36.6.

15N/3E-29D1—Reference point—bottom of flange coupling in pit, elevation 40.2 feet, west side of Butte Avenue, 0.14 mile south of Franklin Road. 12/19/47, 13.3; 3/5/48, 14.2; 11/18/48, 17.9; 3/28/49, 13.0; 12/13/49, 17.3; 3/27/50, 14.9; 11/1/50, 19.7; 3/27/51, 11.1; 11/14/51, 19.0; 4/1/52, 16.7.

15N/3E-29N1—Reference point—top of casing, in pit, elevation 36.9 feet, 0.14 mile north of Lincoln Road, 0.13 mile east of George Washington Boulevard. 12/19/47, 10.4; 3/5/48, 10.6; 11/18/48, 12.0; 3/28/49, 9.1; 11/23/49, 14.3; 3/27/50, 9.6; 11/1/50, 14.9; 3/27/51, 7.6; 11/14/51, 15.3; 4/1/52, 14.0.

15N/3E-29R2—Reference point—top of pump base, elevation 51.9 feet, 0.57 mile west of Walton Avenue, 0.03 mile north of Lincoln Road. 12/19/47, 31.6; 3/24/48, 31.1; 10/4/48, 34.7; 11/18/48, 33.2; 11/25/49, 34.8.

15N/3E-30Q1—Reference point—top of discharge pipe, elevation 47 feet. North side Lincoln Road, 0.40 mile west of George Washington Boulevard. 12/22/47, 20.3; 3/5/48, 20.5; 10/4/48, 21.6; 11/17/48, 20.7; 3/28/49, 18.9; 11/23/49, 21.3.

15N/3E-32N1—Reference point—top of casing, elevation 48.4 feet, 0.05 mile north of Bogue Road, 0.20 mile east of George Washington Boulevard. 12/20/47, 23.7; 3/5/48, 27.9; 11/17/48, 25.4; 3/29/49, 23.5; 11/25/49, 24.3; 3/27/50, 22.9; 11/1/50, 30.5; 3/27/51, 20.4; 11/14/51, 27.6; 4/1/52, 15.8.

15N/3E-33D1—Reference point—hole in base of pump, elevation 51 feet, 0.08 mile south of Lincoln Road, 0.32 mile west of Walton Road. 5/4/48, 30.0; 6/1/48, 29.4; 11/18/48, 34.7; 3/29/49, 29.5; 11/25/49, 35.0; 3/27/50, 32.3; 11/1/50, 37.7; 3/27/51, 31.3; 11/14/51, 35.5; 4/1/52, 29.0.

15N/3E-33F1—Reference point—hole in base of pump, elevation 52.0 feet, 0.10 mile west of Walton Road, 0.27 mile south of Lincoln Road. 12/20/47, 29.7; 3/5/48, 34.5; 5/4/48, 28.3; 5/12/48, 29.2; 6/1/48, 28.2; 11/18/48, 35.0; 3/29/49, 31.8; 11/25/49, 33.7; 3/27/50, 30.5; 11/1/50, 36.0; 3/27/51, 29.9; 11/14/51, 36.3; 4/1/52, 26.0.

15N/3E-33K1—Reference point—hole in base of pump, elevation 52.1 feet. East side of Walton Road, 0.54 mile south of Lincoln Road. 3/12/48, 36.1; 5/6/48, 31.3; 6/1/48, 30.9; 11/11/48, 36.5.

15N/3E-33K2—Reference point—hole in base of pump, elevation 49 feet, 0.20 mile east of Walton Road, 0.73 mile south of Lincoln Road. 11/17/47, 35.6; 3/15/48, 35.6; 11/25/49, 35.9.

15N/3E-33N2—Reference point—hole in base of pump, elevation 48.4 feet, 0.32 mile west of Walton Road, 0.06 mile north of Boque Road. 12/20/47, 27.9; 3/5/48, 33.8; 11/18/48, 30.0; 3/29/49, 26.7; 11/25/49, 31.4; 3/27/50, 20.6; 11/1/50, 34.4; 11/14/51, 32.9; 4/1/52, 23.8.

16N/3E-33P1—Reference point—top of concrete pit, elevation 50.5 feet. West side of Walton Road, 0.15 mile north of Bogue Road. 11/10/47, 30.3; 3/23/48, 32.7; 11/11/48, 32.1; 1/18/49, 29.8; 3/7/49, 29.0; 11/29/49, 33.2; 3/27/50, 30.6; 11/3/50, 35.7; 11/16/51, 33.3.

15N/3E-33C2—Reference point—hole in base of pump, elevation 48.6 feet, 0.20 mile north of Bogue Road, 0.10 mile east of Walton Avenue. 3/16/48, 34.0; 11/11/48, 31.6; 3/7/49, 29.1; 12/1/49, 33.4.

15N/3E-34L1—Reference point—top of casing, elevation 50 feet, 0.52 mile south of Lincoln Road, 0.96 mile east of Walton Road. 11/14/47, 31.3; 3/15/48, 33.9; 5/5/48, 29.2; 6/1/48, 29.2; 7/3/48, 57.0 (operating); 8/3/48, 48.1; 9/30/48, 37.8; 10/4/48, 41.5; 11/19/48, 37.7; 3/23/49, 31.0; 5/31/49, 33.7; 8/31/49, 38.6; 11/28/49, 36.8; 3/27/50, 31.5; 11/1/50, 35.7; 3/28/51, 30.3; 11/13/51, 33.9; 4/1/52, 32.0.

15N/3E-34N1—Reference point—top of casing, elevation 39.5 feet, 0.05 mile west of Phillips Road, 0.15 mile north of Bogue Road. 3/12/48, 21.2; 11/11/48, 37.0; 3/7/49, 34.2; 12/1/49, 36.5.

15N/3E-35E1—Reference point—top of casing, elevation 50 feet, 0.37 mile east of Garden Highway, 0.44 mile south of Lincoln Road. 11/14/47, 22.1; 3/17/48, 21.2; 11/23/48, 22.5; 3/23/49, 20.5; 11/28/49, 21.1; 3/27/50, 20.8.

15N/4E-3A1—Reference point—top of casing, elevation 95.0 feet 0.31 mile east of Hallwood Road, south side of Walnut Road. 11/25/47, 16.6; 3/3/48, 19.8; 4/1/48, 19.1; 11/29/48, 17.0; 3/22/49, 18.8; 11/18/49, 17.7.

15N/4E-3B1—Reference point—top of casing, elevation 95.4 feet, 0.47 mile south of Walnut Road, 0.03 mile west of Hallwood Road. 11/25/47, 23.5; 3/3/48, 26.2; 11/29/48, 24.0; 1/27/49, 25.2; 3/22/49, 23.9; 11/16/49, 23.7.

15N/4E-3D1—Reference point—top of casing, elevation 93.4 feet, 0.45 mile west of Hallwood Road, 0.01 mile south of Walnut Road. 11/25/47, 18.8; 3/3/48, 21.9; 4/1/48, 21.8; 11/29/48, 20.0; 1/27/49, 22.2; 3/22/49, 20.1; 11/18/49, 19.4.

15N/4E-3D2—Reference point—top of casing, elevation 90 feet, 0.56 mile west of Hallwood Road, southeast of curve in Walnut Road. 11/29/48, 22.2; 3/23/49, 22.0.

15N/4E-4A1—Reference point—top of casing, elevation 90.4 feet. South side of Walnut Road, 0.85 mile along Walnut Road from intersection with State Highway 20. 11/25/47, 19.9; 3/3/48, 20.9; 11/29/48, 19.8; 3/22/49, 19.0; 11/18/49, 19.2.

15N/4E-4C1—Reference point—top of casing, elevation 88.7 feet, 0.05 mile south of Walnut Road, 0.41 mile along Walnut Road from intersection with State Highway 20. 11/25/47, 19.4; 3/3/48, 21.1; 4/1/48, 20.4; 11/29/48, 20.4; 3/22/49, 18.8; 11/18/49, 20.0.

15N/4E-4D1—Reference point—hole in pump base, elevation 85 feet, 0.03 mile southeast of intersection of State Highway 20 and Walnut Road. 11/29/48, 26.1; 1/27/49, 26.0; 3/22/49, 23.2; 12/9/49, 27.1.

15N/4E-4E1—Reference point—top of 10-inch casing inside shed, elevation 87.5 feet, 0.17 mile east of State Highway 20, 0.38 mile south along State Highway 20 from intersection of Walnut Road. 11/25/47, 21.9; 3/2/48, 22.8; 4/1/48, 22.4; 11/26/48, 22.8; 1/27/49, 23.2; 3/22/49, 21.0; 11/18/49, 22.5; 3/23/50, 21.5; 10/31/50, 22.2; 3/30/51, 20.5; 11/14/51, 22.3.

15N/4E-4H1—Reference point—top of tin casing at suction line, elevation 85 feet, 0.9 mile east of State Highway 20, 0.5 mile south of Walnut Road. 11/28/47, 20.2; 3/2/48, 20.8; 4/1/48, 21.7; 3/22/49, 20.5; 11/18/49, 20.8.

15N/4E-4N1—Reference point—top of casing, elevation 85.6 feet, 0.55 mile east of State Highway 20, 0.82 mile south of intersection of State Highway 20 and Walnut Road. 11/25/47, 24.3; 3/2/48, 24.3; 4/1/48, 23.5; 11/26/48, 24.6; 3/22/49, 22.6; 12/9/49, 25.2.

15N/4E-4N2—Reference point—top of casing, elevation 85.3 feet, 0.61 mile east of State Highway 20, 0.91 mile south along State Highway 20 from intersection with Walnut Road. 11/25/47, 23.9; 3/2/48, 23.9; 3/22/49, 22.0.

15N/4E-4P1—Reference point—top of casing, elevation 86.5 feet, 0.72 mile east of State Highway 20, 0.73 mile south along State Highway 20 from intersection with Walnut Road. 11/25/47, 70.4; 3/2/48, 25.6.

15N/4E-4R1—Reference point—hole in side of pump, elevation 85.7 feet, 0.81 mile northwest of Dantoni Packing Shed on Dantoni Road, southeast of Yuba River. 11/24/47, 26.3; 3/4/48, 25.0; 3/31/48, 27.3; 10/4/48, 25.4; 11/24/48, 25.4; 1/17/49, 25.2; 3/16/49, 24.0; 5/24/49, 26.3; 6/29/49, 28.7; 7/28/49, 27.8; 8/26/49, 27.9; 11/21/49, 26.2; 3/23/50, 24.1; 10/31/50, 26.5; 4/2/51, 21.4; 11/21/51, 25.6; 4/5/52, 20.4.

TABLE 1—Continued

DEPTHS TO GROUND WATER AT MEASUREMENT WELLS IN SUTTER-YUBA AREA

Measurements Made by Division of Water Resources
(Depths to water in feet measured from reference point)

15N/4E-5D1—Reference point—top of tin casing, elevation 65 feet. 0.17 mile northwest of Kimball Lane at curve, 1.0 mile along Kimball Lane from intersection with Nigger Jack Slough Road. 11/26/47, 7.2; 3/1/48, 8.8; 11/30/48, 8.2; 3/23/49, 8.5; 12/9/49, 8.5.

15N/4E-6C1—Reference point—top of suction pipe flange, elevation 65 feet. 0.10 mile north of intersection of Kimball Lane and Nigger Jack Slough Road on west side of Nigger Jack Slough Road. 11/7/47, 8.3; 12/2/48, 6.0; 3/18/49, 4.5; 11/17/49, 5.1.

15N/4E-7J1—Reference point—top of casing, elevation 68 feet. North side of State Highway 20, 1.65 miles along State Highway 20 from Yuba Street. 11/19/47, 15.9; 3/19/48, 15.9; 11/21/48, 16.3; 3/28/48, 15.0; 11/17/49, 16.0; 3/28/50, 15.8; 11/2/50, 15.7; 3/28/51, 10.5; 11/16/51, 16.2; 4/2/52, 10.2.

15N/4E-7M1—Reference point—hole in base of pump, elevation 64 feet. 0.80 mile north of 15th Street, west side of Nigger Jack Slough Road. 11/19/47, 19.4; 3/19/48, 18.8; 10/5/48, 19.1; 11/22/48, 19.7; 3/28/49, 17.5; 11/17/49, 19.8; 3/28/50, 16.9.

15N/4E-8D1—Reference point—top of casing outside milk house, elevation 65 feet. 0.46 mile east of Nigger Jack Slough Road, 0.25 mile northwest of State Highway 20. 11/25/47, 15.4; 3/2/48, 16.1; 11/30/48, 15.9; 3/22/49, 14.7; 11/21/49, 15.1; 3/23/50, 14.3; 10/31/50, 15.0; 3/30/51, 14.7; 11/14/51, 15.8; 4/5/52, 12.6.

15N/4E-8M1—Reference point—top of casing, elevation 74 feet. 0.20 mile east of State Highway 20, 1.68 miles from intersection with Yuba Street. 11/25/47, 23.1; 3/2/48, 22.7; 11/26/48, 23.1; 3/22/49, 22.2; 12/9/49, 24.7.

15N/4E-8R1—Reference point—base of pump, elevation 80.3 feet. 1.58 miles north of intersection of Dantoni and Hammond Roads on south bank of Yuba River. 11/19/47, 26.7; 3/2/48, 26.7; 3/31/48, 25.7; 5/5/48, 23.3; 6/1/48, 23.2; 10/4/48, 26.8; 11/21/48, 26.9; 3/16/49, 25.4; 11/21/49, 27.7; 3/23/50, 25.0; 10/31/50, 27.7; 4/2/51, 22.2; 11/21/51, 26.9; 4/5/52, 23.4.

15N/4E-9G1—Reference point—top of casing, elevation 84.6 feet. 0.70 mile northwest of Dantoni Road, 0.10 mile southwest along road from Dantoni Packing Shed. 11/24/47, 29.6; 3/3/48, 24.9; 3/4/48, 25.1; 10/4/48, 25.9; 11/24/48, 25.5; 1/17/49, 24.9; 3/16/49, 23.7; 11/21/49, 26.0; 3/23/50, 23.2; 10/31/50, 25.9; 4/2/51, 21.1; 11/21/51, 25.0; 4/5/52, 20.3.

15N/4E-9R1—Reference point—hole in side of pump, elevation 77.2 feet. 0.23 mile northwest of Dantoni Road, 0.40 mile southwest along road from Dantoni Packing Shed. 11/24/47, 19.2; 3/1/48, 20.9; 3/3/48, 21.0; 11/24/48, 20.1; 3/16/49, 20.2; 11/21/49, 21.1.

15N/4E-10F1—Reference point—hole in base of pump, elevation 80.5 feet. 0.23 mile northwest of Dantoni Road, 0.20 mile northeast along road from Dantoni Packing Shed. 11/24/47, 21.5; 3/1/48, 19.8; 3/31/48, 25.7; 10/4/48, 20.9; 11/24/48, 20.6; 3/16/49, 19.7; 11/21/49, 21.5.

15N/4E-10L2—Reference point—pipe in concrete base, elevation 87.8 feet. 0.12 mile southeast from Dantoni Road, opposite Dantoni Packing Shed. 11/24/47, 26.2; 3/3/48, 31.0; 3/4/48, 26.9; 5/6/48, 25.0; 10/8/48, 27.4; 11/21/48, 27.3; 1/17/49, 26.8; 3/16/49, 26.1; 3/24/49, 31.0; 6/29/49, 29.5; 7/28/49, 30.3; 8/30/49, 30.5; 11/21/49, 28.6.

15N/4E-10N1—Reference point—hole in casing, elevation 84.1 feet. 0.16 mile southeast of Dantoni Road, 0.30 mile southwest along road from Dantoni Packing Shed. 11/24/47, 28.6; 3/4/48, 26.0; 3/31/48, 26.6; 5/6/48, 24.2; 10/4/48, 26.2; 11/21/48, 26.5; 3/16/49, 25.8; 11/21/49, 28.0; 12/7/49, 27.8; 3/23/50, 26.6; 10/31/50, 28.2; 4/2/51, 20.7; 11/21/51, 26.9; 4/5/52, 23.0.

15N/4E-11C1—Reference point—top of casing, elevation 90 feet. 1.60 miles north of Hammonton Road at a point 0.55 mile southwest along Hammonton Road from Brophy Road. 5/13/48, 25.0; 6/1/48, 24.7; 10/1/48, 27.5; 11/23/48, 27.5; 1/17/49, 26.9; 3/16/49, 26.5; 11/21/49, 28.8; 3/23/50, 25.4; 3/30/51, 18.8; 11/1/51, 27.1; 4/4/52, 18.4.

15N/4E-11G1—Reference point—hole in pump base, elevation 85 feet. 1.17 miles north of Hammonton Road at a point 0.35 mile southwest along Hammonton Road from Brophy Road. 5/13/48, 25.3; 6/1/48, 24.9; 9/1/48, 29.5; 10/1/48, 26.2; 11/23/48, 26.1, 1/17/49, 26.1; 3/16/49, 25.4; 4/12/49, 24.1; 5/24/49, 28.5; 6/29/49, 29.4; 7/28/49, 28.5; 8/26/49, 28.4; 11/21/49, 23.6; well destroyed.

15N/4E-11K1—Reference point—hole in top of pump base, elevation 83 feet. 0.29 mile west of Brophy Road, 0.90 mile north of Brophy School. 5/13/48, 18.1; 10/1/48, 20.1; 11/23/48, 19.4; 3/16/49, 18.4.

15N/4E-12P1—Reference point—hole in pump base, elevation 82.3 feet. 0.57 mile north of Brophy School, 0.29 mile east of Brophy Road. 11/24/47, 24.3; 3/1/48, 25.9; 3/31/48, 23.8; 11/23/48, 27.5; 11/21/49, 26.7; 12/5/49, 26.6; 3/24/50, 22.4; 11/2/50, 27.6; 4/4/52, 19.4.

15N/4E-13B1—Reference point—top of casing, elevation 84 feet. South side of Hammonton Road, 0.4 mile northeast from intersection with Brophy Road. 12/24/47, 22.9; 3/23/48, 22.6; 11/23/48, 25.7; 3/21/49, 22.1; 12/5/49, 26.2; 3/23/50, 22.7; 11/2/50, 27.7; 4/2/51, 18.7; 11/21/51, 26.4; 4/4/52, 20.4.

15N/4E-14B1—Reference point—top of casing, elevation 80.5 feet. 0.21 mile north of Hammonton Road, 0.20 mile southwest from intersection with Brophy Road. 11/26/47, 16.1; 3/1/48, 16.4; 3/31/48, 16.4; 11/24/48, 17.8; 3/17/49, 16.3; 11/22/49, 16.4; 3/30/51, 4.6; 11/20/51, 17.0; 4/4/52, 4.7.

15N/4E-14N1—Reference point—hole in pump base, elevation 79 feet. 0.11 mile south of Hammonton Road, 0.85 mile southwest from intersection with Brophy Road. 5/6/48, 24.0; 6/3/48, 26.7; 3/17/49, 25.7; 11/21/49, 30.3.

15N/4E-14N2—Reference point—top of casing, elevation 78.8 feet. North side of Hammonton Road, 0.87 mile southwest from intersection with Brophy Road. 11/26/47, 22.7; 5/6/48, 21.8; 10/1/48, 26.4; 10/8/48, 25.8; 11/24/48, 24.9; 1/17/49, 23.9; 3/16/49, 23.3; 5/24/49, 31.3; 6/29/49, 33.5; 7/28/49, 35.3; 8/26/49, 30.8; 11/22/49, 27.7; 3/23/50, 24.3; 11/10/50, 28.7; 3/30/51, 18.5; 11/20/51, 27.9; 4/4/52, 20.3.

15N/4E-14P1—Reference point—hole in pump base, elevation 82 feet. 0.52 mile west of Brophy Road, 0.23 mile south of Hammonton Road. 5/6/48, 25.2; 6/3/48, 28.7; 3/17/49, 26.9; 8/2/49, 40.6; 11/21/49, 30.7.

15N/4E-15A1—Reference point—pipe in concrete base, elevation 78.5 feet. 1.02 miles west of Brophy Road, 0.86 mile north of Hammonton Road. 11/26/47, 18.3; 3/2/48, 17.1; 3/31/48, 18.5; 10/8/48, 20.2; 11/24/48, 19.6; 1/7/49, 19.0; 3/16/49, 18.4; 11/21/49, 21.0; 3/23/50, 19.1; 11/10/50, 22.0; 4/2/51, 11.1; 11/21/51, 20.3; 4/4/52, 12.2.

15N/4E-15L1—Reference point—top of concrete pit, elevation 81.5 feet. 0.15 mile east of Griffith Avenue, 0.66 mile north of Hammonton Road. 11/26/47, 27.0; 3/2/48, 29.8.

15N/4E-16A1—Reference point—hole in side of pump base, elevation 79.5 feet. North side of Dantoni Road, 0.73 mile along road from Dantoni Packing Shed. 11/7/47, 22.5; 3/2/48, 23.2; 3/31/48, 22.7; 10/4/48, 23.7; 10/8/48, 23.7; 11/24/48, 23.7; 1/17/49, 23.2; 3/16/49, 23.0; 11/21/49, 25.1.

15N/4E-16K1—Reference point—base of pump, elevation 81.0 feet. 0.03 mile west of Dantoni Road, 1.43 miles along road from intersection with Hammonton Road. 11/22/47, 26.8; 3/2/48, 28.2; 3/31/48, 27.9; 10/4/48, 30.0; 10/8/48, 29.9; 11/24/48, 29.2; 3/16/49, 28.4; 11/22/49, 31.2; 11/10/50, 30.5; 4/2/51, 21.5; 11/21/51, 29.5; 4/5/52, 22.0.

TABLE 1—Continued

DEPTHS TO GROUND WATER AT MEASUREMENT WELLS IN SUTTER-YUBA AREA

Meosurements Mode by Division of Woter Resources
(Depths to woter in feet meosured from reference point)

15N/4E-16N2—Reference point—hole in pump base, elevation 74.5 feet, 0.28 mile northwest of Dantoni Road, 0.76 mile along road from intersection with Hammonton Road. 11/19/47, 23.9; 3/2/48, 23.3; 3/31/48, 23.1; 5/6/48, 22.3; 6/1/48, 21.8; 10/4/48, 24.5; 11/24/48, 24.2; 3/16/49, 23.6.

15N/4E-16P1—Reference point—base of pump, elevation 76.9 feet, 0.23 mile west of Dantoni Road, 1.31 miles along road from intersection with Hammonton Road. 11/5/47, 24.7; 3/2/48, 24.1; 5/13/48, 24.2; 6/1/48, 22.3; 10/4/48, 25.8; 10/8/48, 25.7; 11/24/48, 24.7; 3/16/49, 24.4; 11/21/49, 28.2.

15N/4E-17M1—Reference point—top of casing, elevation 74.2 feet, 0.76 mile measured perpendicular north of Simpson Lane at a point 0.82 mile from 7th St. Bridge. 11/11/47, 26.4; 3/19/48, 25.8; 3/30/48, 25.5; 11/5/48, 27.0; 11/22/48, 32.8; 3/24/49, 25.2; 11/17/49, 27.3; 3/28/50, 24.7; 11/2/50, 28.2; 3/28/51, 17.9; 11/16/51, 25.8; 4/2/52, 15.9.

15N/4E-17N1—Reference point—top of casing, elevation 74.5 feet, 0.35 mile measured perpendicular north of Simpson Lane at a point 1.27 miles from intersection with Yuba Street. 11/11/47, 26.0; 3/19/48, 25.4; 3/30/48, 25.3; 11/22/48, 26.6; 3/24/49, 25.2; 11/17/49, 27.6.

15N/4E-18G1—Reference point—top of casing, elevation 71 feet, 0.13 mile east of State Highway 20 at a point 0.90 mile from intersection with Yuba Street. 11/19/47, 27.7; 3/19/48, 26.2; 11/21/48, 28.5; 3/28/49, 24.5; 11/17/49, 28.1; 11/2/50, 26.2; 3/28/51, 22.3; 11/16/51, 28.1; 4/2/52, 21.6.

15N/4E-18Q1—Reference point—base of pump at edge, elevation 68.7 feet, 0.36 mile measured perpendicular north of Simpson Lane at a point 0.75 mile from intersection with Yuba Street. 11/12/47, 23.7; 3/18/48, 22.5; 11/22/48, 24.3; 3/24/49, 22.0; 11/17/49, 25.5; 11/16/51, 27.7.

15N/4E-19H1—Reference point—surface of concrete block, elevation 67.0 feet, 0.13 mile measured perpendicular south of Simpson Lane at a point 1.04 miles from intersection with Yuba Street. 11/11/47, 23.5; 3/19/48, 22.6; 10/5/48, 29.0; 11/22/48, 26.5; 3/24/49, 20.7; 11/17/49, 25.0; 11/2/50, 25.3; 3/28/51, 13.7.

15N/4E-19J1—Reference point—hole in pump base, elevation 71.8 feet, 0.43 mile south of Simpson Lane at a point 1.12 miles from intersection with Yuba Street. 11/11/47, 27.4; 3/19/48, 27.3; 3/24/49, 26.8; 11/18/49, 30.0; 3/28/50, 27.5; 11/3/50, 30.3; 3/28/51, 18.5; 11/16/51, 26.5; 4/2/52, 17.6.

15N/4E-19N1—Reference point—top of casing, elevation 59.9 feet. South bank of Levee Road, 0.35 mile east of U. S. Highway 99E bridge over Yuba River. 11/10/47, 20.0; 3/17/48, 19.0; 3/24/49, 17.0; 11/18/49, 21.4.

15N/4E-19P1—Reference point—top of casing, elevation 64.0 feet, 0.04 mile south of levee between Avondale and Southern Pacific Railroad. 11/11/47, 22.7; 3/17/48, 22.6; 3/30/48, 21.1; 11/22/48, 33.7; 3/24/49, 21.0; 12/13/49, 25.2.

15N/4E-20F1—Reference point—hole in pump base, elevation 72.5 feet, 0.20 mile due west from intersection of Hammonton and Dantoni Roads. 11/11/47, 25.7; 3/17/48, 26.0; 5/3/48, 24.7; 6/2/48, 25.4; 11/22/48, 26.2; 3/24/49, 26.5; 11/17/49, 29.6; 3/28/50, 27.3; 11/16/51, 25.1; 4/2/52, 23.6.

15N/4E-20L1—Reference point—top of casing, elevation 66 feet, 0.41 mile north of Hammonton Road at a point 0.55 mile along Hammonton Road from intersection with U. S. Highway 99E. 11/11/47, 14.3; 3/17/48, 15.0; 11/22/48, 13.3; 11/18/49, 22.4; 11/3/50, 22.7; 3/28/51, 12.6.

15N/4E-20N1—Reference point—top of casing, elevation 57.8 feet, 0.40 mile north of Hammonton Road at a point 0.41 mile along Hammonton Road from intersection with U. S. Highway 99E. 11/11/47, 13.6; 3/17/48, 13.9; 10/4/48, 24.4; 11/22/48, 19.3; 3/24/49, 13.5; 11/18/49, 16.1; 3/28/50, 14.3.

15N/4E-20N2—Reference point—top of casing, 8.5 feet below top of concrete pit, elevation 53.4 feet, 0.22 mile north of Hammonton Road at a point 0.45 mile along Hammonton Road from intersection with U. S. Highway 99E. 11/11/47, 12.6; 3/17/48, 12.9; 3/24/49, 6.0; 11/18/49, 8.6.

15N/4E-20N3—Reference point—top of casing, elevation 58.9 feet, 0.31 mile north of Hammonton Road at a point 0.50 mile along Hammonton Road from intersection with U. S. Highway 99E. 4/8/47, 14.7; 3/17/48, 15.3; 3/30/48, 14.5; 11/12/48, 22.2; 3/24/49, 15.9; 11/18/49, 17.3.

15N/4E-20P1—Reference point—top of concrete pit, east wall, elevation 67.5 feet, 0.14 mile due west of intersection of Hammonton and Linda Roads. 12/10/47, 22.5; 3/1/48, 22.5; 11/22/48, 23.3; 3/17/49, 22.9; 11/22/49, 24.6; 3/24/50, 23.2; 11/2/50, 25.7; 11/15/51, 20.7.

15N/4E-20R1—Reference point—top of casing, elevation 67.4 feet. North side of Linda Road, 0.41 mile east of Hammonton Road. 12/12/47, 22.2; 3/1/48, 21.3; 11/22/48, 23.6; 11/22/49, 25.2.

15N/4E-21F1—Reference point—base of wooden block supporting pump, south side, elevation 70.4, 0.10 mile north of Hammonton Road, 0.68 mile west of Griffith Avenue. 11/26/47, 23.6; 3/1/48, 23.6; 10/8/48, 25.7; 11/24/48, 24.8; 3/16/49, 23.5; 6/29/49, 29.2; 8/26/49, 31.0; 11/21/49, 28.8; 3/23/50, 25.3; 11/2/50, 30.0; 3/30/51, 19.1; 11/20/51, 30.8; 4/5/52, 21.9.

15N/4E-21R2—Reference point—hole in pump base, elevation 75.1 feet. West side of Griffith Avenue, 0.05 mile north of North Beale Road. 11/26/47, 27.1; 10/8/48, 29.4; 11/22/48, 29.2; 3/17/49, 27.8; 11/21/49, 32.3; 3/24/50, 29.9; 11/3/50, 34.3; 3/30/51, 26.3; 11/21/51, 33.7; 4/3/52, 26.9.

15N/4E-22B1—Reference point—top of casing, elevation 73.6 feet. North side of Hammonton Road, 0.75 mile along road from intersection with Griffith Avenue. 11/26/47, 20.6; 3/1/48, 20.1; 3/31/48, 20.0; 5/6/48, 19.6; 10/1/48, 23.3; 10/8/48, 23.1; 11/24/48, 22.4; 1/17/49, 21.9; 3/16/49, 21.3; 5/24/49, 24.9; 7/1/49, 31.1; 8/3/49, 28.9; 8/26/49, 28.1; 11/21/49, 25.3; 3/23/50, 22.7; 11/2/50, 27.2; 3/30/51, 15.2; 11/20/51, 24.9; 4/4/52, 27.1.

15N/4E-22K1—Reference point—top of casing, elevation 86.9 feet, 0.40 mile north of North Beale Road, 0.76 mile east of Griffith Road. 12/10/47, 27.7; 3/1/48, 34.7; 10/8/48, 36.6; 11/22/48, 36.9; 3/17/49, 36.5; 11/22/49, 40.0.

15N/4E-22L1—Reference point—top of casing, elevation 74 feet, 0.39 mile east of Griffith Road, 0.26 mile north of North Beale Road. 11/22/29, 25.7; 9/16/30, 25.3; 12/14/31, 27.3; 12/9/32, 27.6.

15N/4E-22P1—Reference point—top of concrete foundation, elevation 72 feet, 0.32 mile east of Griffith Road, 0.15 mile north of North Beale Road. 11/5/47, 23.6; 12/10/48, 26.3; 12/9/49, 29.5; 11/10/50, 31.5; 12/5/51, 30.7.

15N/4E-22P2—Reference point—top of brick lining of well, elevation 73 feet, 0.31 mile east of Griffith Road, 0.15 mile north of North Beale Road. 12/14/33, 29.6; 11/20/34, 30.4; 11/28/36, 27.9; 11/22/37, 27.6; 1/27/39, 25.1; 1/9/41, 22.0.

15N/4E-23A1—Reference point—crack between wood blocks, southeast corner, elevation 84.2 feet. West side of Brophy Road, 0.96 mile north of North Beale Road. 11/26/47, 24.5; 3/1/48, 24.1; 3/31/48, 24.0; 5/6/48, 23.4; 6/3/48, 38.0; 10/1/48, 28.1; 10/8/48, 27.5; 11/23/48, 26.5; 1/17/49, 25.7; 3/16/49, 25.3; 6/1/49, 34.6; 7/3/49, 39.5 (operating); 8/2/49, 39.5 (operating); 11/22/49, 31.0; 3/23/50, 26.7; 11/2/50, 31.2; 3/30/51, 23.8; 11/21/51, 30.8; 4/4/52, 25.1.

15N/4E-23P1—Reference point—top of casing, elevation 77.2 feet, 0.04 mile north of North Beale Road, 0.65 mile east of Brophy Road. 12/10/47, 27.1; 3/1/48, 27.6; 3/31/48, 24.9; 10/8/48, 27.3; 11/22/48, 27.4; 3/17/49, 27.0; 11/22/49, 30.3; 11/2/50, 32.5.

15N/4E-23R1—Reference point—top of wooden platform under pitcher pump, elevation 79.1 feet, 0.05 mile northwest of intersection of North Beale and Brophy Roads. 12/10/47, 24.2; 3/1/48, 24.2.

TABLE 1—Continued

DEPTHS TO GROUND WATER AT MEASUREMENT WELLS IN SUTTER-YUBA AREA

Measurements Made by Division of Water Resources
(Depths to water in feet measured from reference point)

15N 4E-24C1—Reference point—top of casing, elevation 83 feet. 0.19 mile east of Brophy Road, 0.99 mile north of North Beale Road. 5/5/48, 25.1; 6/3/48, 28.6; 11/23/48, 28.1; 1/17/49, 27.4; 3/16/49, 27.0; 7/3/49, 46.0 (operating); 8/2/49, 52.0 (operating); 12/5/49, 30.8; 3/24/50, 29.1; 11/2/50, 33.3; 4/2/51, 28.3; 11/21/51, 38.1; 4/4/52, 35.9.

15N 4E-25L1—Reference point—hole in pump base, elevation 78 feet. 0.49 mile east of Brophy Road, 0.51 mile south of North Beale Road. 10/6/49, 30.0; 11/23/48, 29.5; 3/21/49, 28.6; 12/5/49, 33.7; 3/27/50, 32.1; 11/2/50, 37.2; 4/4/51, 34.5; 11/21/51, 40.0; 4/5/52, 36.7.

15N 4E-26J1—Reference point—hole in base of pump, elevation 76 feet. 0.70 mile south of North Beale Road due south of Brophy Road. 11/23/48, 28.8; 3/17/49, 28.5; 11/23/49, 31.9; 12/5/49, 32.6.

15N 4E-27E2—Reference point—top of concrete north wall, elevation 71.0 feet. 0.23 mile east of Griffith Road, 0.40 mile south of North Beale Road. 12/10/47, 23.1; 3/1/48, 22.3; 3/31/48, 22.4; 10/8/48, 25.5; 11/22/48, 25.4; 3/17/49, 24.5; 11/22/49, 28.5; 4/4/52, 25.3.

15N 4E-28D1—Reference point—hole in pump base, elevation 77.7 feet. 0.04 mile south of North Beale Road, 0.17 mile east of intersection of North Beale and Linda Roads. 11/26/47, 32.3; 3/1/48, 31.5; 11/22/48, 34.1; 3/26/49, 32.5; 11/21/49, 36.9; 3/24/50, 34.3; 11/2/50, 38.9; 3/30/51, 37.5 (operating); 11/21/51, 39.1; 4/3/52, 31.5.

15N 4E-29E1—Reference point—top of casing, elevation 61 feet. 0.23 mile northeast of U. S. Highway 99E, 0.20 mile southeast of Hammonton Road. 12/10/47, 20.9; 3/1/48, 20.6.

15N 4E-29F2—Reference point—top of 4" x 4" bridge over pit, elevation 64 feet. 0.26 mile south of North Beale Road, 0.62 mile west of intersection of North Beale and Linda Roads. 12/10/47, 22.4; 3/1/48, 20.9.

15N 4E-29P1—Reference point—top of 4" x 6" mud sill of shed, elevation 63.6 feet. 0.03 mile north of Earle Road, 0.04 mile east of Southern Pacific Railroad. 12/10/47, 21.5; 3/1/48, 22.7; 10/8/48, 25.0; 11/22/48, 24.2.

15N 4E-30B2—Reference point—hole in base of pump, elevation 62.7 feet. Northeast side of Avondale Avenue, 0.05 mile northwest of North Beale Road. 11/10/47, 21.3; 3/17/48, 20.3; 10/4/48, 23.7; 11/22/48, 22.2; 3/24/49, 19.0; 12/13/49, 23.4; 3/28/50, 20.5; 11/2/50, 24.6.

15N 4E-30D1—Reference point—base of pump, north side, elevation 59.1 feet, 0.03 mile south of U. S. Highway 99E at first turn south of Rancho Motel. 11/10/47, 20.4; 3/17/48, 20.5; 3/30/48, 18.8; 5/5/48, 16.0; 6/2/48, 16.6; 7/1/48, 39.2 (operating); 11/22/48, 21.6; 3/24/49, 18.0; 5/24/49, 20.8; 6/29/49, 24.3; 8/26/49, 25.1; 11/22/49, 24.8; 3/28/50, 17.0; 11/2/50, 22.3; 3/28/51, 10.2; 10/20/51, 21.8.

15N 4E-30E2—Reference point—base of pump, elevation 56.8 feet. Southwest side of Garden Avenue, 0.38 mile southeast of Walnut Avenue. 11/12/47, 18.9; 3/19/48, 17.8; 10/4/48, 22.1; 11/22/48, 21.0; 3/24/49, 16.8; 11/18/49, 21.2.

15N E-30L1—Reference point—top of pump base, elevation 56.0 feet. 0.04 mile southwest of Garden Avenue, 0.25 mile north west of Feather River Boulevard. 11/14/47, 18.2; 3/19/48, 16.8; 11/22/48, 18.8; 3/21/49, 16.0; 11/18/49, 21.2.

15N 4E-30L2—Reference point—hole in pump base, elevation 56.5 feet, 0.03 mile northwest of Feather River Boulevard, 0.08 mile southwest of Garden Avenue. 11/12/47, 18.2; 3/19/48, 17.3; 3/30/48, 17.0; 3/24/49, 16.7; 12/13/49, 20.7; 3/28/50, 7.0; 11/2/50, 21.7; 3/28/51, 10.2; 11/20/51, 18.2; 4/1/52, 9.8.

15N 4E-31K1—Reference point—hole in pump base, elevation 60.1 feet, 0.56 mile south of Earle Road, 0.33 mile west of Arboga Road. 12/10/47, 21.8; 3/2/48, 21.1; 3/30/48, 20.9; 11/22/48, 23.1; 3/17/49, 21.6; 11/23/49, 22.7.

15N 4E-31Q1—Reference point—hole in side of pump, elevation 57 feet. 0.34 mile west of Arboga Road, 2.20 miles north of Ella Road. 11/12/47, 23.0; 3/5/48, 21.4.

15N 4E-32D1—Reference point—hole in pump base, elevation 64.6 feet. 0.10 mile west of intersection of U. S. Highway 99E and Earle Road, 0.03 mile south of Earle Road. 12/10/47, 31.2; 3/2/48, 22.7; 3/30/48, 22.3; 11/22/48, 24.5; 3/18/49, 23.1; 11/23/49, 26.1; 11/2/50, 28.5.

15N 4E-32D2—Reference point—top of casing, elevation 62 feet. South side Pasado Avenue 0.13 mile west of U. S. Highway 99E. 3/19/48, 22.4; 11/22/48, 27.6; 3/28/50, 27.1.

15N 4E-32F1—Reference point—top of wood frame in concrete floor under pump, elevation 62.2 feet, 0.18 mile west of U. S. Highway 99E at a point 0.53 mile south of intersection with Earle Road. 12/10/47, 21.8; 3/2/48, 22.2; 3/30/48, 20.8; 5/14/48, 20.9; 11/22/48, 23.7; 11/23/49, 25.1.

15N 4E-32L1—Reference point—top of concrete under pump, elevation 64 feet, 0.06 mile east of Olivehurst Avenue at a point 0.03 mile from intersection with U. S. Highway 99E. 12/1/47, 30.7; 3/17/48, 22.8.

15N 4E-32M1—Reference point—top of casing, elevation 60 feet. 0.40 mile due west of intersection of Olivehurst Avenue and U. S. Highway 99E. 12/1/47, 22.1; 3/17/48, 22.3; 11/19/48, 24.4; 3/21/49, 23.5.

15N 4E-33D1—Reference point—top of casing, elevation 70.5 feet. 0.10 mile south of Earle Road, 0.80 mile east of intersection with U. S. Highway 99E. 12/10/47, 28.2; 3/1/48, 26.7; 11/22/49, 33.1.

15N 4E-33D2—Reference point—top of concrete pit, north wall, elevation 70.2 feet, 0.10 mile south of Earle Road, 0.85 mile west of Griffith Avenue. 12/10/47, 28.1; 3/2/48, 26.6; 3/31/48, 26.6; 10/8/48, 31.6; 11/22/48, 30.5; 3/17/49, 28.2; 11/22/49, 33.8; 3/24/50, 30.8; 4/4/52, 31.8.

15N 4E-33H1—Reference point—top of casing, elevation 64.0 feet, 0.05 mile west of Griffith Avenue, 0.46 mile south of Earle Road. 12/4/47, 26.8; 3/18/48, 25.5; 11/19/48, 29.3; 3/23/49, 27.5; 11/23/49, 32.6; 3/27/50, 30.3; 11/2/50, 34.9; 7/5/51, 29.5; 11/30/51, 34.9; 4/4/52, 30.3.

15N 4E-33R1—Reference point—top of casing, elevation 65 feet. 1.51 miles north of McGowan Road, 1 mile due east of U. S. Highway 99E. 12/1/47, 26.8; 3/8/48, 29.6; 11/19/48, 33.9; 3/23/49, 31.6; 11/23/49, 38.0.

15N 4E-34D1—Reference point—top of wooden floor of pump house, elevation 69.4 feet. South side of Earle Road, 0.10 mile east of Griffith Avenue. 12/10/47, 22.7; 10/8/48, 26.5; 11/22/48, 25.6; 3/17/49, 24.8; 11/22/49, 29.0; 3/30/51, 26.8; 11/21/51, 31.2; 4/4/52, 26.1.

15N 4E-35E1—Reference point—top of 6" x 6" sill, south wall, elevation 68.7 feet, 0.15 mile east of curve in Earle Road, 1.32 miles south of North Beale Road. 12/10/47, 23.4; 3/1/48, 13.8; 3/31/48, 13.6; 10/8/48, 26.1; 11/22/48, 26.5; 3/17/49, 26.1; 11/22/49, 30.2; 3/24/50, 29.8; 11/2/50, 32.4; 3/30/51, 30.4; 11/21/51, 35.2; 4/4/52, 32.6.

15N 4E-35Q1—Reference point—top of casing, elevation 72.2 feet. North side of Spenceville Road, 0.26 mile east of intersection with Earle Road. 12/4/47, 21.8; 3/18/48, 21.6; 11/18/48, 25.3; 3/23/49, 23.9.

15N 5E-19C1—Reference point—top of brick curb, elevation 86 feet. 1.20 miles south of Hammonton Road at a point 1.50 miles from intersection of Brophy Road. 11/22/29, 24.3; 9/6/30, 24.1; 12/14/31, 26.2; 12/9/32, 25.7; 12/11/33, 25.9; 11/20/34, 26.6; 11/28/36, 25.4; 1/9/41, 3.0; 11/6/47, 24.6; 12/10/48, 24.6; 12/7/49, 27.3; 11/10/50, 26.9.

TABLE 1—Continued

DEPTHS TO GROUND WATER AT MEASUREMENT WELLS IN SUTTER-YUBA AREA

Measurements Made by Division of Water Resources
(Depths to water in feet measured from reference point)

15N/5E-19L1—Reference point—top of concrete crib, elevation 86 feet. 1.77 miles south of Hammonton Road at a point 1.40 miles from intersection of Brophy Road. 11/22/29, 25.8; 9/26/30, 25.5; 12/14/31, 26.5; 12/9/32, 26.7; 12/14/33, 27.4; 11/20/34, 27.6; 11/28/36, 26.2; 11/23/37, 27.1; 1/9/41, 3.0; 11/6/47, 30.9; 12/10/48, 33.4; 12/7/49, 37.0; 11/10/50, 39.6; 12/5/51, 69.7.

15N/5E-31R1—Reference point—top of casing, elevation 79.2 feet. North side of Spenceville Road, 2.43 miles east of intersection with Virginia Road. 12/24/47, 22.1; 3/24/48, 22.0; 11/18/48, 26.7; 1/18/48, 24.9; 3/21/49, 24.2; 12/5/49, 32.2; 3/27/50, 30.3; 11/2/50, 38.4; 4/2/51, 33.2; 4/4/52, 36.5.

15N/5E-32J1—Reference point—top of casing, elevation 91 feet. 0.26 mile north of Spenceville Road, 3.43 miles east of intersection with Virginia Road. 12/24/47, 33.9; 3/24/48, 33.7; 11/18/48, 36.0; 3/21/49, 36.1; 12/5/49, 43.5; 3/27/50, 42.1; 11/2/50, 50.6; 4/2/51, 45.6; 11/21/51, 48.6.

16N/2E-1B1—Reference point—top of casing, elevation 76.2 feet. 350 feet south of Pennington Road, 0.3 mile west of Township Road. 12/22/47, 10.1; 3/1/48, 10.4; 12/8/48, 9.6; 3/29/49, 8.0; 11/8/49, 9.4; 3/21/50, 8.8; 11/2/50, 9.7 3/27/51, 8.6; 11/13/51, 9.2; 4/2/52, 8.1.

16N/2E-1J1—Reference point—hole in pump flange, elevation 72.1 feet. 0.2 mile west of Township Road, 0.5 mile south of Pennington Road. 12/23/47, 7.2; 3/1/48, 7.4; 12/18/48, 6.9; 1/20/49, 6.5; 3/21/49, 4.0; 11/9/49, 6.6.

16N/2E-2A1—Reference point—top of concrete floor, elevation 74.2 feet. 300 feet south of Pennington Road, 0.15 mile west of Schroeder Road. 12/22/47, 8.1; 3/1/48, 8.6; 12/8/48, 7.7; 3/20/49, 6.1; 11/8/49, 6.1; 3/21/50, 7.3; 11/2/50, 6.9; 3/23/51, 7.2; 11/13/51, 7.3; 4/2/52, 6.6.

16N/2E-2J1—Reference point—top of casing, elevation 73.6 feet. 300 feet west of Schroeder Road, 0.75 mile south of Pennington Road. 12/23/47, 8.8; 3/1/48, 9.2; 12/8/48, 8.7; 3/21/49, 5.7; 11/9/49, 6.1.

16N/2E-3K1—Reference point—top of casing, elevation 71.0 feet. 0.50 mile south of Pennington Road, 0.50 mile west of Krehe Road. 11/26/29, 8.4; 10/21/30, 8.7; 12/16/31, 8.1; 12/9/32, 8.4; 12/13/33, 7.0; 11/21/34, 7.8; 11/27/36, 7.5; 12/1/37, 7.1; 1/25/39, 6.8; 1/10/41, 3.5; 11/4/47, 2.7; 12/14/48, 6.2; 11/8/49, 5.6; 11/10/50, 6.7; 11/26/51, 6.1.

16N/2E-4B1—Reference point—top of casing, elevation 73.7 feet. 0.30 mile south of Pennington Road, 1.27 miles west of Krehe Road. 12/22/47, 9.9; 3/2/48, 10.1; 12/3/48, 10.0; 3/30/49, 8.2; 11/15/49, 8.6.

16N/2E-5B1—Reference point—bottom of flange above discharge pipe, elevation 74.8 feet. 0.15 mile south of Pennington Road, 2.3 miles west of Krehe Road. 12/22/41, 6.8; 3/2/48, 6.7; 12/3/48, 9.2; 3/30/49, 10.0; 11/16/49, 8.0.

16N/2E-5L1—Reference point—top of casing, elevation 87.8 feet. 0.55 mile south-southeast of 90 degree turn in Pennington Road, 2.5 miles west of Krehe Road. 12/22/47, 12.8; 3/2/48, 12.8; 12/3/48, 13.6; 3/30/49, 12.0; 11/15/49, 14.0; 3/24/50, 12.8; 11/2/50, 16.1; 3/27/51, 12.9.

16N/2E-12J1—Reference point—top of casing, elevation 71.8 feet. 0.25 mile west of Township Road, 0.15 mile north of Paseo Avenue. 12/23/47, 8.5; 3/1/48, 8.6; 12/8/48, 8.4; 3/21/49, 4.0; 11/9/49, 8.0; 3/22/50, 7.3; 11/3/50, 8.0; 4/3/51, 7.1; 11/14/51, 7.8; 4/2/52, 7.0.

16N/2E-13G2—Reference point—top of casing, elevation 64.6 feet. 0.3 mile west of Township Road, 0.7 mile north of Clark Road. 12/23/47, 7.0; 3/1/48, 3.6; 12/8/48, 3.2; 3/21/49, —1.5; 11/10/49, 5.8; 3/22/50, 7.4.

16N/2E-24D1—Reference point—top of casing, elevation 66.4 feet. 100 feet south of Clark Road, 0.8 mile west of Township Road. 12/23/47, 8.9; 3/1/48, 8.0; 12/8/48, 7.7; 1/20/49, 8.5; 3/21/49, 6.1; 11/10/49, 4.5; 3/22/50, 8.2; 11/3/50, 8.1; 4/3/51, 36.2 (operating); 11/14/51, 8.2; 4/2/52, 6.6.

16N/2E-25P1—Reference point—top of casing, elevation 62.1 feet. 100 feet north of Sanders Road, 1.0 mile west of Broadway. 12/19/47, 9.7; 3/3/48, 10.5; 12/2/48, 9.2; 1/20/49, 10.0; 3/16/49, 8.8; 11/10/49, 7.7; 3/22/50, 9.2; 11/6/50, 8.2; 4/4/51, 8.6; 11/14/51, 8.3; 4/3/52, 6.9.

16N/2E-26K1—Reference point—top of casing, elevation 66.4 feet. 500 feet east of East Butte Road, 0.25 mile north of Sanders Road. 12/19/47, 14.7; 3/3/48, 14.5; 12/2/48, 13.5; 3/16/49, 13.3; 11/10/49, 10.8; 3/22/50, 11.9; 11/2/50, 12.8; 4/4/51, 11.9; 11/14/51, 12.4; 4/3/52, 9.2.

16N/2E-35B1—Reference point—top of casing, elevation 64 feet. 800 feet east of East Butte Road, 0.25 mile south of Sanders Road. 11/26/29, 12.0; 10/21/30, 11.5; 12/16/31, 13.0; 12/8/32, 12.1; 11/21/34, 12.2; 11/24/36, 12.7; 12/1/37, 11.0; 1/25/39, 12.0; 1/11/41, 6.7; 11/4/47, 1.0; 12/14/48, 12.1; 11/11/49, 10.3; 11/10/50, 11.1; 11/26/51, 11.6.

16N/2E-35C2—Reference point—top of casing (10 feet above ground), elevation 65 feet. 300 feet west of East Butte Road, 0.1 mile south of Sanders Road. 12/13/33, 16.3; 11/21/34, 16.9; 12/1/37, 14.5; 1/25/39, 16.2; 1/11/41, 9.8.

16N/3E-1E1—Reference point—top of casing at bottom of pit, ground elevation 80 feet. 0.1 mile east of State Highway 24, 0.6 mile north of Ramirez Road. 11/3/47, 12.5; 3/23/48, 9.4; 12/6/48, 11.2; 3/21/49, 9.4; 11/15/49, 13.4.

16N/3E-1E2—Reference point—base of pump, elevation 80 feet. 0.20 mile east of State Highway 24, 0.6 mile north of Ramirez Road. 11/3/47, 22.3; 3/23/48, 19.2; 12/6/48, 20.6; 3/21/49, 19.0; 11/15/49, 23.1; 3/21/50, 17.0; 11/7/50, 24.5; 3/29/51, 15.2; 11/15/51, 21.7; 4/6/52, 10.7.

16N/3E-1M1—Reference point—top of casing, elevation 78 feet. 500 feet east of State Highway 24, 0.3 mile north of Ramirez Road. 11/4/47, 21.2; 3/23/48, 18.5.

16N/3E-1P2—Reference point—base of pump, elevation 78 feet. 300 feet north of Ramirez Road, 0.60 mile east of State Highway 24. 11/4/47, 18.4; 3/23/48, 15.1; 12/2/48, 15.8; 3/21/49, 15.0; 11/15/49, 18.2; 3/2/50, 19.7; 3/29/51, 11.6; 11/15/51, 17.7; 4/6/52, 5.6.

16N/3E-2C1—Reference point—top of casing, elevation 80 feet. 0.60 mile west of State Highway 24, 0.70 mile north of Ramirez Road. 11/3/47, 21.6; 3/23/48, 18.0; 12/6/48, 20.5; 3/21/49, 18.5; 11/15/49, 22.6; 3/21/50, 16.2; 11/7/50, 22.4; 3/29/51, 14.0; 11/15/51, 21.0; 4/6/52, 10.3.

16N/3E-2J1—Reference point—top of casing, elevation 79 feet. 0.17 mile west of State Highway 24, 0.32 mile north of Ramirez Road. 6/1/48, 16.5; 6/30/48, 20.0; 7/21/48, 34.9; 9/1/48, 21.2; 9/30/48, 20.6; 12/3/48, 17.9; 3/21/49, 16.1.

16N/3E-4L1—Reference point—top of casing, elevation 75 feet. 30 feet west of Shelden Road, 0.25 mile south of Archer Road. 11/10/47, 10.4; 3/20/48, 13.4; 12/3/48, 10.9; 3/8/49, 13.0; 11/9/49, 9.2.

15N/3E-4M1—Reference point—top of casing, elevation 79.2 feet. 50 feet east of Sinnard Road, 0.15 mile south of Archer Road. 12/23/47, 11.3; 3/1/48, 11.9; 12/3/48, 10.7; 3/21/49, 9.4; 11/9/49, 9.9.

16N/3E-4N1—Reference point—top of casing, elevation 76.9 feet. 100 feet south of Coleman Avenue, 0.05 mile west of Sinnard Road. 12/23/47, 9.9; 3/1/48, 10.8; 12/3/48, 9.2.

16N/3E-5A1—Reference point—top of casing, elevation 78.6 feet. 400 feet south of Pennington Road, 0.4 mile east of Larkin Road. 12/23/47, 10.7; 3/1/48, 11.0; 12/8/48, 10.5; 3/30/49, 9.0; 11/8/49, 10.1; 3/22/50, 8.1; 11/2/50, 11.1; 3/27/51, 8.3; 11/14/51, 10.6; 4/2/52, 7.5.

16N/3E-5P1—Reference point—hole in pump base, elevation 74.0 feet. 0.15 mile west of Larkin Road, 1.0 mile north of Paseo Road. 5/4/48, 8.9; 6/2/48, 8.7; 6-30-48, 49.9 (operating); 12/4/48, 11.5; 3/21/49, 5.4; 4/3/51, 7.7.

TABLE 1—Continued

DEPTHS TO GROUND WATER AT MEASUREMENT WELLS IN SUTTER-YUBA AREA

Measurements Made by Division of Water Resources
(Depths to water in feet measured from reference point)

16N 3E-6A1—Reference point—top of casing, elevation 77.9 feet. South side of Pennington Road, 0.8 mile east of Township Road. 12/22/47, 12.1; 3/1/48, 11.4; 5/13/48, 10.0; 12/8/48, 12.3; 1/21/49, 11.4; 3/30/49, 8.0; 11/8/49, 12.6; 3/22/50, 8.6; 11/2/50, 13.6; 3/27/51, 7.5; 11/13/51, 12.8; 4/2/52, 5.2.

16N 3E-7D2—Reference point—top of casing, elevation 73.5 feet. 0.1 mile east of Township Road, 0.65 mile north of Paseo Avenue. 12/23/47, 10.1; 3/1/48, 9.8; 12/8/48, 9.5; 3/21/49, 3.6; 11/9/49, 9.2; 3/22/50, 8.0; 11/3/50, 10.0; 4/3/51, 7.4; 11/14/51, 8.7; 4/2/52, 7.0.

16N 3E-8C1—Reference point—top of curb, elevation 74.1 feet. 0.2 mile west of Larkin Road, 0.75 mile north of Paseo Avenue. 12/23/47, 8.9; 3/1/48, 9.1; 12/4/48, 9.1; 3/21/49, 5.4; 11/9/49, 6.9; 3/22/50, 5.5; 11/3/50, 9.9; 4/3/51, 6.3; 11/14/51, 8.9; 4/2/52, 2.9.

16N 3E-8P1—Reference point—top of casing, elevation 72.0 feet. 200 feet north of Paseo Avenue, 0.15 mile west of Larkin Road. 12/23/47, 8.8; 3/1/48, 9.0; 12/4/48, 8.7; 3/21/49, 5.5; 11/9/49, 7.3.

16N 3E-8R1—Reference point—top of casing, elevation 71 feet. 100 feet north of Paseo Avenue, 400 feet east of U. S. Highway 99E. 1/10/41, 3.4; 11/5/47, 7.6; 12/5/47, 9.2; 12/13/48, 9.3; 11/9/49, 7.1; 3/22/50, 8.7; 11/10/50, 9.4; 4/2/51, 7.2; 11/26/51, 7.8.

16N 3E-8R2—Reference point—top of casing, elevation 71 feet. 100 feet north of Paseo Avenue, 300 feet east of U. S. Highway 99E. 1/23/29, 8.8; 9/27/30, 8.3; 12/16/31, 9.3; 12/9/32, 9.3; 12/13/33, 8.9; 11/21/34, 7.3; 1/24/36, 8.4; 12/1/37, 7.3; 1/26/39, 10.3.

16N 3E-9A1—Reference point—top of casing, elevation 72 feet. 1,500 feet north of Bishop Road, 100 feet east of Levee. 11/10/47, 14.9; 3/20/48, 17.1; 12/3/48, 16.0; 3/8/49, 17.4; 11/9/49, 13.7; 3/22/50, 10.0; 11/3/50, 13.8; 4/2/51, 11.0; 11/14/51, 14.5; 4/3/52, 11.7.

16N 3E-9M1—Reference point—top of casing, elevation 71 feet. 400 feet east of Simard Road, 0.3 mile north of Paseo Avenue. 3/20/48, 11.5; 12/3/48, 10.8; 3/8/49, 11.3; 11/9/49, 8.7; 3/22/50, 9.1; 11/3/50, 9.0; 4/2/51, 7.3; 11/14/51, 8.8; 4/3/52, 5.9.

16N 3E-9Q1—Reference point—top of casing, elevation 75 feet. 60 feet west of Kent Avenue, 150 feet north of Paseo Avenue. 11/10/47, 16.4; 3/20/48, 19.1; 5/13/48, 13.4; 12/3/48, 18.6; 3/8/49, 18.2; 11/8/49, 17.2.

16N 3E-11C1—Reference point—base of pump, elevation 79 feet. 0.50 mile west of State Highway 24 on Ramirez Road extension. 11/4/47, 21.2; 3/23/48, 18.9; 5/7/48, 16.6; 12/3/48, 19.9; 1/26/49, 19.4; 3/21/49, 19.0; 11/15/49, 22.1; 3/21/50, 18.1; 11/7/50, 22.6; 3/29/51, 14.4; 11/15/51, 20.8; 4/6/52, 10.6.

16N 3E-11E1—Reference point—top of casing, elevation 78 feet. 0.75 mile west of State Highway 24, 0.45 mile south of Ramirez Road. 11/5/47, 21.2; 3/23/48, 18.3; 12/3/48, 20.7; 3/21/49, 17.6; 11/15/49, 21.6.

16N 3E-11F1—Reference point—top of casing, elevation 77 feet. 0.50 mile west of State Highway 24, 0.35 mile south of Ramirez Road. 11/5/47, 20.6; 3/23/48, 18.6; 12/3/48, 19.1; 3/21/49, 17.0; 11/15/49, 21.1.

16N 3E-11F2—Reference point—base of pump, elevation 76 feet. 0.50 mile west of State Highway 24, 0.30 mile south of Ramirez Road. 11/5/47, 19.8; 3/23/48, 17.5; 12/3/48, 19.2; 3/21/49, 15.2; 11/15/49, 20.3.

16N 3E-11K1—Reference point—base of pump, elevation 76 feet. 0.20 mile west of State Highway 24, 0.70 mile south of Ramirez Road. 11/5/47, 19.8; 3/23/48, 20.6; 12/3/48, 18.0; 3/18/49, 16.5; 11/15/49, 19.4.

16N 3E-11L1—Reference point—top of casing, elevation 76 feet. 0.40 mile west of State Highway 24, 0.7 mile south of Ramirez Road. 11/5/47, 18.0; 3/23/48, 16.2; 12/3/48, 16.4; 3/18/49, 14.6; 11/15/49, 17.8.

16N 3E-11Q1—Reference point—top of casing, elevation 75 feet. 750 feet west of State Highway 24, 0.9 mile south of Ramirez Road. 11/5/47, 10.1; 12/3/48, 9.5; 3/18/49, 7.0; 11/15/49, 10.0.

16N 3E-12B1—Reference point—top of casing, elevation 79 feet. 20 feet south of Ramirez Road, 0.70 mile east of State Highway 24. 11/4/47, 16.4; 3/23/48, 14.5; 5/7/48, 13.1; 12/2/48, 14.5; 1/25/49, 14.2; 3/21/49, 13.0; 11/15/49, 16.7.

16N 3E-12B2—Reference point—top of casing, elevation 79 feet. 750 feet south of Ramirez Road, 0.75 mile east of State Highway 24. 11/4/47, 9.4; 3/23/48, 7.4; 12/2/48, 7.2; 3/21/49, 5.6; 11/15/49, 8.6.

16N 3E-12E1—Reference point—top of casing at bottom of pit, elevation 76 feet, 0.3 mile east of State Highway 24, 0.6 mile south of Ramirez Road. 11/5/47, 10.2; 3/23/48, 7.6; 12/6/48, 9.5; 3/18/49, 7.5; 11/15/49, 10.3; 3/21/50, 15.3; 11/7/50, 20.6*; 3/29/51, 11.9; 11/15/51, 18.2*; 4/6/52, 6.4*.

16N 3E-12L2—Reference point—top of casing, elevation 76 feet. 0.6 mile east of State Highway 24, 0.6 mile south of Ramirez Road. 11/7/47, 11.3; 3/23/48, 9.2; 12/6/48, 5.4; 3/18/49, 8.0; 11/15/49, 10.1.

16N 3E-13G1—Reference point—top of casing, elevation 72 feet. 2,600 feet north of Magnon Way, 4,300 feet east of State Highway 24. 11/7/47, 14.6; 3/25/48, 13.8; 12/10/48, 13.7; 11/16/49, 14.7; 3/21/50, 13.6; 11/7/50, 18.1; 3/29/51, 9.1; 4/6/52, 5.5.

