Water Levels and Artesian Pressure in Observation Wells in the United States in 1949

Part 6. Southwestern States and Territory of Hawaii

Prepared under the direction of C. G. PAULSEN, *Chief Hydraulic Engineer*

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PREFACE

This report was prepared by the Geological Survey in cooperation with the States of Arizona, California, New Mexico, the Territory of Hawaii, and other agencies, by personnel of the Water Resources Division under the direction of:

C. G. Paulsen_____Chief Hydraulic Engineer
A. N. Sayre_____Chief, Ground Water Branch
S. F. Turner_____District Engineer (Ground Water), Tucson, Ariz.
J. F. Poland_____District Geologist (Ground Water), Long Beach, Calif.
D. A. Davis_____District Geologist (Ground Water), Honolulu, Hawaii
C. V. Theis_____District Geologist (Ground Water), Albuquerque, N. Mex.

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WATER LEVELS AND ARTESIAN PRESSURE IN OBSERVATION WELLS IN THE UNITED STATES IN 1949

Part 6. SOUTHWESTERN STATES

INTRODUCTION

By A. N. Sayre and others

The publication of records of water levels and artesian pressures annually in the United States was begun by the Geological Survey in 1935. Prior to 1940 the records were published in a single volume--1935, 777; 1936, 817; 1937, 840; 1938, 845; and 1939, 886. Beginning with 1940 the records have been published in six volumes, covering the northeastern, southeastern, north-central, south-central, northwestern, and southwestern sections of the country. Hawaii is included in the southwestern section. The following table gives the numbers of water-level reports from 1940 through 1949.

Year	North-eastern (1)	South-eastern (2)	North-central (3)	South-central (4)	North-western (5)	South-western (6)
1940	906	907	908	909	910	911
1941	936	937	938	939	940	941
1942	944	945	946	947	948	949
1943	986	987	988	989	990	991
1944	1016	1017	1018	1019	1020	1021
1945	1023	1024	1025	1026	1027	1028
1946	1071	1072	1073	1074	1075	1076
1947	1096	1097	1098	1099	1100	1101
1948	1126	1127	1128	1129	1130	1131
1949	1156	1157	1158	1159	1160	1161

Ground-water investigations are concerned with the availability of usable water supplies, land drainage, flood control, construction of waterways and dams, mine drainage, and other problems to which the principles of ground-water hydrology are pertinent. Water levels in wells indicate the stages of the aquifers; they show the extent to which water supplies are depleted by drought or by heavy pumping, and the extent to which they

are replenished in seasons of abundant rainfall or melting snow. The recorded changes of pressure in artesian wells also indicate depletion or replenishment of the artesian supplies.

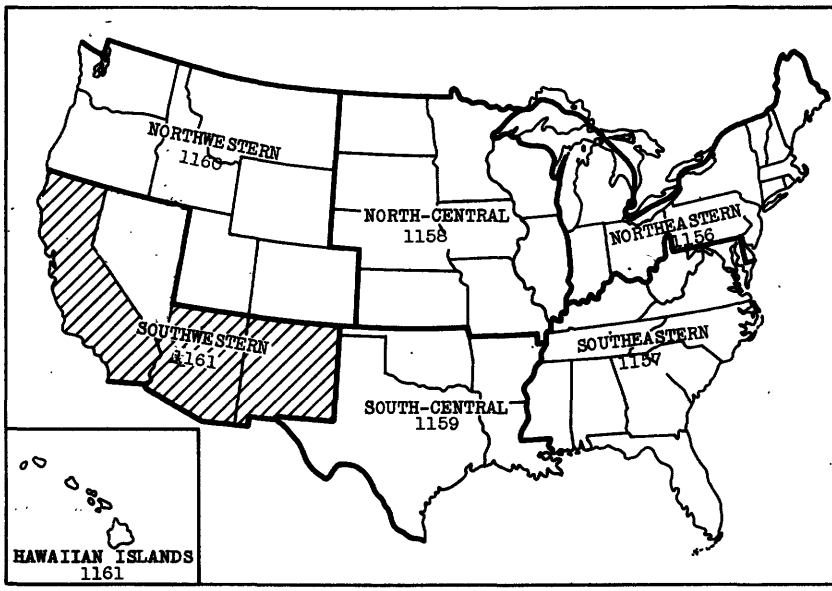

Figure 1.--Outline map of the United States showing States included in each of the six water-supply papers on water levels and artesian pressures in observation wells in 1949. The shaded area indicates the States included in this volume.

This volume gives records of water levels and artesian pressures in observation wells in the southwestern States (Arizona, California, and New Mexico) and Hawaii. Of the 2,360 wells listed, 40 are equipped with recording gages. Descriptive matter for some wells is given in previous reports. For wells not previously reported complete records of water levels are given. For wells whose previous records have been published this volume gives only the current records.

Before 1943, the water levels and artesian pressures for some wells were given in feet above or below the measuring points and for other wells in feet above or below sea level or above or below various assumed datum planes.

In 1943, a precise datum plane was selected at each well which was approximately the land surface. The water levels and artesian heads for all wells listed in this volume are referred to land-surface datum. Water levels above this datum are preceded by a plus (+) sign, those below this datum have no sign but are understood to be minus (-).

Measurements of water levels and artesian pressures in wells were made under the direction of the district supervisors of the Ground Water Branch in the several States. Verda M. Dougherty edited the reports; Rodney Hart edited the illustrations; and Penn Livingston had general charge of the nation-wide observation-well program.

ARIZONA

By S. F. Turner, R. L. Cushman, M. B. Booher,
H. E. Skibitzke, and G. M. Hoskins

PROGRAM OF WORK

In 1949 studies of the ground-water resources of Arizona were continued in cooperation with the State Land Department. The program included gaging the present rate of ground-water use by taking an annual pumpage inventory, and determining the effects of this withdrawal by making periodic water-level measurements in selected wells. Measurements were made in 458 wells, 2 of which are equipped with recording gages. Measurements for Yuma County well 2045 were furnished by the U. S. Bureau of Reclamation.

Particular attention was given in 1949 to studies of the ground-water resources and geology of the Casa Grande-Florence area, the Maricopa-Stanfield area, and the lower San Pedro River basin. A report on the ground-water resources of Deer Valley, Maricopa County, Arizona, by F. I. Bluhm and H. N. Wolcott was issued in October 1949.

In cooperation with the State Land Department, the University of Arizona, and the Museum of Northern Arizona, a program of collection and analysis of drill cutting from wells was begun.

Ground-water investigations in the vicinity of Globe were continued in 1949 in cooperation with the city of Globe. In addition to measuring water levels in selected wells, geophysical surveys were made to determine areas in which the city of Globe might construct additional wells.

At the request of the Bureau of Indian Affairs, the Geological Survey has, since January 1948, been investigating the availability of ground water at selected sites on the Navajo and Hopi Indian Reservations of northeastern Arizona. The work is under the immediate supervision of L. C. Halpenny, engineer. Results of some of these investigations are given in the following reports issued in 1949:

Water-supply investigation at Lukachukai, Navajo Indian Reservation, by S. C. Brown and L. C. Halpenny.

Water-supply investigation at Fort Defiance area, Navajo Indian Reservation, Apache County, Arizona, by L. C. Halpenny and S. C. Brown, with a section on quality of water, by J. D. Hem.

Water-supply investigation at Chinle, Navajo Indian Reservation, Arizona, by L. C. Halpenny and S. C. Brown.

PUMPAGE

In 1949 ground-water levels were lower than in any year in the period of record 1940-49 in most of the heavily pumped areas of Arizona, and the quantity of water pumped from wells exceeded by more than 70,000 acre-feet the previous record high pumpage of 1948. In 1949, approximately 3¼ million acre-feet of water was pumped from wells or about 65 percent of the total quantity used for irrigation in the State. The following table contains records of pumpage during the 8-year period 1942-49.

Pumpage, in acre-feet, from wells in principal ground-water areas

Area	1942	1943	1944	1945
Cochise County:				
San Simon Basin	(a)	(a)	(a)	(a)
Willcox Basin	(a)	(a)	(a)	9,000
Douglas Basin	(a)	(a)	(a)	8,000
Graham County:				
Cactus Flat-Artesia area	(a)	(a)	(a)	(a)
Safford Valley	18,900	35,000	52,000	35,000
Greenlee County:				
Duncan-Virden Valley [1]	1,900	7,100	9,500	8,300
Maricopa County:				
Salt River Valley area [2]	1,004,000	1,104,000	1,017,000	1,143,000
Gila Bend area	(a)	(a)	(a)	(a)
Dendora area	(a)	(a)	(a)	(a)
Pima County:				
Part of Santa Cruz River Basin	85,500	100,000	106,000	111,000
Pinal County:				
Part of Santa Cruz and Gila River Basins	500,000	515,000	530,000	610,000
Santa Cruz County:				
Part of Santa Cruz River Basin	14,500	15,000	12,500	18,500
Yuma County:				
Dateland area	(a)	(a)	4,000	4,000
Wellton-Mohawk area	(a)	(a)	37,000	35,000
South Gila Valley	(a)	(a)	20,000	22,000

Area	1946	1947	1948	1949
Cochise County:				
San Simon Basin	5,800	(a)	(a)	(a)
Willcox Basin	15,500	20,000	23,000	28,000
Douglas Basin	12,500	17,000	22,000	30,000
Graham County:				
Cactus Flat-Artesia area	5,600	(a)	(a)	(a)
Safford Valley	115,000	100,000	110,000	40,000
Greenlee County:				
Duncan-Virden Valley 1/	21,000	26,000	27,000	15,000
Maricopa County:				
Salt River Valley area2/	1,360,000	1,406,000	1,670,000	1,644,000
Gila Bend area	33,300	40,500	60,800	67,000
Dendora area	6,700	6,700	1,900	5,000
Pima County:				
Part of Santa Cruz River Basin	108,000	145,000	145,000	150,000
Pinal County:				
Part of Santa Cruz and Gila River Basins	660,000	700,000	950,000	1,100,000
Santa Cruz County:				
Part of Santa Cruz River Basin	24,000	25,000	28,000	31,000
Yuma County:				
Dateland area	4,000	4,000	5,000	8,000
Wellton-Mohawk area	38,000	43,000	50,000	45,000
South Gila Valley	32,000	35,000	54,000	56,000
Total	2,441,400	2,568,200	3,146,700	3,219,000

a Not determined.
1 Partly in Hidalgo County, N. Mex.
2 Includes Queen Creek area, Maricopa and Pinal Counties.

FLUCTUATIONS OF WATER LEVELS

Apache County

Measurements made in wells in Apache County show no regional change in ground-water levels since the summer of 1948, indicating little or no change in the amount of water in underground storage. As little ground-water is pumped for irrigation in the county, water levels in wells show a direct relation to rainfall and stream runoff. Weather records show that 11.63 inches of precipitation was recorded in Springerville in 1949, or 1.02 inches below normal.

Cochise County

Figure 2 shows graphs of water-level fluctuations in wells 477, 305, and 753 in the St. David-Benson-Pomerene area of the San Pedro River valley.

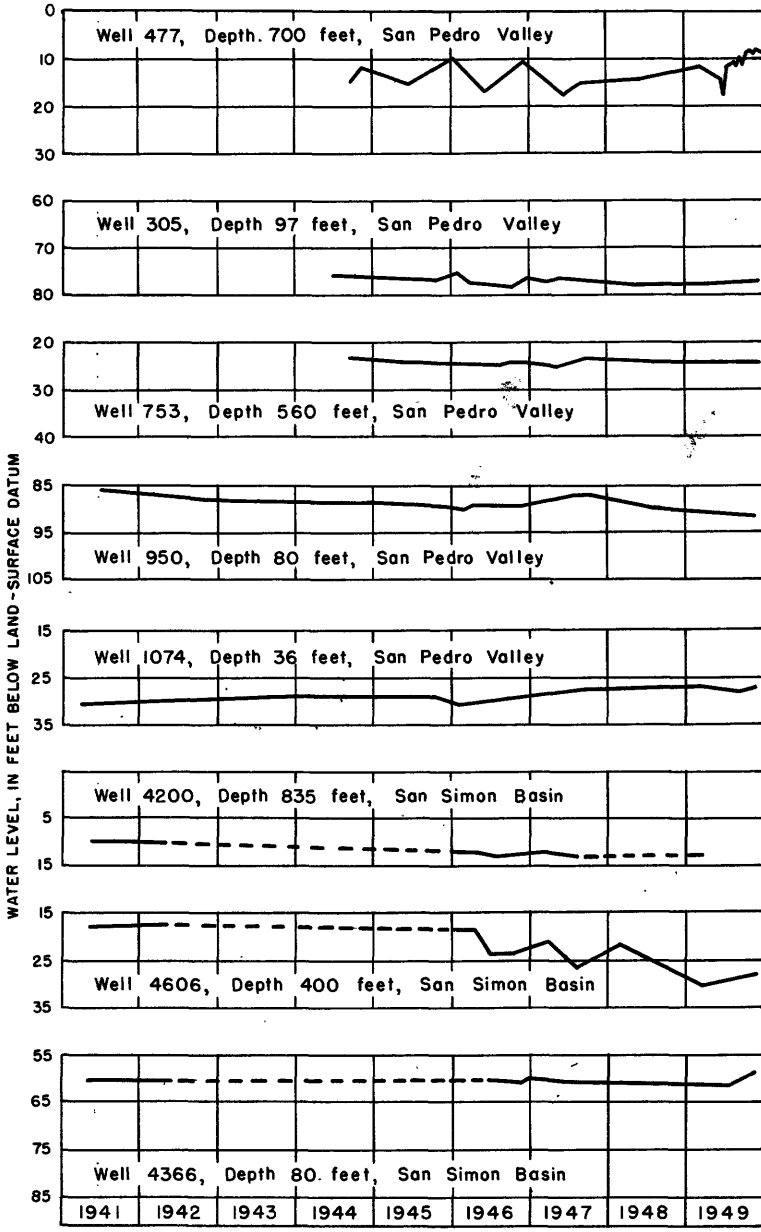

Figure 2.--Graphs showing fluctuations of water levels in observation wells in San Pedro Valley and San Simon Basin, Cochise County.