16N 3E-14B1—Reference point—top of casing, elevation 75 feet. 500 feet west of State Highway 24, 1.2 miles south of Ramirez Road. 11/5/47, 9.2; 3/23/48, 8.1; 5/7/48, 5.8; 12/3/48, 7.8; 3/18/49, 6.1; 11/15/49, 9.3; 3/21/50, 10.0; 11/7/50, 10.3; 3/29/51, 1.7; 11/15/51, 7.9; 4/6/52, 3.7.

16N 3E-14C1—Reference point—top of casing, elevation 74 feet. 1.2 miles south of Ramirez Road, 0.4 mile west of State Highway 24. 11/5/47, 9.75; 3/25/48, 9.1; 12/3/48, 6.8; 3/18/48, 6.8; 11/15/49, 9.9.

16N 3E-14D1—Reference point—top of casing, elevation 72 feet. 1.2 miles south of Ramirez Road, 0.5 mile west of State Highway 24. 11/5/47, 9.9; 3/23/48, 10.7; 5/7/48, 5.8; 12/3/48, 8.9; 1/26/49, 7.9; 3/18/49, 7.0; 11/15/49, 10.2; 3/21/50, 13.9; 11/7/50, 11.2; 3/29/51, 9.4; 11/15/51, 15.8.

16N 3E-14J1—Reference point—hole in front of base of pump, elevation 71 feet. 600 feet north of Magnolia Way, 950 feet east of State Highway 24. 11/8/47, 16.1; 3/25/48, 14.8; 12/3/48, 15.3; 3/18/49, 13.1; 11/16/49, 16.5.

16N 3E-14L1—Reference point—top of casing at bottom of 12-foot pit, elevation 59 feet. 0.5 mile west of State Highway 24, 1.5 miles south of Ramirez Road. 11/8/47, 6.7; 3/25/48, 5.1; 12/3/48, 5.3; 3/18/49, 5.1; 11/16/49, 7.3; 3/21/50, 3.2; 11/7/50, 7.8; 3/29/51, 12.0*; 11/15/51, 18.8*; 4/6/52, 6.0.

16N 3E-16M1—Reference point—top of concrete block, elevation 70 feet, 900 feet south of Cutting Avenue, 300 feet east of U. S. Highway 99E. 11/10/47, 7.65; 3/20/48, 11.7; 12/3/48, 8.9.

16N 3E-17C1—Reference point—top of flange under pump, elevation 72.4 feet, 400 feet east of Larkin Road, 0.8 mile north of Clark Road. 12/23/47, 8.7; 3/1/48, 8.8; 12/4/48, 7.7, 3/21/49, 6.5; 11/9/49, 7.8; 3/22/50, 7.6; 11/3/50, 8.9; 4/3/51, 7.5; 11/14/51, 8.2; 4/2/52, 6.9.

16N 3E-17Q1—Reference point—top of concrete pit, elevation 70.5 feet, 0.2 mile east of Larkin Road, 500 feet north of Clark Road. 12/23/47, 9.3; 3/2/48, 10.1; 5/4/48, 8.0; 6/1/48, 7.0; 12/1/48, 9.4; 1/20/49, 9.8; 3/21/49, 7.5; 5/26/49, 7.0; 6/30/49, 5.6; 7/31/49, 6.2; 8/31/49, 6.5; 11/10/49, 8.7; 3/22/50, 8.9; 11/3/50, 8.8; 4/3/51, 6.8; 11/14/51, 7.9; 4/3/52, 5.4.

* Top of pit.

TABLE 1—Continued

DEPTHS TO GROUND WATER AT MEASUREMENT WELLS IN SUTTER-YUBA AREA

Measurements Made by Division of Water Resources
(Depths to water in feet measured from reference point)

16N/3E-18C1—Reference point—top of casing, elevation 68.3 feet. 100 feet south of Paseo Avenue, 100 feet west of Broadway. 12/23/47, 6.4; 3/1/48, 6.3; 12/4/48, 8.3; 1/20/49, 6.2; 3/21/49, 4.1.

16N/3E-19C1—Reference point—top of casing, elevation 66.8 feet. 250 feet west of Broadway, 0.1 mile south of Clark Road. 12/23/47, 7.1; 3/2/48, 7.2; 12/4/48, 6.8; 3/21/49, 4.7; 11/10/49, 5.5; 3/22/50, 8.6; 11/3/50, 6.3; 4/3/51, 6.4; 11/14/51, 6.7; 4/2/52, 5.7.

16N/3E-20E1—Reference point—slot in concrete base, elevation 69.8 feet. 200 feet west of Marden Avenue, 0.2 mile south of Clark Road. 12/23/47, 10.4; 3/24/48, 11.3; 12/4/48, 10.2; 3/21/49, 8.1; 5/26/49, 7.5; 6/28/49, 7.8; 7/27/49, 9.3; 8/25/49, 8.7; 11/10/49, 9.7; 3/22/50, 10.0; 11/3/50, 9.3; 4/3/51, 9.6; 11/14/51, 10.3; 4/2/52, 9.2.

16N/3E-21D1—Reference point—hole in base of pump, elevation 70 feet. 200 feet south of Clark Road, 0.6 mile east of Larkin Road. 12/23/47, 10.7; 3/2/48, 11.4; 12/3/48, 10.3; 11/8/49, 10.3; 3/22/50, 9.6; 11/3/50, 10.3; 4/3/51, 6.4; 11/4/51, 9.2; 4/3/52, 4.0.

16N/3E-21J1—Reference point—top of casing, elevation 68.0 feet. 0.4 mile east of U. S. Highway 99E, 0.3 mile north of Encinal Road. 11/10/47, 17.9; 3/20/48, 16.4; 5/13/48, 13.3; 12/3/48, 17.5; 1/21/49, 17.0; 3/8/49, 16.8; 11/10/49, 18.6; 3/22/50, 17.2; 4/3/51, 10.5; 11/14/51, 16.5; 4/3/52, 5.2.

16N/3E-21P2—Reference point—top of casing, elevation 65.9 feet. West side of Southern Pacific Railroad Right of Way, 0.1 mile north of Encinal Road. 12/23/47, 14.5; 3/2/48, 15.3; 12/3/48, 14.1; 3/21/49, 13.0; 11/10/49, 15.3.

16N/3E-23C1—Reference point—top of casing, elevation 71 feet. 0.25 mile west of State Highway 24 at a point 0.4 mile south of Magnolia Way intersection. 11/8/47, 17.2; 3/25/48, 15.9; 5/19/48, 13.9; 12/2/48, 15.9; 1/26/49, 15.5; 3/8/49, 13.0.

16N/3E-23J1—Reference point—top of casing, elevation 70 feet. 0.1 mile east of State Highway 24, 0.3 mile north of Woodruff Lane. 11/8/47, 14.3; 3/25/48, 13.1; 5/19/48, 11.9; 12/2/48, 14.6; 3/18/49, 13.0; 11/16/49, 15.1.

16N/3E-23R3—Reference point—center of pump shaft, elevation 70 feet. 200 feet north of Woodruff Lane, 0.3 mile east of State Highway 24. 11/8/47, 14.0; 3/25/48, 13.0; 12/2/48, 13.0; 3/18/49, 11.5; 11/16/49, 13.9.

16N/3E-24A1—Reference point—top of casing, elevation 70 feet. 0.2 mile south of Magnolia Way extended 1.1 miles east of State Highway 24. 11/7/47, 13.8; 3/25/48, 13.5; 12/2/48, 13.7; 1/26/49, 14.4; 3/18/49, 11.1; 11/16/49, 14.5; 3/21/50, 12.1; 11/6/50, 15.8; 3/29/51, 9.4; 11/15/51, 15.1; 4/6/52, 6.0.

16N/3E-24C1—Reference point—top of casing, elevation 70 feet. 0.4 mile south of Magnolia Way, 0.75 mile east of State Highway 24. 11/7/47, 12.3; 3/25/48, 11.7; 12/10/48, 12.1; 3/18/49, 9.8; 11/16/49, 13.2.

16N/3E-24Q1—Reference point—top of casing in pit, elevation 66 feet. North of Woodruff Lane, 1.05 miles east of State Highway 24. 11/7/47, 4.2; 3/25/48, 4.2; 5/19/48, 2.9; 11/30/48, 4.6; 11/16/49, 11.8; 3/21/50, 8.8; 11/6/50, 12.8; 3/29/51, 6.9; 11/15/51, 17.3; 9/6/52, 5.0.

16N/3E-24R2—Reference point—hole in pump base, elevation 69 feet. 0.1 mile north of Woodruff Lane, 0.1 mile east of State Highway 24. 6/2/48, 11.8; 7/1/48, 15.2; 7/21/48, 15.5; 8/1/48, 18.1; 9/2/48, 17.3.

16N/3E-26F1—Reference point—hole in pump base, elevation 69 feet. 0.45 mile west of State Highway 24, at a point 0.3 mile south of Woodruff Lane intersection. 11/15/47, 18.0; 5/3/48, 12.3; 6/1/48, 13.2; 11/30/48, 18.2; 12/13/48, 18.1; 1/26/49, 15.5; 3/18/49, 14.1; 12/9/49, 18.7; 3/21/50, 14.0; 11/6/50, 17.8; 11/10/50, 18.6; 3/29/51, 10.1; 11/15/51, 17.4; 12/7/51, 14.7; 4/6/52, 5.9.

16N/3E-26F2—Reference point—top of concrete pit, elevation 68 feet. 0.5 mile west of State Highway 24, at a point 0.3 mile south of Woodruff Lane intersection. 11/26/29, 15.9; 9/25/30, 15.6; 12/16/31, 16.7; 12/6/32, 16.8; 12/14/33, 16.5; 11/23/34, 16.9; 11/24/36, 15.8; well destroyed.

16N/3E-26G1—Reference point—hole in pump base, elevation 68 feet. 0.25 mile west of State Highway 24 at a point 0.3 mile south of Woodruff Lane intersection. 5/7/48, 12.2; 6/30/48, 52.6 (operating); 11/30/48, 13.6.

16N/3E-26G2—Reference point—top of casing, elevation 68 feet. 0.15 mile west of State Highway 24, at a point 0.3 mile south of Woodruff Lane intersection. 12/1/37, 11.0; 1/27/39, 9.4; 1/10/41, 6.5.

16N/3E-27E1—Reference point—top of casing, elevation 66 feet. 0.1 mile north of Morse Road, 0.4 mile east of U. S. Highway 99E. 3/17/48, 21.9; 11/29/48, 23.7; 3/17/49, 20.0; 5/26/49, 20.5; 6/28/49, 24.5; 7/27/49, 25.1; 8/25/49, 26.2; 11/14/49, 25.2.

16N/3E-28C1—Reference point—top of concrete pit, elevation 65 feet. 0.05 mile south of Encinal Road, 0.1 mile west of U. S. Highway 99E. 3/17/48, 14.2; 11/29/48, 14.6; 3/17/49, 13.7; 11/14/49, 15.5.

16N/3E-28E1—Reference point—top of casing, elevation 65 feet. 0.25 mile south of Encinal Avenue, 0.35 mile west of U. S. Highway 99E. 11/4/47, 17.5.

16N/3E-28N1—Reference point—top of casing, elevation 64.6 feet. 200 feet north of Sanders Road, 0.6 mile east of Larkin Road. 12/19/47, 17.2; 11/29/48, 17.5; 3/17/49, 15.8; 11/10/49, 18.6; 3/22/50, 15.9; 11/3/50, 18.9; 4/3/51, 11.2; 11/14/51, 16.6; 4/3/52, 7.6.

16N/3E-29B1—Reference point—top of concrete pit, elevation 66.8 feet. South side of Encinal Road, 0.2 mile east of Larkin Road. 12/23/47, 12.8; 3/2/48, 13.6; 5/13/48, 11.5; 12/4/48, 13.0; 1/19/49, 13.0.

16N/3E-29N1—Reference point—top of concrete pit, elevation 65.8 feet. 0.25 mile west of Sacramento Northern Railroad tracks, 0.25 mile north of Sanders Road. 12/19/47, 15.3; 3/2/48, 15.2; 12/1/48, 14.3; 3/16/49, 14.0; 1/10/49, 14.7; 3/22/50, 13.2; 11/3/50, 14.5; 4/3/51, 9.6; 11/14/51, 12.4; 4/3/52, 7.3.

16N/3E-29R1—Reference point—hole in pump base, elevation 62 feet. 150 feet north of Sanders Road, 0.4 mile east of Larkin Road. 5/4/48, 17.3; 6/1/48, 16.1; 11/29/48, 19.6.

16N/3E-30A2—Reference point—top of casing, elevation 68.8 feet. 0.1 mile south of Encinal Road, 0.35 mile east of Broadway. 12/23/47, 12.1; 3/2/48, 12.8; 12/4/48, 11.9; 3/21/49, 11.4; 11/10/49, 11.0.

16N/3E-30F1—Reference point—top of pit wall, elevation 64.3 feet. 0.1 mile west of Broadway, 0.45 mile south of Encinal Road. 12/23/47, 11.1; 3/2/48, 11.6; 12/4/48, 10.8; 1/19/49, 10.7; 3/21/49, 9.0; 11/10/49, 10.5; 3/22/50, 10.1; 11/3/50, 10.7; 4/3/51, 9.2; 11/14/51, 10.8; 4/3/52, 6.7.

16N/3E-30L1—Reference point—top of casing next to pump, elevation 62.5 feet. 0.4 mile north of Sanders Road, 400 feet west of Broadway. 12/19/47, 8.9; 3/2/48, 9.5; 12/1/48, 8.7; 3/16/49, 8.8; 11/10/49, 7.8.

16N/3E-30R1—Reference point—top of casing next to pump, elevation 62.5 feet. 500 feet north of Sanders Road, 0.5 mile west of Sacramento Northern Railroad. 12/19/47, 12.9; 3/2/48, 12.6.

16N/3E-31D1—Reference point—top of casing under pump, elevation 60.4 feet. 500 feet south of Sanders Road, 0.2 mile west of Broadway Road. 12/19/47, 9.1; 3/3/48, 9.7; 3/16/49, 9.5.

16N/3E-31K2—Reference point—top of tin cover under pump, elevation 63.2 feet. 0.2 mile east of Broadway Road, 0.5 mile south of Sanders Road. 12/19/47, 13.7; 3/3/48, 14.1; 12/1/48, 17.3; 3/16/49, 16.4; 11/11/49, 18.3; 3/22/50, 15.2; 11/6/50, 19.3; 4/3/51, 12.1; 11/14/51, 16.6; 4/3/52, 17.0.

TABLE 1—Continued

DEPTHS TO GROUND WATER AT MEASUREMENT WELLS IN SUTTER-YUBA AREA

Measurements Made by Division of Water Resources
(Depths to water in feet measured from reference point)

16N 3E-32A2—Reference point—pump base hole, elevation 64.9 feet, 200 feet south of Sanders Road, 0.6 mile east of Sacramento Northern Railroad. 1/6/48, 19.5; 3/2/48, 19.7; 11/29/48, 21.0; 3/17/49, 17.0; 11/10/49, 19.8.

16N 3E-32B2—Reference point—top of 2" x 14" bridge over earth pit, elevation 64.4 feet, 200 feet south of Sanders Road, 0.3 mile east of Sacramento Northern Railroad. 12/19/47, 15.9; 3/2/48, 17.25; 12/1/48, 16.2; 3/17/49, 15.0; 11/10/49, 17.7.

16N 3E-32C2—Reference point—top of casing under pump, elevation 64.4 feet, 0.2 mile south of Sanders Road, 200 feet west of Sacramento Northern Railroad. 12/19/47, 18.1; 3/2/48, 18.7; 12/1/48, 16.9; 3/17/49, 16.1; 11/11/49, 18.5; 3/22/50, 15.9; 11/3/50, 18.2; 4/3/51, 11.3; 11/14/51, 16.1; 4/3/52, 6.4.

16N 3E-32G2—Reference point—hole in pump base, elevation 62.8 feet, 0.5 mile south of Sanders Road, 0.3 mile east of Sacramento Northern Railroad. 12/19/47, 18.9; 3/2/48, 20.2; 12/1/48, 16.9; 3/17/49, 16.8; 11/11/49, 19.8.

16N 3E-33D1—Reference point—top of concrete base, elevation 61.2 feet, 100 feet south of Sanders Road at a point 0.55 mile west of U. S. Highway 99E. 11/4/47, 17.2; 11/29/48, 19.2; 1/20/49, 17.2; 3/17/49, 16.8; 5/26/49, 17.4; 6/28/49, 19.3; 7/27/49, 26.15; 8/25/49, 25.9; 11/14/49, 20.0.

16N 3E-33E1—Reference point—top of concrete base under pump, elevation 64.1 feet, 0.3 mile south of Sanders Road at a point 0.8 mile west of U. S. Highway 99E. 11/4/47, 17.6; 3/17/48, 21.3; 5/13/48, 15.6; 11/29/48, 17.3; 11/14/49, 18.7; 3/22/50, 16.0; 11/6/50, 19.1; 4/3/51, 11.6; 4/3/52, 7.6.

16N 3E-33J2—Reference point—edge of pump base, elevation 66 feet, 150 feet west of U. S. Highway 99E at a point 0.45 mile north of Eager Road. 5/12/48, 20.3; 11/29/48, 27.0; 1/20/49, 23.0; 3/17/49, 22.0; 11/14/49, 27.3; 3/22/50, 22.0; 11/6/50, 25.4; 4/3/51, 17.2.

16N 3E-33P1—Reference point—hole beneath pump base, elevation 61.9 feet, 250 feet north of Eager Road at a point 0.6 mile west of U. S. Highway 99E. 1/9/48, 22.9; 11/22/48, 22.6; 3/17/49, 22.5; 11/14/49, 25.5.

16N 3E-35G1—Reference point—top of volute plug, elevation 67 feet, 400 feet north of Ellis Road at a point 0.5 mile west of State Highway 24. 11/6/47, 17.1; 1/26/49, 14.7; 3/18/49, 18.0; 11/16/49, 22.3.

16N 3E-35J1—Reference point—top of casing, elevation 70 feet, 400 feet south of Ellis Road at a point 0.2 mile west of State Highway 24. 11/6/47, 18.7; 3/29/48, 17.7; 11/30/48, 19.0; 3/17/49, 17.0; 11/16/49, 20.2.

16N 3E-35L1—Reference point—top of air gage hole, elevation 65 feet, 0.2 mile south of Ellis Road at a point 0.7 mile west of State Highway 24. 11/6/47, 20.2; 3/20/48, 20.1; 11/30/48, 20.3; 3/17/49, 20.1; 11/16/49, 22.9; 3/21/50, 17.4; 11/6/50, 22.9; 3/29/51, 19.5; 11/15/51, 23.5; 4/6/52, 10.4.

16N 3E-36G1—Reference point—top of concrete base under pump, elevation 64 feet, 300 feet north of Bills Road at a point 0.5 mile east of State Highway 24. 11/5/47, 11.7; 3/29/48, 11.4; 5/7/48, 10.0; 11/30/48, 12.2; 3/18/49, 9.6; 11/16/49, 12.1; 3/21/50, 11.1; 11/6/50, 12.7; 3/29/51, 6.7; 11/15/51, 11.8; 4/6/52, 4.6.

16N 4E-4L1—Reference point—top of concrete cribbing, elevation 96 feet, 0.15 mile west of La Porte Road, 0.30 mile north of Ramirez Road. 11/19/47, 22.4; 3/15/48, 22.8; 12/1/48, 23.1; 3/23/49, 24.0; 3/22/50, 24.9; 10/31/50, 26.7; 3/28/51, 23.5.

16N 4E-4N1—Reference point—top of casing, elevation 94 feet, 100 feet north of Ramirez Road, 0.05 mile east of Loma Rica Road. 3/15/48, 10.8.

16N 4E-5G1—Reference point—top of concrete cribbing, elevation 91 feet, 0.15 mile north of Ramirez Road, 0.5 mile west of Loma Rica Road. 11/19/47, 19.1; 3/15/48, 19.4; 12/1/48, 20.9; 3/23/49, 18.0; 12/9/49, 22.5; 3/22/50, 20.6; 10/31/50, 24.9; 3/28/51, 19.2; 11/14/51, 23.4; 4/6/52, 23.1.

16N 4E-6H1—Reference point—base of pump, elevation 85 feet, 0.50 mile north of Ramirez Road, 1.0 mile west of Loma Rica Road. 11/4/47, 17.8; 11/18/47, 17.2; 3/15/48, 17.6; 3/23/48, 17.4; 12/1/48, 18.1; 12/2/48, 19.0; 1/26/49, 17.1; 3/21/49, 16.2; 11/15/49, 20.7; 3/22/50, 17.6; 3/29/51, 16.7.

16N 4E-6J1—Reference point—top of casing, elevation 86 feet, 0.25 mile north of Ramirez Road, 1.0 mile west of Loma Rica Road. 11/4/47, 19.4; 11/19/47, 19.2; 3/15/48, 19.2; 3/23/48, 19.2; 12/1/48, 19.4; 12/2/48, 20.0; 3/21/49, 18.1; 11/15/49, 22.6; 3/21/50, 20.0; 3/22/50, 20.0; 11/7/50, 23.8; 11/15/51, 22.7; 4/6/52, 16.5.

16N 4E-6N1—Reference point—top of casing, elevation 80 feet, 30 feet north of Ramirez Road, 1.1 miles east of State Highway 24. 11/4/47, 16.9; 3/23/48, 15.5; well destroyed.

16N 4E-7B1—Reference point—top of casing, elevation 82 feet, 200 feet south of Ramirez Road, 1.5 miles west of Loma Rica Road. 11/4/47, 16.6; 3/23/48, 15.5; 12/2/48, 17.0; 3/21/49, 16.1; 11/15/49, 18.6.

16N 4E-8A1—Reference point—hole in pump base, elevation 91 feet, 150 feet south of Ramirez Road, 0.15 mile west of Loma Rica Road. 11/19/47, 18.8; 3/15/48, 20.0; 5/7/48, 17.5; 3/23/49, 17.8; 6/7/49, 40.5; 7/3/49, 37.3; 8/2/49, 37.6; 11/15/49, 22.0; 3/22/50, 19.8; 10/31/51, 18.9; 11/14/51, 23.0; 11/27/51, 22.6; 4/6/52, 18.0.

16N 4E-8A2—Reference point—top of casing, elevation 94 feet. South side of Ramirez Road, 0.15 mile west of Loma Rica Road. 11/26/29, 18.4; 9/25/30, 17.6; 12/14/31, 19.5; 12/6/32, 19.2; 12/14/33, 19.6; 11/23/34, 19.8; 11/24/36, 18.1; 11/23/37, 17.8; 11/27/39, 15.7; 1/9/41, 16.8; 11/5/47, 18.1; 12/13/48, 21.0; 12/9/49, 22.1; 11/10/50, 23.6.

16N 4E-9J1—Reference point—top of casing, elevation 95 feet, 200 feet west of Bangor Road, 0.6 mile south of Ramirez Road. 11/19/47, 23.2; 3/15/48, 23.4; 12/1/48, 24.0; 3/23/49, 21.8; 11/15/49, 26.6.

16N 4E-10E1—Reference point—top of casing at bottom of pit, elevation 80 feet, 400 feet east of Bangor Road, 0.35 mile south of Ramirez Road. 3/15/48, 2.4; 12/1/48, 3.4; 3/23/49, 2.6.

16N 4E-16A1—Reference point—hole in 4" x 4" board support, elevation 90 feet, 0.1 mile east of Bangor Road, 1.1 mile south of Ramirez Road. 11/19/47, 19.8; 3/15/48, 20.5; 5/7/48, 19.6; 12/1/48, 20.0; 3/23/49, 20.0; 11/17/49, 23.6; 3/23/50, 21.9; 10/31/50, 25.3; 3/28/51, 21.4; 11/14/51, 24.7; 4/6/52, 20.6.

16N 4E-16E1—Reference point—hole in pump base, elevation 81 feet, 100 feet east of Loma Rica Road, 1.25 miles south of Ramirez Road. 11/19/47, 13.0; 3/15/48, 9.3; 12/1/48, 13.6; 3/23/49, 11.8; 11/17/49, 16.5; 3/23/50, 14.5; 3/28/51, 13.1; 11/14/51, 14.6; 4/6/52, 10.8.

16N 4E-21M1—Reference point—top of casing, elevation 75 feet, 0.1 mile east of Loma Rica Road, 0.15 mile south of Bangor Road. 11/19/47, 5.6; 3/15/48, 6.5; 12/1/48, 6.2; 3/23/49, 4.0.

16N 4E-25M1—Reference point—top of concrete floor at bottom of pit, elevation 89 feet, 0.1 mile south of State Highway 20, 1.50 miles east of Loma Rica Road. 11/26/47, 2.8; 3/3/48, 5.0.

16N 4E-26F1—Reference point—top of casing, elevation 91 feet, 0.20 mile north of State Highway 20, 0.85 mile east of Loma Rica Road. 11/26/47, 16.5; 3/3/48, 17.4; 11/29/48, 16.9; 3/23/49, 17.2; 11/18/49, 17.8.

16N 4E-27F1—Reference point—bottom of 90° elbow on suction pipe, elevation 93.6 feet, 600 feet north of Woodruff Lane, 0.20 mile west of Loma Rica Road. 11/26/47, 7.3; 11/18/49, 8.4.

16N 4E-27M1—Reference point—top of casing, elevation 89 feet, 150 feet south of Woodruff Lane, 0.2 mile west of State Highway 20. 12/6/32, 6.4; 12/14/33, 6.9; 11/23/34, 6.9; 11/28/36, 5.6; 11/23/37, 11.6 (operating); 1/9/41, 2.7.

TABLE 1—Continued

DEPTHS TO GROUND WATER AT MEASUREMENT WELLS IN SUTTER-YUBA AREA

Measurements Made by Division of Water Resources
(Depths to water in feet measured from reference point)

16N/4E-27N1—Reference point—top of casing, elevation 89.0 feet. 500 feet north of State Highway 20, 0.30 mile south of Woodruff Lane. 11/27/29, 10.9; 9/25/30, 8.3; 12/14/31, 11.3; 1/9/41, 4.8; 11/5/47, 7.5; 11/26/47, 4.9; 3/3/48, 13.7; 11/29/48, 11.2; 12/13/48, 12.0; 3/23/49, 11.0; 11/18/49, 10.2; 12/9/49, 11.7; 3/23/50, 12.5; 10/31/50, 8.8; 3/30/51, 10.7; 11/14/51, 10.5; 11/27/51, 11.8; 4/6/52, 8.2.

16N/4E-28B1—Reference point—top of casing, elevation 89.4 feet. 0.25 mile north of Woodruff Lane, 0.60 mile east of Kimball Lane. 11/26/47, 13.3; 3/3/48, 16.1; 11/29/48, 13.7; 3/23/49, 12.2; 11/18/49, 12.8.

16N/4E-28E1—Reference point—top of 90° elbow, elevation 80.9 feet. 0.20 mile north of Woodruff Lane, 0.15 mile east of Kimball Lane. 11/26/47, 9.7; 3/3/48, 10.8; 11/29/48, 10.2; 3/23/49, 7.0; 11/18/49, 9.5; 3/23/50, 10.0; 10/31/50, 8.2; 3/30/51, 9.7; 11/14/51, 9.1; 4/6/52, 7.9.

16N/4E-29B1—Reference point—top of casing, elevation 78.1 feet. 500 feet west of Mathews Lane, 0.35 mile north of Woodruff Lane. 11/26/47, 8.7; 3/3/48, 9.6; 5/7/48, 8.1; 11/29/48, 9.3; 3/23/49, 7.2; 11/17/49, 9.5; 10/31/50, 9.0.

16N/4E-33B1—Reference point—top of casing, elevation 83 feet. 200 feet north of West Hallwood Road, 0.6 mile west of State Highway 20. 11/26/47, 7.7; 3/3/48, 10.6; 11/30/48, 8.5; 3/23/49, 13.0; 11/15/49, 7.9.

16N/4E-33J1—Reference point—top of casing, elevation 88.7 feet. 200 feet east of State Highway 20, 0.45 mile south of West Hallwood Road. 11/26/47, 11.8; 3/3/48, 14.9; 3/23/49, 13.0; 11/18/49, 11.8.

16N/4E-33K1—Reference point—top of casing, elevation 84.0 feet. 200 feet northwest of State Highway 20, 0.70 mile south of West Hallwood Road. 11/26/47, 9.2; 3/8/48, 12.1; 11/30/48, 10.5; 3/23/49, 9.7; 11/18/49, 9.7.

16N/4E-33N1—Reference point—top of casing cap, elevation 80.1 feet. 200 feet northwest of State Highway 20, 1.3 miles south of West Hallwood Road. 11/26/47, 8.3; 3/4/48, 11.5; 11/30/48, 10.6; 3/23/49, 9.2; 11/18/49, 10.0; 3/23/50, 10.2; 10/31/50, 9.3; 3/30/51, 9.1; 11/14/51, 10.0; 4/5/52, 7.4.

16N/4E-34B1—Reference point—top of casing, elevation 96.8 feet. 100 feet north of West Hallwood Road, 200 feet east of levee. 11/25/47, 14.4; 3/3/48, 20.5; 11/29/48, 19.5; 3/22/49, 15.8; 11/18/49, 14.6.

16N/4E-34D1—Reference point—top of casing, elevation 91.9 feet. 600 feet west of State Highway 20, 0.20 mile north of West Hallwood Road. 11/26/47, 12.7; 3/3/48, 16.1; 11/30/48, 13.8; 3/23/49, 13.5; 11/18/49, 13.0.

16N/4E-34L1—Reference point—top of casing 2.5 feet above ground, elevation 98.5 feet. 0.4 mile north of Walnut Road, 200 feet west of Hallwood Road. 10/25/47, 17.5; 3/3/48, 21.7; 11/29/48, 18.7; 3/22/49, 19.9; 11/18/49, 18.3.

16N/4E-34Q1—Reference point—top of casing under pump, elevation 95.3 feet. 400 feet north of Walnut Road, 400 feet east of Hallwood Road. 11/25/47, 16.7; 3/3/48, 21.1; 11/29/48, 17.7; 3/22/49, 19.3; 11/18/49, 16.7; 3/23/50, 19.7; 10/31/50, 16.6; 3/30/51, 17.6; 11/14/51, 17.1; 4/6/52, 15.1.

16N/4E-35M1—Reference point—top of casing under pump, elevation 101.1 feet. 0.6 mile east of Hallwood Road, 0.5 mile north of Walnut Road. 11/25/47, 15.3; 3/3/48, 17.9; 4/1/48, 18.1; 3/23/49, 16.8; 11/18/49, 16.6.

17N/1E-25J1—Reference point—hole in base of pump, elevation 77 feet. 100 feet south of North Butte Road, 0.4 mile west of 90° turn (NW.) in North Butte Road. 3/25/48, 18.9; 12/3/48, 19.7; 3/30/49, 16.7; 11/15/49, 22.0; 3/24/50, 16.6; 11/2/50, 21.6; 3/27/51, 21.2; 11/13/51, 23.8.

17N/2E-22R1—Reference point—top of casing, elevation 79.5 feet. 0.07 mile northwest of intersection of Krehe and Lucerne Roads. 12/22/47, 7.7; 3/2/48, 8.3; 11/15/49, 7.4.

17N/2E-24N1—Reference point—top of casing, elevation 81.1 feet. 100 feet north of Lucerne Road, 0.95 mile west of Township Road. 12/22/47, 7.4; 3/1/48, 8.2; 12/8/48, 8.0; 1/21/49, 7.5; 3/30/49, 4.5; 11/8/49, 6.5.

17N/2E-29M1—Reference point—hole in pump base, elevation 79.6 feet. 0.1 mile east of Crane Road, 0.3 mile north of Bigelow Road. 12/22/47, 14.6; 12/3/48, 16.1; 3/30/49, 12.6; 11/15/49, 16.1; 3/24/50, 13.5; 3/27/51, 12.6.

17N/2E-29Q1—Reference point—top of casing, elevation 77.9 feet. 0.1 mile, east-northeast of 90° turn in Bigelow Road, at a point 0.5 mile east of Crane Road. 12/23/47, 13.9; 3/2/48, 15.1; 12/3/48, 15.5; 3/30/49, 12.0; 11/15/49, 14.3.

17N/2E-30N1—Reference point—top of casing, elevation 83 feet. 0.15 mile south of Pennington Road at a point 0.1 mile west of Pennington School. 3/25/48, 22.9; 12/3/48, 24.1; 3/30/49, 21.3; 11/15/49, 25.2.

17N/2E-31A1—Reference point—top of casing, elevation 85 feet. 100 feet north of Pennington Road at a point 0.1 mile west of Bigelow and Pennington Roads intersection. 3/25/48, 23.5; 12/3/48, 24.7; 3/30/49, 22.8; 11/15/49, 25.5; 3/24/50, 23.0; 11/2/50, 26.7; 3/27/51, 21.8; 11/13/51, 28.3; 4/2/52, 20.2.

17N/2E-33J1—Reference point—top of casing, elevation 71.3 feet. 0.35 mile north of Pennington Road, 1.05 miles west of Krehe Road. 12/23/47, 6.4; 3/2/48, 6.5; 12/13/48, 6.2; 3/30/49, 4.0; 11/15/49, 3.7.

17N/2E-34A1—Reference point—top of casing, elevation 74.6 feet. East side of Krehe Road, 0.9 mile north of Pennington Road. 12/22/47, 6.8; 3/1/48, 7.2; 12/8/48, 6.8; 1/21/49, 6.6; 3/30/49, 5.0; 11/8/49, 4.2; 3/21/50, 6.7; 11/2/50, 4.9; 3/27/51, 12.7 (operating); 11/13/51, 6.2; 4/2/52, 5.8.

17N/2E-34Q1—Reference point—top of outer casing, elevation 71.8 feet. North side of Pennington Road, 0.5 mile west of Krehe Road. 12/22/47, 6.4; 3/2/48, 7.1; 12/3/48, 7.0; 3/30/49, 5.0; 11/15/49, 5.7; 3/24/50, 5.5; 11/2/50, 5.5; 3/27/51, 6.6; 11/13/51, 6.1; 4/2/52, 5.4.

17N/2E-35A1—Reference point—top of casing, elevation 75.2 feet. 50 feet west of Schroeder Road, 0.95 mile north of Pennington Road. 12/22/47, 4.7; 3/1/48, 5.7; 12/8/48, 5.5; 3/30/49, 4.0; 5/26/49, 3.8; 6/28/49, 4.2; 7/27/49, 3.4; 8/25/49, 3.5; 11/8/49, 4.4; 3/21/50, 6.0; 11/2/50, 5.9; 3/27/51, 5.0; 11/13/51, 6.2; 4/2/52, 5.5.

17N/2E-36H1—Reference point—top of casing, elevation 76 feet. 300 feet west of Township Road, 0.6 mile north of Pennington Road. 3/26/48, 7.0; 12/8/48, 7.9.

17N/3E-22R1—Reference point—top of casing, elevation 86 feet. 0.25 mile north of Laurel Road at a point 0.48 mile west of intersection with Thame Road. 10/29/47, 23.3; 3/22/48, 26.0; 12/10/48, 21.9; 3/8/49, 21.2; 11/14/49, 23.3; 3/21/50, 22.2; 11/7/50, 23.4; 3/28/51, 16.8; 11/15/51, 22.1; 4/6/52, 13.6.

17N/3E-23P1—Reference point—hole in concrete base, elevation 87 feet. 0.37 mile north of Laurel Road, due north of intersection with Thame Road. 10/29/47, 22.7; 12/10/48, 20.5; 3/8/49, 20.0; 11/14/49, 22.9.

17N/3E-25G1—Reference point—hole in base of pump, elevation 85 feet. 2.57 miles north of Ramirez Road, 0.53 mile east of State Highway 24. 10/29/47, 22.9; 3/22/48, 19.1; 12/10/48, 19.4; 3/8/49, 18.8; 11/14/49, 21.6; 3/21/50, 18.1; 11/7/50, 21.7; 3/28/51, 46.0 (operating); 11/15/51, 23.4; 4/6/52, 9.3.

17N/3E-25M1—Reference point—hole in base of pump, elevation 80 feet. 2.27 miles north of Ramirez Road, 0.15 mile east of State Highway 24. 10/29/47, 22.6; 3/22/48, 19.8; 12/10/48, 20.8.

17N/3E-25N1—Reference point—hole in base of pump, elevation 84 feet. 1.97 miles north of Ramirez Road, 0.24 mile east of State Highway 24. 3/22/48, 20.7; 12/10/48, 19.3; 3/8/49, 18.0; 11/14/49, 21.8.

TABLE 1—Continued

DEPTHS TO GROUND WATER AT MEASUREMENT WELLS IN SUTTER-YUBA AREA

Measurements Made by Division of Water Resources
(Depths to water in feet measured from reference point)

17N/3E-25Q1—Reference point—hole in base of pump, elevation 84 feet. 2.27 miles north of Ramirez Road, 0.75 mile east of State Highway 24. 10/31/47, 18.7; 3/22/48, 18.7; 12/10/48, 17.7; 3/8/49, 15.3; 11/14/49, 20.2.

17N/3E-26A2—Reference point—hole in base of pump, elevation 85 feet. 0.04 mile south of Laurel Road, 0.10 mile west of State Highway 24. 10/28/47, 22.8; 3/28/48, 21.9; 12/10/48, 21.1; 1/26/49, 20.5; 3/8/49, 20.1; 11/14/49, 23.7; 3/21/50, 21.1; 11/7/50, 22.8; 3/28/51, 14.6; 11/15/51, 27.6; 4/6/52, 11.1.

17N/3E-26B1—Reference point—flange of suction line, elevation 87 feet. 0.07 mile north of Laurel Road, 0.28 mile west of State Highway 24. 10/29/47, 15.5; 3/22/48, 11.9; 5/7/48, 9.7; 12/10/48, 13.5; 3/8/49, 12.5; 11/14/49, 15.5.

17N/3E-26H1—Reference point—hole in base of pump, elevation 85 feet. 0.25 mile south of Laurel Road, 0.22 mile west of State Highway 24. 10/29/47, 24.1; 12/10/48, 22.6; 11/14/49, 23.7.

17N/3E-26R1—Reference point—hole in base of pump, elevation 81 feet. 0.10 mile west of State Highway 24, 0.65 mile south of Laurel Road. 10/29/47, 20.0; 3/22/48, 20.8; 12/10/48, 18.8; 3/8/49, 18.0; 11/14/49, 21.0.

17N/3E-28P1—Reference point—top of flange on suction pipe, elevation 82 feet. 0.18 mile east of Cooley Road, 1.10 miles north of intersection of Meteer Road. 10/31/47, 5.8; 3/20/48, 7.4; 5/30/48, 4.7; 12/8/48, 4.9; 3/8/49, 7.0; 11/8/49, 5.5; 3/22/50, 5.1; 11/3/50, 7.0; 3/27/51, 3.1; 11/14/51, 6.5; 4/3/52, 2.2.

17N/3E-29C1—Reference point—top of casing, elevation 82.4 feet. 0.21 mile west of Larkin Road, 0.04 mile north of Riviera Road. 12/22/47, 8.9; 3/1/48, 9.4; 12/8/48, 9.7; 3/30/49, 5.9; 11/8/49, 8.2; 3/21/50, 6.3; 11/2/50, 8.8; 3/27/51, 5.8; 11/13/51, 8.8; 4/2/52, 4.5.

17N/3E-29H1—Reference point—top of casing, elevation 77.7 feet. South side Riviera Road, 0.52 mile east of Larkin Road. 12/23/47, 5.0; 3/1/48, 5.6; 5/12/48, 3.5; 11/8/49, 4.7.

17N/3E-30F1—Reference point—top of casing, elevation 80.6 feet. South side Riviera Road, 0.35 mile east of Township Road. 11/26/29, 4.7; 9/27/30, 3.3; 12/16/31, 6.2; 12/9/32, 5.4; 12/13/33, 5.6; 11/21/34, 5.4; 11/23/37, 3.7; 1/26/39, 6.4; 1/10/49, 3.1; 11/4/47, 7.8; 12/5/47, 8.0; 12/22/47, 8.2; 3/1/48, 8.5; 12/8/48, 8.6; 12/13/48, 9.3; 11/8/49, 7.6; 3/30/49, 5.4; 3/21/50, 3.5.

17N/3E-30G1—Reference point—top of casing, elevation 81 feet. South Side of Riviera Road, 0.23 mile west of U. S. Highway 99E. 11/10/50, 8.6; 11/26/51, 8.7.

17N/3E-30N1—Reference point—top of pumphouse floor, elevation 73.0 feet. 0.08 mile east of Township Road, 1.25 miles north of Pennington Road. 12/22/47, 4.1; 3/1/48, 4.4; 5/13/48, 3.1; 12/8/48, 4.0; 1/21/49, 4.0; 3/30/49, 1.5; 5/26/49, 7.0; 6/28/49, 7.0; 7/27/49, 7.5; 8/25/49, 8.5; 11/8/49, 3.7; 3/21/50, 6.5; 11/2/50, 8.9; 3/27/51, 6.6; 11/13/51, 8.4; 4/2/52, 1.0.

17N/3E-31A2—Reference point—hole in base of pump, elevation 82 feet. 1.01 miles west of Township Road, 0.85 mile north of Pennington Road. 12/8/48, 10.0; 3/30/49, 6.6.

17N/3E-31M1—Reference point—top of casing, elevation 75 feet. 0.24 mile east of Township Road, 0.32 mile north of Pennington Road. 3/26/48, 7.1; 12/8/48, 9.1.

17N/3E-32B1—Reference point—top of casing, elevation 81.5 feet. 0.09 mile east of Larkin Road, 1 mile south of Riviera Road. 12/23/47, 12.2; 3/1/48, 12.4; 12/8/48, 11.7; 3/30/49, 8.1; 1/8/49, 13.3; 3/22/50, 7.8; 3/27/51, 6.5; 11/13/51, 9.8; 4/2/52, 4.7.

17N/3E-33Q1—Reference point—top of casing, elevation 80 feet. North side of Pennington Road, 0.50 mile east of Meteer Road. 11/10/47, 12.2; 3/20/48, 16.7; 12/3/48, 13.1; 3/8/49, 16.6; 11/9/49, 10.7; 3/22/50, 14.0; 11/3/50, 11.4; 4/2/51, 11.3; 11/14/51, 12.4; 4/3/52, 8.8.

17N/3E-35H1—Reference point—top of casing, elevation 82 feet. 0.05 mile west of State Highway 24, 1.57 miles north of Ramirez Road. 10/29/47, 21.5; 3/22/48, 19.0; 10/10/48, 19.7; 3/8/49, 19.0; 11/15/49, 22.2.

17N/3E-35H2—Reference point—hole in base of pump, elevation 82 feet. 1.67 miles north of Ramirez Road, west side of State Highway 24. 10/29/47, 23.4; 3/22/48, 21.0; 5/7/48, 17.2; 12/10/48, 19.9; 3/8/49, 19.0; 11/15/49, 22.3; 3/21/50, 18.2; 11/7/50, 22.9; 3/28/51, 14.2; 11/15/51, 22.3; 4/6/52, 10.1.

17N/3E-36B1—Reference point—top of casing, elevation 84 feet. 0.70 mile east of State Highway 24, 1.87 miles north of Ramirez Road. 10/31/47, 17.9; 3/22/48, 17.6; 12/10/48, 17.0; 3/8/49, 15.5; 11/14/49, 19.6.

17N/3E-36B2—Reference point—hole in base of pump, elevation 84 feet. 0.55 mile east of State Highway 24, 1.9 miles north of Ramirez Road. 10/31/47, 23.7; 3/22/48, 17.3; 5/7/48, 17.0; 12/10/48, 17.6; 1/26/49, 17.1; 3/8/49, 16.3; 11/14/49, 19.9; 3/21/50, 16.6; 11/7/50, 20.2; 3/28/51, 12.3; 11/15/51, 18.6; 4/6/52, 7.4.

17N/3E-36E1—Reference point—slot in base, elevation 83 feet. 0.2 mile east of State Highway 24, 1.55 miles north of Ramirez Road. 10/31/47, 20.3; 3/22/48, 18.4; 3/8/49, 17.7; 11/15/49, 20.8.

17N/4E-22H1—Reference point—top of casing, elevation 116 feet. 0.2 mile east of La Porte Road bridge across Middle Honcut Creek. 2/25/48, 16.1; 3/15/48, 15.3; 11/17/49, 18.3; 3/28/51, 12.1; 11/14/51, 18.6; 4/6/52, 10.2.

17N/4E-27E1—Reference point—top of concrete pit cribbing, elevation 105 feet. 0.30 mile west of La Porte Road bridge across South Honcut Creek. 11/19/47, 29.9; 3/15/48, 33.2; 11/30/48, 30.0; 3/23/49, 24.2.

17N/4E-27F1—Reference point—top of casing, elevation 106 feet. West side La Porte Road, south bank of South Honcut Creek. 11/18/47, 24.8; 3/30/48, 24.2; 5/12/48, 24.2; 11/30/48, 24.9; 3/23/49, 23.1; 11/17/49, 28.0; 3/22/50, 24.9; 10/3/50, 30.2; 3/28/51, 24.1; 11/14/51, 30.3; 4/6/52, 23.8.

17N/4E-29L1—Reference point—hole in pump base, elevation 80 feet. 1.02 miles west of Southern Pacific Railroad tracks, 0.30 mile south of South Honcut Creek. 12/1/48, 21.2; 3/23/49, 19.5; 11/17/49, 26.1; 3/22/50, 22.3; 10/31/50, 30.0; 3/28/51, 21.6; 11/27/51, 14.6; 4/6/52, 5.0.

17N/4E-33D1—Reference point—top of casing, elevation 96 feet. West side Southern Pacific Railroad tracks, 1.08 miles north along tracks from intersection with Ramirez Road. 11/18/47, 24.1; 3/15/48, 24.8; 12/1/48, 25.2; 3/23/49, 27.6; 11/17/49, 27.6; 3/22/50, 27.0; 10/31/50, 28.0; 3/28/51, 25.1; 11/14/51, 28.1; 4/6/52, 24.3.

17N/4E-35C1—Reference point—hole in pump base, elevation 122 feet. South side Iowa City Road, 1.20 miles east of La Porte Road. 3/15/48, 26.7; 11/17/49, 28.5; 3/28/51, 28.5; 11/14/51, 33.1; 4/6/52, 30.1.

TABLE 2

DEPTHS TO GROUND WATER AT MEASUREMENT WELLS IN SUTTER-YUBA AREA

Measurements Made by S. T. Harding
(Depths to water in feet measured from reference point)

13N/2E-1 (Harding 43)—Reference point—top of pump house floor, elevation 35 feet, 1,800 feet north of east quarter corner of section. 9/20/31, 16.5; 12/2/32, 15.7.

13N/3E-2 (Harding 139)—Reference point—top of casing, elevation 43 feet, 30 feet north of east and west center line, 1,700 feet east of Garden Highway. 10/16/31, 22.7; 11/29/32, 18.0.

13N/3E-3 (Harding 76)—Reference point—top of casing, elevation 40 feet, 200 feet south and 1,400 feet east of center of section. 10/13/31, 21.3; 11/29/32, 19.2.

13N/3E-4 (Harding 141A)—Reference point—top of casing, elevation 39 feet, 800 feet south and 50 feet west of northeast corner of section. 10/9/31, 22.1; 12/2/32, 20.0.

13N/3E-4 (Harding 70)—Reference point—top of casing, elevation 40 feet, 20 feet west of Sawtelle Avenue at southeast corner of section. 10/8/31, 23.0; 12/2/32, 20.0.

13N/3E-5 (Harding 140)—Reference point—top of pit, elevation 36 feet, 550 feet south and 200 feet west of north quarter corner of section. 10/9/31, 23.0; 12/2/32, 20.7.

13N/3E-5 (Harding 141)—Reference point—top of casing, elevation 34 feet, 200 feet west and 300 feet north of east quarter corner of section. 10/9/31, 20.5; 12/2/32, 18.0.

13N/3E-7 (Harding 73)—Reference point—top of casing, elevation 33 feet, 1,300 feet east of west quarter corner of section. 10/8/31, 12.0; 12/2/32, 13.0.

13N/3E-9 (Harding 72)—Reference point—top of wall of pit, elevation 35 feet, 500 feet south of north quarter corner of section. 10/8/31, 18.5; 12/2/32, 13.1.

13N/3E-10 (Harding 69)—Reference point—top of wall of wooden pit, elevation 38 feet, 500 feet north and 500 feet south of northeast corner of section. 10/8/31, 17.0; 12/2/32, 17.1.

13N/3E-11 (Harding 75)—Reference point—top of wall of pit, elevation 40 feet, 2,000 feet south and 600 feet west of northeast corner of section. 10/8/31, 17.5; 12/7/32, 15.6.

13N/3E-13 (Harding 74)—Reference point—top of wall of pit, elevation 38 feet, 100 feet east and 1,000 feet north of southwest corner of section. 10/8/31, 16.8; 12/7/32, 17.1.

13N/3E-14 (Harding 64)—Reference point—top of wall of pit, elevation 35 feet, 500 feet north of intersection of Wilson Road and Garden Highway. 10/6/31, 15.5; 12/2/32, 15.2.

13N/3E-15 (Harding 63)—Reference point—top of casing, elevation 35 feet. West side of Southern Pacific Railroad, ¼ mile north of Wilson Road. 10/6/31, 15.0; 12/2/32, 13.8.

13N/3E-16 (Harding 62)—Reference point—top of casing, elevation 36 feet, 500 feet north of southeast corner of section. 10/6/31, 17.0; 12/2/32, 16.4.

13N/3E-16 (Harding 71)—Reference point—top of casing, elevation 31 feet, 1,300 feet east and 2,700 feet south of northwest corner of section. 10/8/31, 12.0; 12/2/32, 11.3.

13N/3E-23 (Harding 60)—Reference point—top of concrete pit wall, elevation 35 feet, 100 feet east of Garden Highway, 2,200 feet south of north quarter corner of section. 10/6/31, 15.5; 12/2/32, 12.5.

13N/3E-23 (Harding 61)—Reference point—top of casing, elevation 36 feet, 500 feet east and 200 feet south of northwest corner of section. 10/6/31, 16.4; 12/2/32, 15.2.

14N/2E-4 (Harding 51)—Reference point—top of casing, elevation 37 feet, 300 feet west and 200 feet south of northeast corner of section. 9/26/31, 8.3; 11/30/32, 6.6.

14N/2E-36 (Harding 47)—Reference point—top of casing, elevation 34 feet, 500 feet south of north quarter corner of section. 9/23/31, 12.0; 12/2/32, 11.6.

14N/2E-36 (Harding 42)—Reference point—top of casing, elevation 35 feet. At east quarter corner of section. 9/20/31, 14.0; 12/2/32, 13.2.

14N/3E-1 (Harding 99)—Reference point—top of casing, elevation 53 feet, 200 feet west of Feather River Boulevard and 1.5 miles south of Alicia Station. 10/16/31, 12.0; 12/5/32, 12.3.

14N/3E-2 (Harding 54)—Reference point—top of casing below ground, elevation 48 feet, 5,200 feet east of Southern Pacific Railroad and 1,500 feet north of latitude 39° 05′. 9/26/31, 21.3; 11/29/32, 18.5.

14N/3E-2 (Harding 79)—Reference point—top of casing, elevation 48 feet, 1,400 feet east and 700 feet south of northwest corner of section. 10/13/31, 19.5; 11/29/32, 16.0.

14N/3E-3 (Harding 66)—Reference point—top of casing, elevation 51 feet, 700 feet west of Southern Pacific Railroad, 1,700 feet south of north line of section. 10/7/31, 35.3; 12/1/32, 33.0.

14N/3E-4 (Harding 57)—Reference point—top of concrete pit, elevation 51 feet, 1,150 feet east and 800 feet south of north quarter corner of section. 9/28/31, 36.3; 11/30/32, 35.3.

14N/3E-4 (Harding 56)—Reference point—top of concrete pit, elevation 48 feet, 600 feet east and 360 feet south of west quarter corner of section. 9/27/31, 33.9; 11/30/32, 32.0.

14N/3E-8 (Harding 118)—Reference point—top of casing, elevation 44 feet, 1,500 feet north and 200 feet east of southwest corner of section. 9/28/31, 25.1; 11/30/32, 23.6.

14N/3E-9 (Harding 123)—Reference point—top of pit, elevation 46 feet, 300 feet east and 200 feet north of south quarter corner of section. 9/30/31, 32.5; 11/30/32, 31.0.

14N/3E-10 (Harding 116)—Reference point—top of pit, elevation 50 feet, 300 feet north of east and west center line, 550 feet west of Southern Pacific Railroad. 10/1/31, 36.0; 12/1/32, 32.6.

14N/3E-10 (Harding 115)—Reference point—top of casing, elevation 52 feet, 700 feet south and 200 feet west of northeast corner of section. 10/1/31, 33.8; 11/29/32, 29.0.

14N/3E-11 (Harding 55)—Reference point—top of casing, elevation 53 feet, 4,400 feet east of Southern Pacific Railroad, 100 feet south of latitude 39° 05′. 9/5/31, 30.1; 10/17/31, 29.0.

14N/3E-13 (Harding 100)—Reference point—top of wall of pit, elevation 50 feet. West of Feather River Boulevard, 500 feet north of Pearson Station. 10/16/31, 10.0; 12/5/32, 10.1.

14N/3E-15 (Harding 67)—Reference point—top of concrete pit, elevation 47 feet, 800 feet east and 150 feet south of northwest corner of section. 10/7/31, 32.7; 12/1/32, 29.2.

14N/3E-15 (Harding 124)—Reference point—top of concrete pit, elevation 48 feet, 1,600 feet south of north line and 200 feet east of Southern Pacific Railroad. 10/8/31, 30.8; 12/1/32, 25.2.

14N/3E-15 (Harding 122)—Reference point—top of concrete pit, elevation 45 feet, 2,150 feet north and 600 feet east of southwest corner of section. 10/17/31, 29.4; 12/1/32, 24.0.

14N/3E-16 (Harding 58)—Reference point—bottom of 6 x 6 strut across top of pit, elevation 45 feet, 750 feet north and 40 feet west of southwest corner of section. 9/29/31, 25.8; 11/30/32, 25.6.

14N/3E-16 (Harding 120)—Reference point—top of concrete pit, elevation 45 feet, 1,350 feet east and 200 feet north of south quarter corner of section. 10/17/31, 27.7; 12/1/32, 25.4.

14N/3E-17 (Harding 119)—Reference point—top of casing, elevation 42 feet, 1,500 feet north and 100 feet east of southwest corner of section. 10/3/31, 21.5; 11/30/32, 20.0.

14N/3E-18 (Harding 45)—Reference point—top of wall of concrete pit, elevation 39 feet, 1,100 feet east and 2,000 feet south of northwest corner of section. 9/21/31, 14.5; 11/30/32, 14.4.

14N/3E-19 (Harding 46)—Reference point—top of pit wall, elevation 38 feet, 1,800 feet east and 900 feet south of northwest corner of section. 9/21/31, 16.0; 11/30/32, 15.0.

14N/3E-20 (Harding 123A)—Reference point—top of casing, elevation 42 feet, 2,000 feet north and 130 feet west of southeast corner of section. 10/3/31, 29.7; 12/1/32, 26.4.

TABLE 2—Continued

DEPTHS TO GROUND WATER AT MEASUREMENT WELLS IN SUTTER-YUBA AREA

Measurements Made by S. T. Harding
(Depths to water in feet measured from reference point)

14N 3E-22 (Harding 68)—Reference point—top of concrete pit, elevation 45 feet. 1,100 feet south of north line of section and 350 feet west of Garden Highway. 10/8/31, 23.4; 11/29/32, 19.7.

14N 3E-23 (Harding 107)—Reference point—top of pit wall, elevation 50 feet. West end of Country Club Road on center line of section. 10/16/31, 20.5; 12/9/32, 19.7.

14N 3E-23 (Harding 129)—Reference point—top of casing, elevation 46 feet. 100 feet east of Garden Highway and 1,650 feet north of latitude 39° 32′ 30″. 10/13/31, 25.2.

14N 3E-27 (Harding 131)—Reference point—top of casing, elevation 42 feet. 700 feet east of Southern Pacific Railroad and 300 feet north of south line of section. 10/16/31, 25.0; 11/29/32, 21.7.

14N 3E-27 (Harding 130)—Reference point—top of casing, elevation 44 feet. 2,000 feet south of latitude 39° 32′ 30″ and 400 feet west of Garden Highway. 10/13/31, 25.2; 11/29/32, 21.2.

14N 3E-28 (Harding 128)—Reference point—top of concrete pit, elevation 40 feet. 500 feet east and 1,600 feet north of southwest corner of section. 10/12/31, 29.8; 12/1/32, 27.0.

14N 3E-28 (Harding 127)—Reference point—top of casing, elevation 42 feet. 150 feet west and 25 feet south of northwest corner of section. 10/12/31, 30.3; 12/1/32, 27.4.

14N 3E-29 (Harding 126)—Reference point—top of planks across top of pit, elevation 41 feet. 1,200 feet west and 1,600 feet south of northeast corner of section. 10/10/31, 29.0; 12/1/32, 26.7.

14N 3E-29 (Harding 125)—Reference point—top of concrete casing, elevation 42 feet. 750 feet north and 300 feet west of south quarter corner of section. 9/5/31, 29.2; 10/9/31, 28.3; 12/2/32, 25.5.

14N 3E-30 (Harding 77)—Reference point—top of casing, elevation 39 feet. 1,500 feet south and 250 feet west of northeast corner of section. 10/13/31, 23.1; 12/2/32, 20.7.

14N 3E-31 (Harding 44)—Reference point—top of concrete pit, elevation 37 feet. 1,000 feet west and 200 feet south of northeast corner of section. 9/20/31, 21.5; 12/2/32, 16.5.

14N 3E-32 (Harding 133)—Reference point—top of casing, elevation 36 feet. 2,000 feet north and 200 feet east of southwest corner of section. 10/14/31, 23.3; 12/2/32, 20.7.

14N 3E-32 (Harding 132)—Reference point—top of casing, elevation 37 feet. 250 feet south and 150 feet west of center of section. 10/14/31, 25.0; 11/29/32, 21.0.

14N 3E-33 (Harding 134)—Reference point—top of tile at hand pump, elevation 43 feet. 200 feet south and 1,410 feet east of northwest corner of section. 10/14/31, 27.6; 12/1/32, 24.8.

14N 3E-34 (Harding 135)—Reference point—top of pit, elevation 41 feet. 300 feet east and 40 feet south of northwest corner of section. 10/14/31, 27.8; 12/1/32, 24.9.

14N 3E-35 (Harding 138)—Reference point—top of wood pit, elevation 42 feet. 100 feet west of levee, 500 feet north of south line of section. 10/16/31, 18.3; 11/29/32, 17.5.

14N 3E-35 (Harding 137)—Reference point—top of casing, elevation 43 feet. 100 feet east of Garden Highway, 100 feet north of south line of section. 10/16/31, 25.4; 11/29/32, 22.1.

14N 3E-35 (Harding 136)—Reference point—top of wooden pit, elevation 42 feet. 200 feet east of Garden Highway, 1,400 feet north of south line of section. 10/16/31, 24.8; 11/29/32, 22.0.

14N 4E-8 (Harding 101)—Reference point—top of pit wall, elevation 56 feet. 700 feet west and 700 feet south of west quarter corner of section. 10/16/31, 12.0; 12/3/32, 12.8.

14N 4E-8 (Harding 103)—Reference point—top of casing, elevation 63 feet. 200 feet southeast of northwest corner of section. 10/16/31, 18.0; 12/3/32, 18.8.

14N 4E-19 (Harding 104)—Reference point—top of casing, elevation 49 feet. Immediately north of center of section. 10/16/31, 14.0; 12/3/32, 13.5.

14N 4E-31 (Harding 98)—Reference point—top of casing, elevation 59 feet. 50 feet east of bend in River Road, ½ mile above Alicia. 10/16/31, 18.0; 12/3/32, 17.0.

15N 2E-1 (Harding 18)—Reference point—top of casing, elevation 56 feet. 1,000 feet south and 180 feet west of northeast corner of section. 9/7/31, 11.8; 10/17/31, 11.3; 12/8/32, 10.2.

15N 2E-12 (Harding 17)—Reference point—top of casing in pit, elevation 51 feet. 1,600 feet south and 400 feet west of northeast corner of section. 9/7/31, 8.1; 10/17/31, 9.3; 12/8/32, 10.1.

15N 2E-12 (Harding 114)—Reference point—top of casing, elevation 54 feet. 200 feet south of Butte House Road on north side of east and west center line of section. 10/1/31, 8.5; 12/8/32, 11.9.

15N 2E-13 (Harding 35)—Reference point—top of highest horizontal flange on suction, elevation 51 feet. 1,800 feet west and 200 feet north of east quarter corner of section. 9/18/31, 14.5; 12/8/32, 14.6.

15N 2E-13 (Harding 113)—Reference point—top of casing, elevation 50 feet. 1,000 feet east and 500 feet north of west quarter corner of section. 10/1/31, 8.0; 12/8/32, 9.7.

15N 2E-26 (Harding 111)—Reference point—top of casing, elevation 44 feet. 2,000 feet west and 50 feet south of northeast corner of section. 10/1/31, 7.0; 11/30/32, 7.7.

15N 2E-28 (Harding 112)—Reference point—top of casing, elevation 43 feet. 500 feet west of east quarter corner of section. 10/1/31, 9.0; 11/30/32, 7.9.

15N 2E-35 (Harding 53)—Reference point—top of casing, elevation 38 feet. 0.25 mile west and 300 feet north of southeast corner of section. 9/26/31, 5.0; 11/30/32, 5.4.

15N 3E-1 (Harding 87)—Reference point—top of casing, elevation 64 feet. East side of State Highway 24, 0.5 mile north of Walnut Avenue. 10/15/31, 14.5; 12/5/32, 13.8.

15N 3E-1 (Harding 85)—Reference point—top of casing, elevation 66 feet. 200 feet north of Walnut Avenue, 0.25 mile west of State Highway 24. 10/15/31, 19.5; 12/5/32, 15.8.

15N 3E-1 (Harding 84)—Reference point—top of walls of pit, elevation 61 feet. 700 feet east of State Highway 24 and 1 mile north of railroad crossing. 10/15/31, 6.0.

15N 3E-1 (Harding 84A)—Reference point—top of casing, elevation 61 feet. 300 feet east of State Highway 24 and 1 mile north of railroad crossing. 12/5/32, 5.0.

15N 3E-2 (Harding 86)—Reference point—top of casing, elevation 68 feet. 500 feet north of west end of Walnut Avenue. 10/15/31, 25.5; 12/5/32, 24.1.

15N 3E-2 (Harding 109)—Reference point—top of casing, elevation 62 feet. West end of first road to left on State Highway 24 after crossing bridge ¼ mile north of cemetery. 10/20/31, 21.5; 12/5/32, 21.0.

15N 3E-2 (Harding 108)—Reference point—top of wall of pit, elevation 61 feet. 0.60 mile west of State Highway 24, on first left road after crossing bridge, ¼ mile north of cemetery. 10/20/31, 19.0; 12/5/32, 18.3.

15N 3E-3 (Harding 4)—Reference point—top of casing, elevation 61 feet. 250 feet south and 240 feet east of northwest corner of section. 8/31/31, 22.7; 10/17/31, 23.4.

15N 3E-4 (Harding 15)—Reference point—top of concrete pit, elevation 60 feet. 1,900 feet north and 900 feet west of southeast corner of section. 9/4/31, 25.5; 10/17/31, 25.5; 12/7/32, 23.7.

15N 3E-5 (Harding 14)—Reference point—2 inches above top of concrete pit, elevation 59 feet. On east line 1,800 feet north of southeast corner of section. 9/3/31, 24.5; 10/17/31, 24.5; 12/7/32, 22.8.

TABLE 2—Continued

DEPTHS TO GROUND WATER AT MEASUREMENT WELLS IN SUTTER-YUBA AREA

Measurements Made by S. T. Harding
(Depths to water in feet measured from reference point)

15N/3E-6 (Harding 16)—Reference point—top of casing, elevation 60 feet, 1,320 feet west and 1,200 feet north of southeast corner of section. 9/7/31, 18.2; 12/8/32, 17.1.

15N/3E-9 (Harding 22)—Reference point—top of concrete pit, elevation 58 feet, 1,000 feet south and 500 feet east of west quarter corner of section. 9/10/31, 28.1; 10/17/31, 27.9; 12/8/32, 25.7.

15N/3E-10 (Harding 19)—Reference point—top of concrete pit, elevation 63 feet. Near north quarter of section. 9/8/31, 30.7; 10/17/31, 30.5; 12/7/32, 28.0.

15N/3E-11 (Harding 82)—Reference point—top of casing, elevation 57 feet. Under Southern Pacific Railroad trestle 2 miles north of Yuba City. 10/20/31, 16.5; 12/6/32, 16.3.

15N/3E-13 (Harding 110)—Reference point—top of casing, elevation 62 feet. 50 feet east of road which runs north and south behind Marysville High School and 0.4 mile south of north end of road. 10/20/31, 12.0; 12/5/32, 12.6.

15N/3E-14 (Harding 83)—Reference point—top of wall of pit, elevation 56 feet. 400 feet east and 200 feet south of west quarter corner of section. 10/13/31, 21.5.

15N/3E-15 (Harding 21)—Reference point—top of concrete pit, elevation 60 feet. 500 feet west of highway and 100 feet south of north line of section. 9/8/31, 29.3; 10/17/31, 29.1; 12/7/32, 27.2.

15N/3E-16 (Harding 23)—Reference point—top of concrete pit, elevation 58 feet, 750 feet south and 850 feet west of northeast corner of section. 9/10/31, 30.2; 10/17/31, 29.7; 12/7/32, 27.7.

15N/3E-17 (Harding 29)—Reference point—top of concrete pit, elevation 56 feet, 1,100 feet east of Live Oak drain, south of Sacramento Northern Railroad. 9/19/31, 25.0; 12/8/32, 22.5.

15N/3E-19 (Harding 37)—Reference point—floor of pit, 8 feet deep, elevation 50 feet, 660 feet east and 500 feet south of northwest corner of section. 9/18/31, 16.0; 10/17/31, 17.5; 11/28/32, 16.9.

15N/3E-19 (Harding 36)—Reference point—top of concrete pit wall, elevation 50 feet, 1,320 feet north and 300 feet east of southwest corner of section. 9/18/31, 18.0; 12/1/32, 17.0.

15N/3E-20 (Harding 20)—Reference point—top of concrete pit, elevation 57 feet, 850 feet west and 40 feet south of northeast corner of section. 9/8/31, 31.4; 10/17/31, 31.0; 12/1/32, 28.6.

15N/3E-20 (Harding 28)—Reference point—floor of pump house or top of pit, elevation 56 feet, 220 feet east and 250 feet north of south quarter corner of section. 9/18/31, 32.1.

15N/3E-21 (Harding 24)—Reference point—top of casing, elevation 55 feet, 1,100 feet west and 400 feet south of northeast corner of section. 9/10/31, 28.1; 10/17/31, 28.5.

15N/3E-23 (Harding 27)—Reference point—top of casing, elevation 57 feet. In Yuba City, back of blacksmith shop, 150 feet south of Sutter Hotel. 9/17/31, 22.2; 11/29/32, 21.1.

15N/3E-26 (Harding 48)—Reference point—top of concrete pit, elevation 54 feet, 3,800 feet east and 700 feet south of northwest corner of section. 9/—/31, 26.5; 11/29/32, 26.0.

15N/3E-26 (Harding 80)—Reference point—top of casing, elevation 50 feet. 2,000 feet east of northwest corner of section. 10/13/31, 20.5.

15N/3E-26 (Harding 81)—Reference point—top of casing, elevation 55 feet. 100 feet west of toe of levee, 3,500 feet south of Yuba City south limit. 10/13/31, 23.5; 11/29/32, 25.5.

15N/3E-27 (Harding 25)—Reference point—top of casing, elevation 55 feet. 500 feet west and 300 feet south of north quarter corner of section. 8/17/31, 30.2; 12/1/32, 28.5.

15N/3E-27 (Harding 49)—Reference point—top of concrete pit, elevation 51 feet, 1,000 feet west and 1,300 feet north of south quarter corner of section. 9/1/31, 32.2; 11/30/32, 32.4.

15N/3E-28 (Harding 26)—Reference point—top of wood pit, elevation 53 feet. South side of highway, 1,100 feet west of northeast corner of section. 4/—/13, 17.0; 9/17/31, 31.4; 12/1/32, 28.4.

15N/3E-29 (Harding 31)—Reference point—top of concrete pit, elevation 50 feet, 150 feet north and 50 feet west of southeast corner of section. 9/22/31, 32.4; 11/30/32, 29.4.

15N/3E-29 (Harding 30)—Reference point—top of concrete pit, elevation 49 feet, 660 feet east and 660 feet north of southwest corner of section. 9/20/31, 25.2; 11/30/32, 22.6.

15N/3E-30 (Harding 39)—Reference point—top of frame of wooden pit, elevation 52 feet, 1,320 feet south of north quarter corner on east bank of Live Oak drain. 9/19/31, 22.5.

15N/3E-31 (Harding 40)—Reference point—top of wall of concrete pit, elevation 45 feet, 1,800 feet east and 200 feet north of southwest corner of section. 9/19/31, 17.5; 11/30/32, 17.3.

15N/3E-31 (Harding 38)—Reference point—top of wall of concrete pit, elevation 47 feet, 200 feet west and 200 feet south of northeast corner of section. 9/19/31, 22.0; 11/30/32, 21.8.

15N/3E-32 (Harding 32)—Reference point—top of concrete pit, elevation 50 feet, 600 feet east and 500 feet north of south quarter corner of section. 9/22/31, 32.7; 12/1/32, 29.1.

15N/3E-33 (Harding 33)—Reference point—top of concrete pit, elevation 50 feet, 1,150 feet east and 250 feet south of northwest corner of section. 9/23/31, 33.3; 11/30/32, 30.6.

15N/3E-34 (Harding 50)—Reference point—top of concrete pit, elevation 52 feet, 1,600 feet north and 400 feet east of south quarter corner of section. 9/—/31, 34.6; 12/1/32, 32.7.

15N/4E-32 (Harding 102)—Reference point—top of wall of pit, elevation 61 feet. 50 feet east of west line of section, 500 feet south of railroad crossing. 10/16/31, 17.0; 12/3/32, 18.0.

16N/3E-2 (Harding 95)—Reference point—top of casing, elevation 80 feet. 100 feet north of Ramirez Road, 0.50 mile east of State Highway 24. 10/15/31, 17.5.

16N/3E-11 (Harding 96)—Reference point—top of casing, elevation 76 feet. At west end of road running west from State Highway 24, 0.8 mile north of Magnolia Avenue. 10/15/31, 19.5; 12/6/32, 17.9.

16N/3E-14 (Harding 97)—Reference point—top of wall of pit, elevation 75 feet. 500 feet west of State Highway 24, 400 feet south of La Finca Lane. 10/15/31, 15.0; 12/6/32, 14.9.

16N/3E-19 (Harding 12)—Reference point—top of casing, elevation 67 feet, 1,260 feet east and 200 feet north of north quarter of section. 9/2/31, 10.1; 12/7/32, 10.1.

16N/3E-21 (Harding 10)—Reference point—top of wood pit, west side, elevation 68 feet. Near southeast corner of section, 0.5 mile east of Southern Pacific Railroad. 9/2/31, 23.8; 10/17/31, 22.9; 12/7/32, 20.8.

16N/3E-24 (Harding 90)—Reference point—top of casing, elevation 70 feet. North of Woodruff Road, 1 mile east of State Highway 24. 10/15/31, 10.0; 12/6/32, 11.5.

16N/3E-27 (Harding 78)—Reference point—top of casing, elevation 69 feet. 500 feet north of east and west center line of section at toe of levee. 10/13/31, 25.0; 12/7/32, 22.4.

16N/3E-28 (Harding 8)—Reference point—top of concrete pit, west side, elevation 64 feet, 1,309 feet west of U. S. Highway 99E, 250 feet north of south line of section. 9/2/31, 21.8; 10/17/31, 20.6; 12/7/32, 19.1.

16N/3E-28 (Harding 9)—Reference point—top of casing, elevation 66 feet, 1,000 feet south of north line of section and 300 feet east of Southern Pacific Railroad. 9/2/31, 19.0; 10/17/31, 19.2; 12/7/32, 17.7.

16N/3E-29 (Harding 2)—Reference point—top of concrete pit, elevation 66 feet. 100 feet west and 120 feet south of northeast quarter of northwest quarter of section. 8/13/31, 13.5; 10/17/31, 13.2; 12/7/32, 12.6.

TABLE 2—Continued

DEPTHS TO GROUND WATER AT MEASUREMENT WELLS IN SUTTER-YUBA AREA

Measurements Made by S. T. Harding
(Depths to water in feet measured from reference point)

16N 3E-29 (Harding 1)—Reference point—top of casing, elevation 65 feet, 1,890 feet north and 660 feet west of east quarter corner of section. 8/31/31, 15.5; 10/17/31, 14.8; 12/7/32, 13.7.

16N 3E-29 (Harding 6)—Reference point—top of casing, elevation 65 feet, 750 feet east and 1,100 feet north of south quarter corner of section. 8/31/31, 18.4; 10/17/31, 18.0; 12/7/32, 16.3.

16N 3E-29 (Harding 91)—Reference point—top of casing, elevation 71 feet. At cross roads at east end of Woodruff Road. 10/15/31, 6.5; 12/6/32, 6.0.

16N 3E-30 (Harding 11)—Reference point—top of casing, elevation 66 feet, 1,750 feet east and 500 feet north of southwest corner of section. 9/2/31, 10.1; 12/7/32, 12.0.

16N 3E-31 (Harding 34)—Reference point—top of timber frame, elevation 61 feet, 1,300 feet east and 300 feet north of south quarter corner of section. 9/17/31, 18.0; 10/17/31, 20.0; 12/7/32, 17.8.

16N 3E-32 (Harding 13)—Reference point—top of concrete pit, elevation 64 feet, 1,350 feet south and 300 feet east of north quarter corner of section. 9/2/31, 19.1; 10/17/31, 18.6; 12/7/32, 17.5.

16N 3E-32 (Harding 3)—Reference point—top of wood pit, west side, elevation 60 feet, 600 feet north and 300 feet east of south quarter corner of section. 8/31/31, 19.3; 10/17/31, 18.9; 12/7/32, 17.0.

16N 3E-33 (Harding 5)—Reference point—top of casing, elevation 64 feet, 3,300 feet west of U. S. Highway 99E, 200 feet south of north line of section. 8/31/31, 24.9; 10/17/31, 19.1; 12/7/32, 17.5.

16N 3E-33 (Harding 7)—Reference point—top of concrete base, elevation 60 feet, 1,100 feet east and 400 feet north of southwest corner of section. 9/1/31, 20.6; 12/7/32, 18.8.

16N 3E-35 (Harding 89)—Reference point—top of wall of pit, elevation 66 feet, 1,000 feet west of angle in Oroville Highway, 0.5 mile north of Ellis Road. 10/15/31, 18.0; 12/6/32, 16.4.

16N 3E-35 (Harding 88)—Reference point—top of wall of pit, elevation 65 feet, 0.75 mile north of Walnut Avenue, 0.50 mile west of Oroville Highway. 10/15/31, 20.0; 12/6/32, 19.1.

16N 3E-36 (Harding 92)—Reference point—top of wall of pit, elevation 65 feet, 600 feet south of Ellis Road, 500 feet west of Western Pacific Railroad. 10/15/31, 7.5; 12/5/32, 8.5.

TABLE 3

DEPTHS TO GROUND WATER AT MEASUREMENT WELLS IN SUTTER-YUBA AREA

Measurements Made by Sutter County Farm Advisor
(Depths to water in feet and/or inches measured from reference point)

13N/3E-2C1—Reference point—air gage. 1/19/32, 18.2; 2/24/32, 17.5; 3/2/32, 17.9; 4/18/32, 19.0; 5/23/32, 17.1; 6/15/32, 20.4; 7/18/32, 23.0; 9/8/32, 19.8; 10/25/32, 19.0; 11/15/32, 19.3; 12/23/32, 19.0; 2/3/33, 18.5; 3/3/33, 18.6; 4/11/33, 21.4; 5/2/33, 19.8; 6/28/33, 24.2; 8/1/33, 35.0; 9/14/33, 32.0; 10/17/33, 31.0; 3/22/34, 27.0; 9/18/34, 31.5; 11/9/34, 30.0; 12/27/34, 29.3; 1/22/35, 27.8; 3/22/35, 26.3; 4/19/35, 23.7; 5/27/35, 22.7; 7/2/35, 57.8 (operating); 10/31/35, 28.4; 12/26/35, 27.6; 1/3/36, 26.0; 2/25/36, 22.0; 4/11/36, 23.0; 6/15/36, 29.0; 7/24/36, 33.0; 8/20/36, 28.0; 9/24/36, 27.8; 10/27/36, 27.8; 12/28/36, 27.0; 2/9/37, 26.0; 4/5/37, 20.0; 5/13/37, 20.0.

13N/3E-5E2—Reference point—top of pit. 5/16/31, 20′ 8″; 7/11/31, 24′ ¾″; 8/31/31, 21′ 7½″; 9/23/31, 21′ 7″; 10/16/31, 21′ ½″; 11/17/31, 20′ 7″; 12/17/31, 19′ 11″; 1/19/32, 18′ 11″; 2/24/32, 18′ 3¾″; 3/22/32, 17′ 11½″; 4/19/32, 18′ 5½″; 5/23/32, 19′ 6″; 6/23/32, 19′ 2″; 9/13/32, 19′ 11½″; 10/18/32, 19′ 10″; 11/30/32, 19′ 7″; 12/27/32, 19′ 6″; 2/6/33, 19′ 2″; 3/5/33, 18′ 10½″; 4/10/33, 19′ ¾″; 5/17/33, 20′ 5½″; 8/1/33, 22′ 4¾″; 9/14/33, 21′ 5½″; 3/16/34, 19′ 5½″; 11/9/34, 20′ 7″; 12/11/34, 20′ 0″; 2/15/35, 17′ 7″; 3/22/35, 18.0; 4/19/35, 17.5; 5/24/35, 17.6; 7/2/35, 24.8 (operating); 8/21/35, 18.7; 9/25/35, 18.5; 10/31/35, 18.5; 12/26/35, 18.1; 1/24/36, 17.7; 2/25/36, 16.6; 4/14/36, 15.2; 4/22/36, 16.7; 8/18/36, 16.9; 9/28/36, 16.9; 10/21/36, 16.4; 12/28/36, 15.8; 2/9/37, 15.3.

13N/3E-24G1—Reference point—air gage. 5/6/31, 19.9; 7/15/31, 22.2; 8/28/31, 19.9; 9/22/31, 21.1; 10/14/31, 19.9; 11/17/31, 19.9; 12/17/31, 19.7; 1/2/32, 17.2; 1/19/32, 16.5; 2/25/32, 15.8; 3/2/32, 17.6; 4/26/32, 15.1; 6/22/32, 16.9; 7/18/32, 19.9; 9/8/32, 18.8; 10/18/32, 18.1; 11/15/32, 18.8; 12/22/32, 18.1; 2/3/33, 17.6; 3/3/33, 17.4; 4/11/33, 21.1; 5/2/33, 17.6; 6/28/33, 34.9 (operating); 8/1/33, 22.2; 9/14/33, 19.5; 10/17/33, 18.3; 3/22/34, 28.0; 6/29/34, 21.6; 9/18/34, 19.9; 11/9/34, 19.7; 12/27/34, 18.8; 1/22/35, 16.5; 3/22/35, 16.5; 4/19/35, 13.0; 5/27/35, 12.4; 7/2/35, 36.1 (operating); 8/19/35, 16.5; 9/25/35, 19.5; 10/31/35, 17.6; 12/26/35, 17.6; 1/30/36, 15.3; 2/25/36, 10.9; 4/6/36, 11.9; 8/10/36; 19.5; 9/3/36, 19.9; 9/24/36, 14.9; 10/27/36, 18.8; 12/28/36, 18.8; 2/9/37, 12.4; 4/5/37, 7.1; 5/19/37, 7.8; 9/13/37, 14.1; 12/30/37, 9.7; 2/24/36, 4.7; 3/23/38, 3.8; 4/25/38, 3.7; 6/3/38, 4.8; 6/21/38, 8.9; 7/22/38, 12.2; 9/8/38, 12.3; 2/25/39, 12.5; 4/10/39, 13.8; 8/2/39, 17.6; 10/11/39, 15.8; 11/29/39, 15.4; 2/8/40, 11.5; 3/22/40, 7.8; 5/20/40, 7.9; 8/24/40, 15.0.

13N/4E-13F3—Reference point—hole in pump base. 12/1/32, 18′ 6¾″; 1/12/33, 17′ 9½″; 2/3/33, 17′ 4½″; 3/10/33, 16′ 9½″; 4/3/33, 18′ 2″; 5/23/33, 20′ 8½″; 10/23/33, 22′ 1¼″; 3/20/34, 23′ 3¼″; 6/27/34, 30′ 6″; 9/26/34, 24′ 6″; 12/10/34, 20′ 11″; 2/14/35, 18′ 5″; 3/25/35, 17′ 4½″; 4/30/35, 15′ 6¼″; 5/28/35, 19′ 2″; 8/18/35, 26′ 3½″; 9/26/35, 20′ 7½″; 1/15/36, 16.7; 3/28/36, 14.2; 3/27/36, 20.6; 8/10/36, 25.3; 8/20/36, 22.6; 9/23/36, 21.0; 10/27.36, 19.4; 1/2/37, 16.7; 2/10/37, 15.6; 4/8/37, 11.6; 11/27/37, 17.0; 3/16/38, 11.0; 4/27/38, 10.7; 5/31/38, 14.0; 7/21/38, 32.2*; 9/8/38, 18.1; 12/29/38, 15.6; 2/16/39, 15.3; 6/15/39, 34.9; 10/12/39, 22.7; 12/6/39, 20.9; 2/19/40, 17.1; 3/27/40, 15.1; 5/15/40, 15.3; 8/6/40, 28.7.

13N/4E-13R2—Reference point—top of casing. 1/12/33; 16′ 3″; 2/3/33, 14′ 8¼″; 3/10/33, 15′ 0″; 4/3/33, 16′ 4½″; 5/23/33, 18′ 1″; 6/28/33, 26′ 3″*; 8/9/33, 25′ 1¾″; 9/15/33, 22′ 8″. Following measurements from new well, reference point—hole in side of pump, 3/20/34, 22′ 3½″; 12/10/34, 18′ 8″; 2/14/35, 16′ 3½″; 3/25/35, 14′ 11½″; 4/30/35, 13′ 5¼″; 5/28/35, 14′ 10″; 7/3/35, 22′ 4½″; 1/25/36, 11.2; 2/28/36, 16.2; 8/10/36, 20.7; 8/20/36, 19.0; 9/23/36, 19.6; 10/27/36, 15.4; 1/2/37, 13.4; 2/10/37, 11.9; 4/8/37, 7.6; 5/26/37, 9.7; 11/27/37, 13.6; 3/16/38, 6.9; 4/27/38, 6.6; 5/31/38, 7.8; 12/29/38, 11.6; 2/16/39, 9.2; 12/6/39, 16.5; 2/19/40, 13.3; 3/27/40, 11.3; 5/15/40, 9.7; 8/6/40, 21.5; 5/19/41, 6.4.

* Nearby well pumping.

13N/4E-14D1—Reference point — air gage. 2/14/33, 12.01; 3/8/33, 12.01; 4/5/33, 39.63 (operating); 6/27/33, 15.00.

13N/4E-15R1—Reference point — air gage. 2/14/33, 18.94; 3/8/33, 18.25; 4/5/33, 43.2 (operating); 5/23/33, 23.56; 6/26/33, 32.8; 9/26/33, 24.0; 10/23/33, 28.18; 3/20/34, 23.56; 6/27/34, 31.65; 9/26/34, 30.49; 12/10/34, 35.11; 2/14/35, 22.15; 3/25/35, 20.79; 4/30/35, 18.94; 5/28/35, 18.94; 6/24/35, 27.03; 8/6/35, 31.65; 9/26/35, 25.18; 1/15/36, 21.25; 2/28/36, 18.25; 3/29/36, 28.18; 7/23/36, 30.5; 8/20/36, 30.5; 9/23/36, 31.65; 10/27/36, 28.41; 1/2/37, 23.56; 2/10/37, 21.25; 5/26/37, 16.63; 7/21/37, 26.4.

13N/5E-7L1—Reference point—top of casing. 12/1/32, 22′ 2″; 2/3/33, 20′ 10½″.

13N/5E-16D1—Reference point—top of casing. 12/1/32, 1′ 3¾″; 1/12/33, 1′ ½″; 2/3/33, 0′ 10½″; 3/10/33, 0′ 6½″; 4/5/33, 0′ 6″; 5/23/33, 1′ 4″; 6/27/33, 2′ 8½″; 8/9/33, 7′ 1″; 9/15/33, 5′ 0″; 10/23/33, 4′ 8½″; 3/20/34, 1′ 4″; 6/27/34, 4′ 6½″; 9/26/34, 6′ ¼″; 12/10/34, 4′ 4″; 2/14/34, 1′ 10¾″; 3/25/35, 0′ 2¼″; 4/30/35, 0′ 9½″; 5/28/35, —0′ 1¾″; 7/3/35, 1′ 9″; 8/6/35, 3′ 0″; 9/26/35, 2′ 7″; 1/15/36, 13.0; 2/28/36, 9.1; 3/27/36, 9.3; 7/30/36, 14.3; 8/20/36, 13.7; 9/23/36, 13.3; 10/27/36, 13.1; 1/2/37, 12.7; 2/10/37, 11.3; 4/8/37, 6.5; 5/26/37, 9.1; 7/21/37, 14.7; 3/16/38, 5.1; 4/27/38, 6.4; 7/21/38, 12.5; 9/8/38, 13.5; 12/29/38, 11.5; 2/16/39, 11.4; 4/27/39, 14.4; 6/15/39, 15.9; 10/12/39, 17.5; 12/6/39, 15.6; 2/9/40, 12.9; 3/27/40, 9.8; 5/15/40, 8.7; 8/6/40, 16.8; 5/19/41, 6.7; 7/28/41, 14.2.

13N/5E-18C1—Reference point—hole in top of pump base. 12/1/32, 17′ 4¼″; 1/12/33, 16′ 7″; 2/3/33, 16′ 2″; 3/10/33, 15′ 7″; 4/3/33, 18′ 4½″; 5/23/33, 19′ 9″; 6/28/33, 25′ 1″; 9/15/33, 22′ 6″; 10/23/33, 21′ 4″; 6/27/34, 30′ 3″; 9/26/34, 23′ 7½″; 12/10/34, 20′ ¼″; 2/14/35, 17′ 11½″; 3/25/35, 15′ 7½″; 4/30/35, 14′ 1¼″; 5/28/35, 16′ 2″; 6/24/35, 21′ 4″; 8/6/35, 26′ 5¼″; 9/26/35, 18′ 8¼″; 8/10/36, 22.05; 8/20/36, 22.2; 9/23/36, 20.9; 10/27/36, 15.0; 1/2/37, 14.3; 2/16/37, 13.04; 4/8/37, 8.2; 5/26/37, 12.9; 11/27/37, 14.6; 3/16/38, 8.0; 4/27/38, 8.2; 5/31/38, 10.2; 7/21/38, 20.3; 9/8/38, 16.4; 12/29/38, 13.2; 5/19/41, 8.2; 7/28/41, 19.7.

15N/3E-7M2—Reference point—top of casing. 7/15/31, 17′ 6½″; 8/27/31, 17′ 11″; 9/17/31, 17′ 6″; 10/26/31, 16′ 11″; 11/19/31, 16′ 6½″; 12/16/31, 16′ ¾″; 4/18/32, 14′ 8½″; 2/23/32, 14′ 2″; 3/23/32, 14′ 2½″; 4/15/32, 14′ 6½″; 5/18/32, 14′ 7½″; 6/2/32, 15′ 3½″; 7/13/32, 15′ 9¼″; 9/12/32, 16′ 2½″; 10/17/32, 17′ 11″; 11/30/32, 16′ 4″; 12/29/32, 16′ 3¾″; 1/26/33, 16′ 5½″; 3/3/33, 16′ 2¾″; 4/7/33, 16′ 5″; 5/12/33, 16′ 9¼″; 6/20/33, 18′ 3″; 7/31/33, 18′ 6¼″; 9/13/33, 17′ 2″; 10/17/33, 16′ 9½″; 11/8/33, 16′ 11½″; 3/12/34, 16′ 3″; 6/26/34, 17′ 8″; 11/2/34, 18′ 5½″; 1/28/35, 17′ 5″; 3/14/35, 16′ 3″; 4/18/35, 15′ 5¼″; 5/23/35, 15′ 1¾″; 6/25/35, 16′ 0″; 7/27/35, 17′ 0″; 10/25/35, 15.2; 12/19/35, 15.2; 1/23/36, 14.8; 2/27/36, 13.2; 3/31/36, 11.7; 7/9/36, 12.0; 8/18/36, 12.8; 9/17/36, 12.5; 10/20/36, 13.3; 12/28/36, 13.2; 2/16/37, 12.2; 3/29/37, 9.4; 5/3/37, 8.8; 7/16/37, 10.7; 9/28/37, 12.2; 12/4/37, 14.2; 4/15/38, 4.6; 5/26/38, 6.6; 7/14/38, 8.5; 9/20/38, 10.3; 10/28/38, 9.5; 12/24/38, 10.5; 1/31/39, 10.6; 3/3/39, 10.9; 4/13/39, 11.6; 8/1/39, 14.7; 9/27/39, 14.6; 11/8/39, 14.2; 1/18/40, 13.2; 3/20/40, 9.6; 5/16/40, 7.9; 8/2/40, 11.2; 10/17/40, 12.7; 9/20/41, 10.3.

15N/3E-31A1—Reference point—top of pit plus 4-inch timber. 5/12/31, 21′ 10¾″; 6/26/31, 22′ 10¾″; 7/28/31, 24′ 0″; 8/31/31, 24′ 11″; 9/23/31, 24′ ¾″; 10/20/31, 23′ 8½″; 11/8/31, 23′ 1″; 12/17/31, 22′ 9½″; 1/19/32, 22′ 2″; 2/23/32, 21′ 4″; 3/22/32, 20′ 11¼″; 4/18/32, 21′ 4½″; 5/23/32, 21′ 2″; 6/21/32, 21′ 5½″; 7/19/32, 22′ 4″; 9/13/32, 22′ 11″; 10/18/32, 22′ 6½″; 11/22/32, 22′ 2½″; 12/27/32, 21′ 10″; 1/30/33, 21′ 3″; 4/10/33, 21′ 5″; 5/17/33, 22′ 2½″; 6/29/33, 23′ ¾″; 7/25/33, 24′ 5″; 10/18/33, 23′ 7½″; 12/8/33, 23′ 7½″; 3/13/34; 22′ 3½″; 6/26/34, 23′ 11″; 10/2/34, 24′ 7″; 11/5/34, 24′ ¾″; 12/11/34, 23′ 7½″; 2/15/35, 22′ 5″; 3/19/35, 21′ 11″; 4/19/35, 21′ 2″; 5/23/35, 20′ 5½″;

TABLE 3—Continued

DEPTHS TO GROUND WATER AT MEASUREMENT WELLS IN SUTTER-YUBA AREA

Measurements Made by Sutter County Farm Advisor
(Depths to water in feet and/or inches measured from reference point)

6/27/35, 21′ 2″; 7/30/35, 22′ 6″; 9/21/35, 23′ 1¾″; 10/25/35, 21.9; 12/20/35, 21.1; 1/23/36, 17.2; 2/25/36, 20.1; 4/14/36, 19.1; 7/22/36, 20.1; 8/18/36, 20.7; 9/17/36, 20.2; 10/21/36, 20.2; 12/28/36, 19.7.

16N/3E-30A1—Reference point—top of casing, 6 inches above ground level. 6/27/31, 11′ 10″; 7/28/31, 12′ 2″; 8/27/31, 12′ 3¼″; 9/17/31, 12′ 6″; 10/26/31, 12′ 9″; 11/17/31, 13′ ½″; 12/16/31, 13′ 1½″; 1/18/32, 10′ ¼″; 2/18/32, 9′ 11″; 3/18/32, 10′ 1½″; 5/15/32, 10′ 10½″; 6/30/32, 10′ 6½″; 7/13/32, 10′ 9½″; 9/8/32, 11′ 10″; 10/17/32, 12′ 4¾″; 11/22/32, 12′ 8½″; 12/21/32, 13′ 2″; 1/26/33, 13′ 2½″; 3/3/33, 13′ 7¼″; 4/7/33, 12′ 11″; 5/11/33, 12′ 8¼″; 6/20/33, 12′ 11″; 7/31/33, 12′ 11″; 9/13/33, 13′ 6½″; 10/17/33, 13′ 10″; 12/8/33, 14′ 4″; 3/12/34, 12′ 7¼″; 6/26/34, 11′ 9″; 7/31/34, 12′ 1¼″; 9/27/34, 12′ 6½″; 11/2/34, 13′ 4″; 12/11/34, 13′ 7¾″; 1/28/35, 11′ 4¼″; 3/14/35, 9′ 2″; 4/18/35, 9′ 6¾″; 5/22/35, 10′ 5″; 6/25/35, 10′ 8″; 7/29/35, 10′ 11½″; 9/19/35, 12′ 2″; 10/23/35, 11.9; 12/19/35, 12.6; 1/22/36, 11.2; 2/27/36, 7.5; 3/31/36, 9.1; 5/15/36, 9.7; 6/12/36, 10.2; 7/9/36, 10.7; 8/18/36, 11.7; 9/17/36, 12.1; 10/20/36, 12.2; 12/22/36, 12.7; 2/16/37, 9.1; 3/29/37, 6.6; 5/3/37, 8.6; 7/16/37, 10.1; 12/4/37, 10.2; 5/17/38, 7.9; 7/14/38, 9.5; 9/15/38, 11.2; 10/26/38, 11.8; 12/24/38, 12.4; 1/31/39, 12.6; 3/3/39, 12.7; 4/13/39, 13.1; 6/3/39, 12.1; 8/1/39, 12.5; 9/22/39, 11.6.

16N/3E-30C1—Reference point—top of casing, 4 inches above ground. 5/22/31, 11′ 8½″; 6/25/31, 11′ 7″; 7/29/31, 12′ 0″; 8/27/31, 11′ 9″; 9/17/31, 11′ 7½″; 10/21/31, 11′ ½″; 11/19/31, 10′ 7½″; 12/23/31, 10′ 2″; 1/18/32, 8′ 7″; 2/23/32, 8′ 4½″; 3/19/32, 8′ 4½″; 4/15/32, 8′ 11¾″; 5/17/32, 9′ 1″; 6/21/32, 8′ 9½″; 7/13/32, 9′ 1″; 9/12/32, 9′ 2½″; 10/17/32, 9′ 4½″; 11/30/32, 10′ 2¼″; 12/29/32, 10′ 6¼″; 1/26/33, 10′ 9¼″; 3/3/33, 10′ 6½″; 4/7/33, 10′ 10″; 5/12/33, 10′ 9¼″; 6/20/33, 9′ 10″; 7/31/33, 9′ 7½″; 9/13/33, 9′ 3″; 10/17/33, 9′ 6″; 12/8/33, 10′ 4½″; 3/12/34, 10′ 0″; 6/26/34, 11′ 8½″; 9/27/34, 11′ 9″; 11/2/34, 12′ 9″; 12/11/34, 11′ 11½″; 1/28/35, 10′ 10¾″; 3/4/35, 9′ 8½″; 4/18/35, 9′ 4″; 5/23/35, 9′ 8″; 6/25/35, 10′ 5″; 7/29/35, 11′ 5½″; 9/21/35, 11′ 2½″; 10/25/35, 10′ 10¾″; 12/19/35, 11.1; 1/23/36, 10.7; 2/27/36, 9.5; 3/31/36, 8.3; 7/9/36, 9.4; 8/18/36, 9.8; 9/17/36, 9.6; 10/20/36, 9.7; 12/28/36, 10.3; 2/16/37, 6.5; 3/29/37, 6.9; 5/3/37, 8.5; 7/16/37, 8.6; 9/28/37, 8.2; 12/4/37, 8.6; 1/25/38, 6.5; 4/14/38, 3.2; 5/26/38, 6.3; 7/14/38, 6.9; 9/20/38, 8.5; 10/26/38, 8.0; 12/24/38, 8.7; 1/31/39, 8.9; 3/3/39, 9.2; 4/13/39, 10.3; 8/1/39, 11.2; 9/22/39, 12.1; 11/8/39, 10.6; 1/18/40, 10.2; 3/20/40, 6.5; 5/16/40, 6.7; 8/2/40, 9.7; 10/17/40, 10.3.

16N/3E-32G5—Reference point—top of casing, 1 foot 6 inches above ground surface. 6/25/31, 22′ 5″; 7/28/31, 26′ 2½″; 8/27/31, 24′ 6½″; 9/17/31, 20′ 5¼″; 10/19/31, 18′ 11″; 11/19/31, 18′ 6″; 12/16/31, 18′ 2¾″; 1/2/32, 17′ 8½″; 1/18/32, 17′ 0″; 2/18/32, 15′ 9″; 3/18/32, 12′ 8½″; 4/15/32, 19′ 6″; 5/17/32, 15′ 1¼″; 6/23/32, 23′ 10¼″*; 7/13/32, 18′ 1″; 9/8/32, 18′, 2½″; 10/17/32, 17′ 10¼″; 11/22/32, 17′ 8″; 12/29/32, 17′ 5″; 1/26/33, 17′ 3½″; 3/3/33, 18′ 1½″; 4/7/33, 25′ 4″ (operating); 5/11/33, 17′ 9½″; 6/20/33, 22′ 5½″; 7/31/33, 28′ 10″ (operating); 9/13/33, 21′ 10¼″; 10/17/33, 21′ 0″; 11/18/33, 19′ 2½″; 3/12/34, 18′ 2″. Reference point—top of casing, ground level. 6/26/34, 24′ 5″; 7/31/34, 25′ 7″; 9/27/34, 23′ 9¾″; 11/2/34, 19′ 5″; 12/11/34, 18′ 5½″; 1/28/35, 16′ 10″; 3/14/35, 14′ 4½″; 4/18/35, 14′ ½″; 5/22/35, 12′ 2½″; 7/3/35, 16′ 5½″; 7/29/35, 20′ 0″; 8/27/35, 17′ 1″; 9/19/35, 19′ 17″; 1/22/36, 15.4; 2/27/36, 12.9; 3/31/36, 13.4; 7/9/36, 18.5; 8/18/36, 18.8; 9/17/36, 19.5; 10/23/36, 16.4; 12/22/36, 15.3; 2/16/37, 13.8; 3/29/37, 11.2; 5/3/37, 10.7; 7/16/37, 15.3; 12/4/37, 15.0; 1/25/38, 12.2; 2/25/38, 5.1; 4/14/38, 3.5; 5/26/38, 5.7; 7/14/38, 12.8; 9/15/38, 13.2; 10/26/38, 12.8.

* Nearby well operating.

APPENDIX F

RECORDS OF APPLICATION OF GROUND WATER TO REPRESENTATIVE CROPS IN SUTTER-YUBA AREA

APPLICATION OF GROUND WATER TO REPRESENTATIVE CROPS IN SUTTER-YUBA AREA IN 1948 AND 1949

Crop	Season	Map number	Well number	Method of irrigation	Soil type	Acres	Depth per irrigation, in inches							Total depth, in inches
							1st	2d	3d	4th	5th	6th	7th	
Alfalfa	1948	1	15N/1E-13E1	Border check	Clay adobe	8	5.8	8.1	7.3	7.3				28.5
	1948	2	11N/3E-15P1	Border check	Fine sandy loam	32	16.1	4.4	30.8	7.5	12.7	2.3		73.8
	1949	3	14N/5E-32R1 14N/5E-32R2	Border check	Loam	20	4.15	4.01	8.81	4.70	4.99	12.96	5.98	53.6
	1949	3	14N/5E-32R1 14N/5E-32R2	Border check	Loam	18	7.83	8.47	9.89	9.29	10.54	11.90	11.10	69.0
	1949	4	15N/5E-18B1	Border check	Loam	27								91.8
							Weighted mean depths: 1948 64.8 inches (5.4 feet) 1949 73.8 inches (6.1 feet) 1948-49 70.0 inches (5.8 feet)							
Almonds	1948	5	16N/3E-29R1	Contour check	Loam	13	5.1	5.0	6.2					16.3
	1948	6	16N/3E-26Q1	Contour check	Loam	50	7.5	7.3						14.8
	1948	7	15N/2E-8J1	Contour check	Loam	70	1.8	8.9						10.7
	1949	6	16N/3E-26Q1	Contour check	Loam	50	7.8	7.33	5.0					20.1
	1949	8	14N/3E-4F1	Contour check	Loam	20	6.4	7.65	3.75	3.75				21.5
							Weighted mean depths: 1948 12.8 inches (1.1 feet) 1949 20.5 inches (1.7 feet) 1948-49 15.4 inches (1.3 feet)							
Young Almonds Inter-planting Beans	1948	9	16N/3E-23R2	Contour check	Loam	20	6.1	4.2	3.8					14.1
Beans	1948	10	13N/4E-7E1	Furrow	Silt loam	36								8.4
	1948	11	15N/4E-17J1 15N/4E-8R1	Furrow	Fine sandy loam	103	4.2	0.8	5.0	6.5				16.5
	1948	12	13N/5E-6D2	Furrow	Fine sandy loam	60	6.0	5.2						11.2
	1949	13	13N/4E-12C1	Furrow	Fine sandy loam	50	4.5	2.0	1.5	1.7	1.7			11.4
							Weighted mean depths: 1948 13.4 inches (1.1 feet) 1949 11.4 inches (1.0 foot) 1948-49 13.0 inches (1.1 feet)							
Cherries	1948	14	15N/3E-15G1	Contour check	Loam	18	6.8	6.8	2.5	4.4	1.9			22.4
	1948	15	15N/3E-3D1	Contour check	Loam	60	7.4	7.7	5.9	7.3	0.7			29.0
							Weighted mean depth: 1948 27.5 inches (2.3 feet)							
Egyptian Corn	1948	11	15N/4E-17J1 15N/4E-8R1	Furrow	Fine sandy loam	13	6.2	5.7	9.2	8.9	1.3			31.3
	1949	12	13N/5E-6D2	Furrow	Fine sandy loam	60	5.6	8.1	7.5					21.2
							Weighted mean depth: 1948-49 23.0 inches (1.9 feet)							
Flax	1948	16	12N/4E-2Q1	Contour check	Clay loam	55								10.4
Hops	1948	17	13N/5E-4J1	Furrow	Fine sandy loam	19	3.7	3.1	3.4	0.8				11.0
	1949	17	13N/5E-4J1	Furrow	Fine sandy loam	27.5	3.8	3.0	3.6					10.4
							Weighted mean depth: 1948-49 10.6 inches (0.9 foot)							
Pasture	1948	18	12N/4E-10A1	Border check	Loam	60								51.5
	1948	19	14N/4E-34C1	Contour check	Loam	120								26.2
	1949	18	12N/4E-10A1	Border check	Loam	75								71.0
	1949	4	15N/3E-18B1	Border check	Loam	30								84.6
	1949	20	14N/5E-21B1	Border check	Loam	172								79.8
							Weighted mean depths: 1948 34.6 inches (3.9 feet) 1949 78.0 inches (6.5 feet) 1948-49 60.7 inches (5.1 feet)							

APPLICATION OF GROUND WATER TO REPRESENTATIVE CROPS IN SUTTER-YUBA AREA IN 1948 AND 1949—Continued

Crop	Season	Map number	Well number	Method of irrigation	Soil type	Acres	Depth per irrigation, in inches							Total depth, in inches
							1st	2d	3d	4th	5th	6th	7th	
Peaches	1948	21	13N/4E-15K1	Contour check	Fine sandy loam	37	17.4	14.1	12.7					44.2
	1948	22	15N/3E-4C2	Contour check	Clay loam	38.5	1.8	7.3	11.5					20.6
	1948	23	13N/5E-7C2	Contour check	Fine sandy loam	55	6.8	5.7	7.7	6.5				26.7
	1948	24	13N/4E-16N1	Contour check	Fine sandy loam	22	4.1	8.0	7.8	7.1				27.0
	1948	25	15N/3E-33D1	Contour check	Loam	47	1.5	17.0	5.2	8.6				32.3
	1948	26	13N/3E-2L1	Contour check	Loam	15	4.0	7.4	5.6	5.2	6.5			28.7
	1948	27	15N/3E-9A1	Contour check	Loam	40	6.8	2.1	4.3	3.5				16.7
	1948	28	14N/3E-26M2	Contour check	Loam	56								31.6
	1948	29	15N/3E-34L1	Contour check	Loam	30								29.5
	1949	26	13N/3E-2L1	Contour check	Loam	15	6.0	5.0	4.7	6.9	11.9			34.5
	1949	23	13N/5E-7C2	Contour check	Fine sandy loam	55								27.0
	1949	30	13N/4E-13F1	Contour check	Fine sandy loam	34								36.1
	1949	24	13N/4E-16N1	Contour check	Fine sandy loam	22								30.6
	1949	29	15N/3E-34L1	Contour check	Loam	30								37.1
							Weighted mean depths:			1948	28.7 inches (2.4 feet)			
										1949	32.2 inches (2.7 feet)			
										1948–49	29.7 inches (2.5 feet)			
Prunes	1948	25	15N/3E-33F1	Contour check	Loam	108	7.1	4.7						12.0
	1948	31	16N/3E-36L1	Contour check	Loam	100	3.7	6.4						10.1
	1948	27	15N/3E-9A1	Contour check	Loam	20	2.5	1.8	3.7					8.0
	1948	32	16N/3E-17Q1	Contour check	Loam	20	13.1	9.8	8.1					31.0
	1949	32	16N/3E-17Q1	Contour check	Loam	20	11.75	9.9	10.2	9.35				41.1
							Weighted mean depths:			1948	12.5 inches (1.0 foot)			
										1949	41.1 inches (3.4 feet)			
										1948–49	14.6 inches (1.2 feet)			
Rice	1948	33	12N/4E-24F1	Contour check	Loam	80								63.5
	1948	34	11N/4E-9L1 11N/4E-9C1	Contour check	Clay adobe	150								88.5
	1948	35	15N/4E-23A1 14N1,14P1,24C1	Contour check	Loam	325								48.7
	1949	36	16N/4E-6N2	Contour check	Clay loam	120								66.0
	1949	37	12N/4E-20J1 R1, Q1	Contour check	Clay loam	185								171.5 56.2
	1949	35	15N/4E-23A1 14N1, 14P1, 24C1	Contour check	Loam	315	Weighted mean depths:			1948	60.6 inches (5.1 feet)			
										1949	92.5 inches (7.7 feet)			
										1948–49	77.5 inches (6.5 feet)			
Sugar Beets	1948	10	13N/4E-7E1 7M1, 18F1	------	Silt loam	224								17.5
Walnuts	1948	6	16N/3E-26Q1	Furrow	Loam	65	8.6	5.9	3.2					17.7
	1948	14	15N/3E-15G1	Contour check	Loam	12	6.7	6.7	2.6	4.4	1.9			22.3
	1948	11	15N/4E-17J1	Contour check	Fine sandy loam	35	16.6	13.7						30.3
	1948	38	15N/4E-20F1	Contour check	Fine sandy loam	40	6.3	8.1	6.0	6.2	4.3			30.9
	1949	6	16N/3E-26Q1	Furrow	Loam	65	6.2	5.1	4.0	4.6	2.8			22.7
							Weighted mean depths:			1948	24.1 inches (2.0 feet)			
										1949	22.7 inches (1.9 feet)			
										1948–49	23.9 inches (2.0 feet)			

APPENDIX G

RESERVOIR YIELD STUDIES

6—63095

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RESERVOIR YIELD STUDIES

YIELD STUDY
HONCUT CREEK RESERVOIR PLUS DIVERSION FROM FRENCH DRY CREEK (NOVEMBER-APRIL)

Capacity: 38,000 acre-feet **Yield: 24,000 acre-feet**

(In acre-feet)

Season	November-May				June-October							Spill, end of May	Deficiency, in percent
	Runoff	Diversion	Demand, 30% of annual demand	Storage, end of May	Demand, 70% of annual demand	Apparent storage, end of October	Apparent deficiency, end of October	Average summer storage	Evaporation	Storage, end of October	Deficiency, end of October		
1920-21	43,170	44,950	7,200	38,000	16,800	21,200		29,600	2,500	18,700		42,920	
1921-22	35,470	28,390	7,200	38,000	16,800	21,200		29,600	2,500	18,700		37,360	
1922-23	18,060	18,350	7,200	38,000	16,800	21,200		29,600	2,500	18,700		9,910	
1923-24	4,700	4,720	7,200	20,920	16,800	4,120		12,520	1,400	2,720			
1924-25	18,490	19,010	7,200	33,020	16,800	16,220		24,620	2,300	13,920			
1925-26	11,350	11,890	7,200	29,960	16,800	13,160		21,560	2,100	11,060			
1926-27	31,120	29,700	7,200	38,000	16,800	21,200		29,600	2,500	18,700		26,680	
1927-28	22,180	22,990	7,200	38,000	16,800	21,200		29,600	2,500	18,700		18,670	
1928-29	6,860	6,260	7,200	24,620	16,800	7,820		16,220	1,700	6,120			
1929-30	16,430	17,110	7,200	32,460	16,800	15,660		24,060	2,200	13,460			
1930-31	4,520	4,680	7,200	15,460	16,800		1,340	7,060	1,000		2,340		9.8
1931-32	21,130	19,720	7,200	33,650	16,800	16,850		25,250	2,300	14,550			
1932-33	8,100	6,120	7,200	21,570	16,800	4,770		13,170	1,500	3,270			
1933-34	6,200	6,320	7,200	8,590	16,800		8,210	190	50		8,260		34.4
1934-35	21,200	20,600	7,200	34,600	16,800	17,800		26,200	2,400	15,400			
AVERAGE	17,900	17,400	7,200		16,800						710	9,040	

YIELD STUDY
CAMP FAR WEST RESERVOIR

Capacity: 104,000 acre-feet **Yield: 90,000 acre-feet**

(In acre-feet)

Season	November-May				June-October							Spill, end of May	Deficiency, in percent
	Runoff	Diversion	Demand, 30% of annual demand	Storage, end of May	Demand, 70% of annual demand	Apparent storage, end of October	Apparent deficiency, end of October	Average summer storage	Evaporation	Storage, end of October	Deficiency, end of October		
1920-21	467,000		27,000	104,000	63,000	41,000		72,500	6,200	34,800		336,000	
1921-22	409,000		27,000	104,000	63,000	41,000		72,500	6,200	34,800		312,800	
1922-23	364,000		27,000	104,000	63,000	41,000		72,500	6,200	34,800		267,800	
1923-24	23,000		27,000	30,800	63,000		32,200				32,200		35.8
1924-25	239,000		27,000	104,000	63,000	41,000		72,500	6,200	34,800		108,000	
1925-26	223,000		27,000	104,000	63,000	41,000		72,500	6,200	34,800		116,800	
1926-27	450,000		27,000	104,000	63,000	41,000		72,500	6,200	34,800		353,800	
1927-28	296,000		27,000	104,000	63,000	41,000		72,500	6,200	34,800		199,800	
1928-29	112,000		27,000	104,000	63,000	41,000		72,500	6,200	34,800		15,800	
1929-30	355,000		27,000	104,000	63,000	41,000		72,500	6,200	34,800		258,800	
1930-31	145,000		27,000	104,000	63,000	41,000		72,500	6,200	34,800		48,800	
1931-32	234,000		27,000	104,000	63,000	41,000		72,500	6,200	34,800		137,800	
1932-33	51,000		27,000	58,800	63,000		4,200	27,300	3,100		7,300		8.1
1933-34	126,000		27,000	99,000	63,000	36,000		67,500	5,800	30,200			
1934-35	354,000		27,000	104,000	63,000	41,000		72,500	6,200	34,800		253,200	
AVERAGE	256,000		27,000		63,000						2,600	160,600	

YIELD STUDY

COON CREEK RESERVOIR PLUS COMBIE-OPHIR DIVERSION OF 100 SECOND-FEET (NOVEMBER-APRIL)

Capacity: 59,000 acre-feet

Yield: 56,000 acre-feet

(In acre-feet)

Season	November-May				June-October							Spill, end of May	Defi-ciency, in percent
	Runoff	Diver-sion	Demand, 30% of annual demand	Storage, end of May	Demand, 70% of annual demand	Apparent storage, end of October	Apparent deficiency, end of October	Average summer storage	Evapora-tion	Storage, end of October	Defi-ciency, end of October		
1920-21	44,600	35,700	16,800	59,000	39,200	19,800	--------	39,400	2,500	17,300	--------	4,500	--------
1921-22	40,000	35,700	16,800	59,000	39,200	19,800	--------	39,400	2,500	17,300	--------	17,200	--------
1922-23	33,500	35,700	16,800	59,000	39,200	19,800	--------	39,400	2,500	17,300	--------	10,700	--------
1923-24	5,900	35,700	16,800	42,100	39,200	2,900	--------	22,500	1,800	1,100	--------	--------	--------
1924-25	24,600	35,700	16,800	44,600	39,200	5,400	--------	25,000	2,000	3,400	--------	--------	--------
1925-26	22,300	35,700	16,800	44,600	39,200	5,400	--------	25,000	2,000	3,400	--------	--------	--------
1926-27	48,200	35,700	16,800	59,000	39,200	19,800	--------	39,400	2,500	17,300	--------	11,500	--------
1927-28	30,200	35,700	16,800	59,000	39,200	19,800	--------	39,400	2,500	17,300	--------	7,400	--------
1928-29	11,500	35,700	16,800	47,700	39,200	8,500	--------	28,100	2,100	6,400	--------	--------	--------
1929-30	19,000	35,700	16,800	44,300	39,200	5,100	--------	24,700	2,000	3,100	--------	--------	--------
1930-31	5,900	35,700	16,800	27,900	39,200	--------	11,300	8,300	900	--------	12,200	--------	21.8
1931-32	23,300	35,700	16,800	42,200	39,200	3,000	--------	22,600	1,800	1,200	--------	--------	--------
1932-33	11,500	35,700	16,800	31,600	39,200	--------	7,600	12,000	1,200	--------	8,800	--------	15.7
1933-34	11,200	35,700	16,800	30,100	39,200	--------	9,100	10,500	1,100	--------	10,200	--------	18.2
1934-35	31,800	35,700	16,800	50,700	39,200	11,500	--------	31,100	2,200	9,300	--------	--------	--------
AVERAGE	24,200	35,700	16,800	--------	39,200	--------	--------	--------	--------	--------	2,100	3,400	--------

APPENDIX H

ESTIMATES OF COST

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ESTIMATES OF COST

ESTIMATED COST OF PEACH BOWL PROJECT

(Based on prices prevailing in April, 1952)

Pumping plant capacity: 135 second-feet
Gross seasonal diversion: 24,000 acre-feet
Maximum monthly demand: (July) 6,450 acre-feet, 105 second-feet

Acreage served: Presently irrigated lands, 4,500 acres; irrigated lands to be developed, 2,500 acres

Item	Quantity	Unit price	Cost	
Capital Costs				
Pumping Plant				
Pumps, motors, and electrical equipment	3 each	$14,330	$43,000	
Discharge pipe and footings	3 each	5,700	17,100	
Sump and trash racks		lump sum	7,100	
Structure		lump sum	14,400	
Discharge structure and sand trap		lump sum	3,400	$85,000
Subtotal				$85,000
Administration and engineering, 10%				$8,500
Contingencies, 15%				12,800
Interest during construction				1,600
TOTAL				$107,900
Conveyance System				
Excavation	137,800 cu. yd.	$0.30	$41,400	
Trimming	195,900 sq. yd.	0.25	49,000	
Lining, concrete	10,900 cu. yd.	35.00	381,500	
Turnouts, 100 second-feet	14 each	1,100	15,400	
50 second-feet	20 each	830	16,600	
Crossings, 100 second-feet				
Railroad	1 each	5,800	5,800	
County road	1 each	3,200	3,200	
Crossings, 50 second-feet				
County road	4 each	2,300	9,200	
Farm road	6 each	1,400	8,400	
Right of way				
Orchard lands	52 acres	1,500	78,000	
Open lands	44 acres	750	33,000	$641,500
Subtotal				$641,500
Administration and engineering, 10%				$64,200
Contingencies, 15%				96,200
Interest during construction				12,000
TOTAL				$813,900

Item	Quantity	Unit price	Cost	
Capital Costs—Continued				
Distribution System				
Presently irrigated lands	4,500 acres	$70.00	$315,000	
Irrigable lands to be developed	2,500 acres	20.00	50,000	$365,000
Subtotal				$365,000
Administration and engineering, 10%				$36,500
Contingencies, 15%				54,800
Interest during construction				6,800
TOTAL				$463,100
Annual Costs				
Pumping Plant				
Interest, 3%				$3,200
Amortization, 0.887%				1,000
Replacement, 0.513%				600
Operation and maintenance, 5%				5,400
Electric energy				5,800
TOTAL				$16,000
Conveyance System				
Interest, 3%				$24,400
Amortization, 0.887%				7,200
Replacement, 0.50%				4,100
Operation and maintenance, 1.0%				8,100
TOTAL				$43,800
Distribution System				
Interest, 3%				$13,900
Amortization, 0.887%				4,100
Operation and maintenance				
Ditch tender service, $0.70 per acre-foot				16,800
Maintenance charge, $0.40 per acre				2,800
District overhead, $0.50 per acre				3,500
TOTAL				$41,100

ESTIMATED COST OF SOUTH HONCUT CREEK DAM AND RESERVOIR

(Based on prices prevailing in April, 1952)

Elevation of crest of dam: 910 feet, U.S.G.S. datum
Elevation of crest of spillway: 898 feet
Height of dam to spillway crest, above stream bed: 168 feet
Capacity of reservoir to crest of spillway: 38,000 acre-feet
Capacity of spillway with 4-foot freeboard: 10,000 second-feet

Item	Quantity	Unit price	Cost	
Capital Costs				
Dam				
Unwatering and care of stream		lump sum	$10,000	
Stripping and preparation of foundation				
Common	37,570 cu. yd.	$1.00	37,600	
Rock	7,760 cu. yd.	3.00	23,300	
Excavation for embankment				
From borrow pits	338,200 cu. yd.	0.45	152,200	
Tailings	451,900 cu. yd.	0.45	203,400	
Sand and gravel filter	101,200 cu. yd.	1.50	151,800	
Embankment				
Impervious from borrow	294,000 cu. yd.	0.25	73,500	
Sand and gravel filter	101,200 cu. yd.	0.50	50,600	
Tailings	451,900 cu. yd.	0.20	90,400	
Rock from salvage	71,600 cu. yd.	0.30	21,500	
Drilling grout holes	4,020 lin. yd.	3.00	12,100	
Pressure grouting	2,680 cu. ft.	4.00	10,700	$837,100
Spillway				
Excavation	86,620 cu. yd.	2.50	216,600	
Concrete	2,770 cu. yd.	35.00	97,000	
Reinforcing steel	207,000 lbs.	0.15	31,100	344,700
Outlet Works				
Excavation				
Common	200 cu. yd.	2.00	400	
Rock	1,980 cu. yd.	6.00	11,900	
Concrete				
Inlet structure	44 cu. yd.	100.00	4,400	
Trench backfill and cut-offs	1,590 cu. yd.	30.00	47,700	
Steel pipe, 42-inch diameter	112,000 lbs.	0.25	28,000	
Reinforcing steel	163,800 lbs.	0.15	24,600	

Item	Quantity	Unit price	Cost	
Capital Costs—Continued				
Outlet Works—Continued				
High pressure slide gates and controls, 30-inch diameter				
Trash rack steel	2 each	lump sum	$15,000	
Control house		lump sum	1,000	
Howell-Bunger outlet valve,		lump sum	1,000	
36-inch diameter				
		lump sum	3,600	$137,600
Reservoir				
Land				
Improvements	906 acres	$125.00	$113,300	
Road to dam site		lump sum	60,000	
Clearing	2 miles	50,000	100,000	
	906 acres	150.00	135,900	409,200
Subtotal				
				$1,728,600
Administration and engineering, 10%				
Contingencies, 15%				$172,900
Interest during construction				259,300
				64,800
TOTAL				
				$2,225,600
Annual Costs				
Interest, 3%				$66,800
Amortization, 0.887%				19,700
Replacement, 0.07%				1,600
Operation and maintenance				6,300
TOTAL				$94,400

ESTIMATED COST OF FRENCH DRY CREEK DIVERSION AND CONDUIT

(Based on prices prevailing in April, 1952)

Elevation of crest of weir: 2,132 feet, U.S.G.S. datum
Height of crest of weir, above stream bed: 7 feet
Capacity of weir with 11-foot head: 10,000 second-feet
Capacity of diversion canal: 200 second-feet
Length of canal: 2 miles

Item	Quantity	Unit price	Cost	
Capital Costs				
Diversion Works				
Excavation	436 cu.yd.	$5.00	$2,200	
Concrete, weirs and head-wall	363 cu.yd.	40.00	14,500	
Reinforcing steel	27,800 lbs.	0.15	4,200	
Trash rack steel	360 lbs.	0.30	100	
Headgates and sluice gate	3 each	1,000	3,000	$24,000
Conduit				
Excavation	12,680 cu.yd.	0.50	6,300	
Compacted fill	6,340 cu.yd.	0.50	3,200	
Shotcrete lining	21,100 sq.yd.	3.50	73,900	
Rights of way	15 acres	200.00	3,000	
Fencing	4 miles	1,500	6,000	
Clearing	15 acres	200.00	3,000	
Road crossings	3 each	500.00	1,500	96,900
Subtotal				$120,900

Item	Quantity	Unit price	Cost
Capital Costs—Continued			
Administration and engineering, 10%			$12,100
Contingencies, 15%			18,100
Interest during construction, none			
TOTAL			$151,100
Annual Costs			
Interest, 3%			$4,500
Amortization, 0.887%			1,300
Replacement, 0.50%			800
Operation and maintenance, 1.0%			1,500
TOTAL			$8,100

ESTIMATED COST OF SOUTH HONCUT CREEK DIVERSION AND CONDUIT

(Based on prices prevailing in April, 1952)

Elevation of crest of weir: 609 feet, U.S.G.S. datum
Height of weir crest, above stream bed: 9 feet
Capacity of weir with 10-foot head: 10,000 second-feet

Capacity of conduit: 150 second-feet
Length of conduit: 4.7 miles

Item	Quantity	Unit price	Cost	
Capital Costs				
Diversion Works				
Excavation, rock	425 cu.yd.	$5.00	$2,100	
Concrete, weirs and headwall	518 cu.yd.	40.00	20,700	
Reinforcing steel	14,900 lbs.	0.15	2,200	
Trash rack steel	360 lbs.	0.30	100	
Headgates and sluice gate	3 each	1,000	3,000	$28,100
Conduit				
Excavation	35,200 cu.yd.	0.50	17,600	
Compacted fill	21,000 cu.yd.	0.50	10,500	
Shotcrete lining	40,800 sq.yd.	3.50	142,800	
Siphon	1,500 lin.ft.	36.70	55,000	
Flume, metal	1,100 lin.ft.	23.40	25,800	
Rights of way	23.4 acres	200.00	4,700	
Fencing	9.4 miles	1,500	14,100	
Clearing	23.4 acres	200.00	4,700	275,200
Subtotal				$303,300

Item	Quantity	Unit price	Cost
Capital Costs—Continued			
Administration and engineering, 10%			$30,300
Contingencies, 15%			45,500
Interest during construction, none			
TOTAL			$379,100
Annual Costs			
Interest, 3%			$11,400
Amortization, 0.887%			3,400
Replacement, 0.50%			1,900
Operation and maintenance, 1.0%			3,800
TOTAL			$20,500

ESTIMATED COST OF NORTHEAST ZONE DIVERSION, CONDUIT, AND DISTRIBUTION SYSTEM

(Based on prices prevailing in April, 1952)

Capacity of conduit: 75 second-feet at diversion, decreasing uniformly to 25 second-feet at terminus
Diversion: Temporary earthfill dam on Prairie Creek

Length of conduit: 6.3 miles
Distribution system: Unlined canals and ditches
Acreage served: 2,300 acres