A recording gage was installed in June 1949 on well 477, an artesian well in the city of Benson. Fluctuations of as much as 1 foot in a 24-hour period have been noted, the fluctuations being attributed to pumping from nearby artesian wells. It is believed that the high water levels in 1949 as shown in figure 2 should not be interpreted to mean the water levels were higher in 1949 than in other years. Through operation of the recording gage high water levels were obtained in 1949 while in previous years water levels were measured approximately once every 4 months. Well 305 is a shallow nonartesian well in an area irrigated primarily with surface water diverted from the San Pedro River, and supplemented by water pumped from artesian and nonartesian wells. Well 753 is an artesian well at the upstream edge of the St. David-Benson-Pomerene irrigated area. Water-level measurements made in these and other wells in this area do not show a continuous rising or lowering of the water level in the artesian and nonartesian aquifers. Seasonal water-level declines are caused by pumping of ground water for irrigation.

Graphs of water-level fluctuations in wells 950 and 1074 in the Fort Huachuca-Charleston area are shown in figure 2. Well 950 is in the Babocomari River valley 8 miles west of its confluence with the San Pedro River. The water level in this well reflects the stage of the underflow of the Babocomari River. Well 1074 is on the west bank of the San Pedro River, 0.2 mile south of Charleston. Water-level fluctuations in this well reflect the stage of the underflow of the San Pedro River.

Graphs of water-level fluctuations in wells 4200, 4606, and 4366 shown in figure 2 illustrate the trend of changes in ground-water levels in the San Simon Valley. The fluctuations of water levels in wells 4200 reflect the downward trend of artesian pressures in the lightly developed western part of the valley. Well 4606 is an artesian well near the center of greatest ground-water development and the water-level fluctuations show the effect of pumping from some of the wells during the irrigation season. The water-level fluctuations in well 4366 reflect the trend of ground-water levels in the nonartesian aquifers.

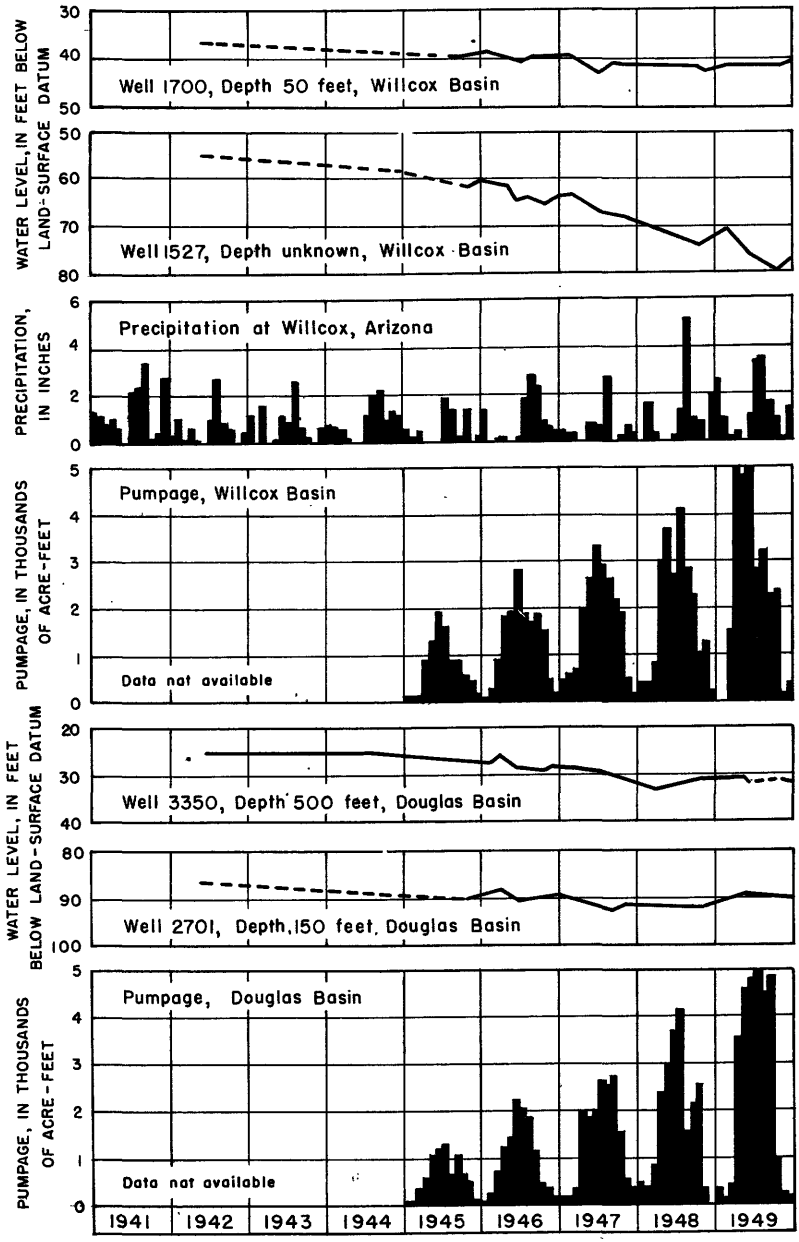

Figure 3.--Graphs showing fluctuations of water levels in observation wells, precipitation at Willcox, and pumpage in Douglas and Willcox Basins, Cochise County.

Figure 3 shows water-level fluctuations in wells 1700 and 1527, the pumpage in the Willcox Basin, and the precipitation at Willcox. Well 1700 is a used domestic well in which water-level fluctuations reflect groundwater conditions outside the pumped area of the Willcox Basin and near the Willcox Playa. Well 1527 is a used stock well in a heavily pumped area of the Willcox Basin. The general downward trend of the water level in this well is typical of the water-level trend in other wells in the pumped area.

In the Willcox Basin, about 28,000 acre-feet of water was pumped for irrigation in 1949, an increase of about 5,000 acre-feet of water over 1948. Additional land was brought under cultivation in the northwestern and southeastern portions of this basin during 1949.

Precipitation at Willcox totaled 14.86 inches in 1949, or 3.45 inches above normal and 3.08 inches above 1948.