Item	Quantity	Unit price	Cost	
Capital Costs				
Diversion Dam				
Stripping	60 cu.yd.	$1.00	$100	
Compacted fill	160 cu.yd.	1.00	200	$300
Subtotal				$300
Administration and engineering, 10%				$100
Contingencies, 15%				100
Interest during construction, none				
TOTAL				$500
Conduit				
Excavation	39,400 cu.yd.	$0.50	$19,700	
Compacted fill	30,800 cu.yd.	0.50	15,400	
Trimming	82,500 sq.yd.	0.30	24,800	
Concrete				
Shotcrete, at road crossings	400 sq.yd.	3.50	1,400	
Reinforced, road crossings	80 cu.yd.	50.00	4,000	
Canal headwall and cutoff	15 cu.yd.	50.00	800	
Reinforcing steel	7,100 lbs.	0.15	1,100	
Headgate, 4′ x 5′ slide gate		lump sum	500	
Rights of way	46 acres	200.00	9,200	
Clearing	46 acres	200.00	9,200	
Fencing	12.6 miles	1,500	18,900	$105,000
Subtotal				$105,000
Administration and engineering, 10%				$10,500
Contingencies, 15%				15,800
Interest during construction, none				
TOTAL				$131,300

Item	Quantity	Unit price	Cost	
Capital Costs—Continued				
Distribution System	2,300 acres	$20.00	$46,000	$46,000
Subtotal				$46,000
Administration and engineering, 10%				$4,600
Contingencies, 15%				6,900
Interest during construction, none				
TOTAL				$57,500
Annual Costs				
Diversion Dam				
Construction cost				$500
Subtotal				$500
Conduit				
Interest, 3%				$3,900
Amortization, 0.887%				1,200
Replacement, 0.50%				700
Operation and maintenance, 1.0%				1,300
TOTAL				$7,100
Distribution System				
Interest, 3%				$1,700
Amortization, 0.887%				500
Operation and maintenance				
Ditch tender service, $0.50 per acre-foot				5,400
Maintenance charge, $0.40 per acre				900
District overhead, $0.50 per acre				1,200
TOTAL				$9,700

ESTIMATED COST OF BROWNS VALLEY DISTRIBUTION SYSTEM

(Based on prices prevailing in April, 1952)

Distribution system: Unlined canals and ditches

Acreage served: 2,600 acres

Item	Quantity	Unit price	Cost	
Capital Costs				
Distribution System	2,600 acres	$20.00	$52,000	$52,000
Subtotal				$52,000
Administration and engineering, 10%				$5,200
Contingencies, 15%				7,800
Interest during construction, none				
TOTAL				$65,000

Item	Quantity	Unit price	Cost
Annual Costs			
Interest, 3%			$2,000
Amortization, 0.887%			600
Operation and maintenance			
Ditch tender service, $0.80 per acre-foot			8,100
Maintenance charge, $0.60 per acre			1,600
District overhead, $0.80 per acre			2,100
TOTAL			$14,400

ESTIMATED COST OF CAMP FAR WEST DAM AND RESERVOIR

(Based on prices prevailing in April, 1952)

Elevation of crest of dam: 311 feet, U.S.G.S. datum
Elevation of crest of spillway: 300 feet
Height of dam to spillway crest, above stream bed: 155 feet

Capacity of reservoir to crest of spillway: 104,000 acre-feet
Capacity of spillway with 4-foot freeboard: 60,000 second-feet

Item	Quantity	Unit price	Cost	
Capital Costs				
Dam				
Diversion and care of stream		lump sum	$50,000	
Stripping and preparation of foundation	149,000 cu.yd.	$1.00	149,000	
Excavation for embankment				
From borrow pits	743,600 cu.yd.	0.65	483,300	
Stream bed gravel	1,243,100 cu.yd.	0.40	497,200	
Rock riprap	63,100 cu.yd.	2.00	126,200	
Embankment				
Common compacted	649,300 cu.yd.	0.25	162,300	
Pervious				
From excavation	1,055,600 cu.yd.	0.20	211,100	
From salvage	112,000 cu.yd.	0.30	33,600	
Sand and gravel filter	187,500 cu.yd.	0.50	93,800	
Rock riprap	63,100 cu.yd.	0.50	31,600	
Drilling grout holes	4,140 lin.ft.	3.00	12,400	
Pressure grouting	2,760 cu.ft.	4.00	11,000	$1,861,500
Spillway				
Excavation	200,000 cu.yd.	1.00	200,000	
Concrete	7,570 cu.yd.	35.00	265,000	
Reinforcing steel	559,400 lbs.	0.15	83,900	548,900
Outlet Works				
Tunnel, 8-foot diameter	950 lin.ft.	200.00	190,000	
Portal, excavation	8,500 cu.yd.	2.00	17,000	
Concrete (intake, gate chamber, saddles, plug, and walkway)	280 cu.yd.	60.00	16,800	

Item	Quantity	Unit price	Cost	
Capital Costs—Continued				
Outlet Works—Continued				
Reinforcing steel	28,000 lbs.	$0.15	$4,200	
Steel pipe, 66-inch diameter	210,000 lbs.	0.25	52,500	
High pressure 5′ x 5′ slide gate		lump sum	25,000	
Stilling basin		lump sum	8,800	
Needle valve				
60-inch diameter		lump sum	27,500	
36-inch diameter		lump sum	10,000	
Venturi meter		lump sum	5,000	$356,800
Reservoir				
Land and improvements	2,160 acres	$50.00	$108,000	
Clearing reservoir land	2,160 acres	100.00	216,000	$324,000
Subtotal				$3,091,200
Administration and engineering, 10%				$309,100
Contingencies, 15%				463,700
Interest during construction				115,900
TOTAL				$3,979,900
Annual Costs				
Interest, 3%				$119,400
Amortization, 0.887%				35,300
Replacement, 0.07%				2,800
Operation and maintenance				12,500
TOTAL				$170,000

ESTIMATED COST OF BEAR RIVER CANAL

(Based on prices prevailing in April, 1952)

Elevation of stilling basin: 187 feet, U.S.G.S. datum
Elevation of division box: 183 feet

Capacity of canal: 400 second-feet

Item	Quantity	Unit price	Cost	
Capital Costs				
Canal				
Excavation	43,600 cu. yd.	$1.50	$65,400	
Compacted fill	40,000 cu. yd.	0.50	20,000	
Lining, shotcrete	24,000 sq. yd.	3.50	84,000	
Drainage structures	3 each	lump sum	1,500	$170,900
Division Box				
Excavation	230 cu. yd.	3.00	700	
Concrete	87 cu. yd.	60.00	5,200	
Gates and trash racks	4 each	600.00	2,400	8,300
Rights of Way				
Land	18 acres	50.00	900	
Clearing	18 acres	100.00	1,800	
Fencing	3 miles	1,500	4,500	7,200
Subtotal				$186,400

Item	Quantity	Unit price	Cost
Capital Costs—Continued			
Administration and engineering, 10%			$18,600
Contingencies, 15%			28,000
Interest during construction, none			
TOTAL			$233,000
Annual Costs			
Interest, 3%			$7,000
Amortization, 0.887%			2,100
Replacement, 0.50%			1,200
Operation and maintenance, 1.0%			2,300
TOTAL			$12,600

ESTIMATED COST OF EAST CENTRAL ZONE SIPHON, CONDUIT, AND DISTRIBUTION SYSTEM

(Based on prices prevailing in April, 1952)

Capacity of siphon: 200 second-feet
Length of siphon: 800 feet
Capacity of conduit, initial 2.9 miles: 200 second-feet
Capacity of conduit, remaining 0.8 mile: 100 second-feet

Distribution system: Unlined canals and ditches
Acreage served: 8,500 acres

Item	Quantity	Unit price	Cost	
Capital Costs				
Siphon				
Excavation, trench	3,000 cu. yd.	$3.00	$9,000	
Backfill				
Concrete	540 cu. yd.	35.00	18,900	
Earth	1,800 cu. yd.	1.00	1,800	
Steel pipe, 66-inch diameter	140,500 lbs.	0.20	28,100	$57,800
Conduit				
Excavation	113,800 cu. yd.	0.50	56,900	
Trimming of canal	61,420 sq. yd.	0.30	18,400	
Compacted fill	16,780 cu. yd.	0.50	8,400	
Concrete				
Shotcrete	9,060 sq. yd.	3.50	31,700	
Flume intake and outlet	40 cu. yd.	50.00	2,000	
Road crossings	63 cu. yd.	50.00	3,200	
Flume footings	20 cu. yd.	80.00	1,600	
Parshall flume	15 cu. yd.	70.00	1,100	
Reinforcing steel	11,800 lbs.	0.15	1,800	
Timber				
Road crossings	6.37 MBM	350.00	2,200	
Flume substructure	14.1 MBM	400.00	5,600	
Flume, metal	300 lin. ft.	30.00	9,000	
Flume, hardware	1,690 lbs.	1.00	1,700	
Rights of way	42 acres	200.00	8,400	
Clearing	42 acres	200.00	8,400	
Fencing	7.4 miles	1,500	11,100	$171,500
Subtotal				$229,300
Administration and engineering, 10%				22,900
Contingencies, 15%				34,400
Interest during construction, none				
TOTAL				$286,600

Item	Quantity	Unit price	Cost	
Capital Costs—Continued				
Distribution System	8,500 acres	$20.00	$170,000	$170,000
Subtotal				$170,000
Administration and engineering, 10%				17,000
Contingencies, 15%				25,500
Interest during construction, none				
TOTAL				$212,500
Annual Costs				
Siphon and Conduit				
Interest, 3%				$8,600
Amortization, 0.887%				2,500
Replacement, 0.50%				1,400
Operation and maintenance, 1.0%				2,900
TOTAL				$15,400
Distribution System				
Interest, 3%				$6,400
Amortization, 0.887%				1,900
Operation and maintenance				
Ditch tender service, $0.55 per acre-foot				16,500
Maintenance charge, $0.40 per acre				3,800
District overhead, $0.50 per acre				4,200
TOTAL				$32,800

ESTIMATED COST OF SOUTH SIDE ZONE CONDUIT AND DISTRIBUTION SYSTEM

(Based on prices prevailing in April, 1952)

Capacity of conduit, initial 11.0 miles: 200 second-feet
Capacity of conduit, remaining 7.8 miles: 100 second-feet

Distribution system: Unlined canals and ditches
Acreage served: 8,500 acres

Item	Quantity	Unit price	Cost	
Capital Costs				
Conduit				
Excavation	341,360 cu. yd.	$0.50	$155,700	
Compacted fill	84,840 cu. yd.	0.50	40,900	
Trimming	330,240 sq. yd.	0.30	99,100	
Concrete				
Shotcrete	13,650 sq. yd.	3.50	47,800	
Flume transition structures	33 cu. yd.	50.00	1,700	
Road crossing	100 cu. yd.	50.00	5,000	
Substructure footings	20 cu. yd.	80.00	1,600	
Parshall flume	15 cu. yd.	70.00	1,100	
Siphon transition structure	30 cu. yd.	50.00	1,500	
Reinforcing steel	20,000 lbs.	0.15	3,000	
Timber				
Road crossings	12.5 MBM	350.00	4,400	
Flume substructure	11 MBM	400.00	4,400	
Flume, metal	420 lin. ft.	15.00	6,300	
Flume, hardware	1,320 lbs.	1.00	1,300	
Pipe, 48″ corrugated metal	150 lin. ft.	20.00	3,000	
Jacking costs	100 lin. ft.	50.00	5,000	
Diversion dam at Markham Ravine		lump sum	1,500	
Rights of way	190 acres	300.00	57,000	
Fencing	37.6 miles	1,500	56,400	
Clearing	190 acres	200.00	38,000	$534,700
Subtotal				$534,700
Administration and engineering, 10%				53,500
Contingencies, 15%				80,200
Interest during construction, none				
TOTAL				$668,400
Capital Costs—Continued				
Distribution System	8,500 acres	$20.00	$170,000	$170,000
Subtotal				$170,000
Administration and engineering, 10%				17,000
Contingencies, 15%				25,500
Interest during construction, none				
TOTAL				$212,500
Annual Costs				
Conduit				
Interest, 3%				$20,100
Amortization, 0.887%				5,900
Replacement, 0.50%				3,300
Operation and maintenance, 1.0%				6,700
TOTAL				$36,000
Distribution System				
Interest, 3%				$6,400
Amortization, 0.887%				1,900
Operation and maintenance				
Ditch tender service, $0.55 per acre-foot				16,500
Maintenance charge, $0.40 per acre				3,800
District overhead, $0.50 per acre				4,200
TOTAL				$32,800

ESTIMATED COST OF COON CREEK DAM AND RESERVOIR

(Based on prices prevailing in April, 1952)

Elevation of crest of dam: 560 feet, U.S.G.S. datum
Elevation of crest of spillway: 552 feet
Height of dam to spillway crest, above stream bed: 207 feet
Capacity of reservoir to crest of spillway: 59,000 acre-feet
Capacity of spillway with 4-foot freeboard: 14,000 second-feet

Item	Quantity	Unit price	Cost	
Capital Costs				
Dam				
Diversion and care of stream		lump sum	$5,000	
Stripping and preparation of foundation	304,200 cu.yd.	$1.50	456,300	
Excavation for embankment				
From borrow pits	903,900 cu.yd.	0.75	677,900	
From Bear River, gravel	1,245,230 cu.yd.	0.75	933,900	
Embankment				
Impervious zone, compacted	786,040 cu.yd.	0.25	196,500	
Pervious zone				
From excavation	1,130,730 cu.yd.	0.20	226,100	
From salvage	128,300 cu.yd.	0.30	38,500	
Sand and gravel filter	115,500 cu.yd.	0.50	57,700	
Rock riprap (from salvage)	40,500 cu.yd.	0.50	20,300	
Drilling grout holes	8,400 lin.ft.	3.00	25,200	
Pressure grouting	5,600 cu.ft.	4.00	22,400	$2,659,800
Auxiliary Dams				
Stripping and preparation of foundation	55,260 cu.yd.	1.50	82,900	
Excavation for embankment				
From borrow pits	180,160 cu.yd.	0.75	135,100	
From quarry	251,410 cu.yd.	0.75	188,600	
Embankment				
Impervious zone	156,660 cu.yd.	0.25	39,200	
Pervious zone				
From excavation	176,510 cu.yd.	0.20	35,300	
From salvage	22,800 cu.yd.	0.30	6,800	
Sand and gravel filter	74,900 cu.yd.	0.50	37,400	
Rock riprap (from salvage)	17,900 cu.yd.	0.50	9,000	
Drilling grout holes	3,400 lin.ft.	3.00	10,200	
Pressure grouting	2,260 cu.ft.	4.00	9,000	553,500
Capital Costs—Continued				
Spillway				
Excavation	2,600 cu.yd.	$2.00	$5,200	
Concrete	3,962 cu.yd.	30.00	119,000	
Reinforcing steel	98,600 lbs.	0.15	14,800	$139,000
Outlet Works				
Excavation	2,000 cu.yd.	5.00	10,000	
Concrete				
Trench backfill	1,000 cu.yd.	30.00	30,000	
Intake structure	50 cu.yd.	100.00	5,000	
Outlet structure	20 cu.yd.	100.00	2,000	
Reinforcing steel	110,000 lbs.	0.15	16,500	
Steel pipe, 48-inch diameter ¼" plate	127,500 lbs.	0.25	31,900	
High pressure slide gates and controls, 30-inch diameter	2 each	lump sum	17,000	
Howell-Bunger valve, 42-inch diameter	1 each	lump sum	7,600	120,000
Reservoir				
Land and improvements	820 acres	75.00	61,500	
Clearing	820 acres	200.00	164,000	
Road across dam		lump sum	10,000	235,500
Subtotal				$3,707,800
Administration and engineering, 10%				370,800
Contingencies, 15%				556,100
Interest during construction				139,000
TOTAL				$4,773,700
Annual Costs				
Interest, 3%				$143,200
Amortization, 0.887%				41,200
Replacement, 0.07%				3,300
Operation and maintenance				8,500
TOTAL				$196,200

ESTIMATED COST OF COON CREEK DIVERSION, CONDUIT, AND DISTRIBUTION SYSTEM

(Based on prices prevailing in April, 1952)

Capacity of conduit: 100 second-feet
Length of conduit: 7.8 miles
Canal lined for first 0.5 mile

Distribution system: Unlined canals and ditches
Acreage served: 12,000 acres

Item	Quantity	Unit price	Cost	
Capital Costs				
Diversion Structure				
Stripping	320 cu.yd.	$0.50	$200	
Embankment	900 cu.yd.	0.50	400	
Timber, flashboards	1.2 MBM	250.00	300	
Crane for removing flashboards		lump sum	1,000	$1,900
Levee				
Stripping	1,500 cu.yd.	0.50	800	
Embankment	2,000 cu.yd.	0.50	1,000	
Concrete headwall and wing walls	22 cu.yd.	60.00	1,300	
Reinforcing steel	2,200 lbs.	0.15	300	
Headgate, 4' x 5'		lump sum	500	3,900
Conduit				
Excavation	72,810 cu.yd.	0.50	36,400	
Compacted fill	32,740 cu.yd.	0.50	16,400	
Trimming	101,830 sq.yd.	0.30	30,500	
Concrete				
Shotcrete	5,330 sq.yd.	3.50	18,700	
Flume transition structures	16 cu.yd.	50.00	800	
Road crossings	60 cu.yd.	50.00	3,000	
Substructure footings	4 cu.yd.	80.00	300	
Siphon transition structure	30 cu.yd.	50.00	1,500	
Reinforcing steel	14,000 lbs.	0.15	2,100	
Timber				
Road crossings	7.5 MBM	350.00	2,600	
Flume substructure	2.6 MBM	400.00	1,000	
Flume, metal	100 lin.ft.	15.00	1,500	
Flume hardware	310 lbs.	1.00	300	
Pipe, 48-inch corrugated metal	150 lin.ft.	20.00	3,000	
Jacking costs	100 lin.ft.	50.00	5,000	
Diversion dam at Markham Ravine		lump sum	1,500	
Rights of way	60 acres	300.00	18,000	
Fencing	15.6 miles	1,500	23,400	
Clearing	60 acres	200.00	12,000	178,000
Subtotal				$183,800

Item	Quantity	Unit price	Cost	
Capital Costs—Continued				
Administration and engineering, 10%				$18,400
Contingencies, 15%				27,600
Interest during construction, none				
TOTAL				$229,800
Distribution System	12,000 acres	$20.00	$240,000	$240,000
Subtotal				$240,000
Administration and engineering, 10%				24,000
Contingencies, 15%				36,000
Interest during construction, none				
TOTAL				$300,000
Annual Costs				
Diversion and Conduit				
Interest, 3%				$6,900
Amortization, 0.887%				2,000
Replacement, 0.50%				1,100
Operation and maintenance, 1.0%				2,300
TOTAL				$12,300
Distribution System				
Interest, 3%				$9,000
Amortization, 0.887%				2,700
Operation and maintenance				
Ditch tender service, $0.55 per acre-foot				23,100
Maintenance charge, $0.40 per acre				4,800
District overhead, $0.50 per acre				6,000
TOTAL				$45,600

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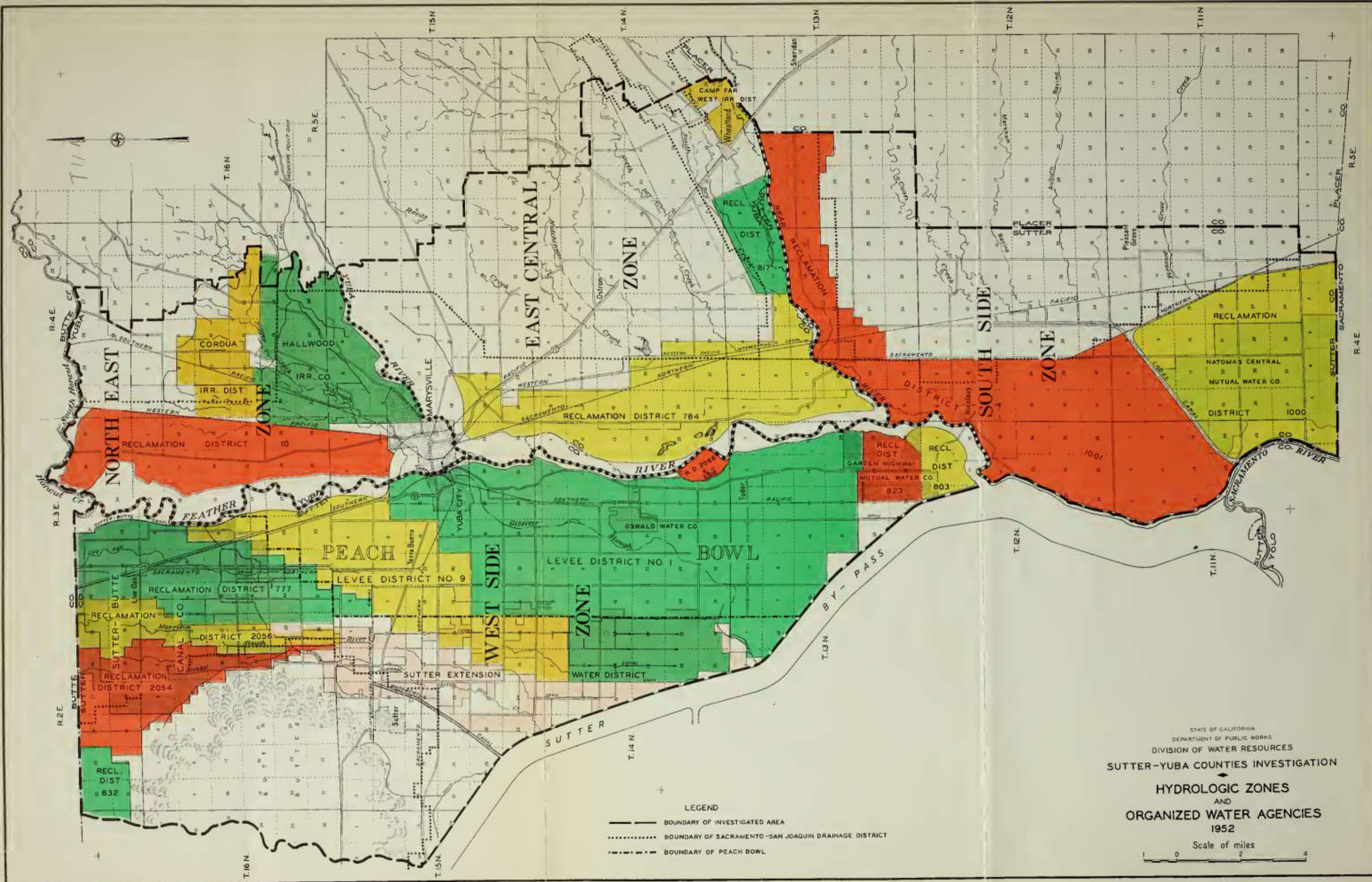
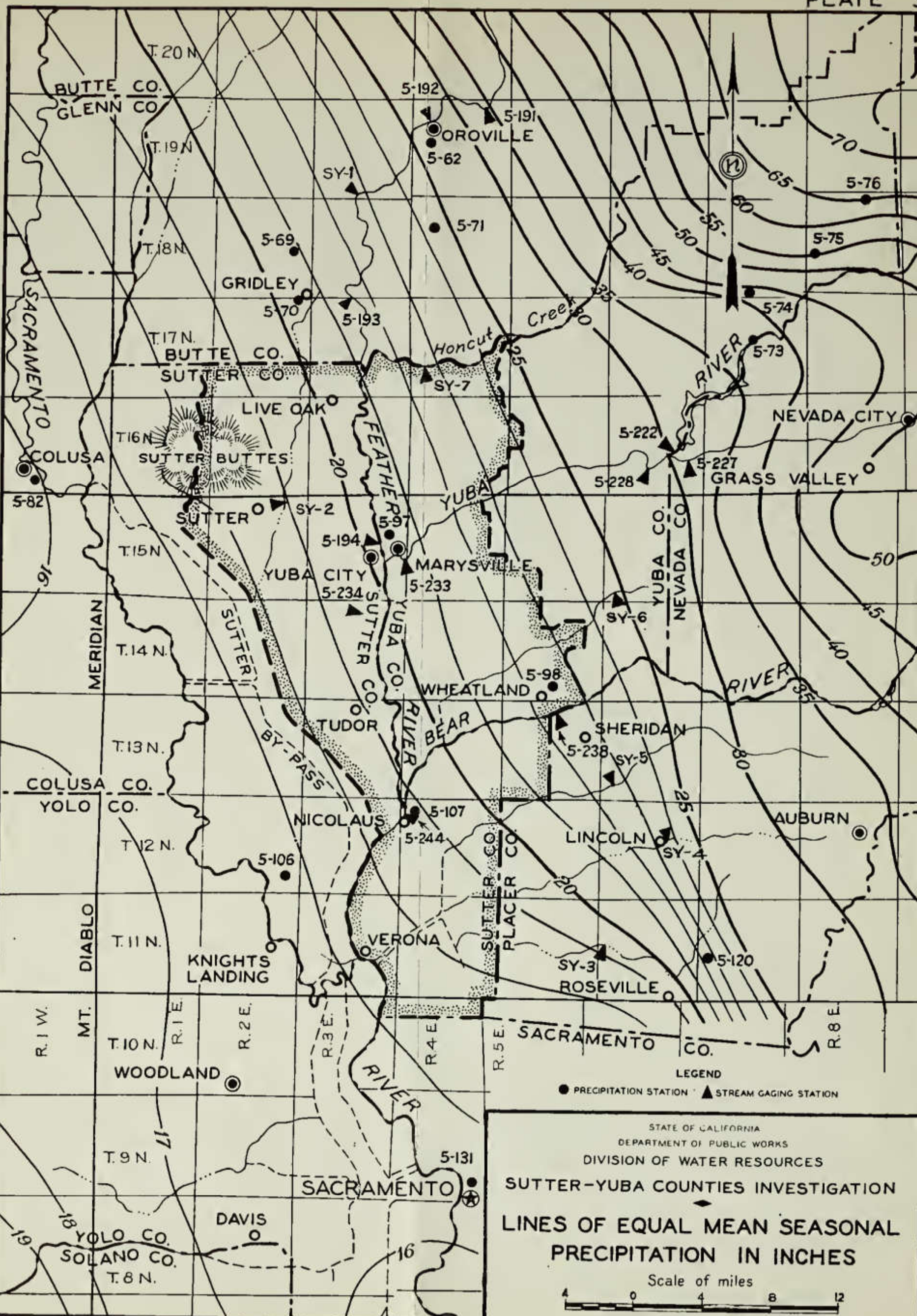
PLATE I


STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER RESOURCES
SUTTER-YUBA COUNTIES INVESTIGATION
LOCATION OF
SUTTER-YUBA AREA
SCALE OF MILES
1952
OREGON
NEVADA
MEXICO
PACIFIC OCEAN
SISKIYOU
MODOC
HUMBOLDT
TRINITY
SHASTA
LASSEN
TEHAMA
PLUMAS
MENDOCINO
GLENN
BUTTE
SIERRA
COLUSA
LAKE
Clear Lake
Lake Tahoe
SONOMA
ALPINE
MARIN
SAN FRANCISCO
ALAMEDA
SANTA CLARA
MONO
Mono Lake
INYO
MONTEREY
SAN BENITO
KINGS
SAN LUIS OBISPO
SANTA BARBARA
VENTURA
LOS ANGELES
SAN BERNARDINO
RIVERSIDE
ORANGE
SAN DIEGO
IMPERIAL
Sacramento
SACRAMENTO
Lake Almanor
Eagle Lake
Goose Lake
Lake Mead


STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER RESOURCES
SUTTER-YUBA COUNTIES INVESTIGATION
HYDROLOGIC ZONES
AND
ORGANIZED WATER AGENCIES
1952
Scale of miles
1 0 2 4
LEGEND
BOUNDARY OF INVESTIGATED AREA
BOUNDARY OF SACRAMENTO-SAN JOAQUIN DRAINAGE DISTRICT
BOUNDARY OF PEACH BOWL
NORTH EAST ZONE
EAST CENTRAL ZONE
SOUTH SIDE ZONE
WEST SIDE ZONE
PEACH BOWL
RECLAMATION DISTRICT 10
CORDUA IRR. DIST.
HALLWOOD IRR. CO
CAMP FAR WEST IRR. DIST.
RECL. DIST 817
RECLAMATION DISTRICT 784
RECLAMATION DISTRICT 1001
NATOMAS CENTRAL MUTUAL WATER CO.
RECLAMATION DISTRICT 1000
RECL. DIST. 803
RECL. DIST. GARDEN HIGHWAY MUTUAL WATER CO. 823
R.D. 2068
OSWALD WATER CO
LEVEE DISTRICT NO. 1
LEVEE DISTRICT NO. 9
RECLAMATION DISTRICT 777
SUTTER-BUTTE CANAL CO.
RECLAMATION DISTRICT 2056
RECLAMATION DISTRICT 2054
RECL. DIST. 832
SUTTER EXTENSION WATER DISTRICT
MARYSVILLE
YUBA CITY
SUTTER BY-PASS

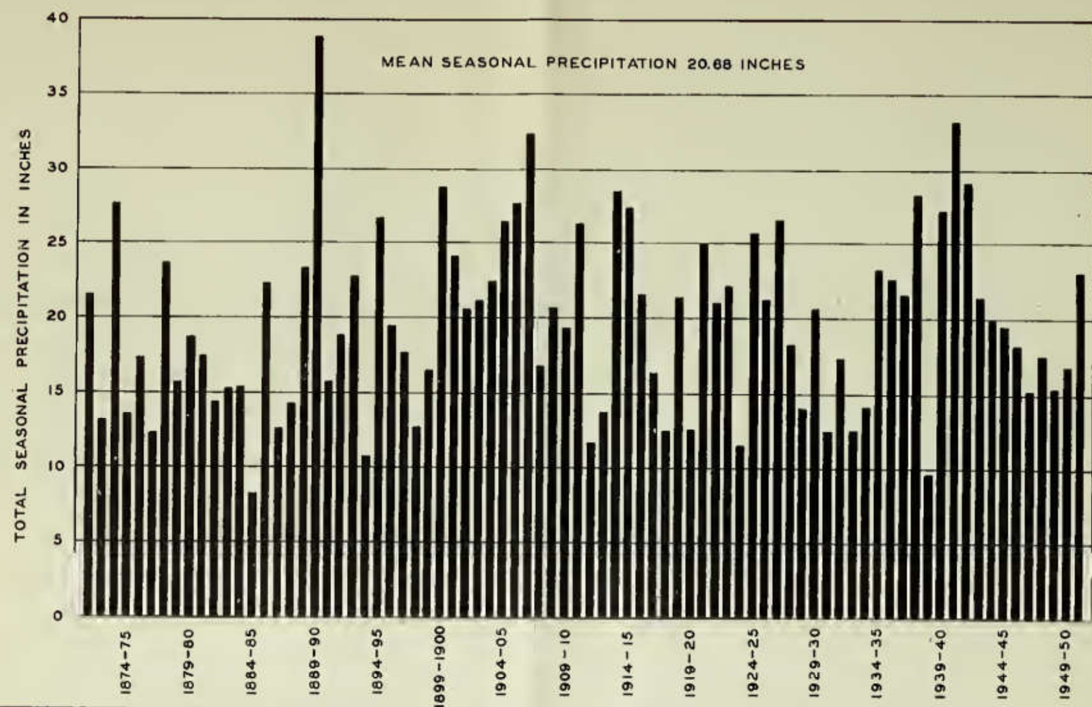


STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER RESOURCES
SUTTER–YUBA COUNTIES INVESTIGATION

LINES OF EQUAL MEAN SEASONAL PRECIPITATION IN INCHES

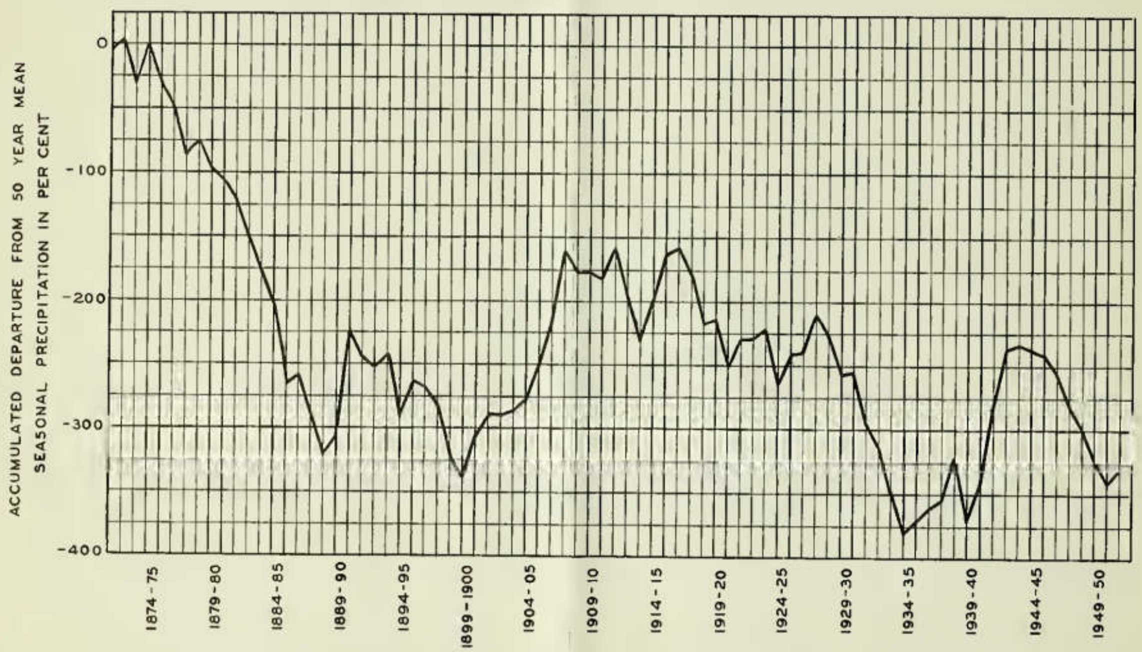
Scale of miles
4 0 4 8 12

PLATE 4

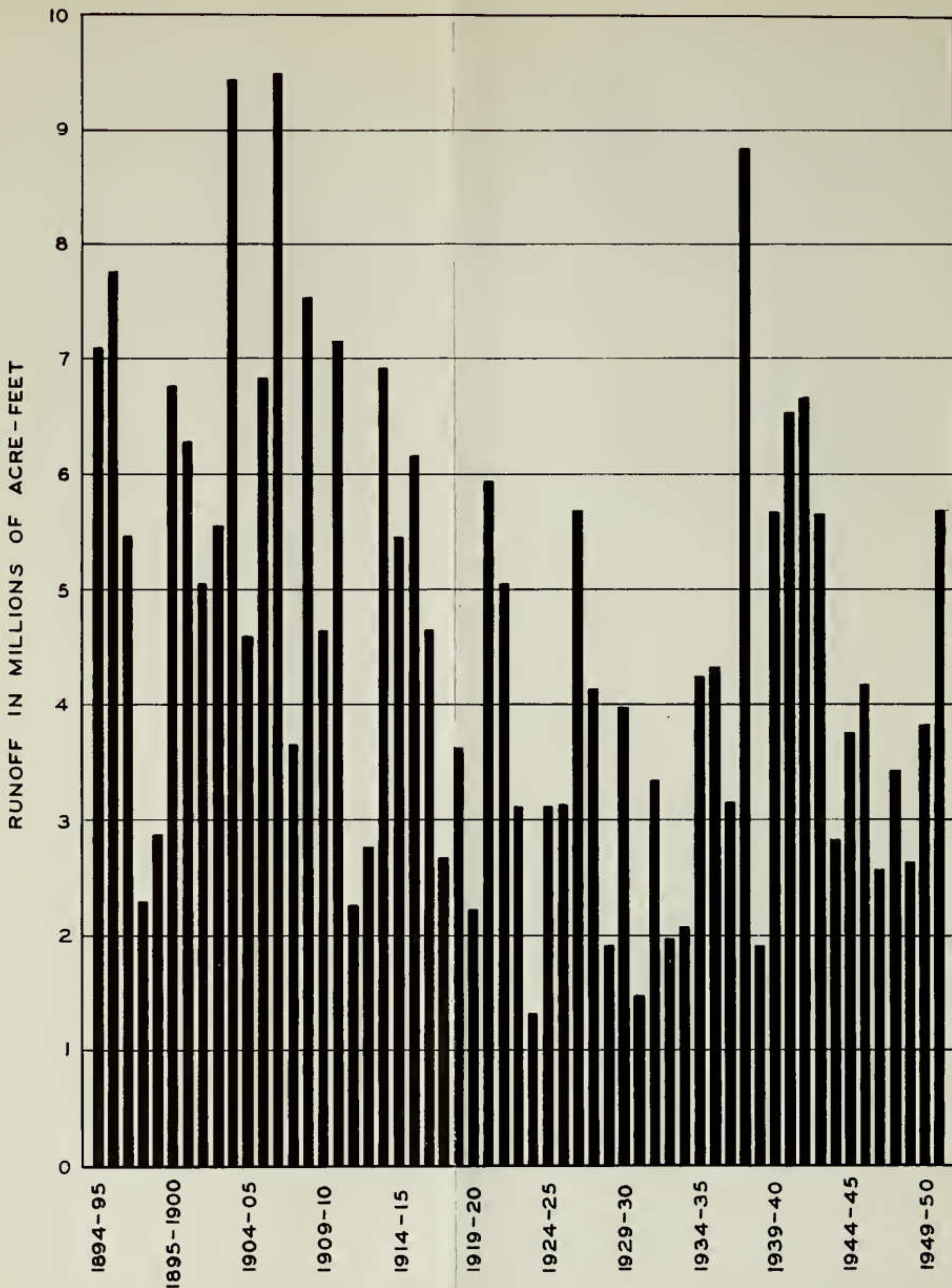


RECORDED SEASONAL PRECIPITATION AT MARYSVILLE

PLATE 5



ACCUMULATED DEPARTURE FROM MEAN SEASONAL PRECIPITATION AT MARYSVILLE



ESTIMATED SEASONAL NATURAL RUNOFF OF FEATHER RIVER AT OROVILLE


STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER RESOURCES
SUTTER-YUBA COUNTIES INVESTIGATION
LINES OF EQUAL DEPTH
TO
GROUND WATER
FALL OF 1947
Scale of miles
1 0 2 4
LEGEND
20 LINES OF EQUAL DEPTH TO GROUND WATER IN FEET
BOUNDARY OF INVESTIGATED AREA
MARYSVILLE
YUBA CITY
Wheatland
Sheridan
Nicolaus
Tudor
Live Oak
Sutter
FEATHER RIVER
SACRAMENTO RIVER
YUBA RIVER
BEAR RIVER
SUTTER BY-PASS
T.11N.
T.12N.
T.13N.
T.14N.
T.15N.
T.16N.
R.2E.
R.3E.
R.4E.
R.5E.

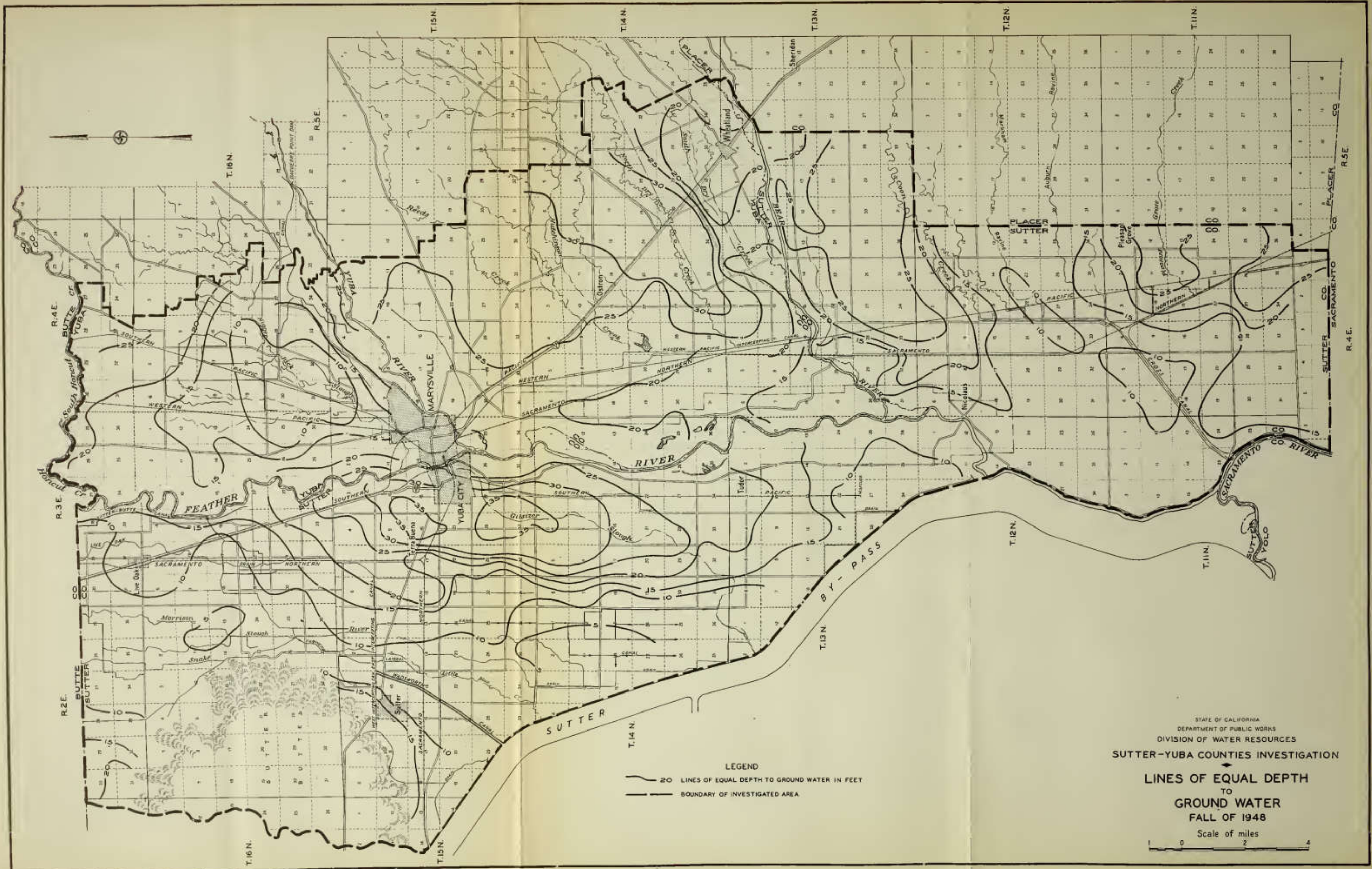
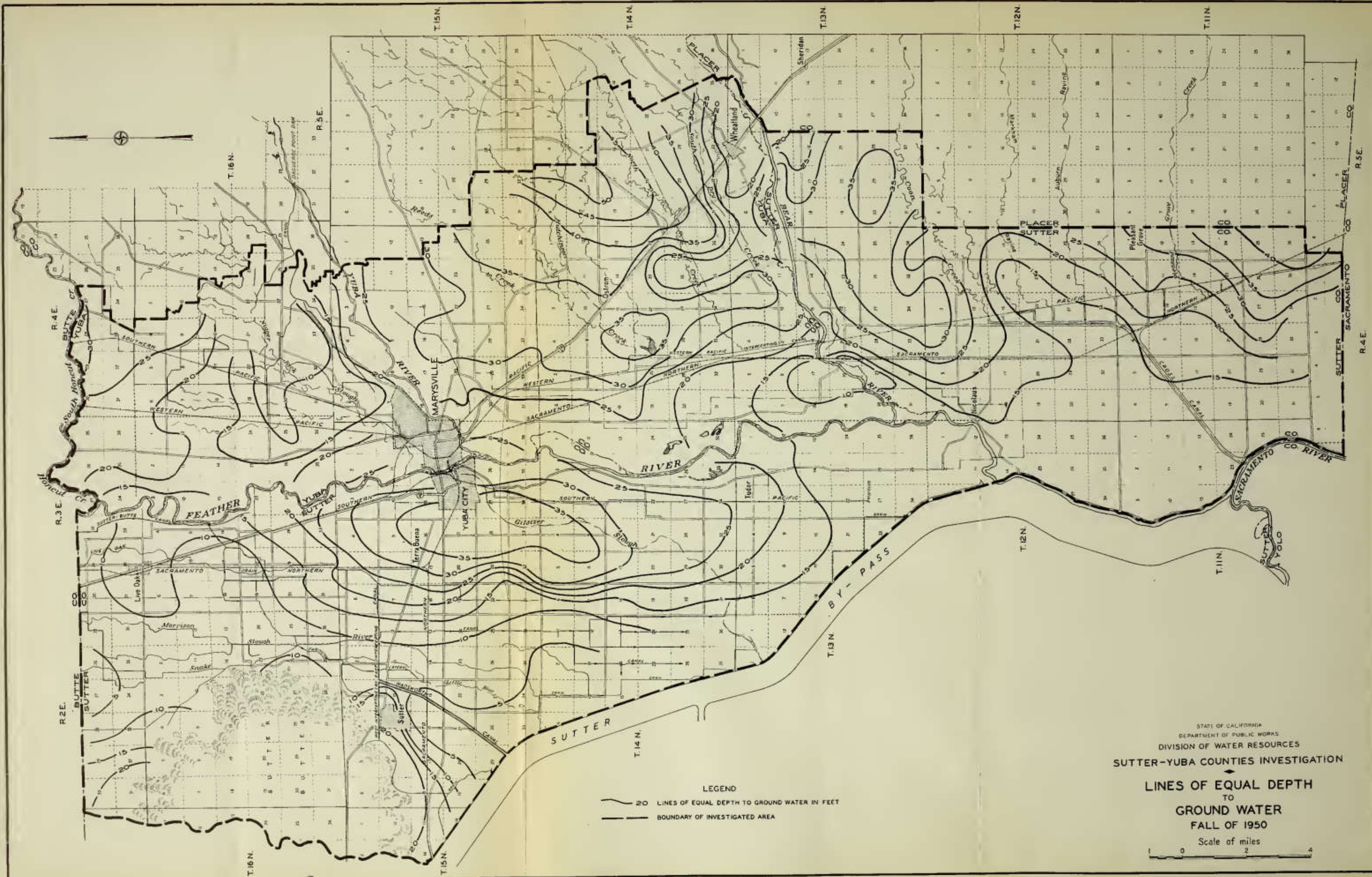

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER RESOURCES
SUTTER-YUBA COUNTIES INVESTIGATION
LINES OF EQUAL DEPTH
TO
GROUND WATER
FALL OF 1948
Scale of miles
0
2
4
LEGEND
20 LINES OF EQUAL DEPTH TO GROUND WATER IN FEET
BOUNDARY OF INVESTIGATED AREA
MARYSVILLE
YUBA CITY
SUTTER BY-PASS
FEATHER RIVER
YUBA RIVER
BEAR RIVER
SACRAMENTO RIVER
T.11N.
T.12N.
T.13N.
T.14N.
T.15N.
T.16N.
R.2E.
R.3E.
R.4E.
R.5E.

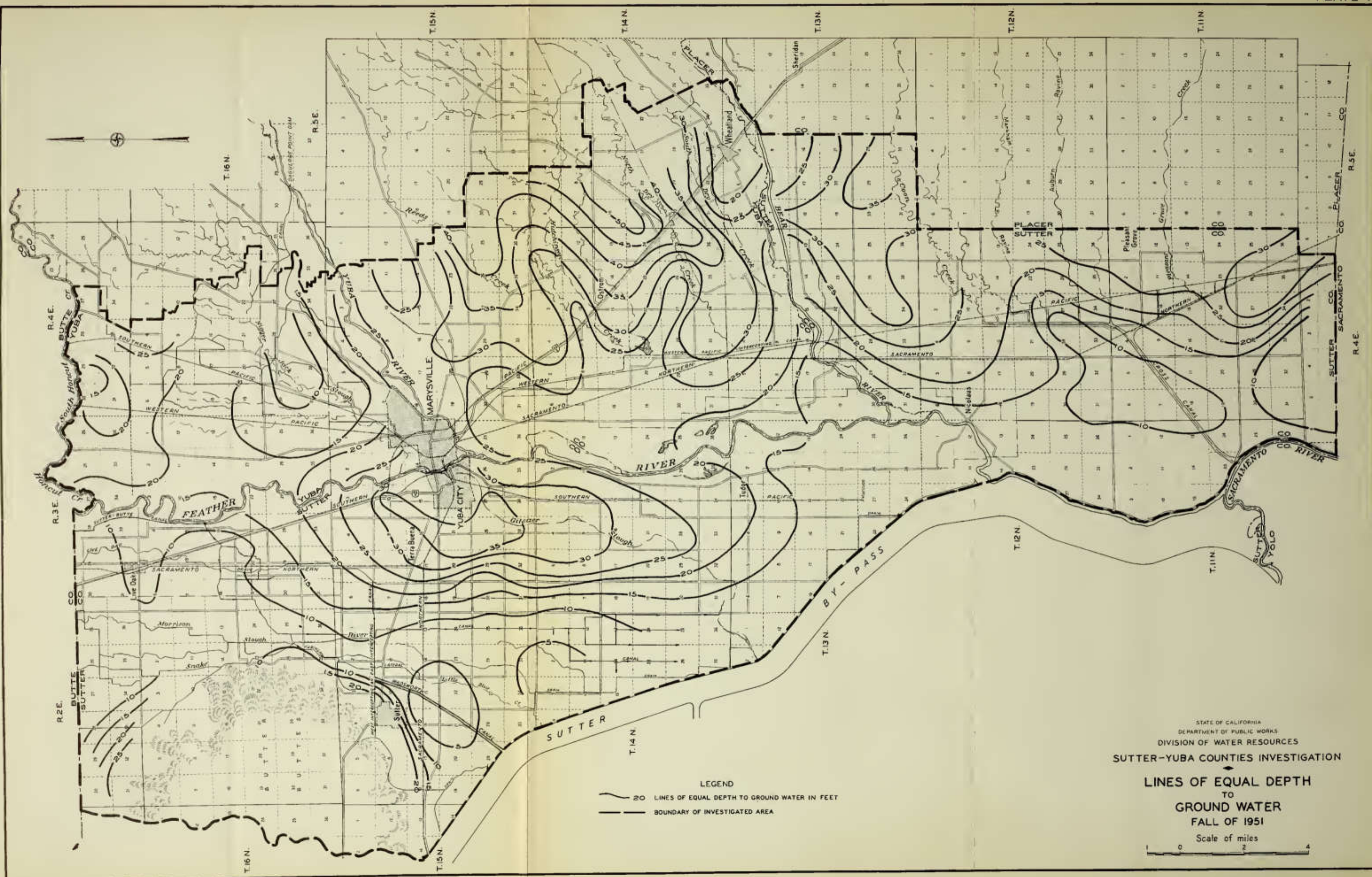
PLATE 9


STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER RESOURCES
SUTTER-YUBA COUNTIES INVESTIGATION
LINES OF EQUAL DEPTH
TO
GROUND WATER
FALL OF 1949
Scale of miles
1 0 2 4
LEGEND
20 LINES OF EQUAL DEPTH TO GROUND WATER IN FEET
BOUNDARY OF INVESTIGATED AREA
MARYSVILLE
YUBA CITY
SUTTER BY-PASS
FEATHER RIVER
YUBA RIVER
BEAR RIVER
SACRAMENTO RIVER
Wheatland
Sheridan
Nicolaus
Tudor
Sutter
Live Oak
T.11N.
T.12N.
T.13N.
T.14N.
T.15N.
T.16N.
R.2E.
R.3E.
R.4E.
R.5E.

PLATE 10



LEGEND
20 LINES OF EQUAL DEPTH TO GROUND WATER IN FEET
BOUNDARY OF INVESTIGATED AREA
STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER RESOURCES
SUTTER-YUBA COUNTIES INVESTIGATION
LINES OF EQUAL DEPTH
TO
GROUND WATER
FALL OF 1950
Scale of miles
MARYSVILLE
YUBA CITY
FEATHER
RIVER
YUBA
SUTTER BY-PASS
SACRAMENTO
Wheatland
Sheridan
Nicolaus
Tudor
Live Oak
Sutter
Terra Buena
PLACER


STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER RESOURCES
SUTTER-YUBA COUNTIES INVESTIGATION
LINES OF EQUAL DEPTH
TO
GROUND WATER
FALL OF 1951
Scale of miles
0
2
4
LEGEND
20 LINES OF EQUAL DEPTH TO GROUND WATER IN FEET
BOUNDARY OF INVESTIGATED AREA
MARYSVILLE
YUBA CITY
Wheatland
Sheridan
Nicolaus
Sutter
Live Oak
Tudor
SUTTER BY-PASS
FEATHER RIVER
YUBA RIVER
BEAR RIVER
SACRAMENTO RIVER
T.16N.
T.15N.
T.14N.
T.13N.
T.12N.
T.11N.
R.2E.
R.3E.
R.4E.
R.5E.

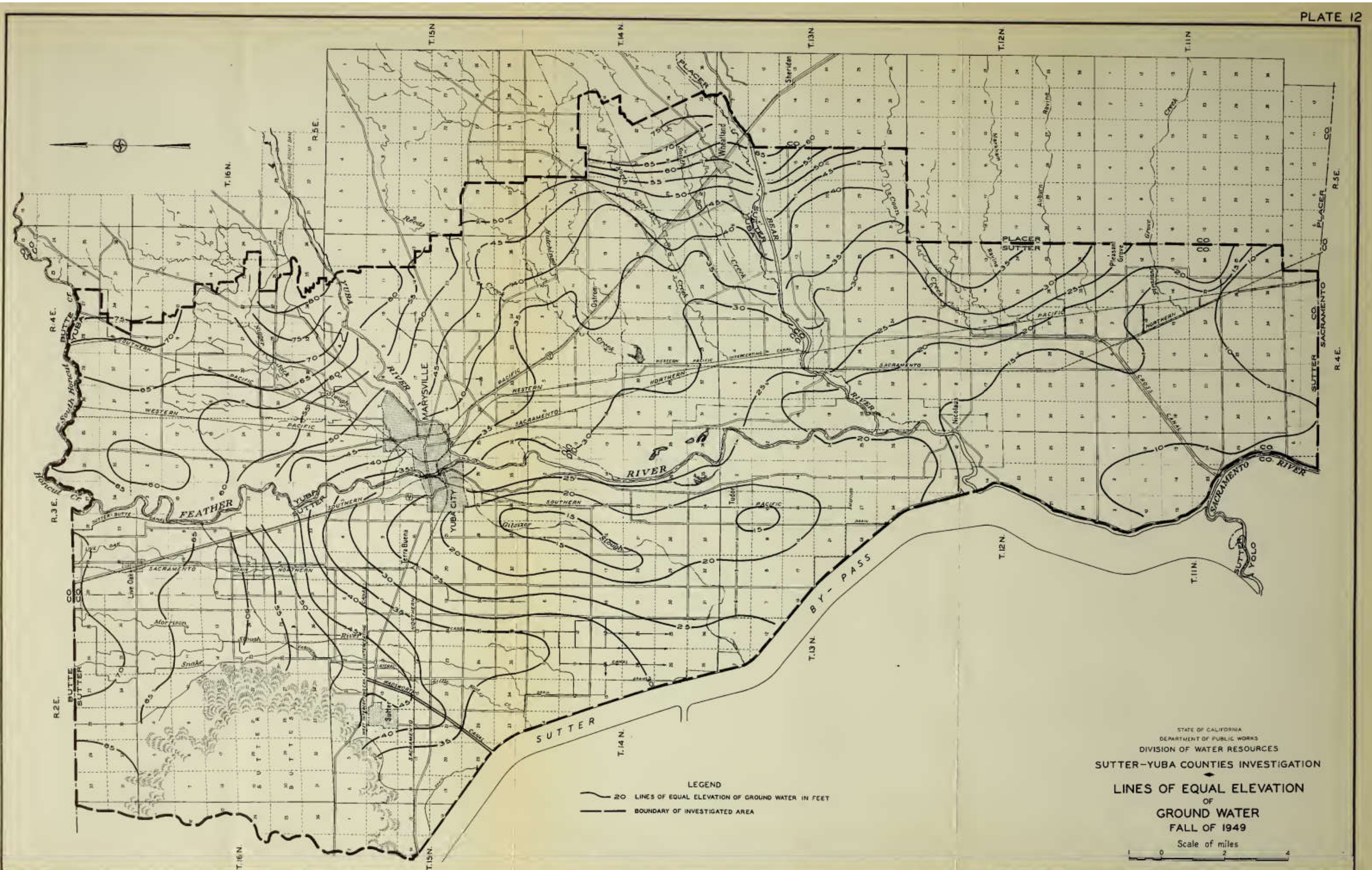
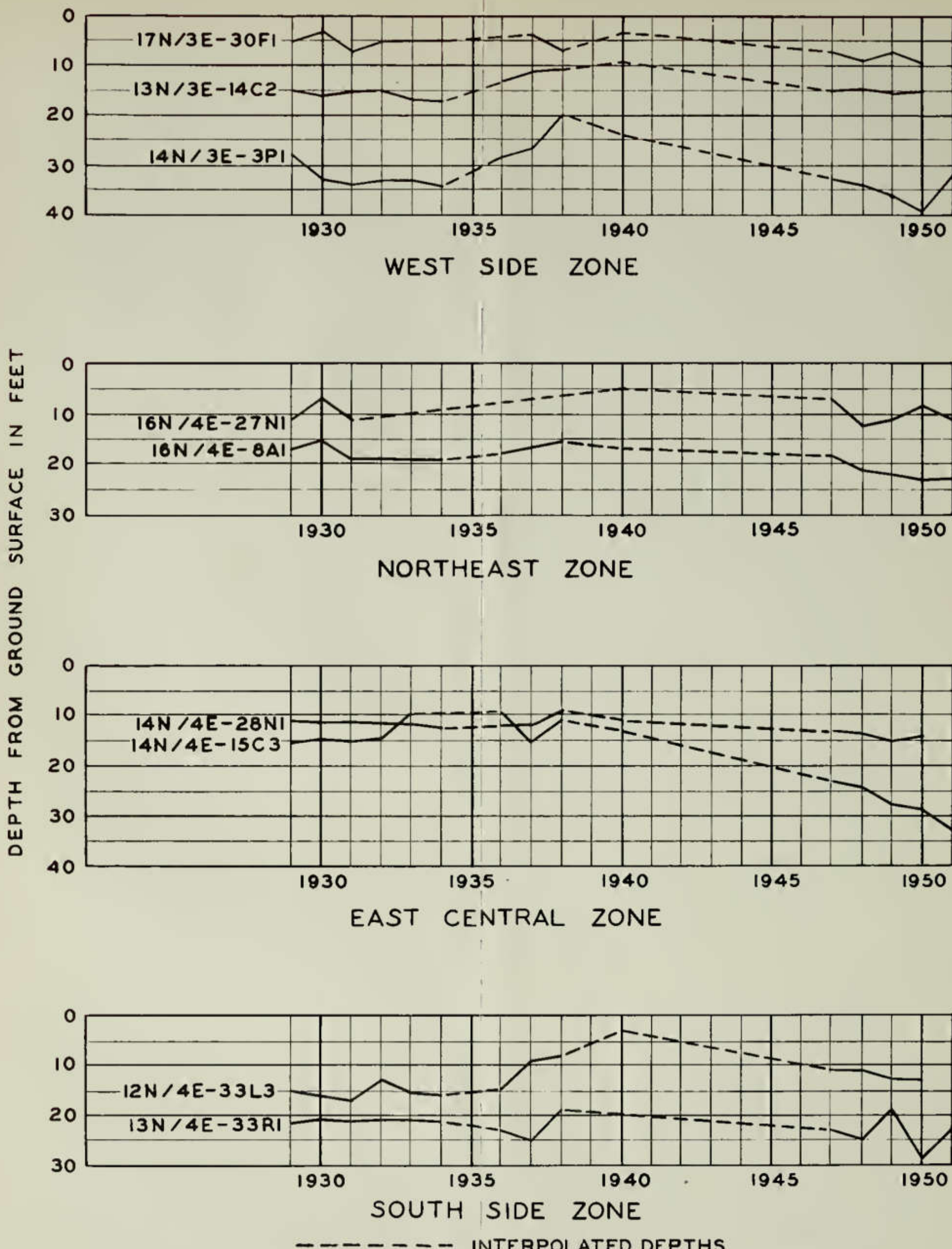
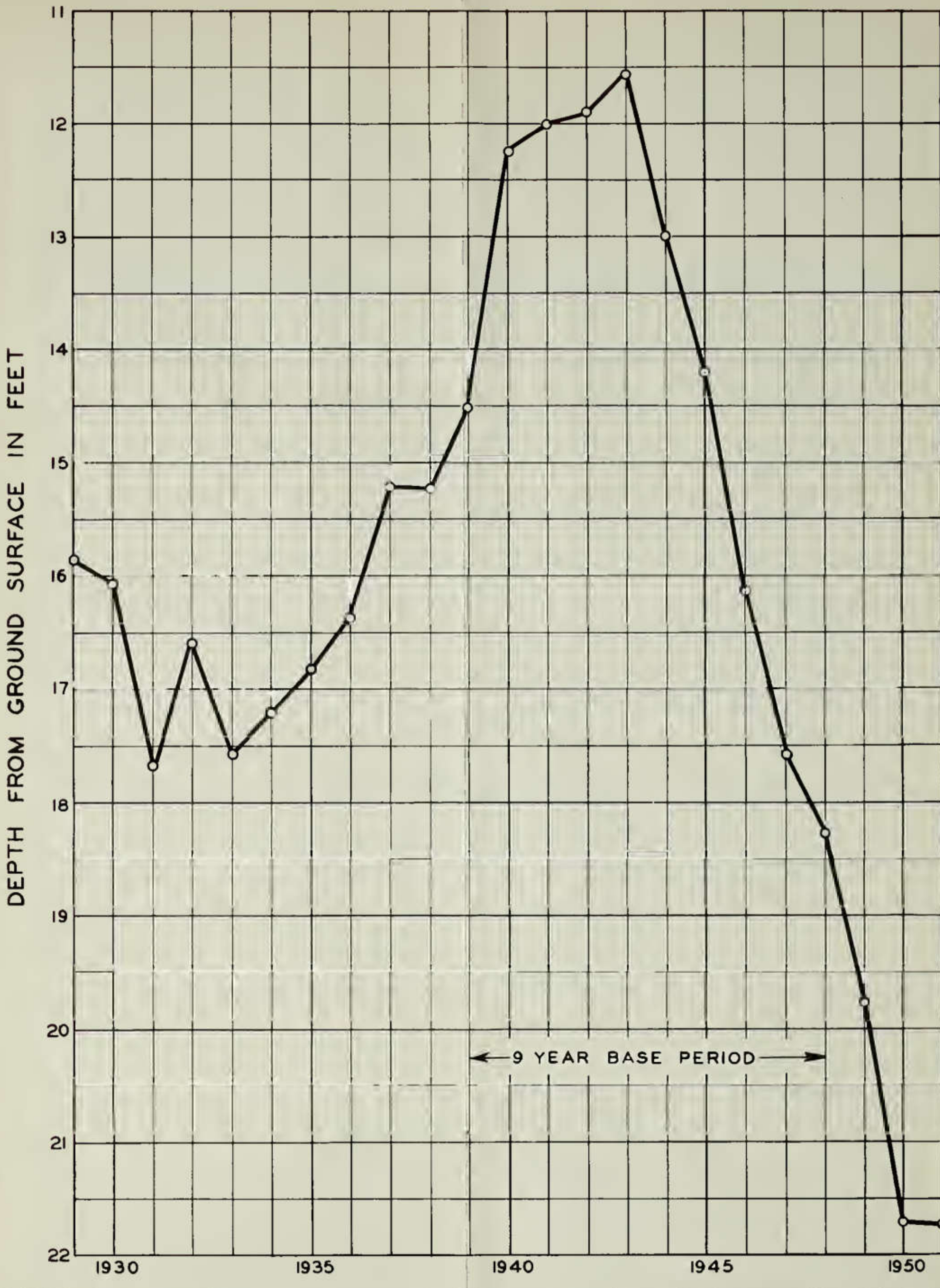

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER RESOURCES
SUTTER–YUBA COUNTIES INVESTIGATION
LINES OF EQUAL ELEVATION
OF
GROUND WATER
FALL OF 1949
Scale of miles
0
2
4
LEGEND
20 LINES OF EQUAL ELEVATION OF GROUND WATER IN FEET
BOUNDARY OF INVESTIGATED AREA
MARYSVILLE
YUBA CITY
FEATHER
RIVER
YUBA
SUTTER BY-PASS
SACRAMENTO
Wheatland
Sheridan
Nicolaus
Tudor
Live Oak
Sutter
Terra Buena
PLACER
SUTTER
T.11N.
T.12N.
T.13N.
T.14N.
T.15N.
T.16N.
R.2E.
R.3E.
R.4E.
R.5E.

PLATE 13



MEASURED FALL DEPTHS TO GROUND WATER AT REPRESENTATIVE WELLS



AVERAGE FALL DEPTH TO GROUND WATER

PLATE 15

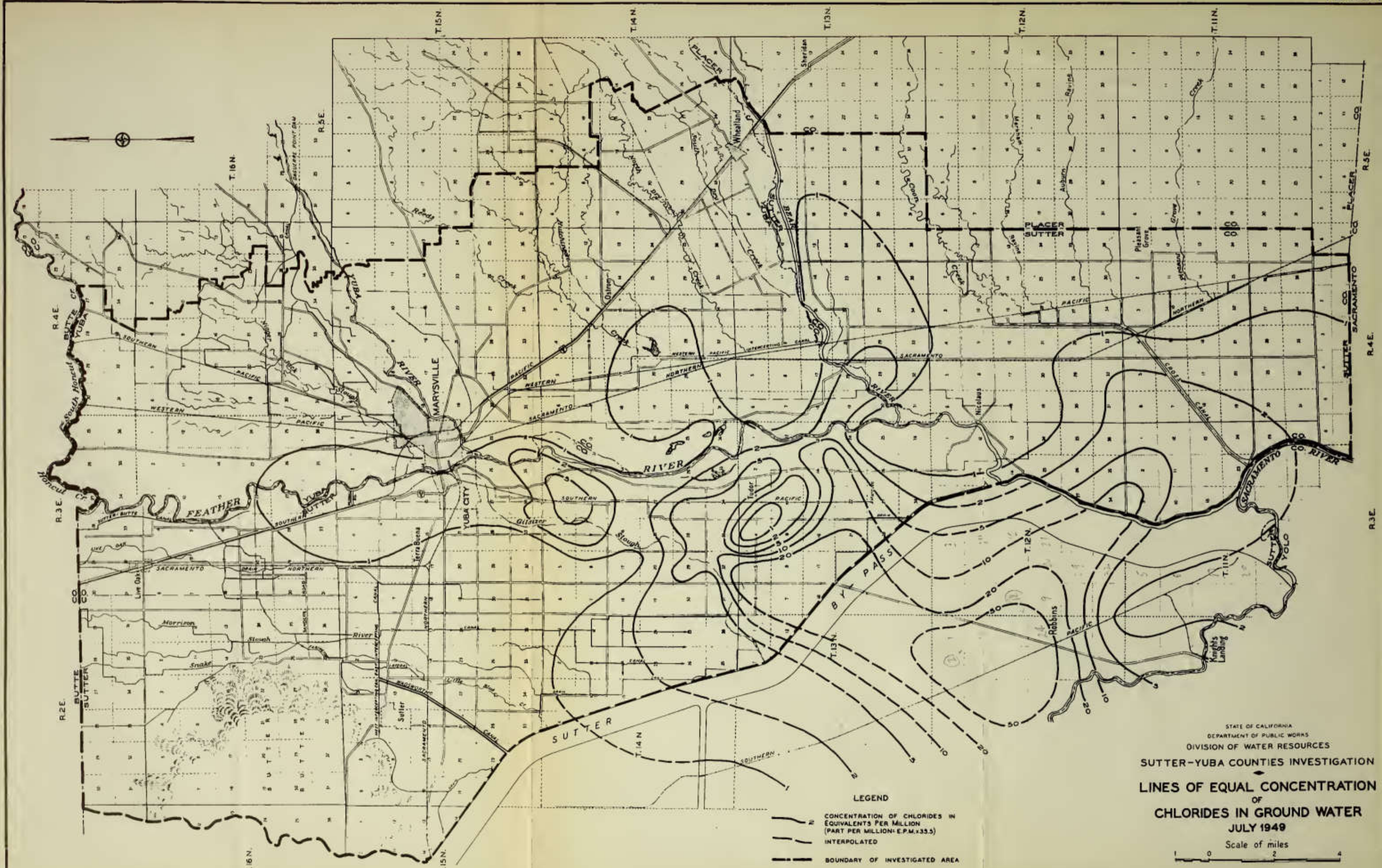
STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER RESOURCES

SUTTER-YUBA COUNTIES INVESTIGATION

LINES OF EQUAL CHANGE IN GROUND WATER ELEVATIONS

FALL OF 1947 TO FALL OF 1951

Scale of miles
1 0 2 4

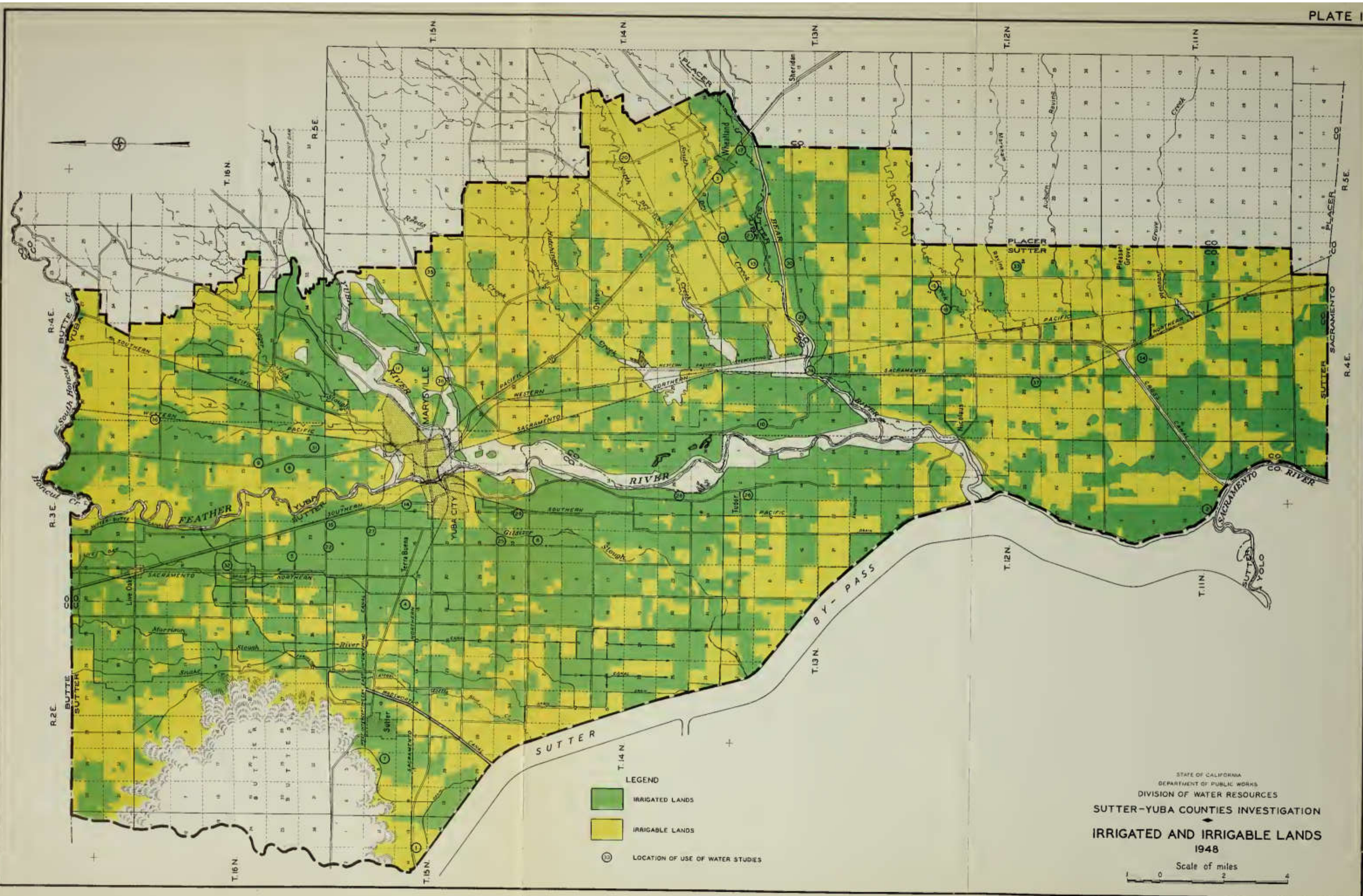


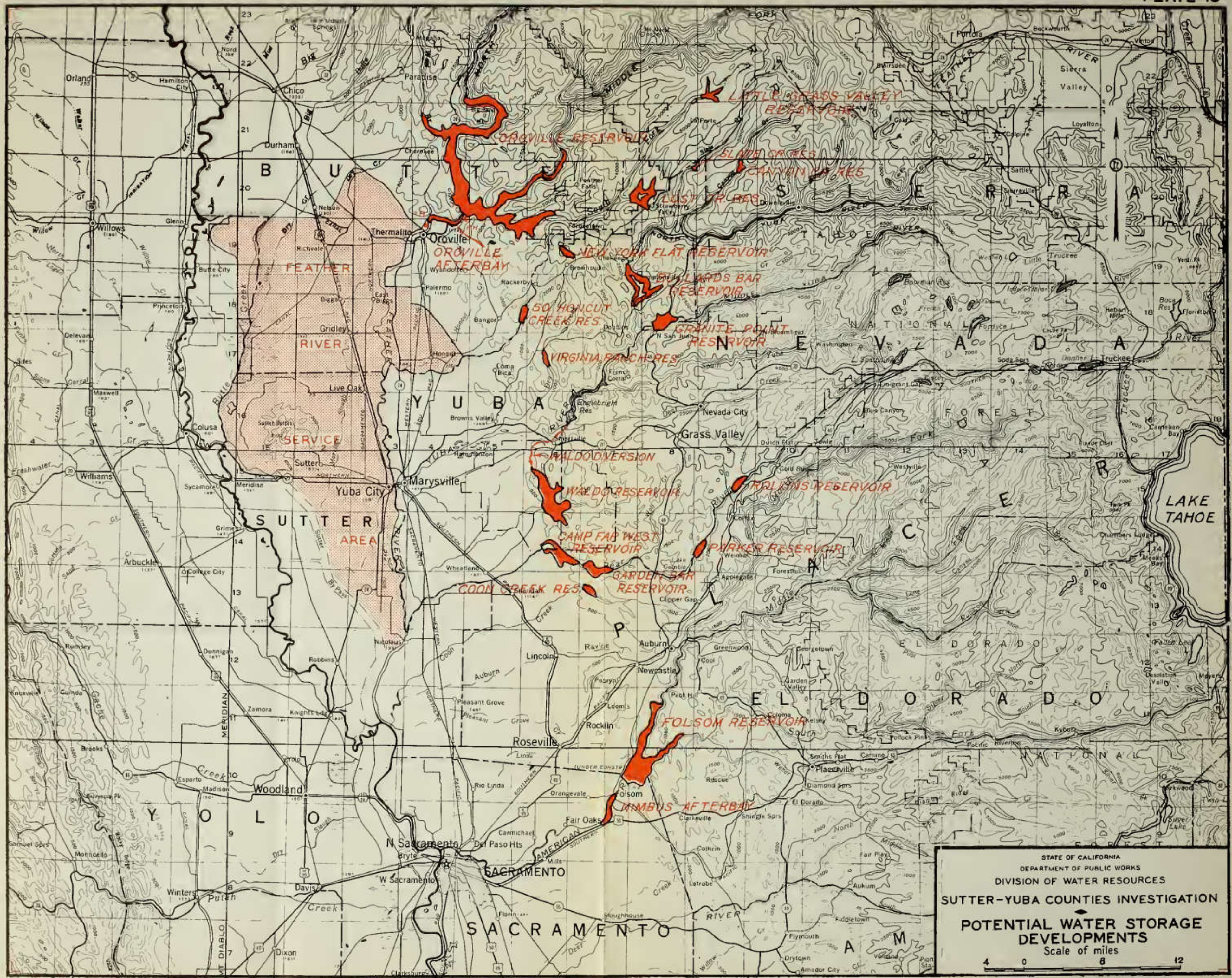
STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER RESOURCES
SUTTER-YUBA COUNTIES INVESTIGATION

LINES OF EQUAL CONCENTRATION OF CHLORIDES IN GROUND WATER

JULY 1949

PLATE 17

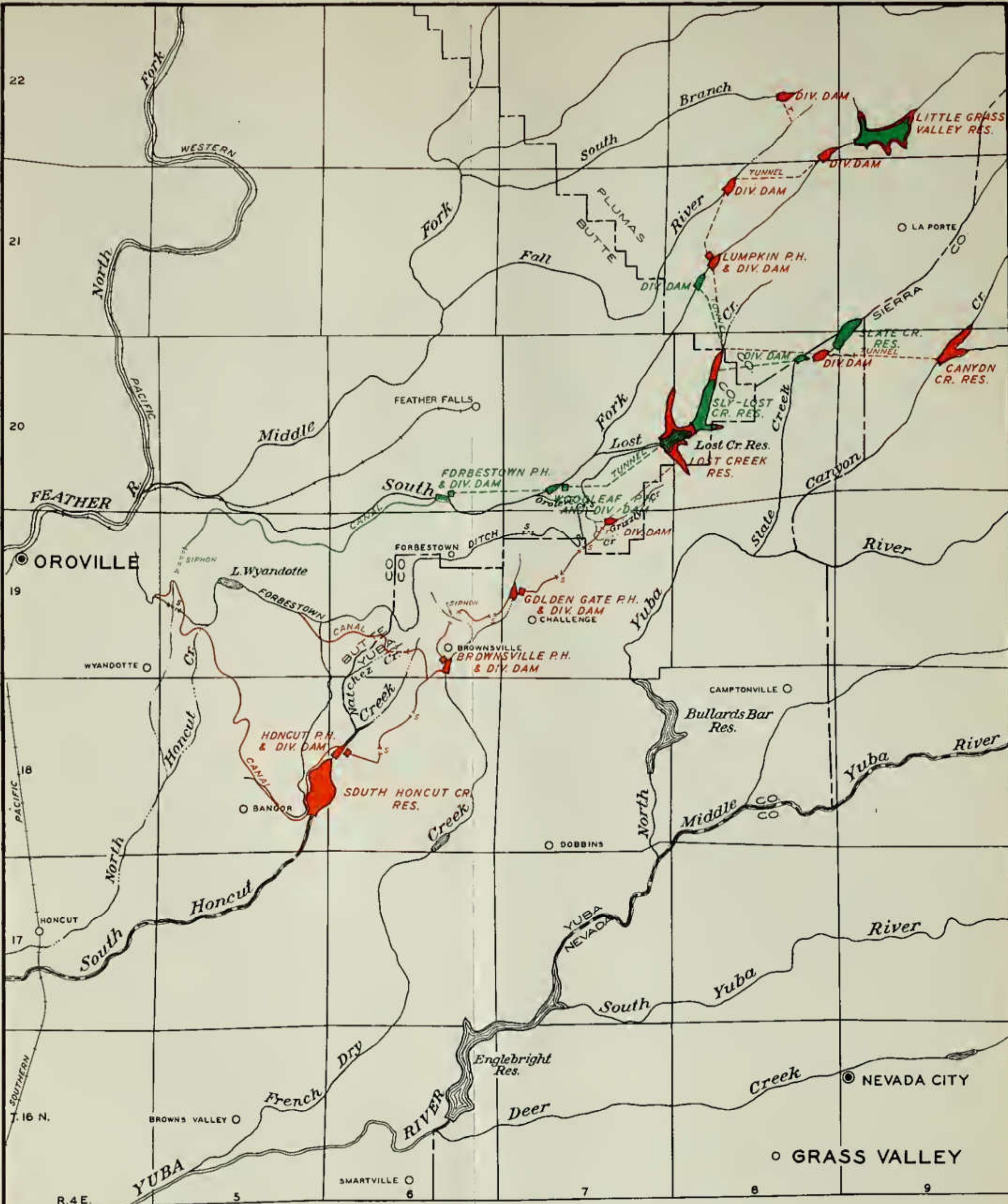

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER RESOURCES
SUTTER-YUBA COUNTIES INVESTIGATION
IRRIGATED AND IRRIGABLE LANDS
1948
Scale of miles
0
2
4
LEGEND
IRRIGATED LANDS
IRRIGABLE LANDS
LOCATION OF USE OF WATER STUDIES
MARYSVILLE
YUBA CITY
FEATHER
RIVER
YUBA
BEAR
SUTTER BY-PASS
SACRAMENTO
CO. RIVER
Wheatland
Sheridan
Nicolaus
Tudor
Live Oak
Sutter
Terra Buena
PLACER
SUTTER
YOLO
BUTTE
T.11N.
T.12N.
T.13N.
T.14N.
T.15N.
T.16N.
R.2E.
R.3E.
R.4E.
R.5E.



STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER RESOURCES
SUTTER-YUBA COUNTIES INVESTIGATION

POTENTIAL WATER STORAGE DEVELOPMENTS

Scale of miles
4 0 8 12



LEGEND

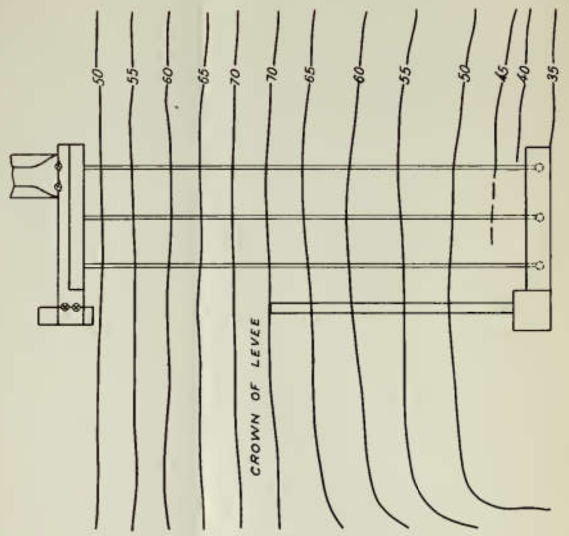
OROVILLE-WYANDOTTE IRRIGATION DISTRICT PLAN

ALTERNATIVE PLAN

PLANS FOR DEVELOPMENT
OF
SOUTH FORK OF FEATHER RIVER

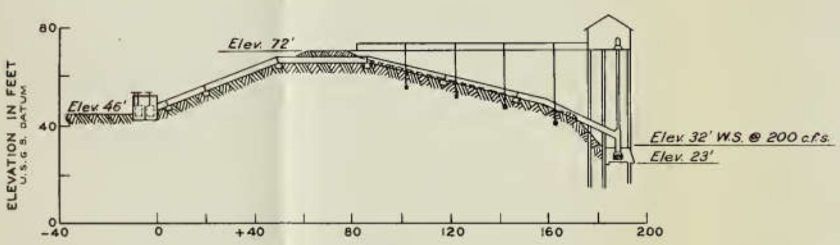
SCALE 1 0 2 4 MILES

DIVISION OF WATER RESOURCES

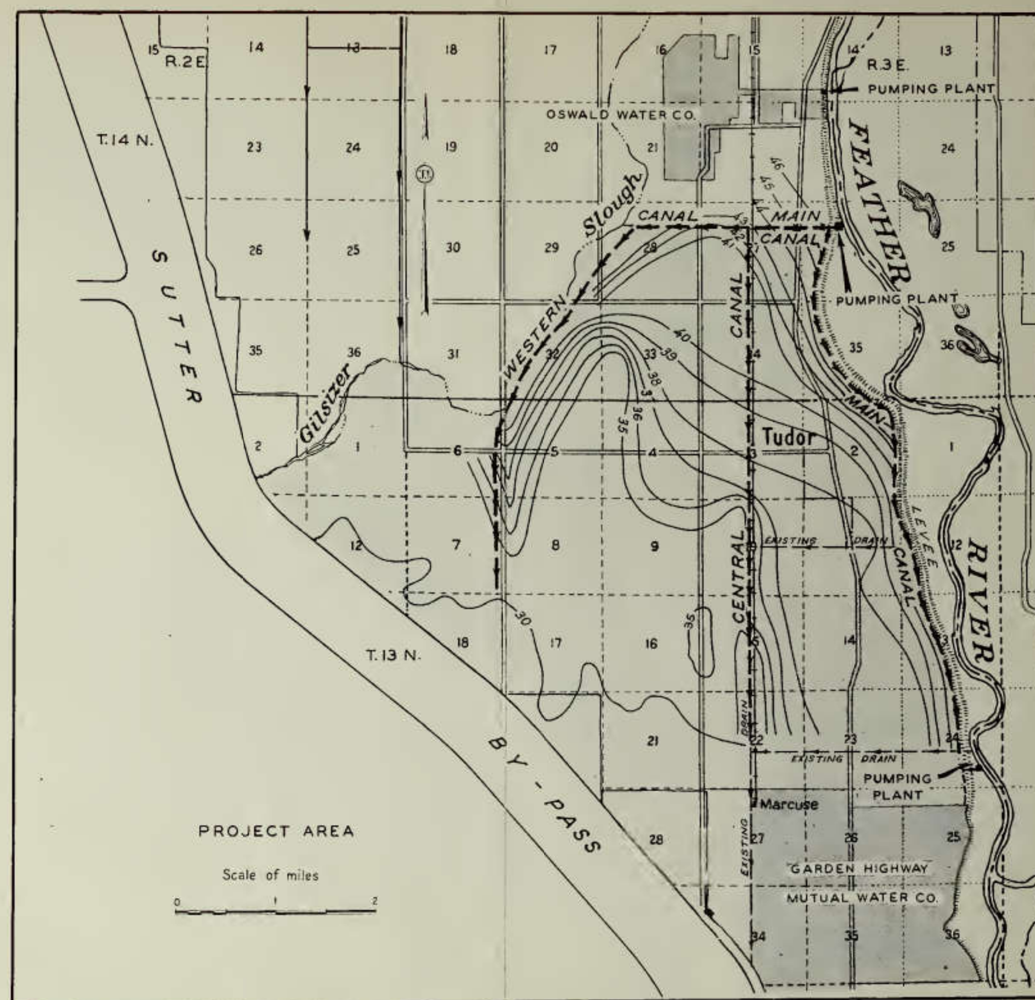


PLAN OF PUMPING PLANT

Scale of feet



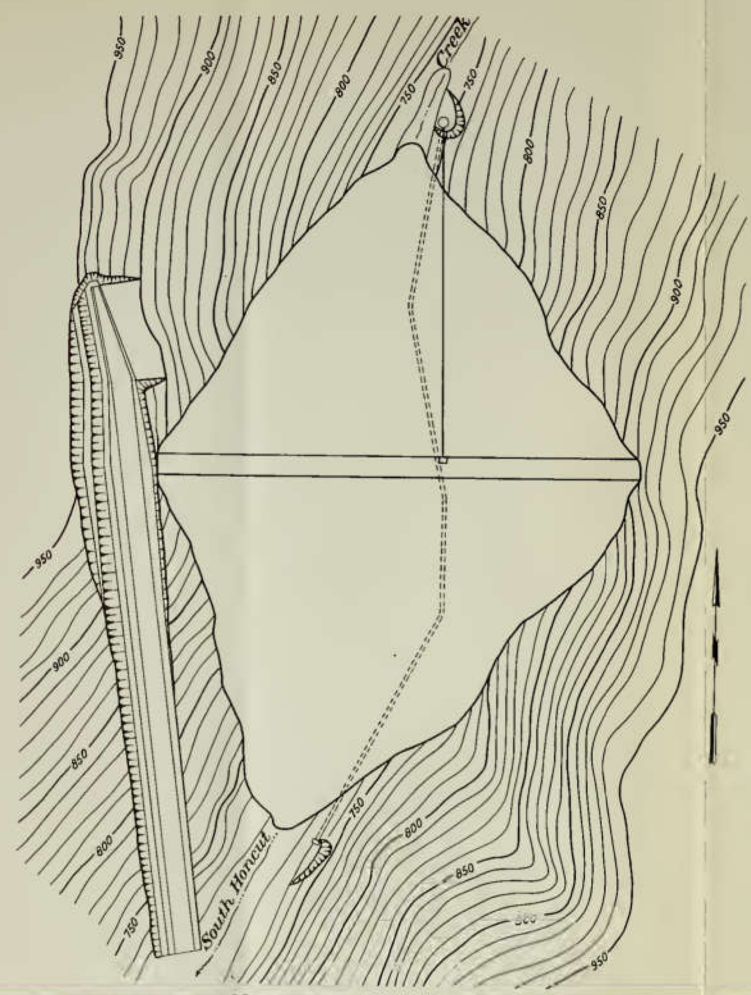
PROFILE OF PUMPING PLANT



STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER RESOURCES

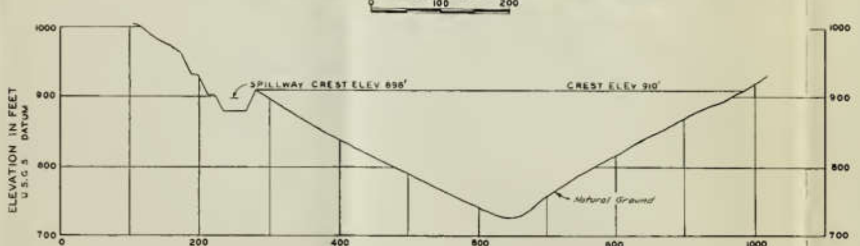
SUTTER-YUBA COUNTIES INVESTIGATION

PEACH BOWL PROJECT

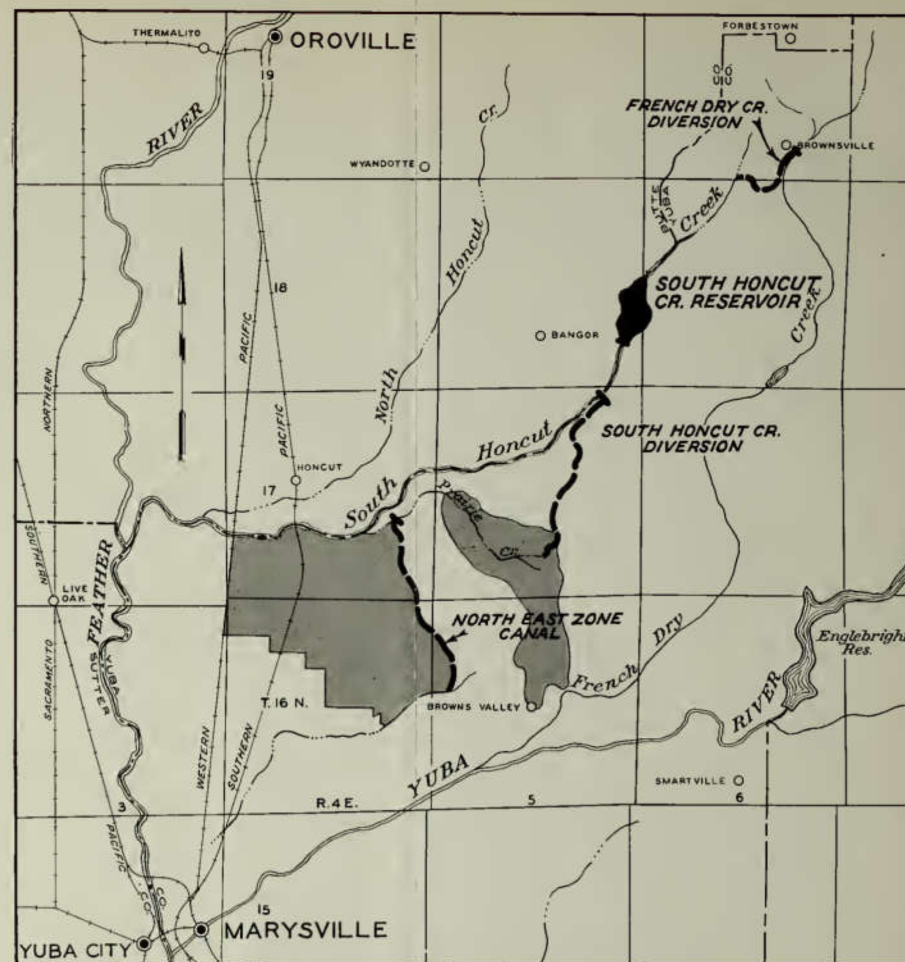


GENERAL PLAN OF DAM

SCALE OF FEET 0 100 200

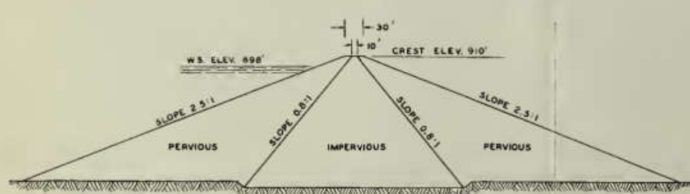


PROFILE OF DAM
LOOKING UPSTREAM



PROJECT AREA

Scale of miles

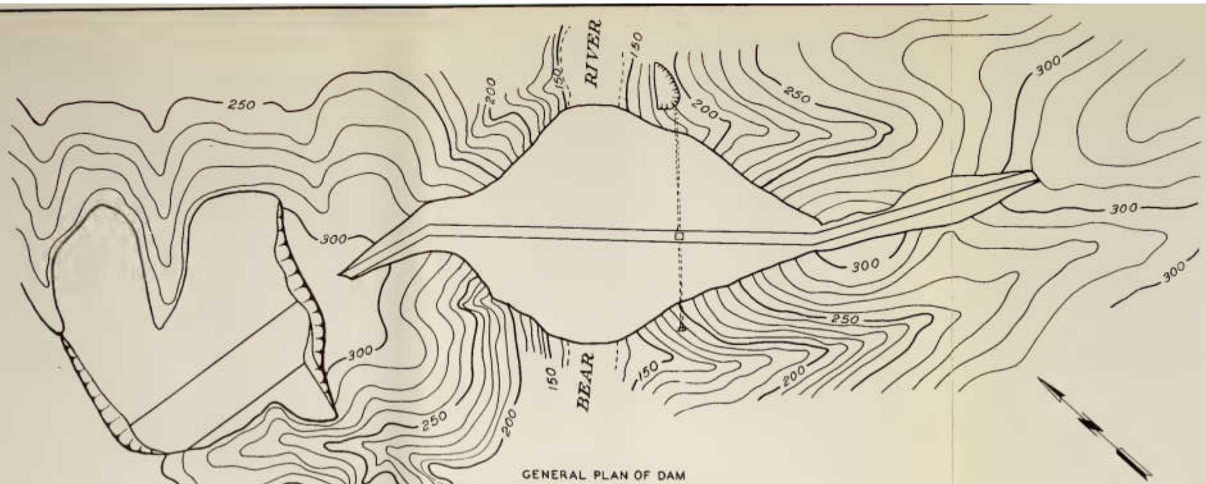


SECTION OF DAM

SCALE OF FEET 0 100 200

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER RESOURCES
SUTTER-YUBA COUNTIES INVESTIGATION

SOUTH HONCUT CREEK PROJECT



GENERAL PLAN OF DAM

SCALE OF FEET 0 200 400

PROFILE OF DAM

LOOKING UPSTREAM

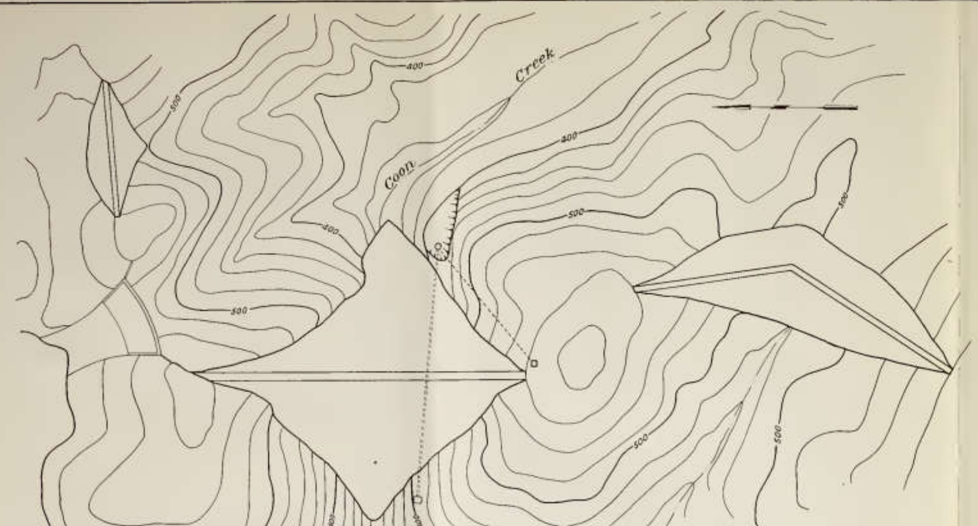
SECTION OF DAM

SCALE OF FEET 0 100 200

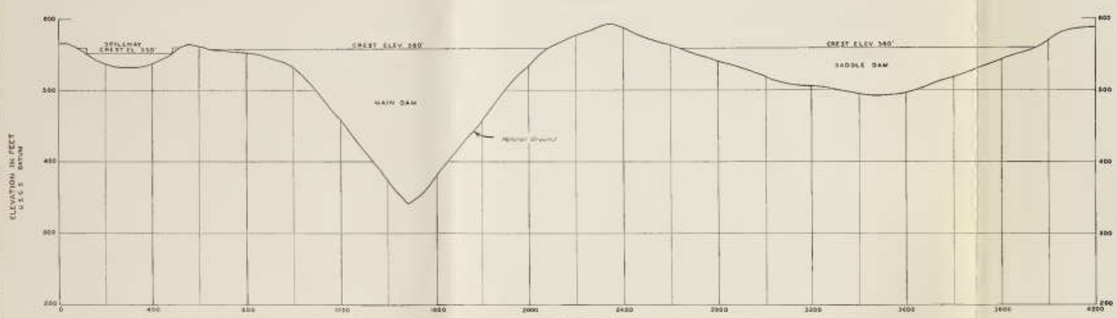
PROJECT AREA

Scale of miles 2 0 2 4

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER RESOURCES
SUTTER-YUBA COUNTIES INVESTIGATION
CAMP FAR WEST PROJECT

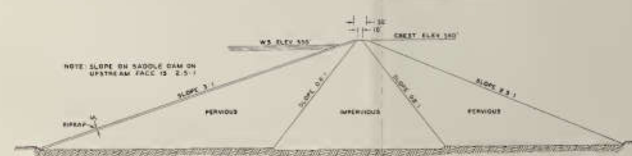


GENERAL PLAN OF DAMS
SCALE OF FEET
0 200 400



PROFILE OF DAMS
LOOKING UPSTREAM

PROJECT AREA
Scale of miles
2 0 2 4



SECTION OF DAMS
SCALE OF FEET
0 100 200

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER RESOURCES
SUTTER-YUBA COUNTIES INVESTIGATION

COON CREEK PROJECT

Hydrogeology of the Sutter Basin, Sacramento Valley, California

HYDROGEOLOGY OF THE SUTTER BASIN, SACRAMENTO VALLEY, CALIFORNIA

by

George Curtin

A Thesis Submitted to the Faculty of the

DEPARTMENT OF GEOSCIENCES

In Partial Fulfillment of the Requirements
For the Degree of

MASTER OF SCIENCE
WITH A MAJOR IN GEOLOGY

In the Graduate College

THE UNIVERSITY OF ARIZONA

1 9 7 1

STATEMENT BY AUTHOR

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SIGNED: George Curtin

APPROVAL BY THESIS DIRECTOR

This thesis has been approved on the date shown below:

Jerome J. Wright
JEROME J. WRIGHT
Associate Professor of Geology

March 23, 1971
Date

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The author is grateful to Lowell E. Redwine, Research Geologist with Union Oil Company, for his critical review of the preliminary cross-sections used in this report and for sharing his authoritative knowledge of the post-Eocene stratigraphy.

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ABSTRACT

A mound of saline water exists in continental sediments between two fresh water rivers in the Sutter Basin of the Sacramento Valley, California. This saline water has moved from the marine sediments, at depth, upward along the Sutter Basin Fault and then through 2,000 feet of alluvium.

The hydraulic head required to move the connate water is supplied by the high topographic position of the Cretaceous sediments carried up by the Sutter Buttes intrusives and exposed at the surface some 250 to 400 feet above the valley floor. Around the Buttes the marine sediments have been flushed with fresh water to depths of over 2,000 feet. The displaced saline connate water has moved south where it intercepts the Sutter Basin Fault.

The geologic section consists of about 5,500 feet of Cretaceous and Eocene marine sediments which have been deposited atop the basement complex (the western extension of the Sierra Nevada fault block) and capped by 2,000 feet of post-Eocene alluvium.

Chemical analyses of the ground water indicate sodium chloride water is being introduced from depth, and as the rising connate water moves northerly into the

orchard area it changes to a calcium-magnesium chloride type water.

INTRODUCTION

Purpose of the Investigation

When a mound of saline ground water exists between two fresh water rivers in alluvial sediments 2,000 feet thick, there must be an explanation. Two principal theories have been offered to account for the saline ground water mound that exists in the South Central portion of the Sutter Basin in California. Wilcox (1948) was the first to propose that the saline water was rising from depth. Wolfe (1958) advanced the theory that the saline water resulted from residual evaporites.

It is the thesis of this investigator that the salinity of the mound is due to the hydraulic head between the elevation of the Kione Sands, at their outcrop (recharge area) in the Sutter Buttes, and the elevation of the top of the saline ground water mound in the Sutter Basin. Fresh water has infiltrated and flushed the Kione Sands to depths of approximately 2,000 feet. The displaced marine connate water has moved south and rises along the Sutter Basin Fault, thence through the overlying alluvial sediments to the surface of the basin. A number of other geologic features are involved in the process.

The physical evidence to support the hypothesis was obtained through a study of the subsurface geology, the hydraulic continuity of the strata and structures and the chemistry of the water.

Maps display the strata, ground water hydrology and chemistry to support the statements that underly this thesis.

Location and Extent of the Area

The saline ground water mound with which this study is concerned lies north of the town of Robbins, California, in the middle of the Sacramento Valley, between the Sacramento and Feather Rivers. Under the saline ground water mound are approximately 2,000 feet of alluvial and non-marine basin sediments. The base of the fresh water that overlies the saline mound lowers in all directions from its center. The salinity of the ground water mound appears to increase with depth.

The area, generally known as the Sutter Basin, is bounded on the west by the Sacramento River, and by the Sutter Bypass on the east. It extends from the alluvial fans of the Sutter Buttes, some 30 miles southeast, to the confluence of the Sacramento and Feather Rivers. The basin lies wholly in Sutter County, California and consists of 114,500 acres of flat, topographical, low, poorly drained land.

To properly evaluate the ground water conditions of the Sutter Basin, the area of investigation was extended to include 1,026 square miles of land lying in all or part of

Township 10 North to Township 16 North, and Range 1 West to Range 4 East, Mount Diablo Base & Meridian. This includes parts of Colusa, Sacramento, Sutter, Yolo and Yuba Counties (Fig. 1).

Previous Investigations

The Division of Soil Management and Irrigation of the United States Department of Agriculture conducted a series of studies in cooperation with the Sutter Mutual Water Company during 1931, 1932, 1933, 1946 and 1947. These studies showed that the amount of dissolved solids in water drained from lands in the southern half of the Sutter Basin greatly exceeded the amount brought onto the land in irrigation water. The salt output during the study periods, expressed as proportion of the input, is reported to have ranged between 248 and 655 percent, with the average about 407 percent. It should be pointed out that all irrigation water for this area is diverted from the Sacramento River. The water table of the basin is controlled by extensive drainage ditches; the drain water is pumped out of the system back into the Sacramento River.

The investigator for the U. S. Department of Agriculture (Wilcox, 1948) concluded that the increase in salt content of the drainage water was due to rising connate water and said (pg. 48):

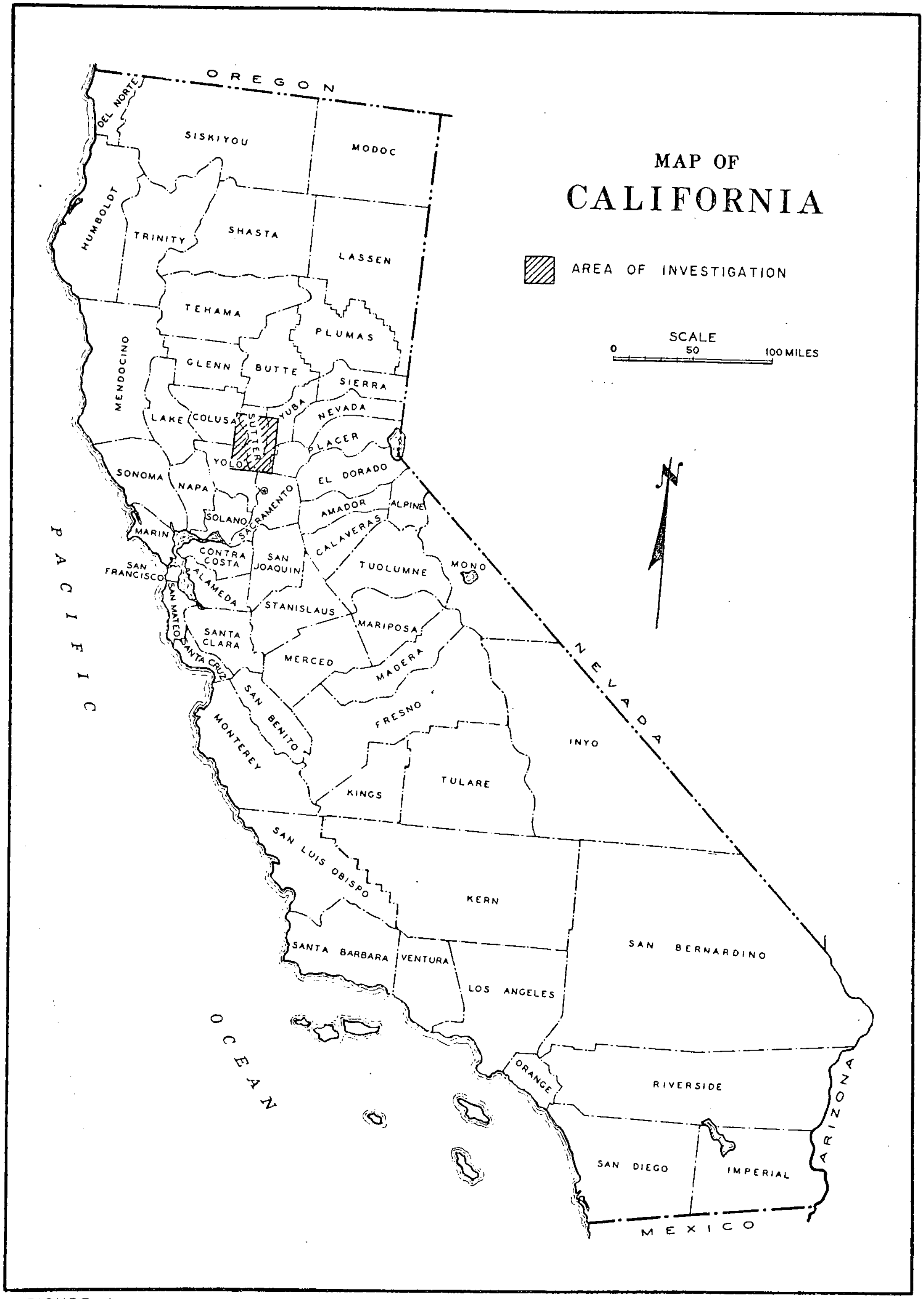

FIGURE 1 MAP OF CALIFORNIA SHOWING AREA OF INVESTIGATION

> Analyses show that the underground water is moderately to very saline, the lowest concentration observed being several times that of the input irrigation water. Also, all of the wells show a strong artesian pressure. Water in the domestic wells stands at or near the soil surface while the deep wells flow. It appears probable, therefore, that due to the upward pressure, substantial quantities of underground water are intercepted and carried off by the drains.

In September, 1952 the California State Water Resources Board published Bulletin No. 6, "Sutter-Yuba Counties Investigation." In this Bulletin reference is made to the Sutter Basin studies of the U. S. Department of Agriculture and indicates it is in agreement with the report as to the origin of these high chloride waters. Bulletin 6 states (pg. 35):

> The opinion was expressed in a report on the foregoing 1946 salt balance study that the salt in the drainage water was probably derived from saline waters underlying the area. Preliminary studies made by the Division of Water Resources similarly indicated that the chloride salinity in many of the wells was due to admixture of deep-seated brines with native fresh ground waters. There is evidence that such brines may underlie aquifers of good quality throughout large areas of the Sacramento and San Joaquin Valleys--such brines sometimes appear in water pumped from the deep wells in the two valleys, or from areas wherein the fresh ground water levels are markedly lowered through over-draft. In many instances these relatively deep-seated brines are under considerable pressure and readily rise to the surface through defective, abandoned, or improperly constructed wells. A case in point is a natural gas well located near the town of Robbins which yields water under artesian and/or gas pressure at a rate of 200 gallons a minute.

Included in the Resources Board's report was a geochemical study by Davis and Olmsted (1952) to determine the cause of the high saline water. A complete chemical analysis was run on water samples collected from 38 scattered wells located in Sutter Basin. The water analyses were classified into eight groups according to the range of concentration of total anions. Group 1 was considered unaltered normal ground water and Group 8 was considered briny contaminate. The chemical constituents, in e.p.m. (equivalent parts per million), of Group 1 were subtracted from the chemical constituents of Groups 2 through 7. The resulting chemical constituents, together with Group 8, were tabulated as to percentage. This tabulation indicated that (pg. 37):

> Irrespective of variations in concentration, the character formula of the degradant in each of the ground water Groups 2 through 7 is strikingly similar to that of the brines comprising Group 8. This is especially true of the anions which are not subject to base exchange reactions. This similarity in composition, together with apparent absence of any other like degradant, indicates that the degradation of the native ground water is due to admixture of deep-seated brines of the type exemplified by Group 8.

However, in the U. S. Geological Survey Water-Supply Paper 1497, Olmsted and Davis (1961, page 136) say:

> Its origin is problematical, however; it may be the result of upward migration of deep marine connate waters through defective, abandoned, or improperly constructed deep wells, as suggested by the California State Water Resources Board (1952, page 35); or, on the other hand, it may be merely a large body of evaporation residue in the Sutter Basin.

This conclusion is interesting because some nine years later these two geologists have added evaporation residue as an alternate theory for the occurrence of saline water in the Sutter Basin.

John Wolfe prepared an office report (Wolfe, 1958) for the California Department of Water Resources and summarized reasons for the theory of rising saline connate water as: (1) subsurface geologic structural highs in marine sediments; (2) artesian and/or gas pressure on connate brines which enable them to rise to the surface through poorly constructed or improperly abandoned water or gas wells; (3) artesian and/or gas pressure on connate brines which permit them to rise through permeable zones in the sediments; and (4) acceleration of rising connates due to lowering of the water table by heavy pumping.

Wolfe still believes (oral communique, 1969) that the geologic conditions favorable to the theory of rising connate water do not exist in the Sutter Basin, and brings forth the following points: (1) there is no known evidence of any structural anomalies in the Sutter Basin; (2) bad water conditions existed in the area before any deep wells were drilled; (3) the area is largely underlain by highly impervious silt and clay; (4) artesian pressure would not be augmented by gas pressure; and (5) an excess of salt and water in the discharge from a basin is no proof of rising saline connate waters.

Wolfe concluded that the saline water in the Sutter Basin is most probably caused by evaporative residues. He based his conclusion on the observation that salinity and well depth do not seem to correlate, and alkali or salts are known to accumulate in the basin sediments. To support his arguments he quoted Kirk Bryan (1923).

Kirk Bryan, geologist with the U. S. Geological Survey, conducted the first comprehensive ground water investigation of the Sacramento Valley. The field work for his water-supply paper was conducted during 1912 and 1913, a time when the Sacramento Valley was still subject to devastating floods and the basin lands were first being reclaimed and used for rice growing. Bryan (1923, page 85) commented on the accumulation of alkali in the Valley:

> Although there are in the valley large areas that have a shallow water table, which is favorable to evaporation and the accumulation of alkali, only comparatively small areas are unfitted for agriculture from this cause. This condition seems to be due to the following reasons: (1) The ground waters are of good quality. (2) The water table is very flat over the basins, and movements of the ground water are sluggish. Water is supplied more freely at the bases of the slopes, and for this reason the principal concentration of alkali occurs at the edges of the basins. This is particularly the case on the west side, where alkaline patches and areas of salt grass border the basins along their western edges. (3) The heavy winter rains leach out much of the salts concentration at the surface. Similarly flood waters wash out the salts in over-flowed lands, and on the edges of the plains the same waters deposit mud or sediment, which often covers up the alkali.

Bryan mentioned buried alkaline spots along the east side of Colusa Basin and suggested better water could be obtained by casing off the well and going deeper. He also suggested that the salty spots are usually small in extent. He thought the same conditions might exist along the west side of Sutter Basin.

In the east Sutter Basin area, Bryan spoke of Gilsizer Slough. This slough cuts southwest across the area from Yuba City to the central part of the Sutter Basin (Fig. 4). It is a depression that ranges in width from a hundred yards to a quarter of a mile. Bryan states that the ground water lay close to the surface and evaporation concentrated alkali in the soil. The slough was later drained by a ditch and the land reclaimed and placed under cultivation. However, the water quality of the wells in the Gilsizer Slough area seems to have been little affected by this shallow saline condition (Fig. 6).

History and Methods of the Investigation

During the early 1960s the California Department of Water Resources was conducting a comprehensive study of the ground water in the Sacramento Valley. Among the duties of this investigator was the compilation of a base-of-the-fresh-water map of the Valley. Electric-logs, run in gas wells, were used for the interpretive work. An apparent resistivity of 25 ohm-meters was designated as the dividing point between fresh and brackish ground water. Results of the study confirmed the mound of saline water in the central portion of the Sutter Basin; and further, that the Ione Sand of Eocene age contained fresh water to a depth of over 2,000 feet around the south central part of the Sutter Buttes. Elsewhere the Ione Sand contains saline connate water.

Correlation section #6, published by the American Association of Petroleum Geologists Committee on Stratigraphic Correlation, shows the stratigraphy of the Sacramento Valley from Red Bluff to Rio Vista. A portion of this section cuts across the Sutter Basin. On this section the Ione Sand crops out in the Sutter Buttes at an elevation of between 250 and 400 feet above the valley floor, is confined by the Nortonville Shale from the Buttes to Humble Oil and Refining Company's "Sutter Basin" #1 well in Section 24, T.13N., R.2E., M.D.B.&M. (well 201 on Fig. 4), and is in contact with the overlying continental sediments in the area of the saline ground water mound in the Sutter Basin. It was therefore believed that here were the conditions necessary for the hydraulic gradient requisite to move the saline water up through the nonmarine sediments to the surface in the Sutter Basin.

Permission was obtained from the Department of Geology, University of Arizona, to investigate this phenomenon as a thesis topic.

During the Summer of 1969 the author was employed by the California Department of Water Resources and permitted to use the office facilities during weekends and evenings to collect and analyze data. Some 550 gas well locations were plotted and electric-logs from more than 400 wells were collected and correlated. Further data were taken from the Department's detailed study of the water quality along both sides of the Feather River, 1964-67, as well as water analyses of wells made during the Department's regular yearly program for succeeding years. Part of this information is displayed graphically on Figure 6 (in pocket), the rest is contained in Appendix A.

Well-numbering System

The customary method of identifying gas and oil wells is to use the name of the operator and the name of the well. To be done legibly would require more space than is available on the base map used in this report. Therefore, each well was assigned a number. In general, the numbering began in Township 10 North, Range 1 West, and moved across to Range 4 East, etc. This places the low numbers in the lower left hand corner of the base map (Fig. 4, in pocket) and the highest numbers in the upper right hand corner. During the process of the investigation the size of the base map was reduced, so as to include only that area most relevant to the study; hence, not all of the wells originally numbered are plotted on the base map.

The water well numbering system used in the study is that of the California Department of Water Resources, and shows the location of wells according to the rect-angular system for the subdivision of public land. For

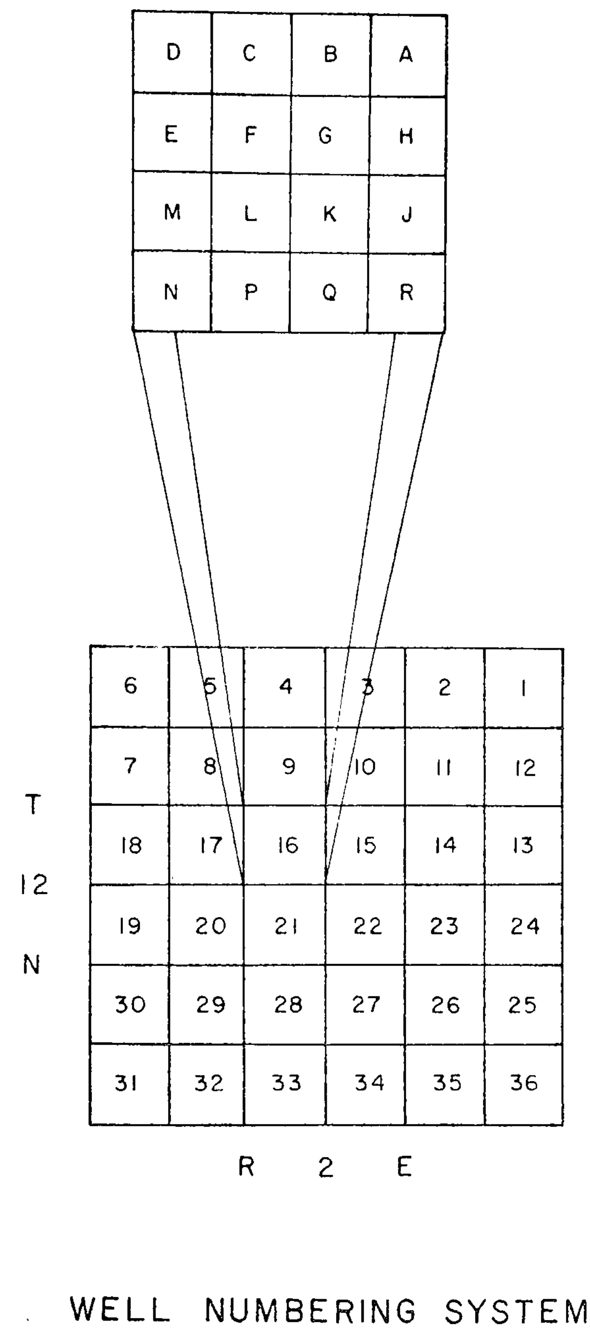

FIGURE 2 DIAGRAM SHOWING WELL NUMBERING SYSTEM

example, in well number 12N/2E-16B2, the segment of the number and letter preceding the bar indicates the Township (T.12N.); the number and letter between the bar and the hyphen, the Range (R.2E.); the digits between the hyphen and the letter, the Section (sec. 16); and the letter following the section number indicates the 40-acre subdivision of the section, as shown in Figure 2. Within each 40-acre tract the wells are numbered serially, as indicated by the final digit. Thus, Well 12N/2E-16B2 is the second well to be listed in NW1/4 NE1/4 Sec. 16, T.12N., R.2E., M.D.B.&M.

Parts of the study area lie in old Mexican land grants and have never been public land; for these, the rectangular system of subdivision has been projected for reference purposes only.

GEOGRAPHY

Topography

The Sacramento Valley is the northern one-third of the Great Central Valley of California and takes its name from the principal river which flows through it. The Sacramento Valley, as defined by Bryan (1923), extends from Red Bluff to the mouth of the Sacramento River at Suisun Bay, a distance of 150 air miles, or about 240 miles by river. The area of the Valley is approximately 5,000 square miles.

The Valley floor slopes southward from an elevation of nearly 300 feet at the north, near Red Bluff, to sea level at Suisun Bay and varies in width from five miles at the north end to 45 miles in the southern part.

The western boundary of the Valley is the North Coast Ranges, which consist of a series of parallel ridges and inter-montane valleys trending slightly west of north. The ridges rise to elevations of 3,000 feet.

The mountainous regions east and northeast of the Valley include the Sierra Nevada and the Cascade Range. The Sierra Nevada has been described (Lindgren, 1911; Matthes, 1930; Piper et al., 1939) as a single block of the earth's crust which has been uplifted along fractures on its eastern margin and tilted westward. The average slope of the western surface is $1^{o}40'$ and becomes steeper as it extends beneath the floor of the Sacramento Valley. The crest of the Sierra Nevada, to the east of the valley, varies from 6,000 to 10,000 feet in elevation. The Cascade Range, to the northeast, consists mainly of volcanic rock. It contains Mount Lassen, which is considered the only active volcano in California.

The Sacramento Valley has been divided into 16 geomorphic units by the U. S. Geological Survey (Fig. 3).

The study area for this report (Fig. 4) lies in the central portion of the Sacramento Valley. In this area the major topographic feature is the Sutter Buttes. It is the erosional remnant of a laccolith and volcano formed during late Pliocene time. The outline of the Buttes is an almost perfect circle, 10 miles in diameter, with the highest peak--South Butte--rising to an elevation of 2,117 feet. The only other prominent topographic feature is the Dunnigan Hills on the west flank of the Valley, which consist of Pliocene and Pleistocene sediments which have been folded into a gentle anticline with the axis trending approximately South 40^{o} East. The Hills are severely dissected but the summits are rounded and rise to nearly the same height. The summits decline from an average altitude of 400 feet at the north end to about 200 feet near the south end.

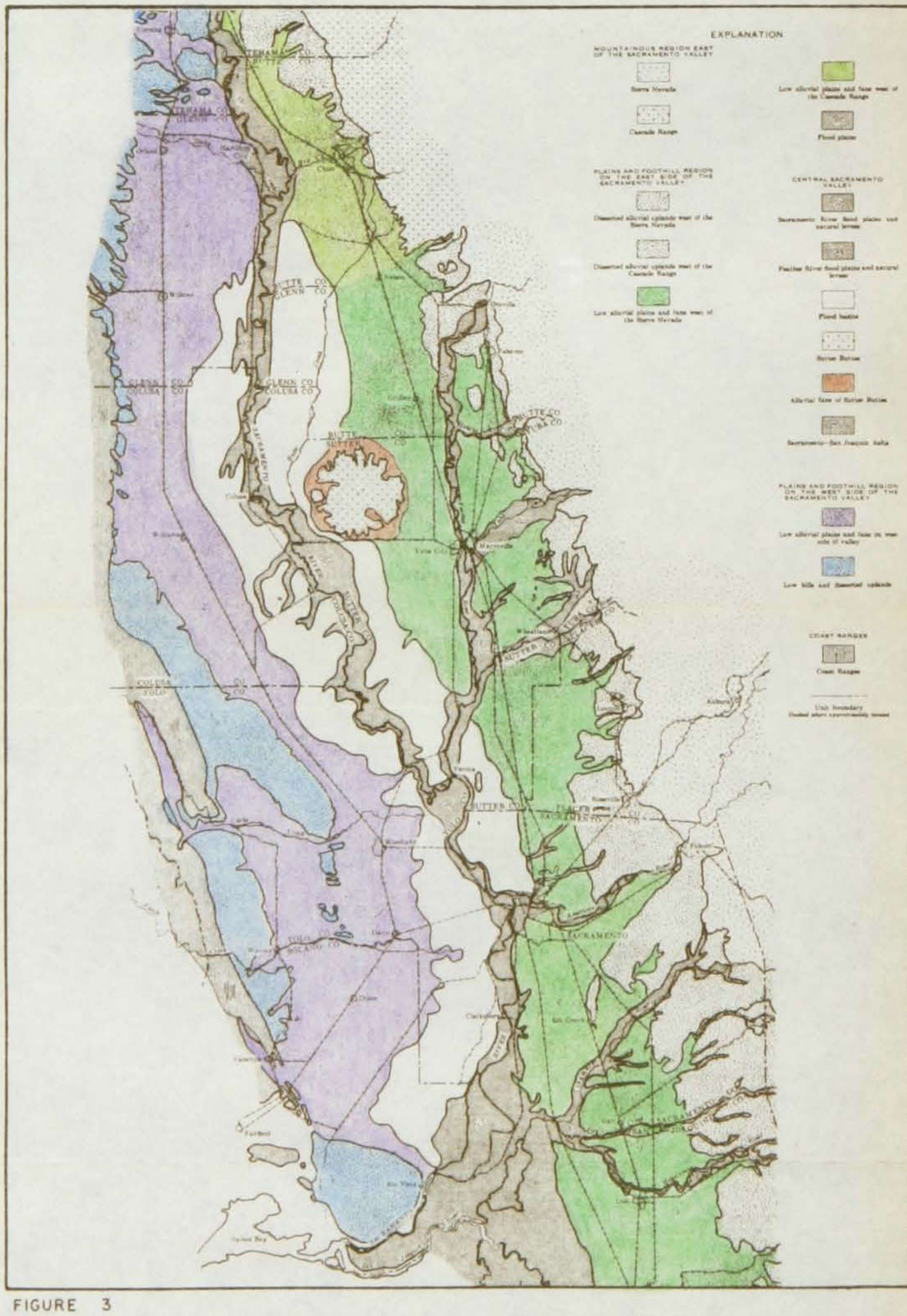

FIGURE 3

MAP OF THE SACRAMENTO VALLEY, CALIFORNIA, SHOWING GEOMORPHIC UNITS

The other topographic features in the study area are of low relief and are related to the fluvial deposition of the Sacramento River and its tributaries. They include the alluvial fans on the west and east sides of the Valley and around the Sutter Buttes, the flood plains and natural levees and the flood basins. These fluviatile features have had a marked influence on the agricultural development of the area.