Water-level fluctuations in wells 3350 and 2701, and pumpage in the Douglas Basin are graphed in figure 3. Well 3350 is 13 miles northwest of Douglas and near the center of an area where ground water is pumped for irrigation. Well 2701 is about 26 miles north of Douglas and in the northeastern part of the pumped area of the Douglas Basin. The water-level fluctuations in these and other wells indicate a downward trend of the water table in the Douglas Basin, ranging from a fraction of a foot a year along the boundary of the basin to more than 2 feet a year in the center of the areas pumped for irrigation.

Approximately 30,000 acre-feet of water was pumped from wells in the Douglas Basin in 1949 for irrigation use. This pumpage is a record high for the basin.

Coconino County

Most of the observation wells in the Flagstaff-Williams area are of shallow depth and tap ground waters in the alluvium and volcanic flows, which, in general, cover the older consolidated rocks. Variation in the amount of annual precipitation has a greater effect on water-level fluctuation in these aquifers than does pumping. Pumpage is principally for domestic and stock use and, therefore, is comparatively light.

Precipitation at Flagstaff in 1949 was reported by the U. S. Weather Bureau to have amounted to 26.49 inches or 5.32 inches above normal.

Gila County

In general, the water levels in shallow wells along Pinal Creek fluctuate seasonally in response to pumping from wells for domestic, municipal, and industrial use and to recharge from flows in ths creek.

The regional water-table decline is attributed in part to reduced recharge caused by below-normal precipitation in recent years, and in part to increased use of ground water.

In 1949, precipitation at Globe amounted to 11.65 inches or 4.81 inches below normal.

Graham County

The water table in the Safford Valley portion of Graham County rose during 1949 and at the end of the year had reached a level higher than had been attained since 1946. The improved condition was the result of an increase in recharge and a decrease in the amount of ground water pumped, both caused by the large amount of surface water used for irrigation. In 1949, approximately 167,790 acre-feet of water was diverted from the Gila River, or 81 percent of the total water supply used for irrigation. The water table rose about 4 feet, except in the Solomonsville-Safford area, where the fluctuations in key wells indicated a general rise of about 15 feet.

Figure 4 shows graphs of water-level fluctuations in wells 662, 597, 273, and 51, monthly amounts of precipitation at Safford, and monthly quantities of water pumped from wells in the Safford Valley.

Well 662, in the eastern part of the valley about 1,250 feet south of the Gila River, is an unused dug well equipped with a recording gage. The water level fluctuates in response to gains or losses in ground-water storage due to the stage of the river and to pumping from nearby wells.

The water level in well 597 rose to within 24 feet of the land surface during the spring and early summer, and then remained at about this level during the pumping season because recharge counterbalanced the effects of pump withdrawals. After pumping ceased in the fall the water level again started its upward trend.

The water-level fluctuations in well 273 illustrate the general upward trend of the water table in the Safford Valley in 1949, comparable to the stage at the end of 1946.

The water level in well 51 fluctuates in response to the stage of the nearby Gila River and to pump withdrawals of ground water.

The following table shows the quantities of water pumped from wells and surface water diverted from the Gila River for irrigation during 1949.

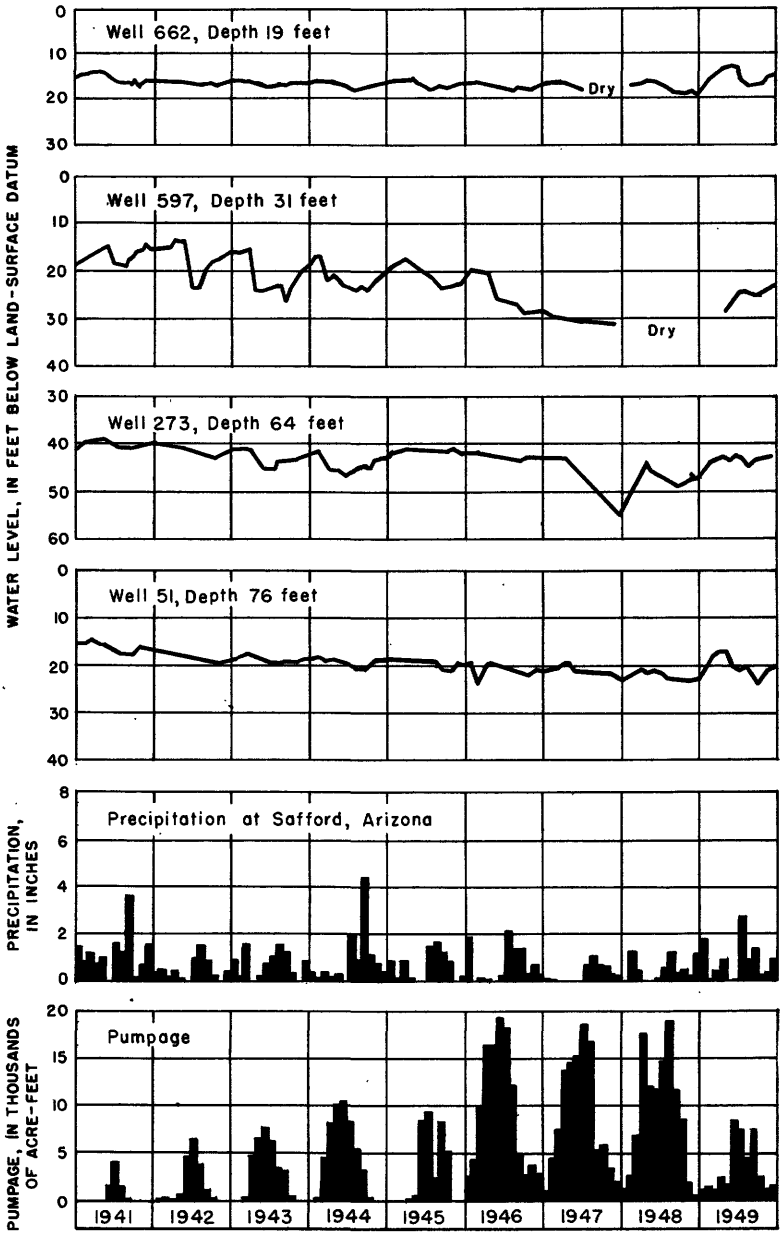

Figure 4.--Graphs showing fluctuations of water levels in observation wells, precipitation at Safford, and pumpage in Safford Valley, Graham County.

The information on surface water was obtained from annual reports of the Gila Water Commissioner.

Year	Ground Water (acre-feet)	Surface Water (acre-feet)	Total (acre-feet)
1940	24,600	99,693	124,293
1941	8,685	151,300	159,985
1942	18,900	172,005	190,905
1943	35,000	121,569	156,569
1944	52,000	128,027	180,027
1945	35,000	148,675	183,675
1946	115,000	69,909	184,909
1947	100,000	51,978	151.978
1948	110,000	39,848	149,848
1949	40,000	167,790	207,790

Precipitation at Safford totaled about 9.8 inches for 1949, or about 4.2 inches more than in 1948.