Drainage

The average annual runoff of the Sacramento River and its tributaries during a 40-year period starting in 1904 was 21,750,000 acre-feet. In the years past most of this flow took place during December to April. Only in the driest years was the Sacramento Valley free from flooding. During the wetter years the flood water would extend from the alluvial fans on the west side of the Valley to the alluvial fans east of the Feather River. Bryan (1923) estimated that before any reclamation had been accomplished, sixty percent of the Valley was subject to overflow--including, in addition to the basins, the river lands and a considerable portion of the low plains. In recent years the construction of levees along the major streams, flood-water bypasses through the Sutter and Yolo Basins, and the building of Shasta Dam on the Sacramento River and Oroville Dam on the Feather River, has greatly limited the large-scale flooding of the basins.

Between Colusa and Verona, the Sacramento River follows a sinuous course, with meanders and oxbow lakes. Over a distance of 63.5 miles the average descent is about 0.4 feet per mile. The channel is narrow--averaging 150 to 600 feet in width--with well-defined broad natural levees. The natural levees are concave upward and relatively flat. In effect, the river is flowing along a broad upraised trench, flanked on either side by poorly drained, low-lying flood basins. The Colusa Basin lies to the West, and the Sutter Basin to the East.

South of Verona at the mouth of the Feather River, the aspect of the Sacramento River changes completely, and the course of the river consists of broad, gentle bends and relatively long straight reaches. The channel averages 600 to 1,200 feet in width, and bars and islands are uncommon. The natural levees are well defined, but are generally narrower than those upstream; the belt of river lands averages about two miles in width.

The Feather River, the principal tributary of the Sacramento River, leaves the Sierra Nevada foothills at Oroville. It follows a southwesterly course for about six miles, then turns sharply south and flows across the Victor Formation of Pleistocene age. Upstream from Marysville, the Feather River flood plain is one to two miles wide and lies 10 to 15 feet below the adjoining low plains. The river pursues a meandering course on its flood plain, and lakes and abandoned channels are common features, indicating frequent changes in course.

South of Marysville, the Feather River is joined by the Yuba River, and in turn by the Bear River. Here the river occupies a broad channelway, as much as a mile wide, that is choked with sand and gravel contributed by the Yuba and Bear Rivers. This channel aggradation is a direct result of hydraulic mining in the Sierra Nevada.

In the seven-mile reach upstream from its junction with the Sacramento River, the Feather River occupies a channel ridge similar to that of the Sacramento River. The prominent natural levees slope a mile or more toward the Sutter Basin to the west, and the American Basin to the east. Well-formed channel ridges of flood distributaries extend laterally toward the flood basins, and bends and abandoned channels are noticeably absent, suggesting long-continued channel stability.

The average grade of the Feather River from Marysville to the Sacramento River is 1.1 feet per mile.

Climate

The climate of the Sutter area is characterized by dry summers with high daytime temperatures and warm nights, and wet winters with moderate temperatures. More than eighty percent of the precipitation occurs during the five-month period from November to March, inclusive. The eighty-year average precipitation for the City of Marysville is

20.68 inches, with an annual high of 38.91 inches and an annual low of 8.15 inches. The growing season is long, the forty-year recorded average for Marysville being 273 days between killing frosts. Temperatures at Marysville have ranged from 16°F. to 118°F., and the monthly average ranges from 46.9°F. in January to 79.3°F. in July.

Culture

The native vegetation in the study area consisted of grasses and occasional oak trees on the alluvial fans. The swamp and overflow land supported a heavy growth of tules, or rushes, that gave the area its coloquial name of the "Tules." The natural levees supported a heavy growth of trees, predominantly Sycamore and Cottonwood.

It was a natural step for the early settlers to substitute grain such as wheat and barley for the native grasses. The commercial production of wheat in this area was begun by General John Sutter in 1843 on his Hock Farm south of Yuba City. With the influx of settlers during and after the gold rush, a large portion of the higher land was converted to the growing of dry-farmed grain crops and livestock.

The continuing wave of settlers in the area caused an increase in land value and the subdivision of lands into small farms which had to be capable of producing consistently high-value crops in order to support the owners. To the purchasers of such tracts the advantages of irrigation were apparent. The colonizing of subdivided lands became a business whereby large blocks of land were purchased and surveyed into small tracts with provisions for roads and perhaps for a town site. Irrigation works were provided for some of the subdivided acreages; in others, a demonstration well and pumping plant was built to persuade the settlers of the advantages of installing their own individual wells and pumps. Settlers were attracted by agents and by advertisements in the eastern newspapers of the United States.

The development of the flood basin and overflow land was slowed by recurring floods. However, many public agencies were organized in the area to deal with the problems of land reclamation and drainage. The provisions of California reclamation district laws have been used extensively to effect the unwatering of low lands and their protection from overflow. A canal was excavated to remove the flood and drainage water from Colusa Basin. The function of Sutter Bypass is to receive and convey excess floodwater of the Sacramento River and Butte Basin through Sutter Basin (Fig. 4).

The highest and best use for most of the basin land, because of the heavy soil, is rice production. In 1966, some 66,000 acres of basin land in Sutter County alone, or one quarter of the entire County, were used for the cultivation of rice. The rest of the basin land is used mainly as irrigated pasture for the raising of livestock.

Other annual crops in the area consist of beans, tomatoes, safflower, corn, hops, sugar beets, and alfalfa seed. Along the Feather River the land is used mainly for deciduous orchards--peaches, apricots, pears, prunes, almonds and walnuts.

Industry in the area is supported largely by agricultural production. About 100 plants are operated during the harvest seasons to can fruits and vegetables and to dehydrate fruits, nuts, rice and seed crops. Packing houses for packing fresh fruits and melons, and cold storage and refrigeration plants, have also been placed in operation.

Following are the population figures for the three counties that comprise most of the study area, and the county seat for each.

	1960	1970
Sutter County	33,380	41,894
Yuba City	11,507	13,740
Yuba County	33,859	43,934
Marysville City	9,553	10,100 (est.)
Colusa County	12,075	11,896
Colusa City	3,518	3,825 (est.)

GEOLOGY

Stratigraphy

The west side of the Sacramento Valley contains one of the thickest and most nearly complete late Mesozoic sections in North America. The Upper Jurassic, Lower Cretaceous, and Upper Cretaceous sequences have a maximum aggregate thickness of sediments in excess of 50,000 feet (not illustrated).

The classification of the Upper Cretaceous by Kirby (1943), the Upper Cretaceous faunal zones of Goudkoff (1945), and the faunal zones of Laiming (1943) for the Paleocene and Eocene sediments have been used in this report (Fig. 5). Where there appear to be differences in opinion as to the stratigraphic relations of the sub-surface geology, Correlation Section No. 6, 1954, "Sacramento Valley from Red Bluff to Rio Vista," of the A.A.P.G. Committee on Stratigraphic Correlations was used as the guide. Where this investigator differs from the A.A.P.G. Committee, these differences are based on electric-log interpretations and discussions with geologic consultants who have worked in the Sacramento Valley.

Upper Cretaceous Units

Forbes Formation. (Figs. 5 and 7, in pocket) The Forbes Formation is the basal member for sub-surface correlations illustrated, and has the most extensive distribution of any of the units correlated. It crops out along the western margin of the Sierra Nevada and along the eastern margin of the Coast Range. It is believed (Weagant, 1964) to have been deposited in a moderately deep-water environment, too far offshore to be affected by shoreline winnowing processes, and is the result of turbidity currents.

The thickness of the Forbes Formation varies from 2,750 feet to 3,000 feet in the study area. It is dominantly a gray, marine shale with fairly thick, fine-grained sandstone interbeds.

Kione Formation. (Figs. 5 and 7) The Kione Formation represents the shallowing of the Forbes basin, which resulted in the development of a shallow near-shore environment. The Kione sands were probably deposited in a series of deltas that lay at the mouths of the major drainages coming off the Sierran land areas to the east. These deltaic sands were further distributed along the east side of the valley by action of along-shore currents and by normal shoreline processes.

The Kione Formation was named and described by Johnson (1943). It is a medium-grained, well sorted, massive, friable sandstone of granitic origin with shale interbeds. The Kione is in gradational contact with the underlying Forbes Formation. Around the Sutter Buttes the

Kione has a thickness of between 800 and 1,000 feet. To the West, the Kione becomes more broken, tending to turn to shale, and to the south it thins and shales out. In the study area it is everywhere conformably overlain by the "Sacramento Shale", except in the Colusa area where it is reported to occur at a shallow depth and is overlain by the Tehama Formation.

"Sacramento Shale." (Figs. 5 and 7) This marine deposit has not been identified in outcrop, although it is possible that it crops out around the Sutter Buttes. For the purpose of this report it will be identified by the description as shown on A.A.P.G., Pacific Section, 1960, Correlation section from Red Bluff to Rio Vista, Sacramento Valley, "the siltstone which conformably overlies the Kione Sand and is conformably overlain by the 'Winter Sand'." The "Sacramento Shale" is typically 150 to 300 feet thick and light gray in color. It is everywhere present in the study area, and is an excellent electric-log marker.

"Winter Sands and Shales." (Figs. 5 and 7) The main source of the marine "Winters Sands and Shales" appears to have been older Cretaceous deposits, reworked and redeposited. In the Dunnigan Hills the shale is described (Rofe, 1962) as a medium-dull, gray, firm, massive, silty, muscovitic, fossiliferous claystone, grading locally into siltstone. The sand beds are light gray, fine to medium-grained, poorly sorted, massive, silty, micaceous sand with subordinate amounts of claystone that grade upward to well sorted, clean sand.

It is possible that the "Winters" crops out on the south side of the Sutter Buttes but has not been identified. It is not present north of the Buttes, it thins to the north and east, thickens to the south, and its western extent is obscured by uplift and erosion during post-Cretaceous time. The unit unconformably underlies the Starkey Sands in the area south of the Sutter Buttes.

"Starkey Sands." (Figs. 5 and 7) The "Starkey" represents a very shallow sea environment with deposition of a series of regressive-transgressive beach or near-beach sands. The deposits were derived from the east and northeast as the Sierran and northern Sacramento Valley areas were uplifted and eroded. The "Starkey" grades from a medium-grained, clean sand into a shale from east to west. The "Starkey" is everywhere confined by the Martinez Silt of Paleocene age or the Capay Shale of Eocene age, except in the southern Sutter Basin where it is unconformably overlain by the post-Eocene non-marine sediments (Fig. 7). The sand thins or has been removed by erosion to the north and west. To the south it occurs at ever-increasing depths and thickens to approximately 1,900 feet before thinning and shaling out in the Delta area.

Tertiary Units

Meganos-Martinez Formations Undifferentiated. (Figs. 5 and 7) This group of sediments conformably overlies the "Starkey Sands" in the southeast portion of the study area.

The type locality of the Martinez Formation is near the town of Martinez on Carquinez Strait, west of Suisun Bay, and was described by Dickerson (1914). Lithologically, it is predominantly a massive, well-sorted, quartzose sandstone with interbedded shale and local conglomerate lenses. Much of the detritus of the Martinez was derived from Cretaceous Formations. A basal shale member is referred to as the Martinez Silt and is an excellent electric-log marker where it overlies the "Starkey Sand." The Martinez contains Laiming's (1943) E fauna zone and is Paleocene in age.

The type locality for the Meganos Formation is in Contra Costa County in the Mount Diablo region and was described by Clark (1918). It consists of friable, fine to medium-grained, micaceous, carbonaceous gray sand and hard, mostly light to dark brown shale with streaks of lignite. For the purpose of this report, it is considered to be those sediments containing Laiming's D fauna zone, and is Lower Eocene in age.

The thickness of the Meganos-Martinez group, in the study area, varies from zero to 240 feet. It occurs only in the south central portion of the study area where it is truncated or pinches out to the north and dips to the south.

Capay Shale. (Figs. 5 and 7) The type section for the Capay Formation is in Capay Valley, to the west of Dunnigan Hills, and was described by Crook and Kirby (1935). Unfortunately, the type section is atypical of most of the Capay in the Sacramento Valley. It consists of as much as 2,000 feet of beds resting unconformably on the Upper Cretaceous rocks, ranging from channel conglomerate to fine-grained estuarine deposits. The source of the detritus was said by Crook and Kirby to have been local. It is now believed that this part of the Capay was deposited in the southern extension of the Princeton Gorge. When the Eocene sea transgressed, the gorge was inundated first and coarse sediments were contributed from immediately adjacent sources. As the sea continued to rise, it topped the gorge and spread out over the floor of the Valley. It was then that the Capay Shale was so extensively deposited.

At Dunnigan Hills the Capay Shale is described by Rofé (1962) as medium gray to dark gray, massive, micaceous, glauconitic, pyritic, fossiliferous claystone with a dark gray, medium-grained, poorly sorted, massive basal gritstone, which is a more typical description of the Capay Shale and is probably the upper part of the Capay Formation. In the study area the Capay Shale is considered Lower Eocene in age.

The Capay Shale acts as a cap rock for many of the gas fields in the Valley. It is present throughout the area except where it has been removed by erosion in the Sutter Basin south of the Sutter Basin Fault, in the "Markley Gorge," and along the western margin of the study area. The Capay Shale varies in thickness from zero to 558 feet and thins to the East. The base of the Capay is one of the major unconformities in the Valley. The Capay progressively overlies older Cretaceous rocks in a northern and eastern direction.

Ione-Domengine Formation. (Figs. 5 and 7) Stewart (1949) divided the Domengine Formation of Clark (1926) into two formations: the Lower Ione Formation, consisting of quartz sand; and the Upper Domengine Formation, consisting of green and brown sand. Both are placed in Middle Eocene and contain Laiming's B-1 faunal assemblage.

In the Dunnigan Hills (Rofé, 1962), the Domengine Formation is 19 to 62 feet thick and consists of dark gray to greenish gray, fine-grained, well sorted, silty sands. It appears that the Lower Ione Formation of Stewart (1949) is not present at this location.

Throughout most of the area, the Middle Eocene is represented by the Ione Formation of Stewart. In the Sutter Buttes, the Ione is described by Johnson (1943) as a white, quartzose, friable sandstone, and probably represents deltaic deposits that have been winnowed by off-shore currents. Figure 5 indicates that the Ione-Domengine Formation is of rather limited extent in the study area, having been removed by erosion to the west and south. It ranges in thickness from zero to 250 feet.

The Ione-Domengine Formation conformably overlies the Capay Shale of Lower Eocene age and is conformably overlain by the Nortonville Shale of Upper Eocene age.

Nortonville Shale. (Figs. 5 and 7) Stewart (1949) divided the Kreyenhagen Formation of Upper Eocene age into the Nortonville Shale member, the Markley Sandstone member, and the Sidney Shale member, in ascending order. Only the Nortonville Shale has been identified in the study area, and then only in gas wells at Dunnigan Hills and in the Sutter Basin. The extent of the Nortonville sea is obscured by subsequent erosion, but probably did not extend further north than the Sutter Buttes and was not as widespread as the Capay sea.

In the Dunnigan Hills, the Nortonville Shale is described (Rofé, 1962) as blue and brown, firm, mottled, micaceous, sandy claystone, interbedded with grayish green, gritty sands. Its thickness varies from 92 to 235 feet, and contains Laiming's A-1 faunal assemblage.

"Markley Gorge" Fill. (Fig. 5) The "Markley Gorge," a deep canyon that was eroded during Upper Eocene, extends from north of the Bear River, near the foothills of the Sierras, southwest to the northflank of Mount

Diablo. This sub-surface feature is more than 45 miles long and nine miles wide, and reaches a maximum depth of 5,700 feet below sea level. Probably a better name for this feature would be the Sacramento Canyon, but at present it is referred to as the so-called "Markley Gorge."

Davis (1953) first described the Gorge, and believed that it was filled with Upper Eocene deposits. Almgren and Schlax (1957) believed the fill is Oligocene and, in part, possibly Miocene in age. Despite the later conclusions, most geologists with a working knowledge of the "Markley Gorge" Fill believe that it is no older than Late Eocene (Sacramento Petroleum Association, 1962).

The "Markley Gorge" Fill consists of shales, sandstone, and conglomerate which have considerable lateral and vertical lithologic variation. The shales are light olive-gray to grayish, brown, silty, and generally barren of microfauna. Sandstones are of two dominant types: one confined to the lower part of the fill is grayish green to greenish brown, earthy, poorly sorted and consists largely of grains of various volcanic rock types, and subangular to sub-rounded pebbles of gray shale and siltstone occur locally; the other dominant type of sandstone is blue, generally coarse-grained and fairly well sorted.

Post-Eocene Non-Marine Sediments. (Figs. 5 and 7) This classification is a catch-all for the alluvial sediments that have been deposited in the Valley by the

Sacramento River and its tributaries from both an eastern and western source. In the study area it has no commercial accumulation of gas and therefore is of little or no interest to the petroleum industry. Petroleum geologists usually call the entire interval the Tehama Formation, which does make up a large percentage of the sediments.

It appears that the Oligocene epoch was a time of uplift and erosion with little or no sediments being deposited in the study area. The Miocene epoch is represented by sedimentary rocks of volcanic origin. The rocks from the Sierra Nevada are a sequence of fragmental volcanic rocks, the source of which lay near the present crest of the Sierras, about 50 miles east of the Sacramento Valley. These rocks, predominantly andesitic, are extensively exposed on the western slope of the Sierra Nevada and extend westward beneath much of the Valley. They probably extend beyond the Sacramento River in the study area. This unit is believed to be related to the Mehrten Formation of Piper et al. (1939).

The sedimentary rocks of volcanic origin that crop out on the west side of the Valley are a sequence of volcanic shale, sandstone and conglomerate beds. Weaver et al. (1944) assigned most of these rocks to the Neroly Formation (Upper Miocene) of Clark and Woodford (1927), but their age and correlation are in considerable doubt.

Five wells (282, 291, 292, 293, and 296) have been drilled through a basalt flow that is approximately 150 feet thick. This island of basalt in Township 13 North, Range 2 East, is believed to be Upper Miocene in age and lies at the base of the Tehama Formation.

The Pliocene sediments consist of continental deposited Laguna Formation of Piper et al. (1939) and the Tehama Formation of Anderson and Russell (1939).

The Laguna Formation (not illustrated) is a sequence of predominantly fine-grained, poorly bedded, somewhat compacted continental sedimentary deposits derived from the Sierra Nevada. The Laguna appears to form a wedge of alluvial material thinning near the Sierra Nevada and thickening toward the axis of the Valley. The maximum thickness of these deposits may be more than 1,000 feet.

The Tehama Formation (Fig. 4) consists of alluvial material derived from the Coast Ranges. It was inaugurated by the orogeny at the beginning of Late Pliocene time, which raised the present Northern Coast Ranges, and was closed by a Middle Pleistocene orogeny. The Formation has been assigned to the Upper Pliocene and possibly the Lower Pleistocene by Anderson and Russell (1939). They state the Formation consists of poorly sorted fluviatile sediments, comprising massive sandy silt, silty sand, and clayey silt enclosing lenses of crossbedded sand and gravel.

The Tehama forms a thick wedge of sediments that thicken to the east and interfinger with the Laguna Formation beneath the Valley floor. In the study area, the Tehama Formation has a maximum thickness of approximately 2,500 feet.

The Sutter Beds of Williams (1929) which crop out in the Sutter Buttes are correlative to the Tehama Formation according to Johnson (1943). They are comprised of continental fine-grained sediments, tuff, sand, silt, and gravel some 1,800 feet in outcrop. Both Williams (1929) and Johnson (1943) believed that the Sutter Beds had a Sierran source because they are petrologically similar to the Sierran andesites. If this be true, then the Sutter Beds are better correlated to the Laguna Formation of Piper et al. (1939).

Quaternary-Recent Units

During Pleistocene time, some 1.2 million years ago, as indicated by radioactive dating according to Dr. Howel Williams (oral communique, 1969), a series of volcanic episodes--the intrusion of rhyolite porphyry volcanic necks followed by the intrusion of an andesite porphyry plug--resulted in the formation of the Sutter Buttes. The final igneous episode was the explosive phase--the formation of a volcano within the andesite plug--the ejecta of which mantles the slopes with andesitic tuff and breccia.

Along the east side of the study area, the alluvial fans and flood-plain deposits of Pleistocene age have been termed the Victor Formation by Olmsted and Davis (1961), after the type Victor Formation of Piper et al. (1939). The Victor Formation consists of an heterogeneous assemblage of clay, silt, sand and gravel, transported by shifting streams from the Sierra Nevada, and has a maximum thickness of 150 feet. The base of the Victor in most places is in conformable contact with the Laguna Formation. Toward the center of the Valley, it is at many places conformably overlain by basin and river deposits of Recent age. In general, the Victor Formation is not appreciably consolidated, although some of the beds have a high proportion of clay and silt which act as a binder. Hardpan layers, representing buried soil zones, occur at various depths, though most are within six feet of the surface.

The Red Bluff Formation is a poorly sorted gravel which has a distinctly reddish silty or sandy matrix and lies on an erosion surface cut on the Tehama Formation. This Pleistocene deposit is of no importance with regard to this report.

The sediments of Recent age include the river and flood-basin deposits. The river deposits consist predominantly of well-sorted sand, gravel, and silt along the channels, flood plains, and natural levees of the major streams. The basin deposits are largely silt and clay deposited in the flood basins during floods on the major streams. The sediments of Recent age range in thickness from zero to 100 feet.

Geologic Structure

Regional Features

The Sacramento Valley is a large structural basin filled with sedimentary rocks ranging in age from Early Cretaceous to Recent. The Valley trough is asymmetrical; the deepest part of the basin lies near the western margin of the Valley, west of the present axis and plunges to the south. The plunge of the Valley trough results in the southern part of the Valley--the Rio Vista Basin--containing the thicker and more complete geologic section.

The basement complex, beneath the Valley floor, is a continuation of the Sierra Nevada fault block that has been tilted toward the southwest. Geophysical evidence indicates that the basement lies some 20,000 feet below the surface along the western edge. Deep wells that have cored the basement complex in the Sacramento Valley indicate that the surface of the block slopes more steeply beneath the central part of the Valley than it does to the east.

The western part of the Valley is bounded by strike ridges underlain by Cretaceous and Lower Tertiary marine sedimentary rocks. Compressive forces deformed the

Coast Ranges sediments into tightly folded anticlines, synclines, and local thrust faults. Vaughan (1943) suggested that these same compressive forces caused the tilting of the rigid Sierra Nevada block by forcing its western part down below its position of isostatic equilibrium.

Sutter Buttes

The Sutter Buttes comprise the major structural and topographic feature in the study area, rising some 2,000 feet above the flat Valley floor. The Buttes are the surface expression of an intrusion of rhyolite porphyry, followed by andesite porphyry (Johnson, 1943) that forced its way upward from an unknown, but great depth, through at least a portion of the underlying "Basement Complex" platform, into and through some 7,500 feet of Cretaceous and Tertiary sediments. The rising laccolith greatly disturbed the sediments intruded and not only sharply tilted them away from the locus of intrusion, but produced an intricate series of radial and peripheral faults. Furthermore, radial and lateral anticlines and synclines were developed, some of them of sufficient amplitude to involve all of the exposed sediments.

After a period of quiescence and erosion, a series of violent explosions of steam and mud took place and a mile-wide central crater located just west of the middle of the great andesitic plug. Great angular masses of andesite and rhyolite, some of them measuring 30 feet or more in diameter, were thrown from this opening and were swept by mudflows down the slopes of the volcano to find a resting place about its periphery.

Erosive processes have brought the Sutter Buttes to their present form. The present-day Buttes are 10 miles in diameter and form an almost perfect circle. The Buttes can be divided into three concentric zones of rock types: the central core, the saddles and low areas surrounding the central core, and an outermost ring of tuff-breccia slopes.

The central core is a roughly circular area three to four miles in diameter, dominated by a cluster of sharp, steep-sided erosional remnants of a laccolith, with South Butte rising to a height of 2,117 feet.

The saddles, low hills, and ridges surrounding the central core are underlain by sedimentary rocks of Tertiary and Late Cretaceous age that were pushed up and fractured when the core was emplaced. This zone is approximately one mile in width and ranges in elevation from 200 to 500 feet above the valley floor.

The tuff-breccia slopes which form the outermost ring are two to three miles wide and have been dissected by erosion. The altitudes range from about 500 to 800 feet at the top of the slopes, and 50 to 100 feet at the foot of the slopes.

Dunnigan Hills Anticline

The Dunnigan Hills structure is an asymetrical anticline, steep on the east flank and gentle on the west flank, and is about 20 miles in length. The anticline plunges to the south, resulting in the subsequent burial of the deformed Tehama and Red Bluff Formations beneath younger valley alluvium along the southern portion. The time of folding is believed to have been during Late Pleistocene.

Faults

The only fault identified in this report is the Sutter Basin Fault (Figs. 5, 6 and 7). The location of this fault is based on electric log correlation and geophysical evidence. It is depicted as a vertical fault, striking N70^{o}W, 11 miles in length, with the south block moving up approximately 500 feet in relation to the north block. The eastern extension of the fault is concealed by the "Markley Gorge," and to the west of the fault appears to die out as it is not discernable in wells further west. The age of the faulting appears to be Upper Eocene.

Around the Sutter Buttes numerous faults occur as the result of the igneous intrusives. The surface expressions of some of these faults have been mapped on Figure 4.

Published investigations of gas fields in the area reveal numerous faults to the south of the Buttes and along the west side of the Valley. Most of the faulting to the south of the Buttes is confined to the Forbes Formation. The few faults that extend above the Forbes (Weagant, 1964) are strike-slip faults trending to the north or northwest, and terminate at the base of the Capay Shale. Since the strike of the faults is approximately parallel to the direction of the ground water flow and the Capay Shale appears to act as a barrier to the upward migration of saline water, these faults have not been illustrated on Figure 5.

In general, the fault systems can be divided into three groups: (1) those that are confined to the Upper Cretaceous sediments only; (2) those that cut the Eocene and Cretaceous rock units; and (3) those that were formed by the Sutter Buttes intrusives during Upper Pliocene time.

Historical Geology

The first geologic event pertinent to the hydrogeology of the Sutter Basin was the deposition of the Upper Cretaceous sediments. According to Weagant (1964), in F-zone time (Forbes Formation), there was transgression of the sea and sediments were deposited by progressive onlap on the Lower Cretaceous shale. East of the central portion of the study area the Lower Cretaceous sediments are fully overlapped by the F-zone. The Forbes Formation was deposited in a moderately deep water environment too far from the shore to be affected by shore-line winnowing processes. These sediments consist of interbedded dark gray claystones and siltstones, and gray, fine-grained friable, lenticular sands. The eastern limit of the F-zone transgression is not known but members of the Forbes Formation crop out along the eastern side of the Sacramento Valley.

The rate of sedimentation was slightly greater than the rate of subsidence, so that the basin gradually shallowed and the E-zone Kione sands as well as some of the uppermost F-zone sands are near-shore sands associated with the shallowing.

The Kione sands were probably deposited in a series of deltas that lay at the mouth of the major drainages coming off of the Sierran land areas to the east. These deltaic sands were further distributed along the east side of the valley by action of along-shore currents and by normal shoreline processes.

Basinal shallowing was accompanied by uplift along the western basin margin with the regression of the sea to a position southwest of the Grimes gas field (Fig. 4). The basin then subsided rapidly, and the Sacramento Shale sea transgressed the area. The Sacramento shales were deposited in a moderately deep water basin.

Again the basin became shallow as the Winters Shales and Sands were deposited. The Starkey represents a very shallow sea environment with deposition of a series of regressive-transgressive beach or near-beach sands.

Following the deposition of the Upper Cretaceous sediments, probably in Late Paleocene time, the basin was uplifted, tilted southerly, and folded into a broad syncline with a north-south trending axis. The eastern margin of the sea was upwarped (Olmsted and Davis, 1961) and a land mass created east of the present position of the Sutter Buttes. The area then underwent extensive peneplanation.

The sea did not completely withdraw from the Sacramento Valley during Paleocene time, as attested by the deposition of the marine sediments of the Martinez Formation, in the southern part of the Valley. The Paleocene sea in which the Martinez Formation was deposited was confined to a restricted portion of the Delta area by barrier beaches (Safonov, 1962). Behind these beaches, lagoonal, swamp, and flood-plain deposits of sand and silt were laid down. The numerous beds of coal and the erratic character of the sediments as shown on electric logs attest to the predominantly nonmarine nature of the Martinez in this area. In late Paleocene time, the sea readvanced, continuing to do so into early Eocene Meganos time.

At the close of Meganos time, gradual subsidence allowed the Eocene sea to continue to spread over the entire Sacramento Valley area. The basin remained relatively quiet as the Capay Shale was deposited. The Capay Shale marks the last major sea transgression into the Sacramento Valley. Being widespread and conspicuous on electric-logs, it is an excellent marker bed. The Capay Shale reflects the post-Capay movement of the Valley, the southerly tilt, and the trough effect.

During Middle Eocene time the sea shallowed again and the deltaic deposits of the Ione-Domengine Formation of Stewart (1949) were laid down. To the east, the alluvial and lagoonal sediments of the Ione Formation of Allen (1929) were deposited. Lignite seams and severely weathered sediments of the Ione Formation attest to a warm, humid climate.

Following the Capay transgression a minor transgression of the sea in Upper Eocene time is reflected in the deposition of the Nortonville Shale member of the Kreyenhagen Formation. Then the sea began to withdraw from the Sacramento Valley.

Near the end of Eocene time the area was again uplifted, and eroded. The "Markley Gorge" of Davis (1953) was being carved and the entire study area was undergoing erosion. Almgren and Schlax (1957) believe that the "Markley Gorge" Fill was predominantly nonmarine deposits of Oligocene and possibly Miocene time.

Commencing in the Middle or Late Eocene and continuing sporadically into Miocene time, volcanic eruptions deposited rhyolitic, andesitic, and basaltic pyroclastic and flow rocks near the present crest of the Sierra Nevada (Piper et al., 1939). The streams eroded this material and redeposited it in the valley as water-laid tuff, tuffaceous sand and volcanic gravel. After a period of erosion and relative quiet, predominantly andesitic eruptions began during the Late Miocene in the northern Sierra Nevada and sent a flood of mudflow breccia and ash down the western slopes. Streams continually reworked these deposits and spread them over broad areas to the west.

The volcanic activity waned and died out and the latter part of the Pliocene epoch was marked by erosion in the Sierra Nevada and subaerial deposition (Laguna Formation) in the Sacramento Valley.

In the Middle or Late Pliocene time (Olmsted and Davis, 1961) an uplift of the present northern Coast Ranges inaugurated a period of erosion in the mountains and deposition of coarse detritus to the east. The Sacramento Valley trough began to assume approximately its present outline. Fluviatile deposition continued through the Pliocene and possibly into the early Pleistocene. The streams continually shifted across broad, low flood plains and deposited the Tehama Formation.

During Middle Pleistocene both the Coast Ranges and the Sierra Nevada appear to have been subjected to orogenic processes, and it is possible that this is the time that the Sutter Buttes were formed. The Coast Ranges were folded, faulted, and elevated and began to assume their present general outline and form. The Pliocene to Pleistocene (?) fluviatile sediments (Tehama Formation) and older rocks were involved in the folding and uplift. Dunnigan Hills anticline was formed at this time. During and after this mountain-building activity, erosion was vigorous, and much of the Tehama Formation was removed and redeposited in the center of the Valley or carried southward by the Sacramento River. Poorly sorted, gravelly material (Red Bluff Formation) eventually was deposited on the eroded surface of the Tehama.

The rejuvenated streams cut laterally and truncated the soft sediments of the Laguna Formation that had been deposited during the Late Pliocene. Most of the detritus was carried westward to be deposited near the axis of the Valley, and in this report is considered part of the Victor Formation.

The present cycle is one of continued erosion of the Coast Ranges, the Sierra Nevada and low hills, and deposition in the Valley.

WATER QUALITY

Connate Water

The term "connate water" has been used several times in this report. Connate water, as originally defined by A. C. Lane (1908) is "water that has remained since burial with the specific rocks in which it occurs, and that its chemical composition has remained unchanged." D. E. White (1965) has summed up the more recent ideas about connate water by saying (pg. 345):

> Much recent evidence indicates that (1) the original interstitial water of sediments normally undergoes diagenetic changes related to bacterial activity and decomposition of organic matter; (2) inorganic reactions between mineral phases and interstitial water occur during early and late diagenesis and also during metamorphism; (3) compaction always occurs, at least to some extent, in response to sediment load, so water must migrate either locally or extensively in directions of decreasing potential; (4) 'salt-sieving' mechanisms, only slightly understood until very recent years, account for changes in salinity of probably all deep waters of sedimentary basins; and (5) other mechanisms, even less well understood, account for changes in chemical composition of saline waters.
>
> Connate water, as here defined, generally is similar in age or somewhat younger, since last direct contact with the atmosphere, than the age of its associated rocks. Most connate waters are probably marine in origin and are associated with normal marine sediments, but some are suspected of being connate to marine and nonmarine evaporites. The dilute meteoric water 'born with' normal nonmarine sediments is probably never preserved in

> its original relationships but is normally displaced after burial by other dilute waters and eventually by any saline water (with higher density) that has access to the sediments.

In this report the water with a high chloride content is believed to have been derived from a marine source when the sediments were deposited in the open sea or in embayments with limited access to the sea. The latter case seems true for the sands of the Upper Cretaceous and Eocene deposits, because their chloride content is about half of that of normal sea water. These waters are termed "connate" under the definition of White (1965).

Basic Data

One hundred thirty-seven water quality analyses were obtained from the files of the California Department of Water Resources for use in this investigation. As many as space would allow are depicted with circle diagrams on Figure 6. Most of the analyses were determined during the 1964-67 period and consist of the standard analyses (i.e., only the major ions were determined). All of the chemical analyses are tabulated in Appendix A.

Approximately 400 electric-logs were used to correlate the formations and zones in the study area. These logs were also used as a guide to the quality of the ground water. The large differences in resistivity for potable and saline water are easily interpreted. Problems arise when one attempts to relate resistivity to degree of salinity. Besides the many assumptions that must be made, it is necessary to compute the resistivity of the formation from cores or drill cuttings, or have water quality samples from the formation in question. Lacking this, the electric-logs can be used only in a general way for determining water quality.

Variations of Water Quality

Vertical Variation

The entire study area is underlain at varying depths with saline water of marine origin. East of the Feather River, the base of the fresh water is at or near the base of the post-Eocene non-marine sediments. The fresh-water base slopes from near surface, at the areas of outcrop along the eastern margin of the Valley, to depths of 1,100 feet below the town of Verona and approximately 650 feet beneath Yuba City.

Throughout most of the Sutter Basin the base of the fresh water is at a depth of less than 500 feet and in the southern part of the Basin it rises to the surface. Along the western edge of the Sutter Basin the base of the fresh water again deepens and reaches a maximum depth of over 2,300 feet in T.10N., R.1E. A trough of fresh water trends to the northwest beneath Colusa Basin and also shallows to the northwest.

To the west of the trough the base of the fresh water again shallows and is at or near the base of the Tehama Formation along the western boundary of the Valley.

Around the Sutter Buttes the marine sands of the Ione-Domengine and the Kione Formations have been flushed with fresh (meteoric) water to depths of over 2,100 feet. Between the Buttes and the City of Colusa is another mound of saline water which is associated with the near-surface occurrence of Cretaceous beds.

If the base of the fresh water south of the Sutter Buttes were to coincide with the base of the nonmarine sediments, then there would be a gradual deepening of the base of the fresh water across the Sutter and Colusa Basins toward the trough of the Valley. Instead, the base of the fresh water shallows in the Sutter Basin and then deepens in the Colusa Basin.

Horizontal Variation

The river water that flows through the area is very good in quality. It is a calcium bicarbonate type with a total dissolved solid (TDS) content of between 50 and 150 parts per million (ppm). When the river water enters the ground water basin by influent seepage it is in a new environment and changes in quality to reach equilibrium with its new environment. It increases in total dissolved solids and changes to a magnesium bicarbonate type water. This is due to the large percentage of andesitic and basaltic debris that is present in the alluvial material.

In contrast to the magnesium bicarbonate type fresh water is the poor quality sodium chloride water that occurs in the Sutter Basin between Tisdale Weir and the town of Robbins (Fig. 6). The sodium chloride type water is unlike either the river water or ground water elsewhere in the area. The development of a pumping trough to the northwest along the Feather River has caused the saline water to move into this area and contaminate the ground water. This movement has been continuous over the years and has caused the farmers to abandon their water wells and resort to Feather River water for irrigation.

HYDROCHEMICAL PROCESS

Recharge Waters and Equilibrium

Recharge of the ground water basin is coming from three main sources: infiltration of rain water, river water, and excess irrigation. These three sources consist of water of high quality. One of the conclusions of this paper is that rising connate water is contaminating the ground water basin.

For saline water to move up and displace the fresh water in 2,000 feet of alluvial material requires a driving force or hydraulic head. The saline connate water was originally contained in the marine sediments of Upper Cretaceous and Eocene age. When the igneous intrusives of the Sutter Buttes forced their way up through the overlying sediments they dragged up the marine sediments and exposed them at the surface around the central zone of the Buttes. The marine sediments now stand some 250 to 400 feet above the surrounding flocr of the Valley. In time (some 1,200,000 years) runoff water of meteoric origin infiltrated the Ione-Domengine and Kione sands, both at outcrop and along faults and fractures, and displaced the saline water of marine origin.

Electric-logs run in wells around the southern half of the Buttes indicate that the fresh water has displaced the connate water to depths of over 2,000 feet. The displaced connate water in the Ione-Domengine Formation has many avenues of escape (Fig. 5) and has contributed saline water to the lower part of the nonmarine sediments in the ground water basin. The hydraulic gradient or head that developed in the Kione Formation, from the Buttes south to the Sutter Basin, has only one avenue of release and that is up the Sutter Basin Fault (Figs. 5, 6 and 7). Therefore it is proposed that the connate water in the Kione Formation moves south from the Sutter Buttes and up the fault, causing a mound of saline water to move to the surface. This movement of high chloride water continues to the present as fresh water infiltrates the Kione sands at the Sutter Buttes. It is possible that the connate water in the Ione-Domengine Formation is also contributing some saline water to the mound, but it appears that the major contributor is the Kione Formation.

There is not enough information available now to determine whether the Sutter Basin Fault zone is pervious and allows the connate water to move through it or that it acts as a barrier and forces the saline water to rise along the north side of the fault.

For a time this investigator thought that the Starkey Sands of Upper Cretaceous age was the main contributor of the saline water. But it now appears that the presence of the Starkey Sands in contact with the overlying nonmarine alluvium (Fig. 6) beneath the mound of saline water in the Sutter Basin has nothing to do with the saline phenomenon. It was hypothesized that the overburden on the confined portion of the Starkey would develop the required pore pressure to move the connate water up through the valley alluvium to the surface. However, a check of "closed in" pressures conducted in gas wells drilled into the Starkey Sands revealed that the pore pressure was approximately equal to the hydraulic load. This means that no abnormal pore pressure has been developed in the Starkey, and therefore there is no hydraulic head to move the saline water through the alluvium and up to the surface in the Sutter Basin.

Base Exchange

When ground water comes in contact with solid phase materials different from the ones it had been in contact with previously, chemical reactions may occur. This is particularly true when the water comes in contact with finely divided solids such as silt and clay that have an adsorptive capacity. One type of adsorption is termed "ion exchange" and is the replacement of adsorbed ions by ions in solution. The capacity for ion exchange is mostly a result of unsaturation of the chemical bonding in the crystal lattice of the solid having this capacity. In most cases there is an excess of negative bonds in certain areas of the crystal lattice, and positively charged ions are attracted to these areas. Most of the ion exchange reactions involve cations (calcium, magnesium, potassium, and sodium) and are therefore called base exchange.

After the ground water has been in contact with the solids a sufficient length of time, cations in solution and the adsorbed ions held by the exchange material constitute a system in chemical equilibrium. The degree and readiness for displacement of the equilibrium to the right or left is governed by the law of mass action, which means that if water or mineral holds some base in large excess, the exchange of that base for another proceeds more readily. The replacing power of the different metallic cations differ widely. Calcium possesses high replacing power; magnesium stands next, followed by potassium and then by sodium. Normally, calcium and magnesium ions from solution replace adsorbed sodium on the exchange material and the water is naturally softened. However, under certain conditions explained by the Le Chatelier's principle the system can be reversed and the ground water will undergo a hardening process. According to the principle of Le Chatelier any equilibrium system subjected to a stress tends to change so as to relieve the stress. For a system in chemical equilibrium, changing the concentration of one of the components constitutes a stress (Sienko and Plane, 1966). Thus, if we introduce a large supply of sodium ions into the ground water body that has reached chemical equilibrium a stress has been applied. Now the adsorbed calcium and magnesium ions will be replaced by the sodium ions in solution and the replacement will continue until the system is again in chemical equilibrium. This is exactly the procedure used in many domestic water softening systems. The water flows in contact with zeolites which act as an ion exchanger. Calcium ions are exchanged for sodium ions being held by the zeolite molecules. Once the exchanger has given up its supply of sodium ions it cannot soften water further. However, it can be regenerated by exposure to a concentrated solution of sodium chloride which reverses the reaction.

Piper et al. (1953) in their study of the contaminated ground water in the Long Beach-Santa Ana area of California found that the introduction of sea water or oil field brines high in sodium chloride resulted in the substitution of calcium (and locally some magnesium) for a large part of the sodium in the contaminating water. In other words, the strongly contaminated waters had been hardened by base exchange reactions, and the degree of hardening was greater than could be explained by the simple admixture of sea water and fresh water. They postulated that the influx of ocean water into the zones of native calcium bicarbonate type water released previously adsorbed calcium and magnesium by base exchange. This condition is also found in the Sutter Basin, where the rising connate water, high in sodium chloride, comes in contact with the calcium-magnesium bicarbonate type ground water of low total dissolved solids, and is changed to a calcium-magnesium chloride type with a high total dissolved solids. In both instances, we see a case of water being hardened by base exchange.

Source and Movement of Ions

Bicarbonate-Carbonate

There is a very limited occurrence of bicarbonate minerals in the Sutter Basin and the drainage areas of the Sacramento River and its tributaries. Based on the work of Bear (1964), this investigator concludes that the bicarbonate and carbonate anions in the ground water come mostly from the carbon dioxide contained in the soil, and in a small part from the precipitation that has been in contact with carbon dioxide in the atmosphere.

The following chemical equations indicate how these reactions might take place:

$$CO_2(gas) + H_2O = CO_2(aqueous) + H_2O$$
$$CO_2(aqueous) + H_2O = H_2CO_3$$
$$H_2CO_3 = H^+ + HCO_3$$
$$HCO_3^- = H^+ + CO_3^{--}$$

Of the 137 water analyses tabulated in Appendix A, 106 samples have the bicarbonate ion as the major anion. This bicarbonate type water is considered the normal condition for the ground water basin and is found on all sides of the mound of high chloride type water.

Sulfate

Feth, J. H., Robertson, C. E., and Polzer, W. L. (1964) propose that most of the sulfate ions in the runoff water of the Sierra Nevada come from water rising along fault zones. The author is aware of a source of sulfur in the upper Feather River drainage called Sulfur Point. The concentration of the sulfur compounds at Sulfur Point is so high that the stream is uninhabitable for fish within a mile below the Point.

The Bear River carries more sulfate ions than the other rivers flowing through the study area. Surface water samples contain as much as 0.56 equivalent parts per million (epm) with a TDS of 180 ppm. Water in well 13N/4E-21A1 is classified as a magnesium sulfate type and is the only well water that has sulfate as the major anion. Well 13N/4E-17J1, which is also near the Bear River (Fig. 6), has the second highest sulfate content among the ground water analyses used in this report.

Throughout the rest of the area the sulfate ions make up the minor constituent of the anion group. This is particularly true for the ground water with a high chloride content. A case in point is well 12N/2E-2J1 that has a TDS of 3525 ppm and a sulfate content of 2.0 ppm. Several other wells with high chloride water, in the same area, have no discernible amounts of sulfate in the water analyses.

Hem (1970) has proposed the following reaction for sulfate reduction:

$$SO_4^{--} + CH_4 \text{ (bacteria) } HS^- + H_2O + HCO_3^-$$

This formula suggests that in the reduction of the sulfate the anaerobic bacteria is the most active agent. Methane gas is known to be present in the area. Bear (1964, p. 279) suggests that though the mechanism of sulfate reduction has still not been completely worked out, the activities of sulfate-reducing organisms are chiefly restricted to heavy clays or water logged soils. Such conditions are found in the Sutter Basin. One of the by-products of sulfate-reducing organisms is hydrogen sulfide with its characteristic odor. Bryan (1923) reported that much of the ground water in the eastern part of the Sutter Basin contained small quantities of hydrogen sulfide and that "many local people prefer the 'sulphur' water for drinking."

Chloride

A study of Figure 6 shows that there is a body of high chloride water in the central part of the Sutter Basin. Possible explanations for this are: (1) concentration of the chloride ion by evaporation of the ground water at or near the surface, (2) buried beds of sodium chloride salt, and (3) connate water rising from marine sediments. Byran (1923) noted that the conditions for residual evaporates existed in the basins of the Sacramento Valley but they were found only in small, isolated bodies. His reasons for the absence of extensive evaporates has already been cited. Drilling has not revealed any buried salt bodies such as exist in the Phoenix area of Arizona. Therefore, it appears most logical that the chloride ions are the result of marine connate water. In the past, the major stumbling block to this theory was that the high chloride occurs in nonmarine alluvial material with a thickness of approximately 2,000 feet.

Chloride ions are resistant to ion exchange, hence maintain their identity as ions after introduction into a ground water body. They are, therefore, ideal for use as tracers in ground water studies. Notice on Figure 6 the area between the Sutter Basin Fault and the Pumping trough to the north, west of the Feather River. The pumping for irrigation water has reversed the natural gradient of ground water and has resulted in the saline water slowly moving north and degrading the ground water. What is of interest to this thesis is that even though the degrading saline water has been diluted and subject to base exchange, the water still maintains a high percentage of chloride ions.

Sodium and Potassium

Feth et al. (1964) state that the igneous rock in the Sierra Nevada contained almost equal portions of sodium and potassium, however, once the ions have been taken into solution by the ground water, the potassium ions are subject to base exchange and rapidly disappear from the ground water, while the sodium ions persist and are carried by the rivers down to the valley ground water basin. This is confirmed in the water analyses in the study area. In both the surface water and the ground water, the sodium ions far outnumber the potassium ions. The two ions have been grouped together in the circle diagrams on Figure 6.

Throughout most of the area, sodium is the minor constituent in the cation group. As the water percolates through interstices of the alluvial material, normally the sodium ions are released to the ground water at the expense of the calcium and magnesium ions in solution. This process of base exchange is known as natural "softening" of the water. There is some evidence that this process is taking place, but in general it is masked by the infiltration of irrigation water diverted from the rivers.

Water analyses of the two deep wells (12N/2E-18 SW1/4 and 12N/2E-24L1, Appendix A) show that the deep waters contain 73.8 and 73.5 percent (of total anion reactance) sodium ions, respectively. South of the Sutter Basin Fault the deep connate water does not change chemically as it rises to the surface. Yet, as this same water moves Northward it becomes harder by changing from a sodium chloride type to a calcium-magnesium chloride type. As previously stated, this phenomenon was observed by Piper et al. (1953) in the Long Beach-Santa Ana area where fresh ground water was being contaminated with sea water. There, as in the Sutter Basin, the contaminated zone contains water which is higher in calcium and magnesium than can be explained by assuming a simple admixture of the saline water and fresh water involved. The best explanation is that previously adsorbed calcium and magnesium ions are being released by base exchange in the presence of the high sodium ion solution. That is to say, the water moving to the North is undergoing a base exchange, or hardening process. And on the other hand, the water moving Southwesterly from the Sutter Basin Fault is moving through soil that now has a deficiency of exchangeable calcium and magnesium ions and maintains its identity as a sodium chloride type water--the difference being that the saline water has been moving north only since the ground water trough was developed by irrigation pumping, whereas the ground water had been moving in a southerly direction for many thousands of years.

Calcium and Magnesium

The river water flowing through the area and recharging the ground water basin is a calcium-magnesium bicarbonate type with a TDS of between 50 and 150 ppm. Once it has infiltrated the basin, it changes to a magnesium-calcium type. The probable explanation for this is that the alluvium has a high content of ferromagnesium minerals due to the presence of andesitic volcanic debris. By the law of mass action and through base exchange, the magnesium ions are released to the ground water and the calcium ions are adsorbed by the soil particles.

Boron

The Feather River and its tributaries are free of boron although a trace is reported from time to time along the lower reaches. The ground water being recharged by the Feather River and its tributaries is also free of boron. Along the eastern edge of the Sacramento Valley, some of the water from wells contains boron that is believed to be coming from marine sediments that occur at shallow depths.

The streams and rivers draining the Coast Ranges generally have a high boron content. Cache Creek, in Capay Valley, has a boron content of up to 4 ppm. The ground water recharged by the western streams normally contains one to two parts per million boron.

Within the mound of saline water in the Sutter Basin the boron content ranges from 10.8 ppm at a depth of 1,500 feet to 1.5 ppm at a depth of 285 feet. As the rising connate water moves laterally away from the mound of saline water, the boron content gradually decreases until it is no longer detected in the analyses. The rapid decrease in boron over a vertical distance of some 1,200 feet is assumed to be largely the result of adsorption.

CONCLUSIONS

On the basis of the findings of this investigation, it is concluded that:

Subsurface Geology

The Kione Formation of Upper Cretaceous age is the chief contributor to the rising connate water in the Sutter Basin.

The Ione-Domengine Formation of Middle Eocene age also contributes saline water to the ground water basin but not in sufficient quantities to raise the base of the fresh water to the surface.

The "Starkey Sands" of Upper Cretaceous age are in direct contact with the overlying alluvial sediments in the southern portion of the Sutter Basin. This happenstance has nothing to do with the mound of saline water in the same area.

Hydraulic Continuity

The Sutter Basin Fault cuts the Upper Cretaceous marine sands and allows the saline water in the Kione Formation to rise along the fault into the post-Eocene alluvium.

Hydraulic Gradient

The head required to move the saline connate water from the underlying marine beds up through 2,000 feet of alluvium is supplied by the position of the Kione Formation which has been dragged up by the Sutter Buttes Intrusives and exposed at elevations between 250 and 400 feet above the Valley floor. The marine sands have been flushed with fresh water to depths of over 2,000 feet below sea level around the south side of the Buttes. The displaced saline water has moved south and up the Sutter Basin Fault and then through the overlying alluvial sediments to the surface.

Water Chemistry

The mound of saline water in the Sutter Basin is coming from connate water related to the marine sediments which underlie the entire area. The connate water is of a sodium chloride type that changes into a calcium-magnesium chloride type due to base exchange as the water moves into an area which previously contained calcium-magnesium bicarbonate type water.

APPENDIX A

ANALYSES OF GROUND WATER

Well Number	Depth ft.	Chemical constituents CA	MG	NA+K	equivalents per million percent reactance value HCO3+CO3	SO4	CL	parts per million B.	TDS	TH
10N/1E-15H2	176	1.95 33.6	2.14 36.9	1.71 29.5	4.24 71.7	0.54 9.1	1.13 19.1	1.5	270	204
10N/2E-17J3	243	2.05 34.8	2.14 36.3	1.71 29.0	4.24 74.3	0.40 7.0	1.07 18.7	1.5	278	207
11N/1E-4R1	-	1.30 11.1	4.59 39.2	5.82 49.7	9.43 77.8	1.39 11.5	1.30 10.7	4.2	695	295
11N/1E-16P1	172	1.85 32.2	2.06 35.9	1.83 31.9	4.74 80.2	0.23 3.9	0.93 15.8	1.3	304	195
11N/2E-14F4	330	1.35 24.9	1.73 31.9	2.35 43.3	4.78 86.3	0.20 3.6	0.56 10.1	0.7	277	153
11N/2E-32G1	-	1.45 13.1	5.85 52.9	3.75 33.9	7.26 68.7	1.00 9.5	2.31 9.5	3.3	604	366
11N/3E-3N2	112	0.75 39.5	0.25 13.2	0.90 47.4	1.73 91.0	0.08 4.2	0.02 5.3	0.1	131	50
11N/3E-14N2	-	3.59 28.8	3.40 27.2	5.49 44.0	4.30 34.1	0.18 1.4	8.10 64.0	0.3	705	351
11N/3E-14R1	236	1.20 10.0	0.30 2.5	10.51 87.5	4.83 40.0	0.06 0.9	7.17 59.1	0.2	718	75
11N/3E-24D1	145	2.18 30.8	2.88 40.4	2.05 28.8	6.92 93.4	0.15 2.3	0.31 4.3	0.2	365	253
11N/3E-36L1	140	0.37 9.5	0.23 5.9	3.33 84.7	3.20 82.5	0.20 5.2	0.48 12.4	0.3	246	30
11N/4E-3P2	305	2.30 40.6	2.38 42.0	0.99 17.5	4.49 82.1	0.11 2.0	0.87 15.9	0.0	295	234

Well Number	Depth ft.	Chemical constituents CA	MG	NA+K	equivalents per million / percent reactance value HCO3+CO3	SO4	CL	parts per million B.	TDS	TH
11N/4E-9D1	-	1.40 42.2	1.32 39.7	0.60 18.1	2.60 76.3	0.50 14.7	0.31 9.0	0.1	184	138
11N/4E-14D2	204	0.83 26.1	0.99 31.1	1.36 42.8	2.16 77.7	0.08 2.9	0.54 19.4	0.2	152	91
11N/4E-19E2	-	1.35 31.4	1.41 32.8	1.54 35.8	3.00 69.3	0.31 7.2	1.02 23.5	0.1	262	138
12N/1W-21A1	405	1.50 32.7	2.30 50.3	0.78 17.0	4.20 97.5	0.00 0.0	0.11 2.5	0.0	214	189
12N/2E-2J1	100	30.37 28.2	35.30 33.4	39.90 37.8	4.10 4.0	0.05 0.0	99.45 96.0	0.6	5610	205
12N/2E-9B2	-	1.35 20.6	0.03 4.0	5.17 79.0	3.89 65.2	0.33 5.5	1.75 29.3	0.5	402	69
12N/2E-11N1	-	1.55 12.5	1.15 9.3	9.70 78.2	4.30 36.0	0.00 0.0	7.61 64.0	0.9	728	135
12N/2E-14B1	-	7.58 18.3	9.21 22.2	24.65 59.5	3.12 7.9	0.00 0.0	38.63 92.1	0.8	2790	841
12N/2E-16R1	-	2.25 21.5	0.72 6.9	7.46 71.6	7.13 70.0	0.35 3.5	2.68 26.5	0.6	577	148
12N/2E-18SW	1500	19.83 19.2	7.22 7.0	76.12 73.8	2.71 2.5	0.08 0.1	99.98 97.4	10.8	5870	166
12N/2E-23Q1	-	1.15 12.1	0.55 5.8	7.82 82.1	4.50 48.4	0.01 0.0	4.79 51.6	0.7	571	85

Well Number	Depth ft.	Chemical constituents: CA	MG	NA+K	equivalents per million / percent reactance value: HCO3+CO3	SO4	CL	parts per million: B.	TDS	TH
12N/2E-24G1	446	0.70 7.6	0.72 7.9	7.61 84.5	4.00 47.4	0.35 4.1	4.09 48.5	0.1	670	-
12N/2E-24L1	1565	19.81 19.3	7.23 7.2	75.21 73.5	2.70 2.6	0.08 0.1	100.03 97.3	10.8	5940	-
12N/2E-24L2	146	19.81 36.5	9.29 17.1	25.23 46.4	3.47 8.1	0.02 0.0	39.48 91.9	1.1	2452	-
12N/2E-26A1	-	1.40 13.3	0.72 6.8	8.41 79.9	4.64 44.8	0.00 0.0	5.72 55.2	0.6	608	107
12N/2E-35SW	44	4.09 15.3	5.84 21.7	16.88 63.0	4.20 15.4	0.01 0.0	23.41 84.6	0.4	1628	-
12N/3E-13F1	285	0.85 20.3	0.47 11.2	2.87 68.5	2.91 69.8	0.02 0.5	1.24 29.7	0.2	266	66
12N/3E-16H2	-	2.15 19.0	4.45 39.3	4.73 41.7	5.28 47.1	2.21 19.7	3.71 32.2	0.0	620	330
12N/3E-23G1	120	6.47 36.6	4.72 26.7	6.49 36.7	2.82 15.9	0.23 1.3	14.72 82.8	0.4	1060	561
12N/3E-25A1	155	2.05 41.3	1.45 29.2	1.46 29.4	4.02 79.2	0.25 5.0	0.76 15.1	0.1	286	175
12N/25C2	97	3.79 50.1	2.20 29.1	1.58 20.9	4.13 54.9	0.75 10.0	2.65 35.2	0.1	435	252
12N/3E-26R1	-	2.99 42.2	1.64 23.1	2.46 34.7	3.52 48.6	0.17 2.4	3.55 49.0	0.1	423	234

Well Number	Depth ft.	Chemical constituents CA	MG	NA+K	equivalents per million / percent reactance value HCO3+CO3	SO4	CL	parts per million B.	TDS	TH
12N/3E-30H1	232	4.64 13.9	2.96 8.9	25.71 77.2	3.18 9.7	0.19 0.6	29.34 89.7	1.5	1970	380
12N/4E-4N2	89	1.45 36.2	1.75 43.6	0.81 20.22	2.72 68.3	0.19 4.8	1.07 26.9	0.0	257	160
12N/4E-6G1	82	2.50 26.2	4.30 45.0	2.76 28.8	6.20 69.0	2.17 24.1	0.62 6.9	0.2	491	340
12N/4E-7R1	100	0.95 32.3	1.35 45.9	0.64 21.8	2.63 92.9	0.02 0.7	0.18 6.4	0.0	181	115
12N/4E-32J1	-	4.39 42.8	4.19 40.8	1.68 16.4	4.25 41.6	2.08 20.4	3.89 38.1	0.0	682	427
13N/1W-15R2	-	1.80 33.3	1.23 22.8	2.37 43.9	4.03 75.9	0.21 4.0	1.07 20.5	0.5	287	153
13N/1W-36Q2	36	1.75 38.6	1.15 24.9	1.72 36.5	3.31 74.3	0.15 3.4	0.99 22.3	0.3	276	145
13N/1E-22J1	-	2.84 52.4	1.48 27.3	1.10 20.3	3.71 69.6	0.17 3.2	1.44 27.0	0.1	327	216
13N/1E-36Q1	-	1.75 37.9	1.15 24.9	1.72 37.2	3.31 74.4	0.15 3.4	0.99 22.2	0.3	276	145
13N/2E-23B1	72	17.41 28.0	21.18 38.7	20.87 33.3	3.54 5.6	0.00 0.0	59.80 94.4	0.4	5970	2080
13N/3E-2C4	190	3.64 36.8	3.67 37.1	2.58 26.1	5.94 61.2	0.98 10.1	2.79 28.7	0.2	486	-

Well Number	Depth ft.	Chemical constituents CA	MG	NA+K	equivalents per million / percent reactance value HCO3+CO3	SO4	CL	parts per million B.	TDS	TH
13N/3E-14G1	-	5.56 21.5	14.18 54.9	6.08 23.6	2.98 11.2	3.39 12.9	20.01 75.9	0.1	1994	987
13N/3E-15B1	95	6.99 31.5	9.01 40.6	6.20 27.9	2.75 12.5	0.06 0.3	19.18 87.2	0.1	1400	800
13N/3E-15C2	90	8.53 37.6	10.85 44.0	5.29 21.4	4.18 16.8	0.06 0.2	20.68 83.0	0.1	1580	970
13N/3E-23C1	105	13.40 41.9	13.00 40.6	5.60 17.5	5.92 18.7	0.10 0.3	25.60 80.8	0.2	1884	1320
13N/3E-23H1	-	5.10 30.7	7.70 46.4	3.80 22.9	3.43 20.7	0.46 2.8	12.65 76.5	0.1	900	640
13N/3E-24D1	-	7.80 26.2	11.80 39.6	10.21 34.2	1.46 4.8	0.23 0.8	28.50 94.4	0.5	2140	980
13N/4E-3D1	130	1.30 22.2	3.30 56.3	1.26 21.5	3.93 68.0	0.19 3.3	1.66 28.7	0.0	320	230
13N/4E-17J1	200	2.45 39.5	2.75 44.3	1.01 16.3	3.33 56.7	2.00 34.1	0.54 9.2	0.02	387	260
13N/4E-21A1	-	3.59 36.3	5.26 53.2	1.04 10.6	4.31 42.9	5.45 54.3	0.28 2.8	0.0	565	445
13N/4E-27M1	196	0.70 29.4	1.02 42.9	0.66 27.7	1.92 84.2	0.02 0.9	0.34 14.9	0.0	163	86
13N/4E-32N1	84	0.95 23.4	1.43 35.2	1.68 41.4	2.41 83.1	0.12 4.1	0.37 12.8	0.0	200	119