Greenlee County (Duncan Valley)

The average water level in most of the wells measured in the Duncan Valley was higher in 1949 than in any year since 1946, owing to an increase in recharge and a decrease in pump withdrawals. Both the increase in recharge and the decrease in pumping were the result of more surface water being available for irrigation in 1949 than in recent years.

Figure 5 shows graphs of water-level fluctuations in wells 232 and 201 in Virden Valley, N. Mex., and in wells 133, 92, 63, and 5 in the Duncan Valley, precipitation at Duncan, and pumpage from wells in the Duncan-Virden Valley.

Pump withdrawals of ground water offset the gain in recharge with the result that the altitude of the water table in the vicinity of well 133 was at about the same level at the beginning and end of the year.

Well 92 is near the Gila River and at the edge of a moderately pumped area. The seasonal drawdown caused by pumping was less near well 92 than near well 133. A net rise in water level for the year resulted.

Precipitation totaling 10.83 inches was recorded at Duncan during 1949 or 0.97 inches above normal.

Approximately 15,000 acre-feet of water was pumped for irrigation from wells in the Duncan-Virden Valley during 1949, or about 12,000 acre-feet less than the amount pumped in 1948. The available supply of surface water was 24,528 acre-feet in 1949, an increase of 15,448 acre-feet over the supply available in 1948. The following table shows the amount of surface water diverted and the amount of ground water pumped in the Duncan-Virden

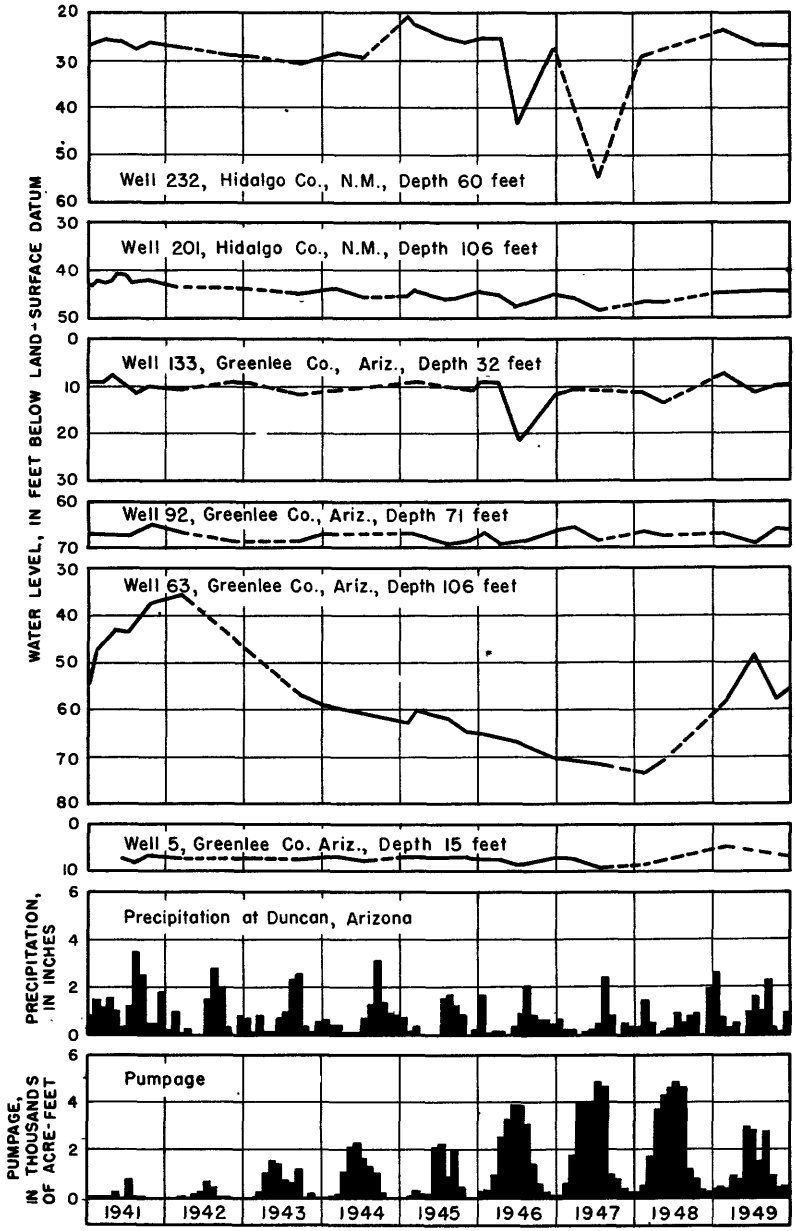

Figure 5.--Graphs showing fluctuations of water levels in observation wells, precipitation at Duncan, and pumpage, Duncan-Virden Valley, Arizona and New Mexico.

Valley each year since 1939. The information on surface water was obtained from annual reports of the Gila Water Commissioner.

Year	Ground Water (acre-feet)	Surface Water (acre-feet)	Total (acre-feet)
1940	2,436	39,935	42,371
1941	1,348	34,262	35,610
1942	1,900	36,439	38,339
1943	7,100	31,520	38,620
1944	9,500	27,225	36,725
1945	8,300	27,657	35,957
1946	21,000	14,419	35,419
1947	26,000	10,168	36,168
1948	27,000	9,080	36,080
1949	15,000	24,528	39,528

Maricopa County

Figure 6 shows the average cumulative net change in water levels in the five areas into which the Salt River Valley area has been arbitrarily divided for ground-water study purposes. The areas are designated from east to west as follows: Queen Creek-Higley-Gilbert area, Tempe-Mesa-Chandler area, Phoenix-Glendale-Tolleson area, Litchfield-Beardsley-Marinette area, Liberty-Buckeye-Hassayampa area.

In general, water levels are highest in the spring months when pumpage is at a minimum and there has been time for partial recovery from the effects of pumping for irrigation use during the previous growing season. The spring measurements for 1949 show that water levels are continuing to decline.

The rate of decline in water levels was about the same as in 1948 in all areas except the Liberty-Buckeye-Hassayampa area. Here, there was practically no change in water levels during 1949, probably because of a reduction in pumpage.

It may be noted that in the Queen Creek-Higley-Gilbert area and the Litchfield-Beardsley-Marinette area, where most of the irrigation supply is pumped from ground water, the rate of decline in water levels shows a sharp increase beginning in 1946. In the Tempe-Mesa-Chandler area and the Phoenix-Glendale-Tolleson area where large quantities of surface water are available for irrigation, the sharp increase in the rate of decline of water levels did not begin until 1947. Since that time the decline in all four areas has continued at nearly the same rate.

In the Queen Creek-Higley-Gilbert area, water levels in wells declined an average of approximately 40 feet since 1940. About 30 feet of this decline occurred within the past 4 years.

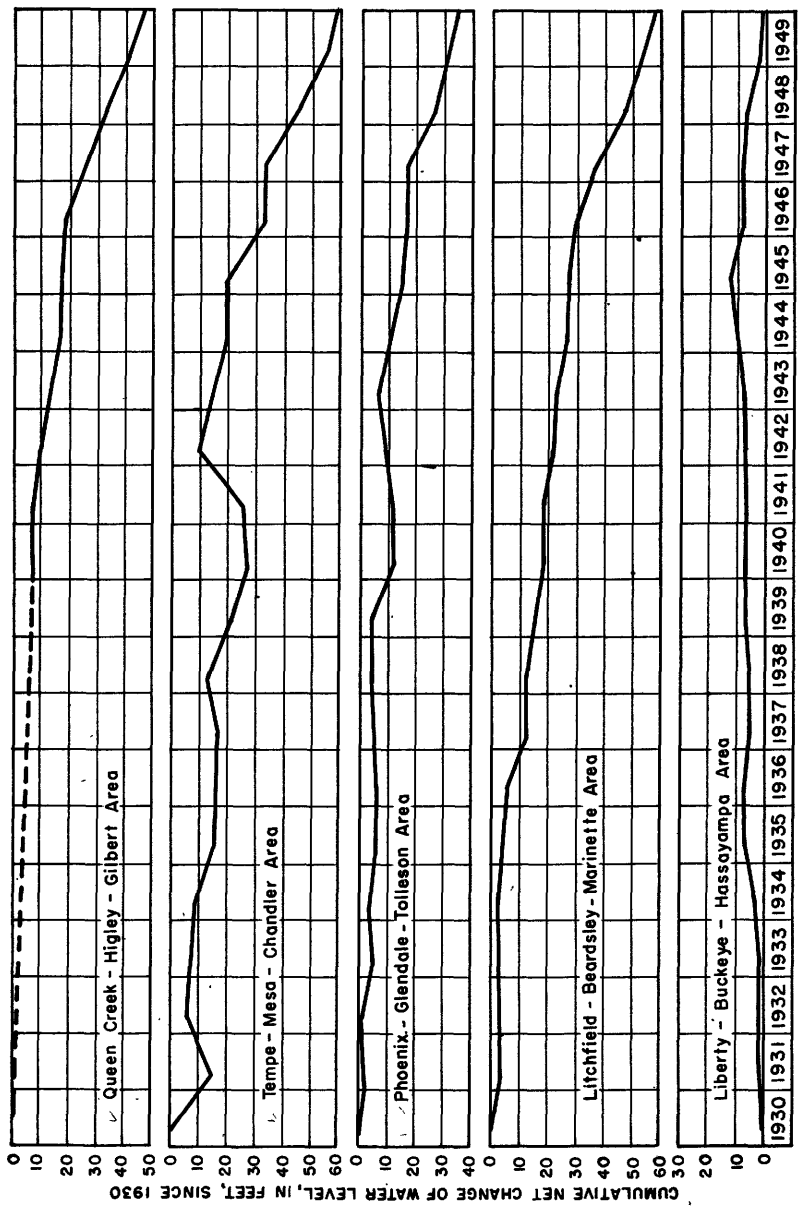

Figure 6.--Graphs showing cumulative net change in water levels in various parts of the Salt River Valley area, Maricopa County.

Ground-water levels in the Tempe-Mesa-Chandler area fluctuate widely, but the general trend has been downward since 1930. The total average decline in the area has amounted to about 60 feet, of which about 40 feet has taken place since 1945.

Although the Phoenix-Glendale-Tolleson area shows a smaller total average decline in water levels than some of the adjacent areas, the rate of decline since 1947 has been greater than at any time in the past with the exception of the drought year of 1939. The total average decline in water levels in this area since 1930 has been about 38 feet, and the decline during the past 3 years has been almost 20 feet.

The amount of surface water storage behind Carl Pleasant Dam has been small since the wet winter of 1940-41, and therefore the Litchfield-Beardsley-Marinette area has had to rely largely upon pumped water for irrigation. Since 1941, ground-water levels in this area declined an average of more than 40 feet. The decline during the past 4 years has amounted to about 30 feet.

Ground-water levels in the Liberty-Buckeye-Hassayampa area did not decline during 1949. The water table was slightly higher here than it was in 1930, although about 10 feet lower than the peak level attained in 1945.

Figure 7 shows graphically the cumulative net change in water levels in the entire Salt River Valley area since 1930 and the amount of water pumped annually in the area since 1933. There was little change in 1949, either in the rate of decline of the water levels or in the amount of water pumped, from the previous year.

The following table shows the quantity of water, in acre-feet, used annually for irrigation in the Salt River Valley area during the period 1940-49. In 7 years out of the 10-year period more than one-half of all water used annually for irrigation was pumped from wells.