Well Number	Depth ft.	Chemical constituents equivalents per million / percent reactance value: CA	MG	NA+K	HCO3+CO3	SO4	CL	parts per million: B.	TDS	TH
13N/4E-33J2	154	1.95 35.7	2.55 46.6	0.97 17.7	4.56 85.6	0.09 1.7	0.68 12.8	0.0	312	-
14N/1W-2D1	-	2.84 31.8	2.47 27.6	3.63 40.6	3.67 40.6	1.64 18.2	3.72 41.2	0.2	493	268
14N/1W-12A1	-	1.05 17.6	0.09 1.5	4.83 80.9	4.41 74.7	0.02 0.3	1.47 24.9	0.5	319	57
14N/1E-1A1	-	3.24 45.5	2.63 36.9	1.25 17.6	6.05 88.1	0.37 5.4	0.45 6.6	0.0	344	294
14N/1E-24N1	125	1.60 34.0	1.73 36.0	1.42 30.0	3.99 86.0	0.441 10.0	0.19 4.0	0.1	248	166
14N/2E-13L1	79	1.20 29.6	1.81 44.7	1.04 25.7	3.90 96.3	0.06 1.5	0.09 2.2	0.0	205	150
14N/2E-17E1	330	1.25 25.9	1.25 25.9	2.32 48.2	3.93 83.6	0.33 7.0	0.48 9.4	0.1	298	196
14N/2E-30R1	188	1.90 27.8	1.58 23.1	3.37 49.1	5.22 77.5	0.21 3.1	1.30 19.4	0.1	386	174
14N/3E-4E5	160	2.20 26.0	4.12 48.7	2.14 25.3	5.61 71.0	1.44 18.2	0.85 10.8	0.0	455	316
14N/3E-5A3	106	4.39 34.5	5.18 40.8	3.14 24.7	8.30 66.4	2.08 16.6	2.12 17.0	0.1	670	481
14N/3E-5D2	150	1.50 29.8	2.10 41.7	1.44 28.6	4.54 91.9	0.17 3.4	0.23 4.7	0.0	266	180

Well Number	Depth ft.	Chemical constituents CA	MG	NA+K	equivalents per million / percent reactance value HCO3+CO3	SO4	CL	parts per million B.	TDS	TH
14N/3E-6A1	100	2.50 32.9	3.29 43.4	1.80 27.7	6.54 89.3	0.58 7.9	0.20 2.7	0.0	363	180
14N/3E-7H1	105	1.90 23.9	4.18 52.6	1.86 23.4	6.06 77.5	0.58 7.4	1.18 15.1	0.0	401	304
14N/3E-9K1	230	2.99 33.2	3.57 39.6	2.45 27.2	3.65 41.5	0.19 2.2	4.96 56.3	0.1	628	328
14N/3E-13D1	650	1.00 37.6	0.68 25.6	0.98 36.8	2.01 76.4	0.00 0.0	0.62 23.6	0.2	198	84
14N/3E-14E2	90	1.10 44.7	1.07 43.5	0.29 11.8	2.25 91.8	0.10 4.1	0.10 4.1	0.0	118	104
14N/3E-16B2	99	4.09 29.3	7.15 51.1	2.74 19.6	4.18 29.8	1.60 11.4	8.23 58.7	0.1	895	564
14N/3E-18A2	125	2.69 35.1	3.29 42.9	1.69 22.0	6.39 81.2	0.58 7.4	0.90 11.4	0.1	396	301
14N/3E-20H3	105	2.59 34.4	3.19 42.3	1.74 23.1	5.35 73.5	0.58 8.0	1.35 18.5	0.1	385	289
14N/3E-23M2	83	0.90 37.2	1.16 47.9	0.36 14.9	2.41 97.6	0.02 0.8	0.04 1.6	0.0	385	289
14N/3E-24M1	-	1.75 34.3	2.06 40.3	1.30 25.4	3.56 71.8	0.69 13.9	0.71 14.3	0.1	280	191
14N/3E-24P1	-	1.15 41.7	0.53 19.2	1.08 39.1	1.95 72.8	0.00 0.0	0.73 27.2	0.2	184	84

Well Number	Depth ft.	Chemical constituents CA	MG	NA+K	equivalents per million / percent reactance value HCO3+CO3	SO4	CL	parts per million B.	TDS	TH
14N/3E-25D3	85	1.10 41.4	0.90 33.8	0.66 24.8	2.11 79.6	0.06 2.3	0.48 18.1	0.0	159	102
14N/3E-26D4	110	0.77 32.9	0.05 2.1	1.52 65.0	1.61 95.3	0.05 3.0	0.03 1.8	0.2	136	11
14N/3E-27K1	180	2.89 24.8	3.91 33.6	4.84 41.6	5.60 49.1	0.31 2.7	5.50 48.2	0.2	665	340
14N/3E-28E1	-	1.25 22.2	2.46 43.6	1.93 34.2	3.52 62.4	0.24 4.3	1.88 33.3	0.2	286	185
14N/3E-29Q1	-	5.12 26.9	6.52 34.2	7.40 38.9	2.92 15.6	0.10 0.5	15.67 83.8	0.4	1000	581
14N/3E-31B1	63	1.30 20.5	2.86 45.2	2.17 34.3	5.51 88.9	0.21 3.4	0.48 7.7	0.0	317	208
14N/3E-32F1	-	5.63 26.4	7.08 33.2	8.60 40.4	3.42 16.1	0.05 0.2	17.76 83.7	0.3	1135	635
14N/3E-33A1	-	3.99 30.3	6.04 45.9	3.13 23.8	2.60 19.7	0.05 0.4	10.54 79.9	0.1	682	501
14N/3E-33C1	-	3.04 21.0	7.76 53.7	3.64 25.2	3.06 21.0	0.13 0.9	11.37 78.1	0.2	806	540
14N/3E-34F1	84	3.49 28.1	4.31 34.7	4.63 37.3	4.96 40.5	0.00 0.0	7.28 59.5	0.1	750	390
14N/3E-34J1	-	1.80 18.9	5.80 60.8	1.94 20.3	3.62 38.3	1.29 13.6	4.55 48.1	0.1	481	380

Well Number	Depth ft.	CA	MG	NA+K	HCO3+CO3	SO4	CL	B.	TDS	TH
		Chemical constituents			equivalents per million percent reactance value			parts per million		
14N/4E-6H1	112	1.00 44.4	0.58 25.8	0.67 29.8	1.86 81.6	0.07 3.1	0.35 15.4	0.0	116	79
14N/4E-7M1	83	2.25 35.3	2.87 45.0	1.26 19.7	3.51 56.3	2.19 35.1	0.54 8.7	0.0	528	395
14N/4E-9J1	100	1.64 33.3	2.06 41.8	1.23 25.0	3.54 73.1	0.15 3.1	1.15 23.8	0.0	242	165
14N/4E-22H1	400	0.70 31.3	0.64 28.6	0.90 40.2	1.52 70.4	0.02 0.9	0.62 28.7	0.0	191	67
14N/4E-27N1	510	0.80 36.0	0.50 22.5	0.92 41.4	1.92 86.9	0.06 2.7	0.23 10.4	0.0 0.0	148	65
15N/1E-16R1	-	1.90 27.5	3.78 54.7	1.23 17.8	5.84 85.8	0.35 5.1	0.62 9.1	0.1	355	283
15N/1E-35H1	108	2.20 35.1	2.96 47.2	1.11 17.7	5.22 85.6	0.20 3.3	0.28 4.6	0.0	225	-
15N/1E-35R1	-	3.84 47.4	3.53 43.6	0.73 9.0	5.28 66.1	0.62 7.8	2.09 26.2	0.0	466	370
15N/2E-1R1	49	2.10 36.5	2.55 44.3	1.01 17.5	4.69 88.2	0.46 8.7	0.17 3.2	0.0	310	231
15N/2E-22D1	306	1.05 36.0	0.99 33.9	0.83 28.4	2.54 89.4	0.10 3.5	0.10 7.0	0.0	184	100
15N/2E-26D2	-	3.24 40.9	2.79 35.2	1.90 24.0	5.23 74.2	0.44 6.2	1.38 19.6	0.1	447	304

Well Number	Depth ft.	Chemical constituents equivalents per million percent reactance value						parts per million		
		CA	MG	NA+K	HCO3+CO3	SO4	CL	B.	TDS	TH
15N/3E-4C2	147	3.04 34.2	4.52 50.9	1.32 14.9	5.72 69.3	1.77 21.5	0.76 9.2	0.1	558	379
15N/3E-9C2	200	2.20 34.9	2.28 36.2	1.82 28.9	5.52 88.0	0.44 7.0	0.31 4.9	0.1	350	224
15N/3E-11H4	60	0.94 39.2	1.13 47.1	0.33 13.7	2.17 90.0	0.11 4.6	0.13 5.4	0.0	127	103
15N/3E-13F1	350	1.80 50.9	0.92 26.0	0.82 23.1	2.68 77.5	0.50 14.5	0.28 8.0	0.0	239	136
15N/3E-13J2	300	1.10 44.2	0.54 21.7	0.85 34.1	1.90 74.2	0.01 0.4	0.65 25.4	0.0	201	82
15N/3E-14N1	350	0.70 24.4	0.72 25.1	1.45 50.5	2.34 81.3	0.00 0.0	0.54 18.8	0.3	182	71
15N/3E-15C1	170	1.15 28.3	0.65 16.0	2.27 55.8	3.59 87.4	0.01 0.2	0.51 12.4	0.3	257	90
15N/3E-15E2	188	1.64 24.4	1.92 28.6	3.15 46.9	4.96 76.0	0.27 4.1	1.30 19.9	0.4	329	178
15N/3E-15H4	133	3.49 41.8	3.95 47.3	0.91 10.9	6.65 81.4	0.20 2.5	1.32 16.1	0.0	483	373
15N/3E-15J2	160	0.55 9.1	4.35 71.7	1.17 19.3	3.99 75.9	0.71 13.5	0.56 10.7	0.0	354	245
15N/3E-15Q1	-	0.70 16.8	0.86 20.6	2.61 62.6	3.61 84.6	0.04 0.9	0.62 14.5	0.3	262	-

Well Number	Depth ft.	Chemical constituents CA	MG	NA+K	equivalents per million / percent reactance value HCO3+CO3	SO4	CL	parts per million B.	TDS	TH
15N/3E-19M1	75	0.94 30.2	1.39 44.7	0.78 25.1	2.79 92.1	0.09 3.0	0.15 5.0	0.1	150	117
15N/3E-21C1	185	1.30 23.6	2.86 51.9	1.35 24.5	4.47 81.1	0.25 4.5	0.79 14.3	0.0	328	208
15N/3E-22N1	115	3.49 34.4	4.75 46.8	1.90 18.6	7.42 74.6	0.75 7.5	1.78 18.0	0.0	529	412
15N/3E-23C1	118	0.75 46.3	0.65 40.1	0.22 13.6	1.41 92.2	0.05 3.3	0.07 4.6	0.0	99	70
15N/3E-23D1	125	2.25 38.3	3.30 51.5	0.60 10.2	5.19 90.1	0.29 5.0	0.28 4.9	0.0	325	264
15N/3E-24F1	130	2.84 42.8	2.59 39.0	1.21 18.2	4.71 69.4	0.58 8.5	1.50 22.1	0.1	334	261
15N/3E-26C1	163	1.35 30.0	1.71 38.0	1.44 32.0	4.C3 90.2	0.10 2.2	0.34 7.6	0.0	262	153
15N/3E-26M1	250	1.45 32.6	1.23 27.6	1.77 39.8	3.97 89.4	0.10 2.3	0.37 8.3	0.2	241	134
15N/3E-27C1	80	3.89 32.2	6.02 49.8	2.17 18.0	8.85 77.2	0.92 8.0	1.69 14.8	0.2	557	496
15N/3E-27L1	150	2.15 31.6	3.05 51.3	1.59 17.0	4.93 86.1	0.33 6.3	1.41 7.6	0.0	370	260
15N/3E-29G1	90	3.09 34.3	4.27 47.4	1.65 18.3	7.20 85.7	0.75 8.9	0.45 5.4	0.0	488	367

Well Number	Depth ft.	Chemical constituents CA	MG	NA+K	equivalents per million percent reactance value HCO3+CO3	SO4	CL	parts per million B.	TDS	TH
15N/3E-29G2	110	2.84 31.6	4.61 51.3	1.53 17.0	7.35 86.1	0.54 6.3	0.65 7.6	0.0	487	373
15N/3E-30D1	65	2.64 37.9	3.44 49.4	0.89 12.8	6.10 94.0	0.23 3.5	0.16 2.5	0.0	384	304
15N/3E-34N2	80	3.80 22.9	10.38 62.5	2.43 14.6	7.02 42.8	2.02 12.3	7.36 44.9	0.1	831	709
15N/4E-8D1	333	1.87 43.8	1.82 42.6	0.58 13.6	3.04 73.3	0.90 21.7	0.21 5.1	0.1	220	184
15N/4E-16P1	450	1.15 41.8	1.07 39.0	0.53 19.2	2.21 81.6	0.42 15.5	0.08 2.9	0.0	184	111
15N/4E-20J2	271	1.60 36.9	2.14 49.3	0.60 13.8	3.13 73.0	0.98 22.8	0.18 4.2	0.0	271	187
15N/4E-29H1	145	1.35 36.2	1.75 46.9	0.63 16.9	2.96 80.2	0.54 14.6	0.19 5.2	0.0	187	155
15N/4E-31A1	157	1.05 39.5	1.07 40.2	0.54 20.3	2.32 89.9	0.02 0.8	0.24 9.3	0.0	172	105
16N/1W-29J1	-	1.30 31.3	1.48 35.7	1.37 33.0	3.82 94.1	0.00 0.0	0.24 5.9	0.1	199	139
16N/3E-14G1	63	4.34 46.7	4.22 45.4	0.73 7.9	6.78 76.9	1.19 13.5	0.85 9.6	0.0	472	428
16N/3E-16B1	46	0.84 46.9	0.80 44.7	0.15 8.4	1.49 87.1	0.12 7.0	0.10 5.9	0.0	90	82

Well Number	Depth ft.	Chemical constituents			equivalents per million percent reactance value			parts per million		
		CA	MG	NA+K	HCO3+CO3	SO4	CL	B.	TDS	TH
16N/3E-23B1	160	1.13 40.1	1.08 38.3	0.61 21.6	2.38 90.5	0.10 3.8	0.15 5.7	0.0	160	110
16N/3E-26Q1	416	1.40 46.1	0.80 26.3	0.84 27.6	2.40 81.6	0.17 5.8	0.37 12.6	0.1	218	110
16N/3E-31C1	72	1.32 30.8	2.04 47.7	0.92 21.5	3.92 92.7	0.16 3.8	0.15 3.5	0.0	318	168
16N/3E-36E1	85	2.16 37.1	2.84 48.7	0.83 14.2	5.04 92.5	0.02 0.4	0.39 7.2	0.0	280	250

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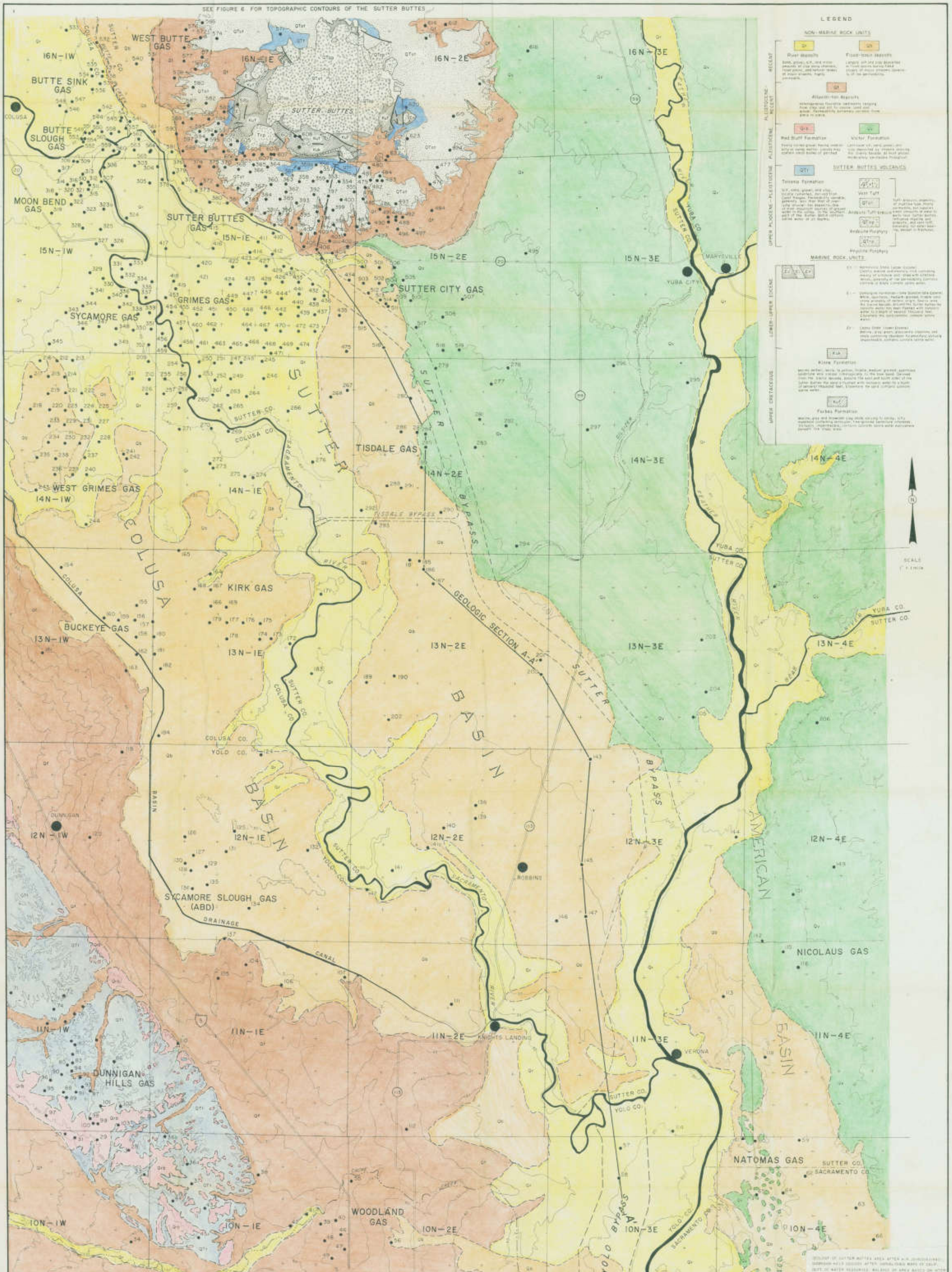

FIGURE 4

SURFICIAL GEOLOGY OF THE SUTTER BASIN AREA, SACRAMENTO VALLEY, CALIFORNIA

CURTIN
THESIS, GEOLOGY 1971

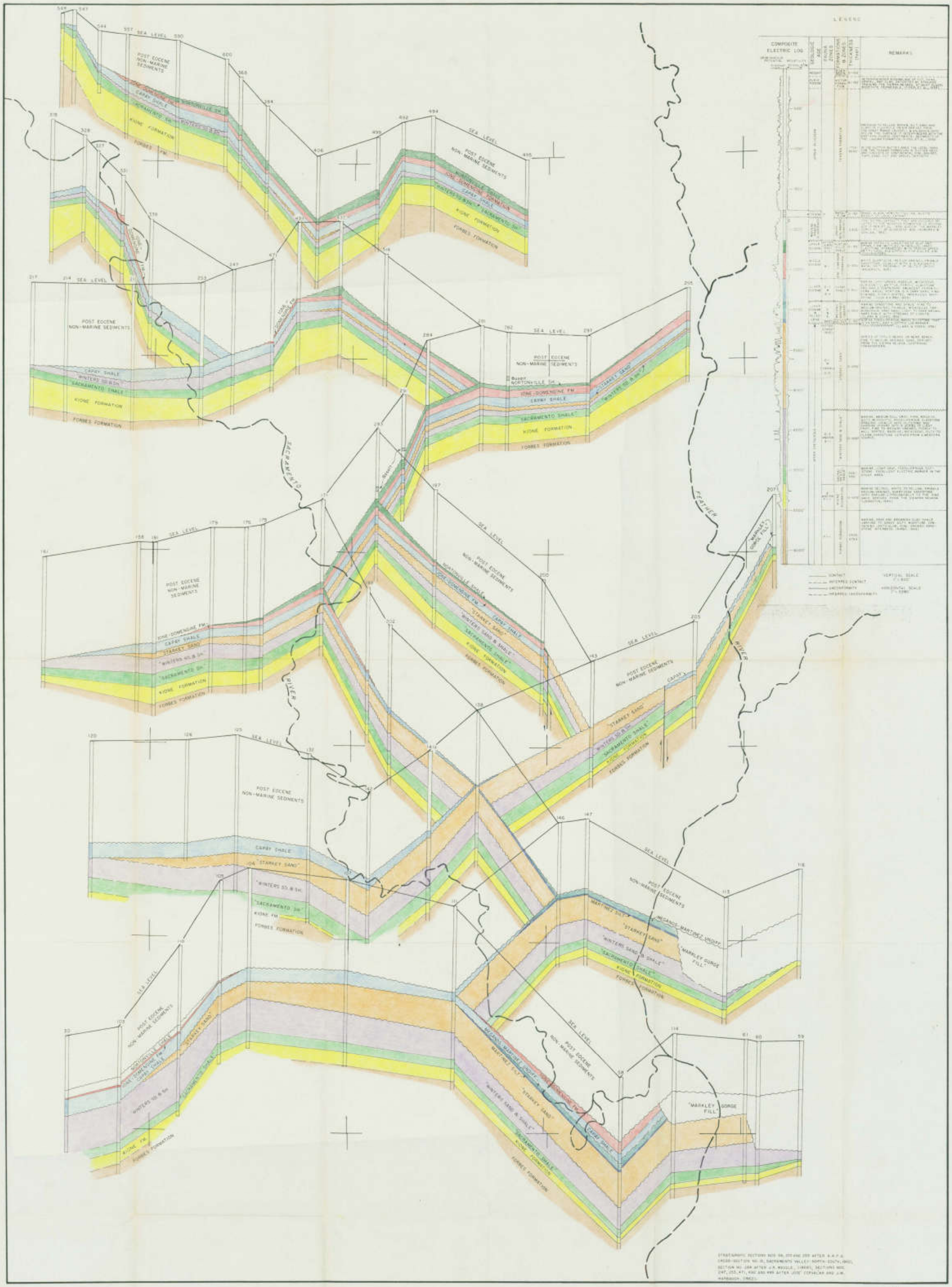

FIGURE 5

PANEL DIAGRAM SHOWING THE STRATIGRAPHY OF THE SUTTER BASIN AREA, SACRAMENTO VALLEY, CALIFORNIA

CURTIN
THESIS, GEOLOGY 1971

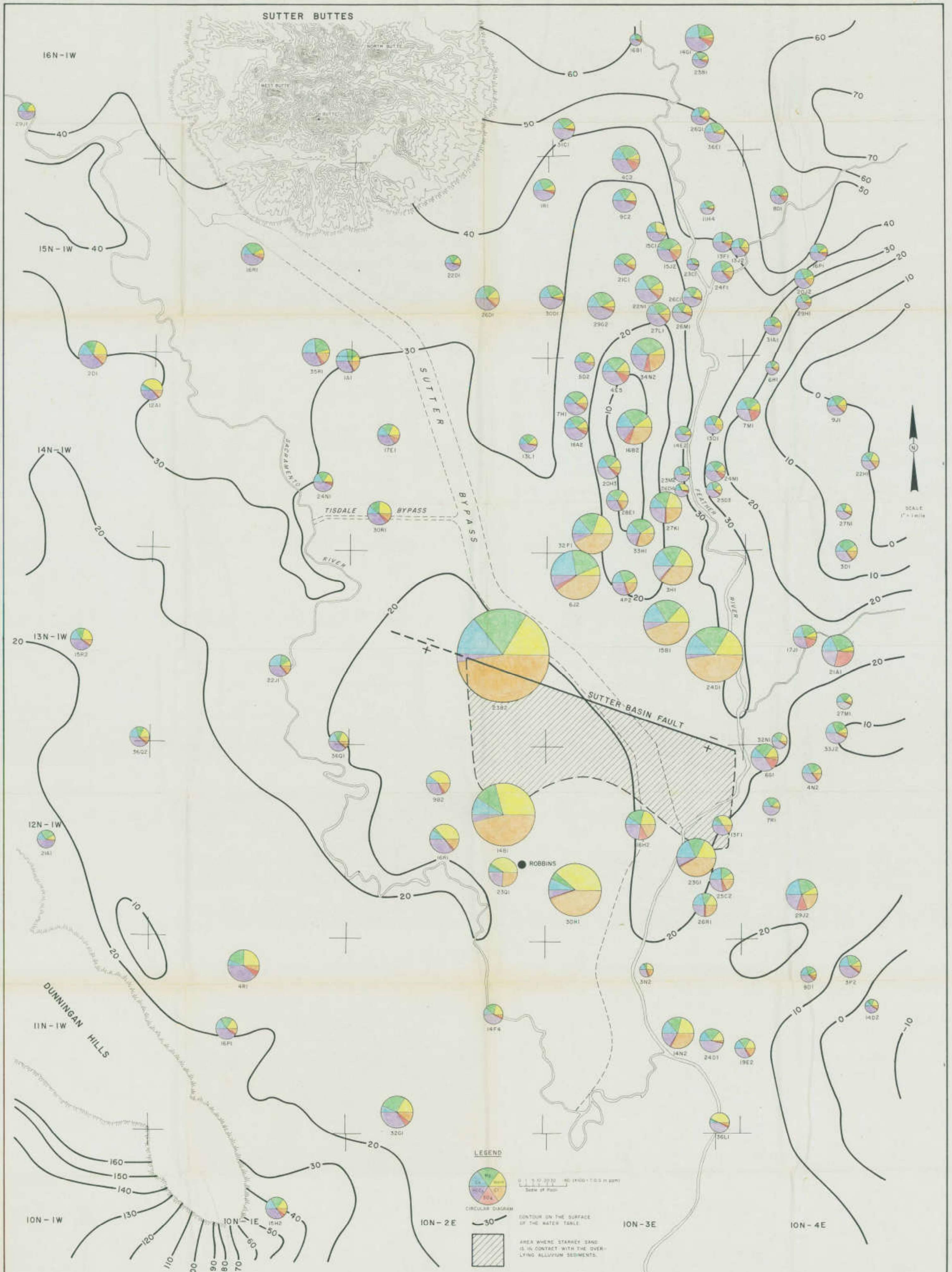

FIGURE 6 WATER QUALITY AND CONTOUR ELEVATION OF WATER IN WELLS, SPRING 1966 (SEA LEVEL DATUM) SUTTER BASIN AREA, SACRAMENTO VALLEY, CALIFORNIA

CURTIN
THESIS, GEOLOGY 1971

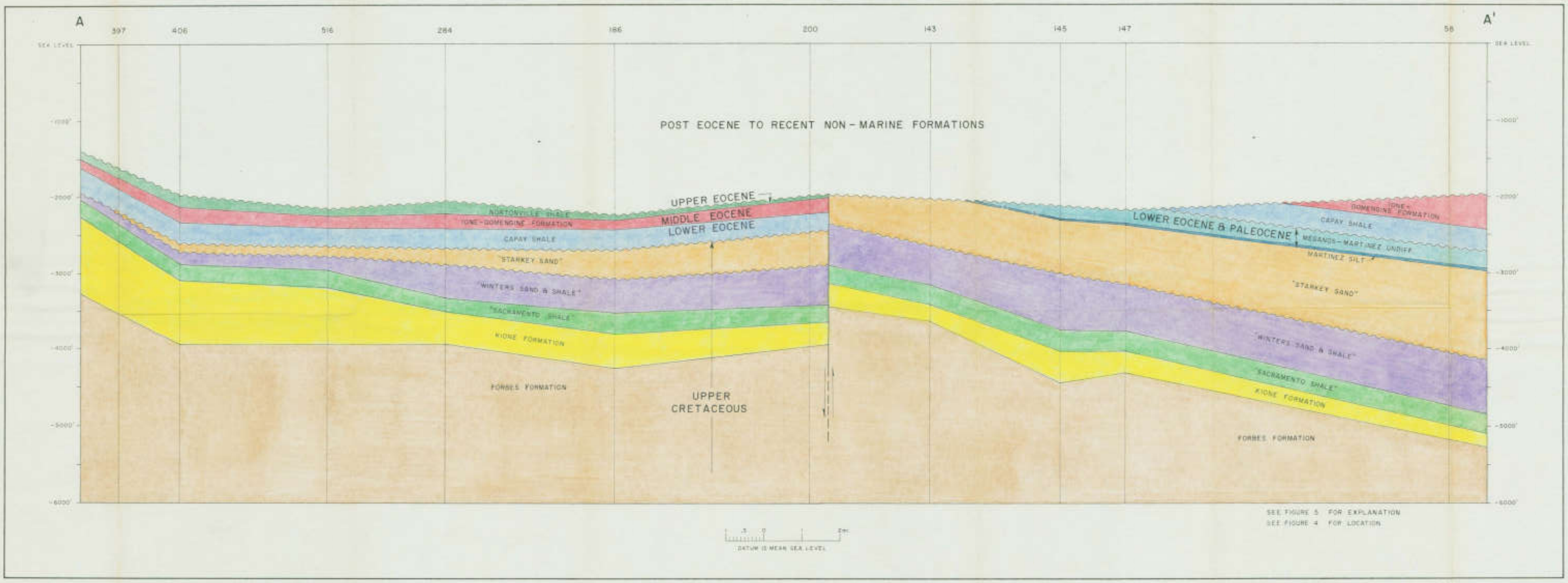

FIGURE 7

GEOLOGIC SECTION A-A', SUTTER BASIN, SACRAMENTO VALLEY, CALIFORNIA

CURTIN
THESIS, GEOLOGY 1971

From:	Ben King
To:	Mary Fahey; Gosselin, Paul
Cc:	Buck, Christina; Ben King
Subject:	Arsenic and Connate Sea Water Contamination around the Sutter Buttes
Date:	Monday, July 06, 2020 1:17:17 PM
Attachments:	Sutter_County_Final_GMP_20120319 (1).pdf Sutter County GMP Figures.pdf CA-Arsenic-Report.pdf

Hi Mary, Paul and Christina,

I wanted to follow up regarding my public comment on the last Butte Basin call. As mentioned in my call, my concern is that the connate seawater under the Sutter Buttes is contaminating groundwater and drinking water quality.

I have previously sent the SWCB Bulletin No. 6 from 1952 and the PHD Paper by George Curtin from 1971. Bulletin No. 6 reported that pumping depressions were drawing salt brines to the surface causing groundwater contamination. Curtin's paper proposes that the connate seawater is moving laterally through faults around the Buttes and researched several hundred gas well logs to express this opinion.

According to the Sutter County GMP on Page 23 "The Sutter Buttes Rampart consists largely of gravel, sand, silt and clay sediments which were deposited circumferentially around the Buttes as a geologic apron. These sediments may extend up to 15 miles north and west beyond the Sacramento River. " On Page 32 the GMP addresses the arsenic contamination issue - "… recent data analysis suggest a possible correlation between elevated arsenic concentrations and the presence of volcaniclastic material of the Sutter Buttes Rampart formation." Since the Colusa and Butter Basins are within the 15 mile circumference of the Sutter Buttes this would impact the analysis for Lower Water Quality and potentially Seawater Intrusion SGMA Sustainability metrics. I am mentioning the Seawater Intrusion metric because of the hydraulic components of pumping depressions and the physics of natural occurring contaminants moving laterally from higher elevations to lower elevations in combination of the force of pulling water to the surface by the operation of groundwater wells.

You will see the elevated EC levels and arsenic levels in the GMP Figures attachments. On Figure 19, there was an observation at T15NR3E of arsenic at 350 ppm and an EC of 1126. To the south at 14NR2E the observation of arsenic at 370 ppm and an EC of 1400. Since this study was focused on Sutter County there were not observations for Colusa County and Butter County. For Colusa County – the attached report regarding Arsenic contamination in public drinking water systems has the Grimes water district at 23.9 ppm which is the worse levels of toxicity of any public system in the Sacramento Valley. To the northwest of the Buttes there is a USGS Gamma well ESAC 21 which seems to be located in the Colusa County portion of the Butte Basic which has an arsenic reading of 80 ppm. Finally ESAC 11 which is due north of the Buttes and appears to be located in Grey Lodge has an arsenic level of 70.

I can also note that the EPA assessment of the wastewater treatment facility for Yuba City reported that the high levels of arsenic in the wastewater was apparently from the portion of the Yuba infrastructure. Since most of the source of the water for Yuba City is surface water from the Feather River the arsenic contamination is pronounced where ground water is used. Finally as I mentioned in the past you probably are aware that the EPA has entered into an mitigation agreement with Sutter County regarding the arsenic contamination at Robbins. As you know Robins is at lower elevation and due south of the Buttes which would explain the contamination so far away from the Buttes. Robbins arsenic levels are less than the levels observed at Grimes.

I will send the Yuba City EPA report and the USGS Gamma documents next.

My suggestion would be to pick up where the SWRCB left off in 1952 and examine salt water and arsenic levels within a 15 mile circumference around the Buttes and set up a monitoring network to monitor changes in ground water quality going forward. This would not only focus on the southern part of the Buttes but within the whole circumference.

Thank you for your time and consideration.

Best Regards,

Ben

From:	Ben King
To:	Mary Fahey; Gosselin, Paul; Buck, Christina
Cc:	Ben King
Subject:	Arsenic Attachments Part II
Date:	Monday, July 06, 2020 1:38:28 PM
Attachments:	USGS Water Quality.pdf EPA Arsenic yuba_city_2004-05-28_inspection.pdf

Hi Mary, Paul and Christina

The 2006 USGS Study presents the observations wells on Figure 3 – Page .   I have attached a photo of the link to the USGS GAMMA website sorting for Arsenic.   I have also include USGS Laux Road which is ESAC 21 and USGS Gray Lodge which is ESAC 11.   On the website you can see the actual locations on the satellite imagery.

The 2004 EPA assessment for the Yuba City Sewage infrastructure addresses the arsenic issue on Page 10.   It ascribes more than half of the arsenic contamination to groundwater.

Thanks again for your time and consideration

Best Regards,

Ben

ARSENIC IN CALIFORNIA DRINKING WATER

Three Years After EPA Notice of Noncompliance to State, Arsenic Levels Still Unsafe in Drinking Water for 55,000 Californians

ENVIRONMENTAL INTEGRITY PROJECT

SEPTEMBER, 2016

ACKNOWLEDGEMENTS

This report was researched and written by Tom Pelton, Courtney Bernhardt, and Eric Schaeffer of the Environmental Integrity Project. The map was created by Kira Burkhart and the graphics by Alana Natke.

THE ENVIRONMENTAL INTEGRITY PROJECT

The Environmental Integrity Project (http://www.environmentalintegrity.org) is a nonpartisan, nonprofit organization established in March of 2002 by former EPA enforcement attorneys to advocate for effective enforcement of environmental laws. EIP has three goals: 1) to provide objective analyses of how the failure to enforce or implement environmental laws increases pollution and affects public health; 2) to hold federal and state agencies, as well as individual corporations, accountable for failing to enforce or comply with environmental laws; and 3) to help local communities obtain the protection of environmental laws.

For questions about this report, please contact EIP Director of Communications
Tom Pelton at (202) 888-2703 or
tpelton@environmentalintegrity.org.

PHOTO CREDITS

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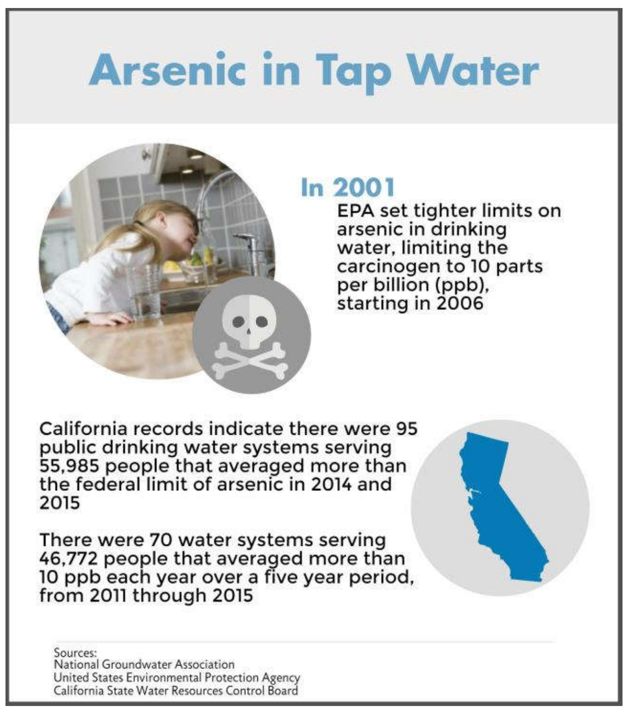
Arsenic in California Drinking Water

More than three years after the U.S. Environmental Protection Agency found California in noncompliance with the federal Safe Drinking Water Act, 95 community water systems in the state, serving more than 55,000 people, are still providing water with illegal levels of arsenic, according to an examination of state data for the last two years.[1] Arsenic occurs naturally in the soil and groundwater in parts of California and is a known carcinogen that may also damage the developing brains of children and cause other health problems.[2] Many of the people drinking excessive levels of arsenic are poor and/or Latino or African-American, with a cluster in the San Joaquin Valley.[3] Nearly all have been exposed to excessive arsenic levels for at least five years and probably longer.[4]

California requires public water systems to notify their customers when arsenic fails to meet federal health standards. But strangely, the state's language for mailed advisories suggests the water is still safe to drink no matter how high the contimation levels or how long they persist, with the notices telling residents: "You do not need to use an alternative water supply (e.g., bottled water)." [5] That advice conflics with what California tells private well owners (who aren't covered by federal standards) on a state website: "If you suspect that your well may have arsenic, you should not use the water until it is tested, and you take appropriate measures to protect yourself and your family from potential chronic health effects if arsenic is present."[6] Whatever the intention, California's language for people on public water systems is likely to encourage them to drink contaminated water. (For the full text of the California's language, see Appendix A). As the state continues a multi-year effort to solve the contamination problem, it should immediately fix a communications problem so that it clearly warns people not to drink arsenic-tainted tap water.



The highest levels of arsenic in drinking water in California from 2011 through 2015 were in a group home for troubled teenage boys, the Valley Teen Ranch in Madera County. About 50 boys assigned by the courts to the facility have been living in a home with water that has arsenic at concentrations averaging more than 12 times the federal limit (10 parts per billion, or ppb) over these five years, according to state records.[7] "Nobody wants to drink the water because it's brown and nasty,"said Connie R. Clendenan, CEO of the nonprofit organization that runs the group home.[8] "It looks bad."

It is bad. Although California has made substantial progress in addressing drinking water problems, the state still has 13 school districts, serving a total of 8,822 students, with arsenic in their drinking water that exceeded the federal limit from 2011 to 2015.[9] Twelve mobile home parks in California, serving 889 people, had arsenic in their tap water that averaged up to five times the legal limit. The average annual concentrations of arsenic in the drinking water of 58 residential communities (other than trailer parks) exceeded the legal limit during this time period, as did a military base, three wineries, two food preparation businesses and two campgrounds.

In many of the schools, the group home and military base, administrators say they verbally warn people not to drink tap water. They also provide bottled water as an alternative. But in the residential neighborhoods and trailer parks, it is not clear what warning – if any -- people are receiving. "There is no warning not to drink it. There is no 'non-drink' order out there," said Robert Johnson, President of the Shaver Lake Point 2 Mutual Water Company, which supplies 210 homes in Fresno County with tap water that has seven times the legal limit of arsenic. When asked if these residents should drink bottled water instead of his arsenic-tainted tap water, Johnson said: "It's one of those things, if you want to do it, that's your deal. It's not being recommended. We're not suggesting it. This is per the state of California. We are following their guidance."

The drinking water crisis in Flint, Michigan, was a reminder of how important it is for state governments to issue clear warnings to people with unhealthy tap water. California's mixed message is nearly identical to the one issued by Texas to homeowners with illegal levels of arsenic in their drinking water. Texas also tells consumers with excessive levels of arsenic: "You do not need an alternative water supply."[10] Many other states, however, are more direct in warning people not to drink water with excessive amounts of arsenic, at least for private well owners. Wisconsin, Michigan, Maine, and Washington, for example, simply tell residents not to consume water with more than 10 ppb arsenic (a health standard set by EPA in 2001). Wisconsin advises private well owners: "If your arsenic level is more than 10 ppb, the Wisconsin Department of Health Services recommends that you stop using your water for drinking or food preparation."[11] Florida advises its consumers to avoid water where arsenic contamination persists.[12] The U.S. Department of Health and Human Services makes similar recommendations.[13] If anything, the most recent science suggests that the current 10 ppb arsenic standard is not protective enough and that the IQ of children may be damaged at much lower exposures.[14]

In the wake of a 2013 EPA notice of noncompliance to California over its failure to invest enough money in its drinking water systems, the state has taken several important steps to fix its problems. Over the last three years, the state has more than doubled the amount of funding to build water treatment plants, pipelines, and new wells. The state and counties have filed compliance orders with local utilities to push them to upgrade their systems and are directing small, underfunded water systems to merge with larger utilities. Because of these measures, EPA announced in May 2016 that California was back in compliance with the federal Safe Drinking Water Act.

But in fact, the work is far from done – as witnessed by the 55,985 people in 95 communities across California who still have illegal levels of the carcinogen in their tap water, according to state records.[15] Why the delays? Local officials say that in some cases, bureaucratic negotiations are holding up projects, which are sometimes stalled because of conflicts between county and state rules. In other cases, local water districts struggle with indecision or a lack of money.

Until these important water system improvements are complete, California and EPA must do a better job of warning consumers to stop drinking water that fails federal health standards. This report recommends:

- California and EPA should revise their regulations and guidance to require that local utilities warn people to stop drinking or cooking with water that fails to meet federal arsenic standards (10 ppb), especially when the contamination persists over several years. The advice should be sensitive to the additional risks posed when children and other sensitive populations drink contaminated water. If there is no reason for consumers to take precautions, there is no reason for Safe Drinking Water Act standards in the first place.

- Public notices mailed to consumers should inform them of options for treating contaminated water at home, e.g., through filtration systems that have proven to be effective. Conversely, the public should be told what doesn't work. For example, boiling water will not reduce arsenic concentrations.

- Federal and state authorities should provide enough money to these 95 California communities to allow them to install water filtration systems or take other steps to eliminate contamination problems. Although the state has already boosted its funding, it still faces a projected $30 billion plus in needed capital improvement projects to help its inadequate systems provide safe drinking water trough 2026.[16]

The big picture is that stepped-up investment in crumbling public infrastructure is sorely needed across the U.S., and it should be regarded as a top priority for both Congress and California lawmakers. But the state also needs to improve its efforts to better inform consumers so people can protect their own health. California does not have to wait for EPA action to strengthen its warnings because the state is already empowered to act independently of EPA.

Public health advisories that are contradictory and confusing – as they are in California -- are as bad as no warnings at all, because they undermine action and weaken public confidence in government.

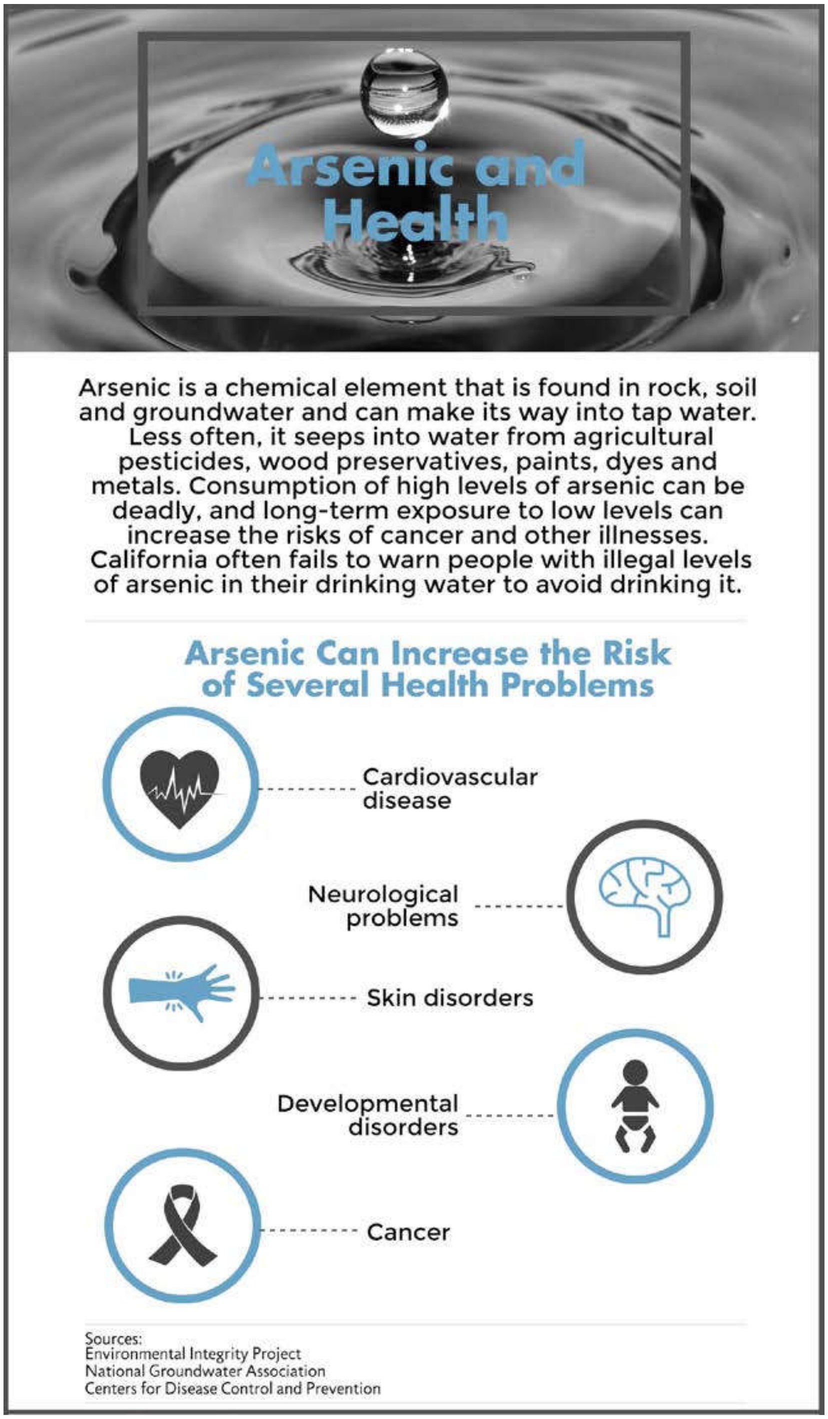
Table 1. Top 20 Arsenic Concentrations in California Public Water Systems

Water System (in Order of Arsenic Levels)	County	Pop. Served	2014-2015 avg (ppb)	2011-2015 avg (ppb)
Lakeview Improvement Association #1	Fresno	160	86.88	86.88*
Fountain Trailer Park Water	Kern	68	85.75	83.90
Hungry Gulch Water System	Kern	33	72.56	70.04
Corral De Tierra Estates WC	Monterey	45	72.50	78.40
Keeler Community Service District	Inyo	50	71.25	75.63
Quail Valley Water District- Eastside System	Kern	60	70.06	69.11
CSA 70 W-4 Pioneertown	San Bernardino	625	64.52	61.55
MD #06 Lake Shore Park	Madera	130	64.25	71.94
Valley Teen Ranch	Madera	50	62.00	120.80
Sierra East Mobile Home Community	Mono	50	54.63	47.03*
Shaver Lake Point #2	Fresno	210	52.31	42.88*
Winterhaven Mobile Estates	Los Angeles	40	52.13	53.35
Olam Spices And Vegetables Inc.	Kings	75	48.38	46.70
The Village Mobile Home Park	Los Angeles	70	45.05	47.04
Callier Water System	San Bernardino	1000	42.13	49.21*
Black Stallion Winery	Napa	25	41.75*	41.75*
Ironwood Camp	San Bernardino	1000	38.38	38.55
Boron CSD	Kern	2500	38.07	37.98
Edgewater Mobile Home Park	Sacramento	40	38.00	37.59
Prunedale MWC	Monterey	252	35.7	32.0

Note: The federal limit for arsenic is 10 ppb. * Average concentrations do not include concentrations from every year. For example, Lakeview Improvement Assn. #1 changed from a non-community water system to a community water system in 2013, and sampling data was only available from 2014 and 2015. Sampling results for Black Stallion Winery were only available for 2015. See Appendix B for annual concentrations in all systems that averaged above 10 ppb.

Health Risks Posed by Arsenic

Arsenic is a chemical element that occurs naturally in geological formations in California and elsewhere, and is also used in a variety of industrial products, including pesticides, paint, and wood preservatives.[17] It is a well-known poison at high doses. At lower doses, researchers have concluded it can cause cancers of the lung, kidney, bladder, skin, and other



organs with prolonged exposure. Any level of exposure, however, carries some risk.[18] According to EPA, the risk of developing cancer after drinking water containing 10 ppb arsenic over a lifetime is 1 in 2,000.[19] This level of risk is almost never 'acceptable' from a regulatory perspective. The agency usually tries to limit lifetime cancer risk to no more than 1 in 10,000, at most. EPA's risk estimate assumes that the cancer risk is linear, meaning if water contains 20 ppb arsenic, those who drink it over a long period of time have a 1 in 1,000 chance of developing cancer. People exposed over shorter periods of time have lower risks, but exposure during childhood may have a greater impact than exposure during adulthood.[20]

Morever, these risk calculations reflected the old thinking. New evidence suggests that the actual cancer risk may be much higher. EPA is currently revising its assessment of cancer risks from arsenic to incorporate more recent science. A 2010 draft of the assessment indicated that the risk of getting cancer from drinking water containing 10 ppb of arsenic is closer to 1 in 136, more than 17 times higher than current assumptions.[21] In addition to causing cancer, arsenic is also a neurotoxin that can harm developing brains at levels at or below the allowable limit.[22] One recent study in Maine, for example, found significant reductions in IQ and other problems in children exposed to arsenic concentrations of 5 to 10 ppb.[23] Specifically, children in homes with more than 5 ppb arsenic in the tap water tested roughly 6 points lower on a full-scale IQ test.[24] While EPA's

Scientific Advisory Board and the most recent studies suggest that the 'safe' level of arsenic is likely much lower than 10 ppb, any concentration higher than 10 is clearly unsafe.

Background on California's Problem

On April 19, 2013, EPA sent a letter to the California Department of Public Health notifying the state that it was out of compliance with the federal Safe Drinking Water Act.[25] The reason was that California's drinking water system was inadequate – providing contaminated water in many poor, rural communities – and the state was not investing enough money to fix the problem. A state investigation that year revealed that 680 community water systems serving 21 million people relied on groundwater that was compromised by one or more contaminants, with the most common being arsenic.[26]

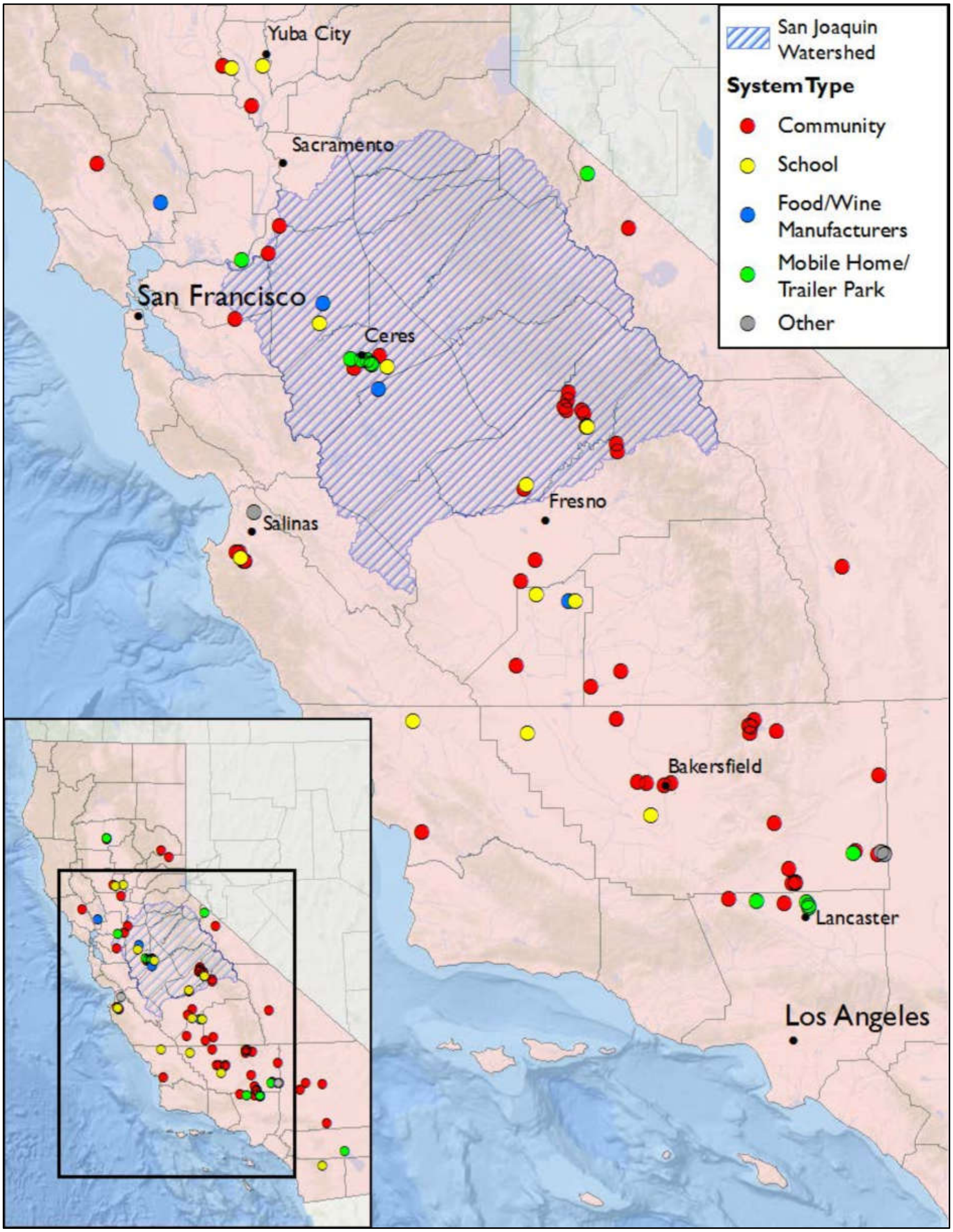
Not all of these 680 water systems provided tap water that had levels of contaminants in excess of federal health standards. In most wealthier and urban communities, the local water utilities treated the groundwater or diluted it with clean water from other wells so that it met the requirements of the federal Safe Drinking Water Act. But in 265 of these communities – often with small populations in rural, isolated areas – the tap water provided to customers had at least one violation of federal standards from 2002 to 2010 for a variety of contaminants, including nitrates from farm fertilizer, according to a 2013 report by the California Department of Health.[27]

In a separate study, researchers at the University of California, Berkeley, examined 464 community water systems serving 1.1 million people in California's San Joaquin Valley, one of the poorest regions in the state, and found that 15 percent of the systems and 14 percent of the people had tap water with arsenic above the federal limit.[28] Of the people exposed, 61 percent were either Latino or African-American. "Community water systems serving higher percentages of people of color had a 260 percent higher chance of having at least one (arsenic) violation," researcher Dr. Carolina L. Balazs and colleagues wrote.[29]

In response to the chronic drinking water problem, Congress had approved $1.5 billion to California over a decade to upgrade its water systems through a program called the Safe Drinking Water State Revolving Fund.[30] Yet because of bureaucratic obstacles and inefficiencies, the state by 2013 had not spent $455 million of those funds – the largest unspent balance of any state. According to EPA's 2013 letter of noncompliance to the California Department of Health, this violated a federal requirement that the state "make *timely* loan or grants using *all available* drinking water funds."[31]

EPA ordered the state to accelerate its efforts to fix public water systems. California Governor Jerry Brown's administration took action in several steps. These included switching control of the state's drinking water program from the Department of Health (where policy focus was dispersed among numerous problems, including drug abuse and AIDS), to the California State Water Resources Control Board (whose only focus is water) under the California Environmental Protection Agency. Since the EPA issued its

Map 1. Public Water Systems with Illegal Levels of Arsenic, 2014-2015



2013 letter of noncompliance, the state has more than doubled the amount of money it is distributing for water system upgrade projects, to an average of $738 million per year, compared to $366 million per year in the period of 2008 to 2012.[32] The unspent balance in the drinking water fund dropped to about $100 million.[33] As a result, EPA in May 2016 decided that California's system was back in compliance.[34]

Recent Analysis of California Records

The problem, however, is still far from fixed. An examination of California's online records by the Environmental Integrity Project (EIP) in May 2016 revealed that there were still 95 community water systems in the state, serving 55,985 people, providing drinking water with levels of arsenic that exceed the federal standard of 10 ppb in 2014 and 2015, according to two-year averages over those years. [35]

Over a longer period of time, 2011 through 2015, state records show 70 systems serving 46,772 residents, that each year have averaged higher than the limit in the Safe Drinking Water Act. These do not include homes on individual private wells, which are not covered by the federal Safe Drinking Water Act.

For a detailed discussion of the methods used to arrive at these numbers, please see Appendix C.

Examples of Drinking Water Contamination

Some of the worst water in community systems in California can be found in the Lakeview Community Association, which serves 160 residents in Shaver Lake (northeast of Fresno, in Fresno County). This community had an average arsenic concentration of nearly nine times the federal limit – 87 ppb – in 2014 and 2015, according to state data.[36]

Four water systems in the unincorporated community of Boron, in San Bernardino County, provided water to about 5,200 residents that had at least three times the safe limit of arsenic in 2014 and 2015.[37] In the city of Keyes in Stanislaus County, 4,891 people have tap water with arsenic concentrations that averaged above the federal limit each year for the last five years. The Pixley Public Utilities District, serving 3,310 residents, had arsenic levels in its drinking water that averaged 50 percent higher than health standards in 2011-2014.

Twelve school districts, serving a combined total of 5,462 students, had arsenic levels that averaged from 30 percent higher to three times the federal limit over the last five years. (See Table 4. Some of these school districts provided explanations, which will be discussed on pages 15 and 16 of this report).

Across California, there were 12 mobile home parks serving 889 people that had average arsenic levels ranging from 20 percent over legal limits to five times the federal standards from 2011 through 2015.[38]

Table 2: Top 10 Mobile Home Parks for Arsenic Contamination

Water System	County	People Served	2014-2015 Avg. (ppb)	2011-2015 Avg. (ppb)
Fountain Trailer Park Water	Kern	68	85.8	83.9
Sierra East Mobile Home Community	Mono	50	54.6	47.0*
Winterhaven Mobile Estates	Los Angeles	40	52.1	53.4
The Village Mobile Home Park	Los Angeles	70	45.1	47.0
Edgewater Mobile Home Park	Sacramento	40	38.0	37.6
Mitchell's Avenue E Mobile Home Park	Los Angeles	26	21.3	21.0
Millstream Mobile Home Park	Tehama	80	20.5	20.0
Country Western Mobile Home Park	Stanislaus	120	20.4	22.2
Saint Anthony Trailer Park	Riverside	300	19.7	21.5
New Orchard Mobile Home Park LLC	Tehama	125	19.6	19.0

Note: federal limit is 10 ppb arsenic. The 2011-2015 average for Sierra East Mobile Home Community reflects fewer than 5 years.

Response from California Officials

The Environmental Integrity Project asked the California State Water Resources Control Board why so many people are still exposed to contaminated drinking water after the state supposedly returned its system to compliance. Officials at the state agency replied in an interview and emails that they had issued orders to nearly all of the local utilities to fix the arsenic problem, but that some local government still need more time to upgrade their systems. In some cases, local utilities are building water filtration systems to remove arsenic, or digging new wells in an effort to extract cleaner water.

"The State Water Board Division of Drinking Water is working with each of these communities to return them to compliance," said Cindy Forbes, Deputy Director of the Division of Drinking Water at the Water Resources Board.[39] "District Office staff are working with these communities to evaluate alternative solutions, including new treatment options, new wells or modification of existing wells, and in some instances consolidation with larger water systems that can provide drinking water that meets all standards. The State Water Board is also helping communities that are struggling financially to reach compliance by offering financial assistance to solutions through low-interest loans and grants."

Public Notification of Drinking Water Violations

As the work continues to upgrade the drinking water systems, however, many citizens of California have not been given warnings to avoid drinking contaminated water.

The background is this: As part of the federal Safe Drinking Water Act, local water utilities are required to periodically test public drinking water systems that serve at least 25 people. When those results show more than 10 ppb arsenic (a standard imposed by EPA in 2001), the utilities must notify residents of the violation in writing by mail "as soon as practical, but within 30 days."[40] In California, however, the warning notices provide a mixed message, stating: "Our water system recently violated a drinking water standard," but also, "you do not need to use an alternative water supply (e.g., bottled water). This is not an emergency…. However, some people who drink water containing arsenic in excess of the (federal limit) over many years may experience skin damage or circulatory system problems, and may have an increased risk to getting cancer."[41] (For the full text of California's notice template for local utilities to use, see Appendix A)

This advisory says two contradictory things: Warning, you have a problem with your water. But don't worry – keep drinking it. If consumers are being told to ignore the federal health standards and keep drinking the contaminated water, there is no reason for the federal Safe Drinking Water standards for arsenic to exist. As stated previously in this report, California is much more clear about warning private well owners to "protect yourself and your family" from arsenic-tainted tap water. And other states – including Wisconsin, Michigan, Maine, and Washington – bluntly advise people not to drink private well water with more than 10 ppb arsenic.

In addition to receiving advisories about violations when they occur, customers also receive annual reports from their local water utilities called "Consumer Confidence Reports." These reports list the levels of more than a dozen different potential contaminants, including bacteria, lead, copper, nitrates and arsenic. When arsenic levels exceed the limit of 10 ppb, these reports provide the numbers and say: "Some people who drink water containing arsenic in excess of the MCL (maximum contaminant level) over many years may experience skin damage or circulatory system problems, and may have an increased risk of getting cancer."[42] But the reports do not tell consumers to stop drinking water with excessive levels of arsenic, and instead hint that it might not be a problem, saying: "Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants."

We asked the California State Water Resources Control Board why the agency doesn't tell people to avoid drinking water with illegal levels of arsenic. In response, Forbes, the deputy director for water, said that the state does provide this kind of blunt and immediate warning for other contaminants that can make consumers sick immediately, such as fecal bacteria. But for arsenic, she said, the threat is more long term. "Arsenic is categorized as a chronic contaminant that poses possible health risks after long-term exposure – 70-plus years of drinking two liters of arsenic-contaminated water a day above the maximum contaminant level," Forbes said. "There are no known acute/immediate health effects that would cause consumers to immediately stop drinking the water."