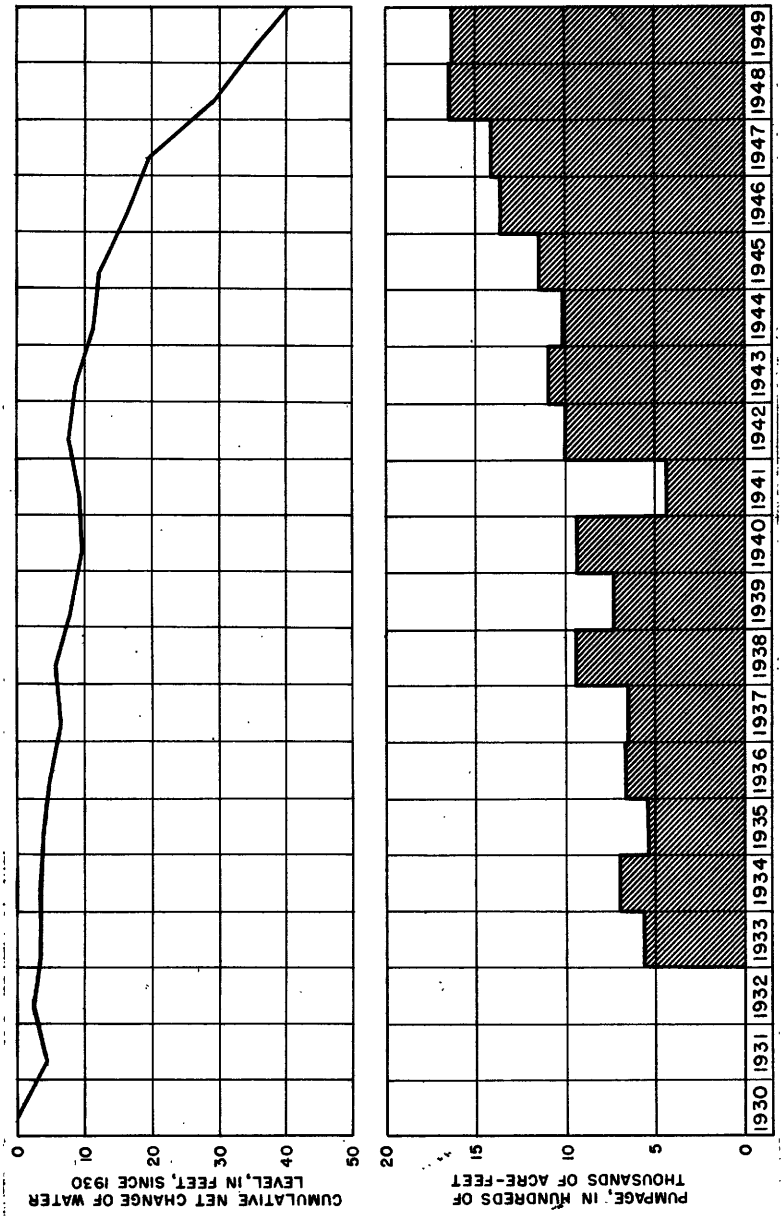

Figure 7.--Graphs showing cumulative net change in water levels and water pumped for irrigation in the Salt River Valley area, Maricopa County.

Year	Ground water	Surface water[a]	Total	Ratio of ground water to total water used (percent)
1940	943,000	691,000	1,634,000	58
1941	444,000	1,442,000	1,886,000	24
1942	1,004,000	1,274,000	2,278,000	44
1943	1,104,000	1,072,000	2,176,000	51
1944	1,017,000	1,083,000	2,100,000	48
1945	1,143,000	1,098,000	2,241,000	51
1946	1,360,000	951,000	2,311,000	59
1947	1,406,000	721,000	2,127,000	66
1948	1,670,000	728,000	2,398,000	70
1949	1,644,000	800,000	2,444,000	67

a Surface water diverted in Arlington District not included.

Pumpage from wells for irrigation in the Gila Bend area and Dendora area was 67,000 acre-feet and 4,700 acre-feet respectively in 1949.

Mohave County

In Mohave County, water levels have been measured in selected observation wells since 1944 principally in areas of cultivation along the Big Sandy Wash and in the vicinity of Kingman. No significant trends in water levels were noted in the wells measured.

Navajo County

The principal source of ground water in Navajo County is the Coconino sandstone. The small water-level fluctuations in wells tapping this aquifer indicate that no large changes in ground-water storage have occurred during the period of record 1944-49.

Pima County

Water levels in observation wells in Pima County, most of which are in the Santa Cruz River Valley, were lower in 1949 than at any time in the period of record 1940-49. The trend in ground water levels in the county has been downward throughout the period of record. In 1940 and again in 1944, water levels in wells near the Santa Cruz River and Rillito Creek rose appreciably in response to recharge occurring as seepage from above-average stream flows. The principal cause of the lowering water levels is heavy pumping from wells for agricultural and domestic use. The water supply for the cultivated lands in Pima County and all the water used by the city of Tucson is pumped from wells. Most of the cultivated land in Pima County lies along the Santa Cruz River and Rillito Creek.

Figure 8 shows graphs of water-level fluctuations in well 1337 in the Tucson-Marana area, well 4156 just east of Tucson, well 8686 in the Tucson-Continental area, and well 6410 in Avra Valley. Also shown in figure 8

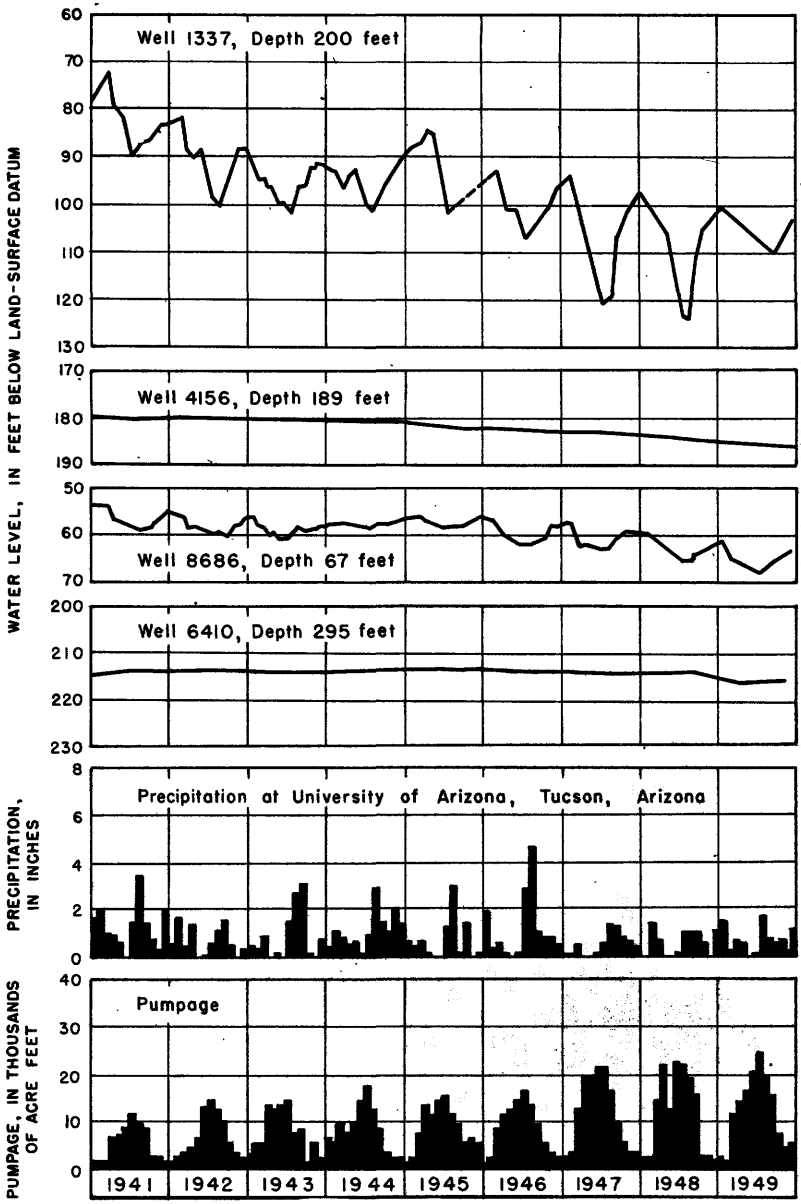

Figure 8.--Graphs showing fluctuations of water levels in observation wells in the Santa Cruz Valley, Pima County.

are graphs of precipitation at Tucson and pumpage from wells in Pima County. In the period of record 1940-49 water levels in wells in the cultivated area along the Santa Cruz River between Tucson and Continental lowered about 9 feet, about 1.5 feet of this decline occurring in 1949. In the Tucson-Marana cultivated area water levels in wells lowered about 25 feet during the period of record, about 4 feet of this decline occurring in 1949.