This answer, however, ignores the fact that many of these California residents have been drinking arsenic-contaminated water for decades. For example, Drs. Carolina Balazs and Isha Ray in 2014 published a study in the American Journal of Public Health in which they interviewed residents with contaminated tap water and found that the current notification requirements are poorly serving people with long-term exposure to pollutants.[43] "A resident from the community of Cutler explained that for years she had received Consumer Confidence Reports indicating that dibromochloropropane levels in the water exceeded the MCL (maximum contaminant level)," Balazs and Ray wrote. "These reports noted that residents should not worry because health impacts were not based on immediate exposure, but rather on lifetime exposure... She had lived in her community for nearly 30 years—so, she asked, should she worry or not? In these situations, water systems simply leave residents to cope with contaminated drinking water as best they can….In these instances, Safe Drinking Water Act regulations ultimately fail the (low-income) household."[44]

California's records identify more than 46,772 people whose tap water has had average levels of arsenic that have exceeded the federal standards for at least five years, from 2011 to 2015. But there is no reason to believe that these people received cleaner water before this. The longer a person drinks water contaminated with excessive levels of arsenic, the higher the increased risk of cancer. In much the same way, smoking a single cigarette is not an immediate health threat, in that it will instantly kill a person. But the longer a person smokes, the worse the health threat. For this reason, California would better protect public health if it told people to stop drinking arsenic-tainted water now, just as health warnings on tobacco required by the U.S. Food and Drug Administration advise, "WARNING: Quitting smoking now greatly reduces serious risks to your health." These advisories do not state, "WARNING: You do not need to change your smoking habits."

Evolution of the Science on Arsenic

One reason for stronger warning language is that scientific research continues to show that arsenic causes health problems – including brain damage in children -- at lower levels than previously thought.

The history of EPA's arsenic rule reflects the continuing evolution of scientific knowledge about the harms that even low levels of the element can cause. Back in 1996, Congress amended the Safe Drinking Water Act and directed EPA to establish new limits for arsenic to replace the old standard of 50 ppb. Based on the best available research, EPA proposed a limit of 5 ppb in 2000. Because arsenic is a carcinogen, some public health experts consider any level above zero to pose some risk. EPA then revised its proposal, based in part on cost considerations, and finalized a new arsenic standard of 10 ppb in 2001.

The EPA Administrator at the time, Christine Todd Whitman, explained that "the 10 ppb protects public health based on the best available science and ensures that the cost of the standard is achievable."[45] The new regulations required that public water systems across the U.S. meet the new standard by January 23, 2006.[46] The law allowed states to grant exemptions until January 23, 2015, for some small community water systems that had trouble complying.[47]

The 2014 Maine study discussed earlier in this report found found significant reductions in IQ in children exposed to arsenic concentrations of 5 to 10 ppb.[48] With this new information, EPA should change its own guidance for notification language so that people – especially parents of young children -- receive a clearer warning not to drink contaminated water. A template for warning language on the federal agency's website for drinking water systems with chemical contaminants such as arsenic advises utilities to tell their customers: "Some people who drink water containing arsenic in excess of the MCL (maxiumum contaminant level) over many years may have an increased risk of getting cancer." But the notices also say: "There is nothing you need to do….If you have specific health concerns, consult your doctor."[49] This is a problem, because many lower-income people do not have doctors with whom they can regularly consult about questions like water quality.

Responses from Local Drinking Water Systems

When asked about their drinking water violations by EIP, some of the utilities in California with illegal levels of arsenic replied that their attempts to fix the problem have been hindered by bureaucratic obstacles at the local level. Others indicated they are taking steps to solve the problem, but simply need more time or money. Not all public systems were contacted by EIP or provided answers.

Table 3. Top 10 Residential Water Systems for Arsenic Contamination (Excluding Mobile Home Parks)

System	County	Population Served	2014-2015 avg (ppb)	2011-2015 avg. (ppb)
Lakeview Improvement Association #1	Fresno	160	86.9	86.9*
Corral De Tierra Estates WC	Monterey	45	72.5	78.4
Keeler Community Service District	Inyo	50	71.3	75.6
Quail Valley Water District-Eastside System	Kern	60	70.1	69.1
MD #06 Lake Shore Park	Madera	130	64.3	71.9
Valley Teen Ranch	Madera	50	62.0	120.8
Shaver Lake Point #2	Fresno	210	52.3	42.9
Boron Community Service District	Kern	2500	38.1	38.0
Monterey Park Tract Comm. Service District	Stanislaus	186	31.9	34.3
North Edwards Water District	Kern	600	31.5	31.6

Note: The federal limit is 10 ppb arsenic. Lakeview had fewer than five years of data available.

At the **Lakeview Improvement Association** in Fresno County, 160 people have been receiving drinking water with more than eight times the legal limit of arsenic on average for at least the last five years, according to state data. State records show that on May 16, 2016, the California Water Resources Control Board issued a citation to the association's water system, imposing a fine of $1,000 for its failure to follow the directives of two earlier compliance orders, in 2014 and 2015. "The water system continues to violate the arsenic maximum contaminant level (MCL) and does not appear to be making progress toward the compliance deadline," says the most recent letter from the state. "Additionally, the water system has failed to routinely conduct the public notification of the arsenic MCL violation, as required."

Philip Dutton, an engineer for surrounding Fresno County, said that the Lakeview Association's plan, as expressed verbally, is to test some in-home water filtration systems and see how well they perform.[50] "They've got a few of these (filtration systems) installed in homes, but they are sampling from different technologies to try and identify what is going to be the best long-term alternative," Dutton said. The California State Water Resources Control Board's website already lists which types of filtration technologies work well to remove arsenic.[51]

In **Kettleman City**, in Kings County, 1,450 residents have had tap water with excessive levels of arsenic for decades. The average from 2011 to 2015 was 20 percent above the legal limit, according to state data. "I have a daughter, a little one, who's still brushing her teeth with contaminated water, taking a bath in contaminated water," said Maricela Mares-Alatorre, a city resident, during a recent public hearing of the state water board.[52] The Kettleman City Community Services District has promised local residents that it will build a $9 million water treatment plant, but the project has been repeatedly delayed – with a target to open in the fall of 2016 recently pushed back to 2018.[53]

At the **Corral De Tierra Estates** subdivision in Monterey County, 45 people have been exposed to drinking water with arsenic levels almost eight times the legal limit from at least 2011 through 2016, state records indicate. This small water system has received 10 violations notices from the state for excessive levels of arsenic over the last decade, with the most recent in the first quarter of 2016, when it had 77 ppb of the contaminant (compared to the 10 ppb limit).

The manager of Monterey County's drinking water program, Cheryl Sandoval, said Corral De Tierra Estates is among at least five privately-owned water systems that have been issued corrective orders by the county because they are in violation of the arsenic standard. Solving the problem is taking longer than expected, Sandoval said, and some of the local water utilities are still debating the best path forward. "Dealing with the problem is very complicated," Sandoval said.[54] "They haven't made a lot of progress toward compliance, but they are going to have to." One challenge is that a water treatment plant for even a small system can cost hundreds of thousands of dollars and cause new waste disposal problems, because the plants produce concentrated arsenic sludge that must be handled carefully as a hazardous material. Corral De Tierra Estates and other subdivisions want to try in-home water treatment systems as a systemic solution, but county rules don't allow that, Sandoval said. However, debate over this in-home option continues, because new state regulations may open the door for in-home filtration as a systemic solution in the future.

Meanwhile, as the bureaucratic discussions continue, residents are receiving confusing advice about whether they should drink the water pouring from their taps with illegal levels of arsenic. One recent report from Corral de Tierra Estates to local water consumers, displayed on the state website and sent to homeowners in July 2014, advised people that arsenic levels were eight times above the legal limit.[55] But that fact was buried in the middle of a dense report with lots of numbers that also gave the impression that the exceedance was not a problem. The report told homeowners: "The presence of contaminants does not necessarily indicate that the water poses a health risk."[56]

At the **Quail Valley Water District-Eastside System** in Kern County, 60 residents have been receiving drinking water with seven times the legal limit of arsenic over the last five years, state records show. In April 2015, the state issued a compliance order to the local utility and mandated that it fix the problem by April 2018.

Randy Hardenbrook, Director of the Quail Valley Water District, said the problem should be solved within the next two years because a $5.8 million grant from the state is allowing the district to build a new pipeline. The pipe will be about 8.5 miles long and will connect a part of the system with arsenic-tainted water to a well that has good water.[57] In the interim, local residents receive quarterly letters with data on the arsenic exceedances but are not being provided with bottled water. More importantly, they are not being told to refrain from consuming the contaminated water. "We're not telling them not to drink it," Hardenbrook said, "but we are telling them there are long-term health effects."[58]

At the **Shaver Lake Point #2** subdivision in Fresno County, 210 people have been receiving tap water with more than four times legal levels of arsenic for at least the last five years, according to state data. In January 2015, the state wrote to the water system's administrators and ordered them to come into compliance with the federal and state arsenic limits by December 31, 2016.

With only four months left until the deadline, the arsenic levels remain illegally high and Robert Johnson, President of the Shaver Lake Point Mutual Water Company, said he is still thinking about what to do about the problem.[59] "Currently, it's being researched. We have engineers involved. We have water experts involved, and we are trying to figure it out," Johnson said. He added that building a water filtration system could cost as much as $250,000, so the subdivision is considering trying to blend water from its arsenic-tainted wells with cleaner water from different wells.

Meanwhile, nobody in the community is being warned to avoid the contaminated water. "There is no warning not to drink it. There is no 'non-drink' order out there," said Johnson.[60] When asked if his customers should drink bottled water as a precaution instead of the arsenic-tainted tap water, Johnson said: "It's one of those things, if you want to do it, that's your deal. It's not being recommended. We're not suggesting it. This is per the state of California."

Group Home for Troubled Children

The **Valley Teen Ranch**, a Christian residential treatment group home for 32 court-referred abused and neglected boys in Madera County, has arsenic in its tap water that averaged more than 12 times the federal limit from 2011 through 2015, according to state records.[61] "We've been out of compliance, but no children have gotten sick, no adults have gotten sick," said Connie R. Clendenan, CEO of the nonprofit organization that runs the group home. "Nobody wants to drink the water here because it's brown and nasty."[62]

About five years ago, the state approved a $5 million grant to help the group home solve the problem by linking its small water system to a larger one run by the county. But the work has not started yet. Because of ongoing negotiations at the county level, the fix could still be three years or more away, Clendanan said. Meanwhile, children are being given bottled water and are verbally warned not to drink tap water, although there are no warning signs posted above sinks.

"I want to get out of the water business. I'm in the kid business," Clendenan said. Of the continuing delays in fixing the problem with contaminated water, she said: "Nobody's mad. But it's government, and it takes a lot of time. It's just the stupid county."

Table 4. Schools with Excessive Arsenic in Drinking Water

System	County	Population Served	2014-2015 avg. (ppb)	2011-2015 avg. (ppb)
Kit Carson Elem. School	Kings	510	34.7	34.7*
Washington School WS	Monterey	250	26.1	27.7
MUSD-Nile Garden School	San Joaquin	804	20.9	22.8
Liberty High School	Madera	1340	17.9	20.5*
Island Union School	Kings	300	11.9	18.8
Winship Elementary School	Sutter	38	16.4	17.3*
Lakeside School	Kern	800	16.3	16.9
Barry Elementary School	Sutter	650	15.2	15.3
Pleasant Valley Elementary	San Luis Obispo	100	13.8	14.1
Gratton School	Stanislaus	110	13.5	13.5
North Fork Union School	Madera	350	12.9	12.4
Warner Unified School District	San Diego	250	10.9	11.4
Central Union Elementary	Kings	320	10.1	13.5

*Note: federal limit is10 ppb arsenic. *Indicates systems with monitoring gaps (less than five years available data)*

Arsenic in School Drinking Water

At the **Washington School in Salinas,** California, the tap water serving about 250 students has had almost three times the federal limit of arsenic for the last five years, 28 ppb on average over this time period, compared to the limit of 10 ppb.[63] School Principal Whitney Meyer said that the local school district has been discussing the problem for several years but does not yet have a solution. Meanwhile, students are given bottled water, she said.

"We remind them over and over that they cannot drink the water," Meyer said.[64] "Many of the students live out in this area and their homes are similarly impacted (with arsenic), so they also hear the message at home. We have drinking stations with clean water in every classroom, teaching space, and hallway. The fountains have all been shut down."

At the **Barry Elementary School in Yuba City**, California, the arsenic levels have averaged 50 percent above the federal limit for arsenic over the last five years. Because of the violations, the state issued a compliance order to the school in May 2015. Tom Butcher, Director of Maintenance and Facilities for the school system, said that the school has not yet solved the problem, but is giving bottled water to students as officials try to figure out a solution.[65] Adminstrators of the water system are discussing a consolidation with a larger neighboring system that has better water. "The (state) Water Board indicates a best case scenario of a consolidation in approximately 1.5 years," Butcher said. "Until the consolidation is completed (the school district) will continue to provide bottled drinking water."

At the **Kit Carson Elementary School**, in Hanford, Ca., arsenic levels in drinking water averaged more than three times the legal limit in 2011 through 2014, according to state records. In January 2015, the school solved the problem by connecting its pipes to the water system of the surrounding city,[66] whose arsenic levels are below the federal limits.

At the **Lakeside School in Bakersfield,** California, the arsenic levels in the drinking water averaged more than 70 percent above the federal limit for arsenic over the last five years, 17 ppb compared to the limit of 10 ppb. Ty Bryson, District Superintendent, said that the school notified all families by sending home notice letters with the students and by posting warnings in the office. "We provide bottled drinking water for students and staff," Bryson said. "We drilled an alternate well, but that also had unacceptable levels of contaminant. We are now pursuing an alternative source of drinking water by connecting to a local municipal water source via pipeline."

At the **Gratton School in Denair,** California, the drinking water system has had arsenic levels that averaged 40 percent above the federal limit for arsenic over the last five years, state records indicate. The school's superintendent, Shannon Sanford, said that students have been provided bottled water for the last two years. "Students were initially warned (not to drink the water) and signs were used until fountains were disabled," Sanford said. More recently, the school drilled a new well that will be used for the 2016-2017 school year that should solve the problem.

At the **Island Union School in Lemoore,** California, arsenic levels in the drinking water were nearly twice the federal limit from 2011 to 2015, averaging 18.8 ppb compared to federal limit of 10 ppb, according to state records. Superintendent Charlotte Hines said the school dug a new well in 2015, and provided students and warnings and bottled water in the interim. "We know that bottled water is only a temporary solution," Hines said. "And in an effort to find a permanent solution, the school requested -- and was awarded -- state funding to drill a new well that would meet all primary drinking water standards."[67]

Military Base with Contaminated Water

At the **U.S. Army Base Fort Irwin** in San Bernardino County, 16,000 soldiers live in facilities that have had arsenic in some tap water at levels 50 percent higher than the federal limit from 2011 through 2015, state records indicate. For the last three years, the Army Corps of Engineers has been building a new $100 million water treatment plant at the base to solve the problem. The plant is now undergoing testing and is scheduled to go online in October 2016, base officials indicate.

"The new plant will treat all Fort Irwin water to comply with Safe Drinking Water act Standards for ALL pollutants of concern including …arsenic," said Muhammad A. Bari, Director Public Works at Fort Irwin.[68]

In the interim, soldiers have been provided with bottled water and warned which faucets to avoid, according to base managers.

Vineyards with High Arsenic Levels

In San Joaquin County, the **Delicato Family Vineyards** had arsenic levels in the tap water that averaged 18 ppb from 2011 through 2014, which was 80 percent higher than the federal limits, state records indicate. Kylie Barnett, a spokeswoman for the company, said that the vineyards worked with county officials in 2014 to build a new drinking water system, including by digging two new wells, which brought the arsenic levels down below the federal standard in 2015 and 2016.[69] "The drinking water is not used in production of our wine," Barnett noted. Before the repair, people working at the vineyards and visiting were provided bottled water, she said.

In Napa County, the **Larkmead Vineyards** had drinking water with six times more arsenic than allowed from 2011 through 2013, according to state records. No results were listed for 2014 or 2015, and it is unclear if the drinking water system, which serves 25 people, is used for workers or guests. (Wine making does not generally use tap water.) Emails sent to managers of the vineyard asking about the water were not returned. The researchers of this report also received no response from the **Black Stallion Winery** in Napa County, whose tap water had four times legal limits of arsenic from 2011 through 2015, according to state records.

Conclusion

California is making progress toward solving its drinking water contamination problem. The state has reorganized its drinking water agency, and increased its financial assistance to local utilities to build water treatment systems, dig new wells, and take other steps to resolve the issue. The work, however, is expected to take many more years. In the meantime, tens of thousands of people continue to be exposed to drinking water with illegal levels of arsenic, a carcinogen that could damage the developing brains of children and cause other health problems. And yet, the warnings that some of these residents receive from the government are contradictory and confusing.

Both California and the federal government need to do more to protect consumers, especially the young. This report recommends:

1) California and EPA should both revise the language for written notifications of violations of arsenic standards, so that people are clearly advised to stop drinking contaminated water. If the violations are in schools or group homes, warning signs should also be posted over all sinks and drinking fountains. The state should help provide bottled water as an interim solution.

2) Consumers should be provided more information through the mail about what works and what does not work to remove arsenic from tap water. Residents need to know, for example, that boiling water will not help, but that certain filtration systems can remove the carcinogen. In some cases, residents may need technical help from the state in understanding how to use filtration systems properly.

3) Both Congress and the state government should increase investments in upgrades to California's drinking water systems. This is not only an environmental justice issue, but also a sensible strategy to boost the local economy through the hiring of engineers, construction workers and others to improve local infrastructure.

Counter arguments made by California officials – that the state is already taking action, and that arsenic is not an immediate threat to public health – do not hold water. Although the state has issued enforcement orders to local utilities, some local officials clearly still need more prodding and money to upgrade their water systems. A growing amount of scientific research suggests that arsenic increases the risk of cancer and other diseases and may do so at a lower level than expressed in current federal regulations. Years more of exposure to arsenic-tainted water will only raise the risk of cancer or neurological damage for California residents.

The state and federal governments should advise people to stop drinking contaminated water immediately, just as public health experts urge smokers to change their habits sooner rather than later because it will increase their odds of survival.

With public health warnings, simple and direct is better than bureaucratic and complex, because safe is better than sorry when people's lives and minds are at risk.

APPENDIX A: California's Language for Public Notices about Arsenic Violations

IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER

Este informe contiene información muy importante sobre su agua potable.
Tradúzcalo o hable con alguien que lo entienda bien.

[System] Has Levels of Arsenic Above the Drinking Water Standard

Our water system recently violated a drinking water standard. Although this is not an emergency, as our customers, you have a right to know what you should do, what happened, and what we are doing to correct this situation.

We routinely monitor for the presence of drinking water contaminants. Water sample results received on [date] showed arsenic levels of [level and units]. This is above the standard, or maximum contaminant level (MCL), of 0.010 milligrams per liter.

What should I do?

- **You do not need to use an alternative water supply (e.g., bottled water).**
- This is not an emergency. If it had been, you would have been notified immediately. However, *some people who drink water containing arsenic in excess of the MCL over many years may experience skin damage or circulatory system problems, and may have an increased risk to getting cancer.*
- If you have other health issues concerning the consumption of this water, you may wish to consult your doctor.

What happened? What is being done?

[Describe corrective action]. We anticipate resolving the problem within [estimated time frame].

For more information, please contact [name of contact] at [phone number] or [mailing address].

Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, *nursing homes, schools, and businesses). You can do this by posting this public notice in a public place or distributing copies by hand or mail.*

Secondary Notification Requirements

Upon receipt of notification from a person operating a public water system, the following notification must be given within 10 days [Health and Safety Code Section 116450(g)]:

- SCHOOLS: Must notify school employees, students, and parents (if the students are minors).
- RESIDENTIAL RENTAL PROPERTY OWNERS OR MANAGERS (including nursing homes and care facilities): Must notify tenants.
- BUSINESS PROPERTY OWNERS, MANAGERS, OR OPERATORS: Must notify employees of businesses located on the property.

This notice is being sent to you by [system].

State Water System ID#: ___________. Date distributed: ___________.

APPENDIX B: Listing of All California Public Drinking Water Systems with Arsenic Levels that Averaged Over the Federal Limit over the Last Five Years

System Name	County	Pop. Served	2014-2015 Avg (ppb)	2011-2015 Avg (ppb)	
Lakeview Improvement Association #1	Fresno	160	86.9	86.9	^
Fountain Trailer Park Water	Kern	68	85.8	83.9	*
Hungry Gulch Water System	Kern	33	72.6	70.0	*
Corral De Tierra Estates WC	Monterey	45	72.5	78.4	*
Keeler Community Service District	Inyo	50	71.3	75.6	*
Quail Valley Water District-Eastside System	Kern	60	70.1	69.1	*
CSA 70 W-4 Pioneertown	San Bernardino	625	64.5	61.6	*
MD #06 Lake Shore Park	Madera	130	64.3	71.9	*
Valley Teen Ranch	Madera	50	62.0	120.8	*
Sierra East Mobile Home Community	Mono	50	54.6	47.0	^
Shaver Lake Point #2	Fresno	210	52.3	42.9	^
Winterhaven Mobile Estates	Los Angeles	40	52.1	53.4	*
Olam Spices And Vegetables Inc.	Kings	75	48.4	46.7	*

System Name	County	Pop. Served	2014-2015 Avg (ppb)	2011-2015 Avg (ppb)	
The Village Mobile Home Park	Los Angeles	70	45.1	47.0	*
Callier Water System	San Bernardino	1000	42.1	49.2	^
Black Stallion Winery	Napa	25	41.8	41.8	^
Ironwood Camp	San Bernardino	1000	38.4	38.6	*
Boron CSD	Kern	2500	38.1	38.0	*
Edgewater Mobile Home Park	Sacramento	40	38.0	37.6	*
Prunedale MWC	Monterey	252	35.7	32.0	
Kit Carson Elem. School	Kings	510	34.7	34.7	^
Darr Water Co.	San Bernardino	1000	34.3	36.0	*
Monterey Park Tract Community Service District	Stanislaus	186	31.9	34.3	*
North Edwards WD	Kern	600	31.5	31.6	*
Desert Lake Community Service District	Kern	700	31.0	32.5	*
Locke Water Works Co [SWS]	Sacramento	80	29.5	29.1	*
Lucky 18 On Rosamond, LLC.	Kern	73	28.0	24.3	*
Washington School WS	Monterey	250	26.1	27.7	*
Rancho Marina	Sacramento	250	24.0	30.1	*
Colusa Co. WWD #1 - Grimes	Colusa	500	23.9	24.7	*
Bridgeport PUD	Mono	850	23.3	24.0	*
Country Hills Estates	San Luis Obispo	60	23.0	26.8	^
Doubletree Ranch Water System	Contra Costa	49	21.6	22.4	*
Mitchell's Avenue E Mobile Home Park	Los Angeles	26	21.3	21.0	*
Vista Del Toro WS	Monterey	87	21.0	20.4	*
MUSD-Nile Garden School	San Joaquin	804	20.9	22.8	*
Country Villa Apts.	Stanislaus	30	20.8	21.1	*
Millstream Mobile Home Park	Tehama	80	20.5	20.0	*
Country Western Mobile Home Park	Stanislaus	120	20.4	22.2	*
Saint Anthony Trailer Park	Riverside	300	19.7	21.5	*
New Orchard Mobile Home Park LLC	Tehama	125	19.6	19.0	*
MD #24 Teaford Meadow Lakes	Madera	150	19.0	12.5	
William Fisher Memorial Water Company	Kern	53	19.0	18.4	*
Ceres West Mobile Home Park	Stanislaus	161	18.9	18.0	*
Boulder Canyon Water Association	Kern	28	18.4	17.9	*
Lakeview Ranchos Mutual Water Company	Kern	120	18.1	22.4	*
Liberty High School	Madera	1340	17.9	20.5	^
Sutter Co. WWD #1 (Robbins)	Sutter	350	17.9	18.1	*
MD #42 Still Meadow	Madera	100	17.7	17.7	^
Maher Mutual Water Company	Kern	150	17.7	20.8	*
Cedar Valley Mutual Water Co.	Madera	137	17.6	18.6	^
First Mutual Water System	Kern	35	17.5	15.1	*
Sierra Co. W.W.D #1 Calpine	Sierra	225	17.0	14.1	*
Bar-Len MWC	San Bernardino	124	16.6	16.2	*

System Name	County	Pop. Served	2014-2015 Avg (ppb)	2011-2015 Avg (ppb)	
Winship Elementary School	Sutter	38	16.4	17.3	^
Lakeside School	Kern	800	16.3	16.9	*
Lanare Community Services Dist	Fresno	660	16.2	17.3	*
Delicato Vineyards	San Joaquin	25	15.6	18.3	^
Fourth Street Water System	Kern	56	15.6	14.0	*
Barry Elementary School	Sutter	650	15.2	15.3	*
Rand Communities Water District	Kern	450	15.1	15.3	*
US Army Fort Irwin	San Bernardino	16000	14.9	15.4	*
Pond Mutual Water Company	Kern	48	14.7	14.4	^
Alpaugh Community Services District	Tulare	1026	14.5	17.8	
Lands Of Promise Mutual Water Associatio	Kern	190	14.4	15.0	*
Pixley Public Util Dist	Tulare	3310	14.4	15.0	*
Caruthers Comm Serv District	Fresno	2497	14.3	15.4	*
Nord Road Water Association	Kern	32	14.2	15.0	*
Lancaster Park Mobile Home Park	Los Angeles	53	14.2	15.0	*
Mesa Del Toro MWC	Monterey	90	14.2	13.1	*
Green Run Mobile Estates	Stanislaus	100	14.0	15.1	*
Pleasant Valley Elementary	San Luis Obispo	100	13.8	14.1	*
Loch Haven Mutual Water Company	Sonoma	50	13.8	13.1	*
Gratton School	Stanislaus	110	13.5	13.5	*
Hillview Water Co-Raymond	Madera	290	13.4	17.8	
Mettler Valley Mutual	Los Angeles	100	13.0	13.1	*
Mobile Plaza Park	Stanislaus	125	13.0	12.7	*
Hilmar Cheese Company	Merced	1000	13.0	13.3	
North Fork Union School	Madera	350	12.9	12.4	*
Yosemite Forks Est Mutual	Madera	110	12.8	11.6	
MD #08 North Fork Water System	Madera	264	12.8	13.9	^
Keyes Community Services Dist.	Stanislaus	4891	12.3	12.8	*
Countryside Mobile Home Park	Stanislaus	60	12.1	12.5	*
Land Project Mutual Water Co.	Los Angeles	1500	12.1	13.5	*
El Adobe POA, Inc.	Kern	200	12.1	12.1	*
Island Union School	Kings	300	11.9	18.8	
Plumas Eureka CSD	Plumas	325	11.6	11.4	*
Kettleman City CSD	Kings	1450	11.4	12.0	*
Laguna Seca WC	Monterey	162	11.1	11.7	*
Los Molinos Comm. Services Dist.	Tehama	1500	11.1	9.0	
R.S. Mutual Water Company	Kern	67	11.0	11.1	*
Oasis Property Owners Association	Kern	100	10.9	10.8	^
Warner Unified School District	San Diego	250	10.9	11.4	^
MD #07 Marina View Heights	Madera	200	10.5	9.3	
Central Union Elementary	Kings	320	10.1	13.5	^

Note: Click on the hyperlink in the name of the system to view the state records for each water system.

** Indicates a system that has had annual concentrations averaging over the federal limit (10 ppb) each year 2011-2015*

^ Indicates that the 2011-2015 average includes years for which data was not available.

APPENDIX C:

Methods

This report is based on public data available from the California Environmental Protection Agency's State Water Resources Control Board (SWRCB) as of May 2016. We downloaded the SWRCB's Water Quality Analyses Database Files for 2011-2016 and identified public water systems that had arsenic concentrations that exceeded the 10 ppb Maximum Contaminant Level, targeting the systems with frequent exceedances between 2011 and 2015. The SWRCB database contained results for each water source used by a drinking water system, such as wells, treated or blended water, and standby wells that are only allowed to be used for a few days during a year. SWRCB warns users of its database that results in the database may not reflect the quality of water that systems actually served their customers.

Calculating average arsenic concentrations

- We calculated the average arsenic concentration from each individual water source at each water system using the sampling results available in SWRCB's database as of May 2016. Some sampling results from the end of 2015 may not have been available in the database at the time we downloaded the data in May.

- We reviewed each water system's source descriptions to determine which sources represented water served to consumers and whether the source should be included in the system-wide average arsenic concentration. For example, if the database showed that a system had two groundwater wells and a 'treated' source, we assumed that consumers would be served the treated source if results for that treated source were available each year. If the database listed a treated source in 2011, for example, but contained no data from that source for the following years, we excluded that source from the average because it was not clear if the system continued treating water for arsenic. If a system listed a source as inactive or as a 'standby' option, we excluded that source from the analysis because we could not determine when or if the water was used. We compared the selected sources with available Consumer Confidence Reports available through California's Drinking Water Watch system and narrative information in public SWRCB enforcement action documents to verify, to the extent possible, that the sources we selected represented water that was provided to consumers. If no information was available for a particular system, we relied on the assumptions described above (i.e. inactive and standby sources were not used, treated sources were used instead of untreated sources when concentrations were available for each year). We did not include purchased water sources.

- After identifying individual sources, we calculated the system's annual average arsenic concentration using the annual average concentrations from each source. The average concentrations during the two-year period between 2014 and 2015 and the five year period between 2011 and 2015 are time-weighted average concentrations (i.e. we averaged the annual average concentrations from each year). This method is similar to how the California EPA's Office of Environmental Health Hazard Assessment calculated average concentrations at drinking water systems for use in it's 2014 CalEnviroScreen 2.0 tool, except we focused on annual average concentrations from 2011-2015, rather than a single average concentration from 2005-2013.

- We excluded entire systems from the analysis if a) they were inactive, b) the available data and source descriptions did not allow us to confidently assume that customers received the sampled water at their taps, and c) the average concentration over the most recent two years (2014-2015) fell below the MCL.

Mapping Public Water Systems

To map water system locations, we found the centroids of public water system boundaries from the California Environmental Health Tracking Program's Water Systems Geographic Reporting Tool, or Water Boundary Tool (WBT). For systems without boundaries in the WBT, we determined coordinates from the addresses in the SWRCB Water Quality Analysis database files and the California Drinking Water Watch system.

Notes

[1] Based on averages for 2014-2015. Numbers in this report from the California State Water Control Resources Board online database, "Drinking Water Watch," https://sdwis.waterboards.ca.gov/PDWW/ Records accessed May, 2016.
[2] U.S. EPA (1998), Integrated Risk Information System, Inorganic Arsenic, available at http://www.epa.gov/iris/subst/0278.htm.
[3] Carolina L. Balazs, Rachel Morello-Frosch, Alan E. Hubbard and Isha Ray, "Environmental justice implications of arsenic contamination in California's San Joaquin Valley: a cross-sectional, cluster-design examining exposure and compliance in community drinking water systems," Environmental Health, 2012. Link: https://ehjournal.biomedcentral.com/articles/10.1186/1476-069X-11-84
[4] California State Water Control Resources Board online database, "Drinking Water Watch," https://sdwis.waterboards.ca.gov/PDWW/ Records accessed May. Records show 51,306 residents receiving drinking water from 2011-2015 with annual averages of more than 10 ppb.

[5] California Code of Regulations Title 22, Chapter 15, Section 64463.4(b)] reglations require notifications for arsenic exceedances. The California State Water Resources Board template for the language in notifications to be sent out by local water utilities is available on state agency's website at: http://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/Notices.shtml.

[6] California State Water Resources Control Board website, link: http://www.waterboards.ca.gov/drinking_water/certlic/device/watertreatmentdevices.shtml
[7] Ibid.
[8] Telephone interview with Connie R. Clendenan, CEO of the Valley Teen Ranch nonprofit organization, on August 1, 2016.
[9] Ibid.
[10] Texas Commission on Environmental Quality Notice of Drinking Water Arsenic Violation. Available at https://www.tceq.texas.gov/assets/public/permitting/watersupply/pdw/notices/chemical/arsenic.pdf
[11] Wisconsin Department of Natural Resources, Arsenic, Available at: http://dnr.wi.gov/topic/groundwater/arsenic/, accessed 3/7/2016.
[12] Florida Department of health, Brueau of Environmental Health, "Chemicals in Private Drinking Water Wells Fact Sheet- Arsenic," Available at: http://www.floridahealth.gov/environmental-health/drinking-water/_documents/arsenic-fs.pdf. Accessed 3/7/2016.
[13] See e.g. U.S. Department of Health and Human Services, (2004), "Health Consultation: Arsenic in Private Drinking Water Wells, Cornville, Yavapai County, Arizona," available at: http://www.atsdr.cdc.gov/HAC/pha/ArsenicInPrivate061504-AZ/ArsenicInPrivateHC061504.pdf, accessed 3/8/2016.
[14] Wasserman et al. (2014), A Cross-Sectional Study of Well Water Arsenic and Child IQ in Maine Schoolchildren, Environ Health 13:23-32.
[15] Based on averages for 2014-2015. Numbers from California State Water Control Resources Board online database, "Drinking Water Watch," https://sdwis.waterboards.ca.gov/PDWW/ Records accessed July 28, 2016.
[16] Letter from Jared Blumenfeld, Director of EPA's Region 9 office, to California Department of Public Health Director Dr. Ron Chapman, April 19, 2013. Link: https://www3.epa.gov/region9/water/grants/pdf/CDPHNoticeofNonCompliance.pdf
[17] U.S. Centers for Disease Control, fact sheet on arsenic. Available at http://www.cdc.gov/biomonitoring/pdf/Arsenic_FactSheet.pdf
[18] U.S. EPA (1998), Integrated Risk Information System, Inorganic Arsenic, available at http://www.epa.gov/iris/subst/0278.htm.

[19] The EPA describes arsenic's cancer-causing potency with a 'slope factor' (because it describes the slope of the dose-response curve). The current EPA slope factor for arsenic is 1.5 per mg/kg-d. This number represents the risk that can be expected from consuming one milligram of arsenic per kilogram of body weight per day. The EPA also translates the slope factor into a 'drinking water unit risk' of 5×10^{-5} per µg/L. For carcinogens, the formal MCL Goal is always zero. Zero is an unattainable goal, so in most cases the EPA will reduce exposure to carcinogens to a level of 'acceptable risk,' something between 10^{-6} (1 in 1,000,000) to 10^{-4} (1 in 10,000).[19] One way of looking at this range is to assume that risks less than 1 in 1,000,000 are always 'acceptable,' while risks greater than 1 in 10,000 never are. The risks of drinking arsenic at the MCL of 10 µg /L are much higher than 1 in 10,000.

[20] See, e.g., National Research Council, Critical Aspects of EPA's IRIS Assessment of Inorganic Arsenic – Interim Report, 82 – 83 (2013). For health endpoints like childhood IQ, the critical window of exposure is obviously much less, encompassing in utero development and childhood.

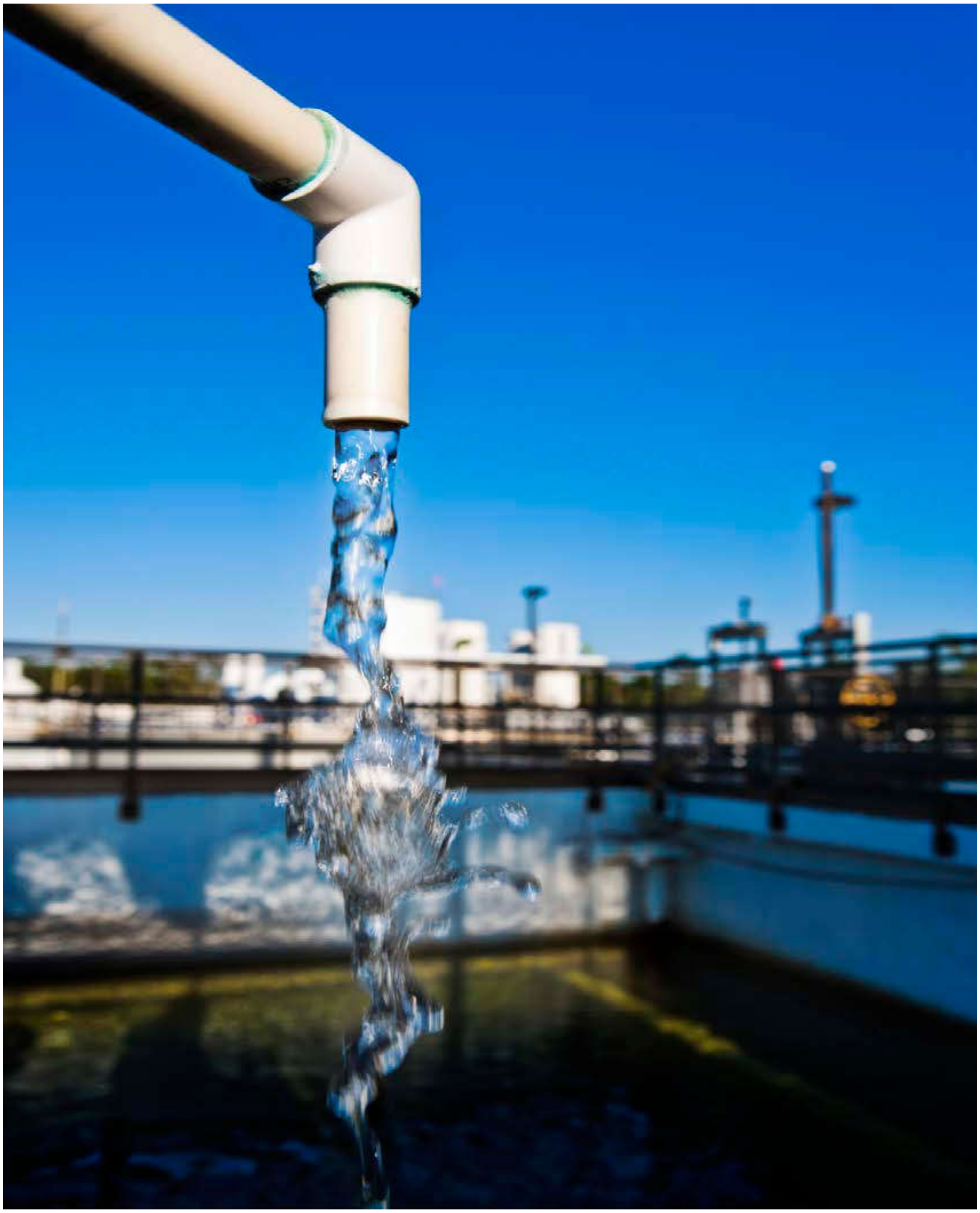
[21] EPA web page, "Drinking Water Arsenic Rule History," available at: https://www.epa.gov/dwreginfo/drinking-water-arsenic-rule-history.
[22] ATSDR (2007), Toxicological Profile for Arsenic; Grandjean and Landrigan (2014), Neurobehavioural Effects of Developmental Toxicity, *Lancet Neurol* 13:330-338.

[23] Wasserman et al. (2014), A Cross-Sectional Study of Well Water Arsenic and Child IQ in Maine Schoolchildren, *Environ Health* 13:23-32.

[24] Ibid.

[25] Ibid.
[26] California Water Resources Board report to the California legislature, "Communities that Rely on a Contaminated Groundwater Source for Drinking Water," January 2013. Link: http://www.waterboards.ca.gov/water_issues/programs/gama/ab2222/docs/ab2222.pdf
[27] California Water Resources Board report to the California legislature, "Communities that Rely on a Contaminated Groundwater Source for Drinking Water," January 2013. Link: http://www.waterboards.ca.gov/water_issues/programs/gama/ab2222/docs/ab2222.pdf
[28] Carolina L. Balazs and colleagues, "Environmental Justice Implications of Arsenic Contamination In California's San Joaquin Valley: a Cross-Sectional, Cluster-Design Examining Exposure and Compliance in Community Drinking Water Systems," Environmental Health, November 14, 2012. Link: https://ehjournal.biomedcentral.com/articles/10.1186/1476-069X-11-84
[29] Ibid.
[30] Letter from Jared Blumenfeld, Director of EPA's Region 9 office, to California Department of Public Health Director Dr. Ron Chapman, April 19, 2013. Link: https://www3.epa.gov/region9/water/grants/pdf/CDPHNoticeofNonCompliance.pdf
[31] Ibid.
[32] California Water Boards press release, "State Water Board, Drinking Water Revolving Fund Return to Safe Drinking Water Act Compliance," May 26, 2016. Link: http://www.waterboards.ca.gov/press_room/press_releases/2016/pr052616_cap_release.pdf
[33] Ibid.
[34] Ibid.
[35] Based on averages for 2014-2015. Numbers from California State Water Control Resources Board online database, "Drinking Water Watch," https://sdwis.waterboards.ca.gov/PDWW/ Records accessed July 28, 2016.
[36] Ibid.
[37] Ibid.
[38] Ibid.
[39] Email from Andrew DiLuccia, Public Information Officer for the California State Water Resources Control Board, containing quote from Cindy Forbes, Deputy Director of the Division of Drinking Water, on August 8, 2016. Telephone interview with Forbes on August 4, 2016.
[40] California State Water Resources Board, template for public notification of Arsenic MCL Exceedance, Link: http://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/Notices.shtml
[41] Ibid.
[42] Example of Consumer Confidence Report for a California system can be found on the state website: https://sdwis.waterboards.ca.gov/PDWW/JSP/WaterSystemDetail.jsp?tinwsys_is_number=370&tinwsys_st_code=CA&wsnumber=CA1000071#
[43] Carolina L. Balazs and Isha Ray, "The Drinking Water Disparities Framework: On the Origins and Persistence of Inequities in Exposure," American Journal of Public Health, April 2014, Vol 104, No. 4. Link: http://www.ncbi.nlm.nih.gov/pubmed/24524500.
[44] Ibid.
[45] Ibid.
[46] Ibid.
[47] 40 CFR 142.20(a)(2)
[48] Wasserman et al. (2014), A Cross-Sectional Study of Well Water Arsenic and Child IQ in Maine Schoolchildren, Environ Health 13:23-32.
[49] U.S. EPA public notification template on EPA website: https://www.epa.gov/dwreginfo/public-notification-templates-community-and-non-transient-non-community-water-systems
[50] Telephone interview on August 25, 2016 with Philip Dutton, engineer for Fresno County.
[51] California State Water Resources Control Board website, http://www.waterboards.ca.gov/drinking_water/certlic/device/watertreatmentdevices.shtml
[52] KFSN-TV, ABC-30 in Fresno, report "Kettleman City Residents Get Answers to Questions about Construction of Water Treatment Plant," August 31, 2016. Link: http://abc30.com/society/kettleman-city-residents-get-answers-to-questions-about-construction-of-water-treatment-plant/1493726/
[53] Ibid.

[54] Telephone interview on August 26, 2016, with Cheryl Sandoval, Supervising Environmental Health Specialist and Manager of Monterey County's drinking water program.
[55] Corral de Tierra Water Company 2013 Consumer Confidence Report, dated July 11, 2014.
[56] Ibid.
[57] Telephone interview on August 26, 2016, with Randy Hardenbrook, Director of the Quail Valley Water District.
[58] Ibid.
[59] Telephone interview on August 25, 2016, with Robert Johnson, President of the Shaver Lake Point 2 Mutual Water Company.
[60] Ibid.
[61] Numbers from California State Water Control Resources Board online database, "Drinking Water Watch," https://sdwis.waterboards.ca.gov/PDWW/ Records accessed July 28, 2016.
[62] Telephone interview with Connie R. Clendenan, CEO of the Valley Teen Ranch nonprofit organization, on August 1, 2016.
[63] Numbers from California State Water Control Resources Board online database, "Drinking Water Watch," https://sdwis.waterboards.ca.gov/PDWW/ Records accessed July 28, 2016
[64] Email from Whitney Meyer, Principal of the Washington School in Salinas, California, on August 1, 2016.
[65] Email from Robert Shemwell, Assistant Superintendent of Business Services of the Yuba City Unified School District, containing quote from Tom Butcher,Director of Maintenance and Facilities, on August 12, 2016.
[66] Email on August 24, 2016, from Liliana Stransky of the Kings County Department of Public Health.
[67] Email from Superintendent Charlotte Hines of the Island Union School in Lemoore, California, August 4, 2016.
[68] Email from Kenneth Drylie, Public Affairs Specialist at Fort Irwin, containing quotes from Muhammad A. Bari, Director Public Works at the forst, on August 11, 2016.
[69] Email from Kylie Barnett, Director Public Relations at Delicato Family Vineyards, August 10, 2016.



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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

May 28, 2004

Mike Paulucci
Treatment Plants Chemist
City of Yuba City
302 Burns Drive
Yuba City, California 95991

Re: 2004 Pretreatment Evaluation

Dear Mr. Paulucci:

Enclosed is the April 30, 2004 report for our pretreatment evaluation of Yuba City. We ask that the City provide short written responses to each of the findings in Sections 2.0 to 8.0 of this inspection report by **July 30, 2003.** We expect to follow this inspection report with an Administrative Order that establishes a 12-month schedule for upgrading the pretreatment program, starting with the budget cycle on July 1.

The new NPDES permit incorporates a number of permit limits for pollutants that were unregulated in the past. There are now many pollutants of concern for which the City must develop and implement a source control program. One noteworthy finding of this inspection is that for most of the new pollutants of concern, the effluent levels for Yuba City exceed those for sewer districts representative of the industrialized Central Valley. Yuba City=s levels are partly explained by the ground water supply (*arsenic, barium*), water delivery system (*copper*), and the fact that the other districts perform advanced treatment, either nutrient removal or tertiary filtration, and thus have higher removal rates (*chromium, manganese, iron, silver*). Nevertheless, for a number of metals, non-domestic contributions appear to be the primary or at least a significant source in the Yuba City effluent (*aluminum, arsenic, copper, iron, manganese, mercury, molybdenum, selenium, and zinc*).

Otherwise, the most significant findings involve the unrepresentative self-monitoring by the industrial users over their reporting periods, the under-developed industrial user inventory, the incorrectly permitted significant industrial users, the lack of an updated sewer use ordinance as approved in 1995, and outdated local limits. Some of these issues were advanced in the EPA inspection reports and follow-up Administrative Orders to three significant industrial users in Yuba City. It is expected that their efforts to meet the requirements of their Administrative Orders will partly address the issues in this report.

Much of the City=s past efforts to regulate non-domestic contributions to the sewers will not have to be reconsidered or redone. In particular, the work done by the City to identify pollutant sources can be built upon, and the annual reports are informative. But the City will have to provide resources to do a number of required functions to address the deficiencies found in this inspection. Local limits will have to be redetermined. The ordinance will have to be updated and adopted. Permits will have to be reissued to most significant industrial users. Self-monitoring requirements will have to be re-evaluated. Fact sheets will have to be prepared. All of these requirements are outlined in the enclosed inspection report.

Thank you for your cooperation during and after this inspection. Please do not hesitate to call (415) 972-3504 or e-mail arthur.greg@epa.gov.

Sincerely,

Original signed by:
Greg V. Arthur

Greg V. Arthur
Clean Water Act Compliance Office

cc: Melissa Hall, RWQCB

U.S. ENVIRONMENTAL PROTECTION AGENCY

REGION 9

CLEAN WATER ACT COMPLIANCE OFFICE

PRETREATMENT PERFORMANCE EVALUATION INSPECTION REPORT

NPDES Permittee:	City of Yuba City 302 Burns Drive, Yuba City, California 95991 Wastewater Treatment Plant (NPDES CA0079260) WDRs Orders R5-2003-0085
Dates of Inspection:	August 5, August 20-21, August 27, 2003
Data Review:	Influent and Effluent Conventional: 2003 – 2004 Influent and Effluent Toxics: 2000 – 2004 Sludge toxics: 2000 – 2004

Inspection Participants:

US EPA:	Greg V. Arthur, CWA Compliance Office, (415) 972-3504 Meg Masquelier, CWA Compliance Office, (415) 972-3536
RWQCB:	No Representative
Yuba City:	Mike Paulucci, Chemist, (530) 822-7695 Al Butterfield, Chief Plant Operator
Industrial Users:	Sunsweet Growers, Jerry Ramsey, Engr Mgr, (530) 751-5278 Greenleaf Unit 2, Diane Tullos, Compliance Mgr, (530) 821-2074 Custom Chrome, Gene Hutchinson, Owner, (530) 673-2360

Report Prepared By: Greg V. Arthur, Environmental Engineer
April 30, 2004

Section 1

Introduction and Background

1.0 Scope and Purpose

In April 2004, EPA completed a performance evaluation of the regulatory control of non-domestic wastewaters discharged into the City of Yuba City wastewater treatment plant (“WWTP”). This performance evaluation was one of a series of reviews of small publicly-owned treatment works that accept non-domestic contributions, many of which are not large enough to be mandated to operate EPA-approved pretreatment programs. Yuba City is large enough and has operated an EPA-approved pretreatment program since 1982.

The scope of this performance evaluation comprised:

- Sampling inspection of the Yuba City wastewater treatment plant on August 27, 2003;
- Review of the 2003-2004 Yuba City self-monitoring reports;
- Review of the 2000-2004 influent and effluent sampling records for toxic pollutants;
- Inspections of three significant industrial users including the sampling of two of them;
- Review of the 2000-2003 sampling records for the significant industrial users inspected;
- Interviews with City representatives on August 5, August 20-21, and August 27, 2003;
- Review of the industrial responses to their inspection reports and enforcement actions.

The purpose of this evaluation was to determine if non-domestic discharges into the Yuba City sewer system are properly controlled. The evaluation findings were measured against two fundamental performance objectives. The first is the prevention of sewage treatment works pass-through, interference and sludge contamination as shown by compliance with the Federal sludge limits, the discharge permit limits, and any expected future Clean Water Act requirements. The second is the consistent compliance by the industrial users with their own Clean Water Act requirements, in particular with the Federal best-available-technology standards that apply to certain industrial categories, and any national prohibitions and local limits for pollutants associated with treatment works non-compliance.

This report covers the performance of the pretreatment program as it currently exists in Yuba City. Some pertinent findings from the industrial user inspections are also incorporated. The significant industrial users received individual reports and enforcement actions. Arthur collected samples on August 20, 21, and 27, 2003 for delivery to the EPA Richmond Lab.

1.1 Yuba City Wastewater Treatment Plant

The Yuba City WWTP is a pure-oxygen activated sludge plant that discharges either by diffuser to the Feather River in the winter wet-season or to 120 acres of percolation ponds

Section 1 – Introduction and Background

located alongside the river in the summer dry-season. The wastewater treatment plant provides high-rate treatment of higher-than-typical-strength wastewaters. It has a dry-weather design capacity of 7.0 million gallons per day ("mgd") and a wet-weather design capacity of 11.0 mgd. The average and calculated peak flows were 6.60 and 8.05 mgd in 2003. See Figure 1.

- Primary and Secondary Treatment - The headworks, which provide grinding and aerated grit removal, is followed by primary sedimentation. Ammonia and phosphates are added, usually in the summer, in order to precondition the high-strength and nutrient-poor contributions from Sunsweet Growers. Primary effluent is then aerobically biodegraded in three treatment trains each with four compressed-gas pure-oxygen aeration cells followed by three secondary clarifiers. Activated sludge returns without re-aeration in order to strip carbon dioxide, and does so at rates to support a mean cell residence time of around 3 days. Real-time metering for dissolved oxygen, solids, and redox potential are used to better ensure the treatment plant can respond to the contributions from Sunsweet.

- Advanced Treatment - There is no capability to provide nitrification or denitrification. There is also no tertiary polishing of secondary effluent and, as a result, no capability to reuse treated wastewater off-site.

- Solids Handling - Waste secondary activated sludge and primary sludge are digested in two anaerobic digestors each with detention times of 25 days and operated in series. Digested sludge dosed with anionic polymer is dewatered through belt pressing, with the cake further dewatered in on-site sludge drying beds for off-site disposal as landfill cover. Grit is hauled off-site to a landfill. The waste activated sludge is first thickened in two polymer-aided dissolved air flotation units. Belt press filtrate returns to the lateral leading into the headworks. Dissolved air flotation subnatant returns to the aeration cells.

- WWTP Sampling - The influent sampling point, located upstream of the headworks is designated as IWD-YC1 for the purposes of this report. All return flows except the belt press filtrate rejoin treatment downstream of influent sampling. The effluent compliance sample point, sited immediately after final dechlorination, is designated as IWD-YC2. The accumulation of filter cake for hauling off-site is designated as the sludge sampling point, IWD-YC3. The receiving water sampling point downstream of the Yuba City outfall is designated in the permit as R-1.

- Water Supply - For most of its sewered users, Yuba City provides surface water drawn from the Feather River and treated through its water treatment plant. Some sewered customers located outside of the city limits receive untreated ground water from the former Hillcrest Water Company system. According to the City's Urban Water Management Plan, an estimated 1,000 of the 9,020 water users receive the more mineralized ground water. For the purposes of this report, a ratio of 1:9 ground to surface water was used in estimating the flow-weighted average concentrations for the water supply.

Section 1 – Introduction and Background

- <u>Receiving Water Hardness</u> - The USGS maintains a station on the Feather River at Nicolaus, approximately 13 miles downstream from the Yuba City outfall. This station and six others in Sacramento River basin were extensively sampled under a full range of conditions for conventional, toxic, and pesticide-related pollutants, as part of the 1995-1998 National Water Quality Assessment Program. The calculated 99th% minimum hardness and the minimum sample result for the Feather River station was 22.6 mg/l and 22 mg/l as CaCO3. The lowest minimum sample result recorded for all seven stations both upstream and downstream of the Feather River station was 16 mg/l. For the purposes of this report, a hardness of 22.6 mg/l is used in the calculations of the permit limits for metals to be in effect in 2007. By then, Yuba City will have a better data set of hardness values for the Feather River near the outfall, as required by the NPDES permit.

1.2 Sewer Service Area

The Yuba City sewer service area comprises the incorporated area of the city that receives city supplied surface water as well as the unincorporated county lands southwest of the city limits that receive ground water. The WWTP also serves as a regional disposal point for septage collected from septic tanks in unsewered areas within both the city limits and in the outlying county land. According to the City's Urban Water Management Plant, the service area has a population in 2004 estimated to be 60,000, and 950 commercial and four industrial users, who together contribute 35-40% of the sewered wastewater. The inventory of industrial users includes at least seven considered to be significant industrial users who together discharged an average of 930,000 gallons per day into the sewers in 2003 (14% of total flows).

1.3 Discharge Requirements

Yuba City is authorized by the June 6, 2003 RWQCB Waste Discharge Requirements, Order R5-2003-0085, ("WDRs"), and a concurrent Cease and Desist Order, Order No. R5-2003-0086, ("CDO"), to discharge treated sewage from the Yuba City WWTP either to the Feather River or to percolation ponds sited along the river or from the percolation ponds to the Feather River. The WDRs also function as National Pollutant Discharge Elimination System ("NPDES") permit CA0079260. The WDRs contain narrative prohibitions, effluent limits that implement the California Toxics Rule, receiving water limitations, monitoring requirements, pretreatment provisions, and sludge disposal requirements. In essence, the WDRs and CDO together require Yuba City to comply with effluent limits for conventional pollutants, disinfection, and pH upon issuance of the permit and for pesticides, metals, surfactants, toxic organics, ammonia, and nitrates by November 2007.

The effluent limitations for a discharge to the Feather River are for conventional pollutants, total coliform, ammonia based on temperature and pH, nitrites and nitrates, surfactants, residual chlorine, pH, acute biotoxicity, and various pesticides, metals, and toxic organics. The effluent limits that take effect on November 1, 2007 are for additional metals based on the hardness in the river, and for additional toxic organics. The CDO required the completion of the corrective steps necessary to meet the WDRs for organochlorine pesticides, thiobencarb, aluminum, ammonia, arsenic, chloroform, diazinon, cis-1,2-dichloroethene, ethion, iron, manganese, MTBE, surfactants, molybdenum, and nitrates also by November 1, 2007.

The limitations for a discharge to percolation ponds are limited to narrative prohibitions against public contact, objectionable odors, anoxic conditions, the proliferation of mosquitoes, inadequate freeboard, degraded ground waters, and exceeding numerical limitations for pH. The receiving water limitations include narrative provisions against causing a visible film, discoloration, objectionable growths, nuisance conditions, the bioaccumulation of toxics, bad tasting fish, increased temperatures over 5°F, increased turbidity, increased specific conductivity, high or low pH's, and any adverse effect on the beneficial uses of the receiving waters.

1.4 Legal Authorities

Yuba City obtained approval of its pretreatment program in 1982. Yuba City operates under the authority of Public Works Title 6, Wastewater Collection and Treatment Chapter 5 of its municipal code as adopted in 1976. Yuba City began the process of revising its ordinance to be in accord-ance with the requirements of 40 CFR 403 in the late 1980's and submitted a draft ordinance for review in 1990. EPA and the RWQCB provided numerous and extensive reviews of the ordinance culminating in an approval letter from the RWQCB issued on November 29, 1995. Yuba City has not readopted the revised ordinance. As a result, the local limits and the regulatory provisions in effect are those in the 1976 ordinance. The WDRs since 1990 have imposed pretreatment provisions that require implementation of the regulatory controls necessary to enact all of 40 CFR 403. The current WDRs issued in June 2003, require Yuba City to resubmit pretreatment program for approval. Requirements to obtain and implement an approved pretreatment program would include the following:

- The implementation of the general and specific national prohibitions in 40 CFR 403.5 for industrial users against the introduction of incompatible wastewaters;
- The requirement in 40 CFR 403.5 to develop locally-determined limits necessary to protect the treatment works from potential adverse impacts, such as operational interference, worker health and safety risks, the pass-through of pollutants to the receiving waters, and sludge contamination;
- The performance of the program functions set forth in 40 CFR 403.8, such as identifying industrial users, issuing permits, inspecting and sampling industrial users, providing adequate funding, and enforcing against violators;
- The implementation of an industrial users self-monitoring program under 40 CFR 403.12;
- The implementation of Federal categorical standards under 40 CFR 403.6; and
- The enacting of the local legal authorities necessary to operate an approved pretreatment program under 40 CFR 403.8.

Section 1 – Introduction and Background

This evaluation did not involve a review of the 1976 ordinance because the proposed 1990 revised ordinance has not been adopted. As a result, the administrative record since the late 1980's stands as the determination that Yuba City does not have the legal authority to implement all aspects of an approved pretreatment program.

Section 2

Wastewater Treatment Plant Performance

The Yuba City WWTP must meet permit effluent limits for conventional pollutants, nutrients, pesticides, metals, toxic organics, pH, surfactants, and biotoxicity. 40 CFR 403.5(a,b,c) and 403.6.

Non-domestic wastewaters may not result in unpermitted releases, hazardous or explosive conditions with the sewers, or operational interferences in the collection system. 40 CFR 403.5(b).

2.0 Summary

The WWTP has the capacity and capability to handle the domestic wastewaters in the Yuba City service area as well as the high-strength wastes generated by Sunsweet. However, without a change in the influent loadings, removal rates, or disinfection methods, the WWTP is expected to experience the pass-through of a number of metals, chlorination byproducts, toxic organics, and pesticides once their NPDES permit limits take full effect in 2007. Moreover, without nitrification and denitrification, the WWTP is also expected to experience the pass-through of ammonia and the toxicity associated with ammonia. Finally, the nutrient-poor nature of Sunsweet's contributions caused operational interferences related to WWTP responses, however, better metering has lessened those risks.

<u>See</u> Tables 1 - 3 for wastewater and sludge summaries, Table 4 for statistical probabilities of violation, Table 5 for a comparison of Yuba City with representative Central Valley sewer districts, Table 6 for the EPA sampling results, and Table 8 for the definitions of 'pass-through' and 'interference'.

Requirements

- The domestic, non-domestic, and water supply sources of aluminum, arsenic, copper, iron, manganese, molybdenum, and zinc must be identified and quantified.

Recommendations

- The wastewater treatment plant influent should be monitored for aluminum, arsenic, copper, iron, manganese, mercury, molybdenum, selenium, and zinc.

- The receiving waters should be monitored for hardness, pH, and temperature.

- The cause of the instances of low pH in the influent should be determined.

Section 2 – Wastewater Treatment Plant Performance

Recommendations – continued

- Corrosion controls of the water delivery system should be implemented in order to reduce the leaching of copper, thereby reducing the copper discharged from the treatment plant.
- Sunsweet and septage deliveries should be monitored for the farm-related contaminants such as arsenic and selenium.
- Sunsweet and the power plants should be monitored for the corrosion-related contaminants associated with circulating water systems such as iron, molybdenum, and zinc.
- A specific prohibition against abrupt changes in organic loads, such as a restriction in the percentage change in mass loads per day, should be considered for Sunsweet.
- The water service newsletter should be supplemented to also inform rate payers of the wastewater compliance status and the on-going need to fund the capital improvements, pretreatment, and operations to protect and maintain the public wastewater investment.

2.1 Conventional Pollutants

The WWTP produces high-quality secondary-treated wastewaters. As a result, it consistently complies with its permit limits for conventional pollutants. The average and calculated 99th% peaks are less than 11 and 22 mg/l BOD and 9 and 16 mg/l TSS even through Sunsweet's contributions elevate the average influent BOD to 339 mg/l. The WWTP discharged to the percolation basins May 1 through October 31, and to the river otherwise.

There were four instances of the effluent pH below the lower 6.5 limit and one above the upper 8.5 limit. There were also two unrelated instances of low influent pH, (2.62 on 11/14/03 and 4.99 on 11/22/03). The national prohibitions not only prohibit discharges that cause structural damage to the sewerage works but also specifically prohibit discharges below 5.0 s.u. because pHs below that level are known to cause concrete degradation.

2.2 Ammonia Toxicity

The permit sets sliding-scale effluent limits for ammonia which are most stringent when pH and temperature are high. During the winter wet-season when the WWTP discharges to the Feather River, the monthly-average and sample-maximum ammonia limits bottom out at 3.56 and 19.7 mg/l based on and assumed maximums for pH and temperature of 7.2 s.u and 70ºF. Sampling required by the permit would result in actual values for maximum pH and temperature in the Feather River and better establish the ammonia limits. Against these preliminary sliding-scale ammonia limits, the WWTP inconsistently complies when it discharges to the river, with the average and calculated 99th% peak ammonia concentrations