Water levels in most parts of Avra Valley did not change. Most of the wells in the area are used to obtain domestic and stock water. In the northern part of Avra Valley, near its junction with the Santa Cruz River Valley, water levels in wells declined about 2 feet in 1949 as the result of pumping from irrigation wells in the Santa Cruz River Valley near the junction.

Precipitation at the University of Arizona in Tucson totaled 7.04 inches in 1949, or 4.07 inches below normal.

The following table summarizes the pumpage from wells in Pima County in the period 1940-49. The pumpage in the Ajo area of Pima County is not included.

Year	Acre-feet
1941	68,500
1942	85,500
1943	100,000
1944	106,000
1945	111,000
1946	108,000
1947	145,000
1948	145,000
1949	150,000

Pinal County

Figure 9 shows graphs of water-level fluctuations in wells 890, 890A, 981, and 1795, the amount of monthly precipitation at Casa Grande Ruins National Monument, and the amount of monthly pumpage in Pinal County.

The water-level fluctuations in well 890A reflect the trend of the regional water-level fluctuations, there being no irrigation wells close enough to cause local water-level fluctuations that result from intermittent heavy pumping. The water table in this vicinity has been lowering each year since 1944 because of insufficient recharge to offset the effects of regional pumping. The hydrograph shows this downward trend continuing through the first 4 months of 1949, followed by a rise in the water table during the remainder of the year. The rising water table was the result of

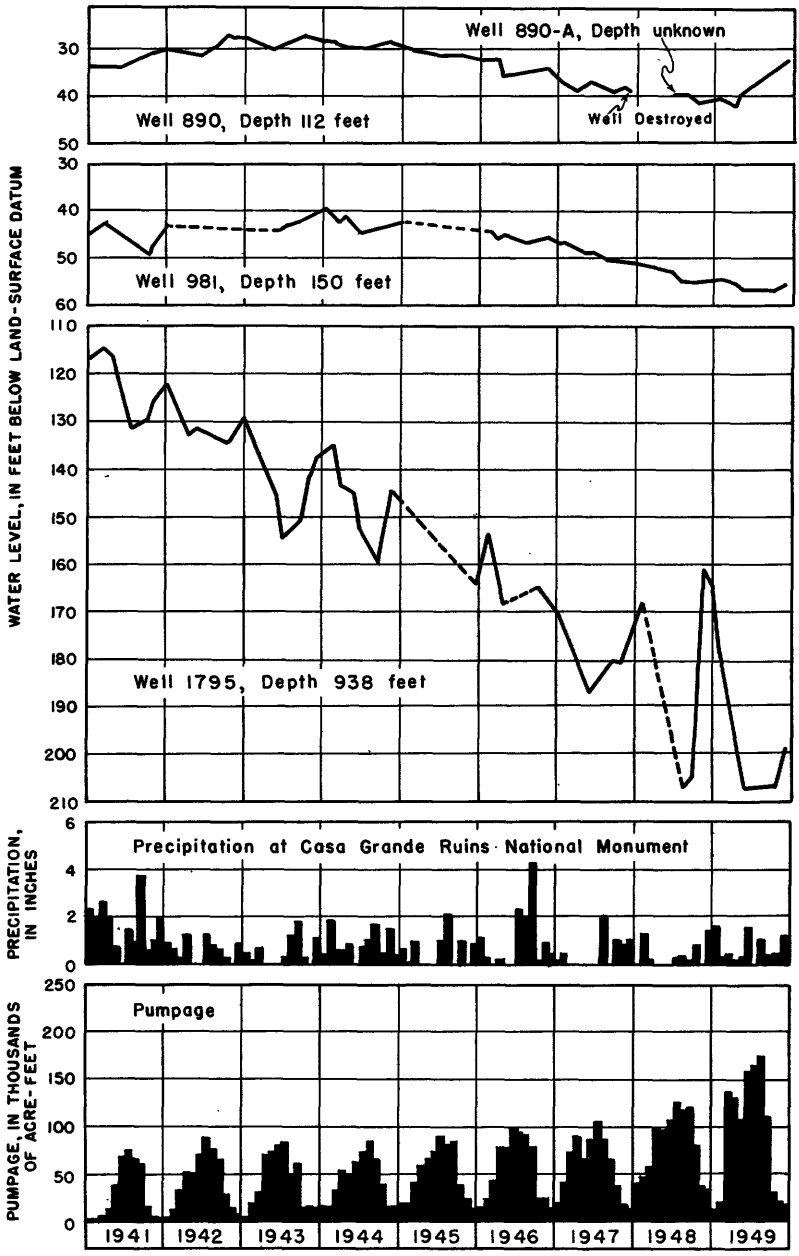

Figure 9.--Graphs showing fluctuations of water levels in observation wells in the Casa Grande-Eloy area, Pinal County.

recharge occurring as influent seepage from surface water applied to the land. Approximately 2½ times more surface water was available for irrigation in 1949 than in any other year in the period of 1946-49.

Well 981 is an unused well in an area irrigated with surface water supplemented by water pumped from wells. Pumping in the area has caused a downward trend in the water table in this well since 1944. Unlike conditions near well 890A the recharge from additional surface water in 1949 was sufficient only to cause the rate of lowering to decrease during the pumping season. After pumping ceased in late summer the water level started to rise.

Well 1795 is an irrigation well, in an area irrigated entirely from wells. The continued decline of the water level shows that the rate of withdrawal exceeds the rate of recharge in this area.

Precipitation amounted to 7.54 inches at the Casa Grande Ruins National Monument during 1949, or 1.91 inches below normal. Increased precipitation in the upstream watershed of the Gila River resulted in an increased supply of surface water in 1949 for the Casa Grande-Florence area.

The following table summarizes the quantities of ground water pumped annually in Pinal County since 1940.

Year	Acre-feet
1940	372,000
1941	351,000
1942	500,000
1943	515,000
1944	530,000
1945	610,000
1946	660,000
1947	700,000
1948	950,000
1949	1,100,000

A large share of the increased pumpage in Pinal County in 1949 was due to additional acreage brought under cultivation in the Maricopa area.

Santa Cruz County

Figure 10 shows graphs of water-level fluctuations in wells 915 and 1525 in Santa Cruz County, volume of water discharge monthly in the Santa Cruz River near Nogales, precipitation at Nogales, and quantities of water pumped from wells.

The graph shows a rise in water level in well 915 caused principally by large amounts of water recharging the ground-water reservoir as influent seepage from flows in the nearby Santa Cruz River.

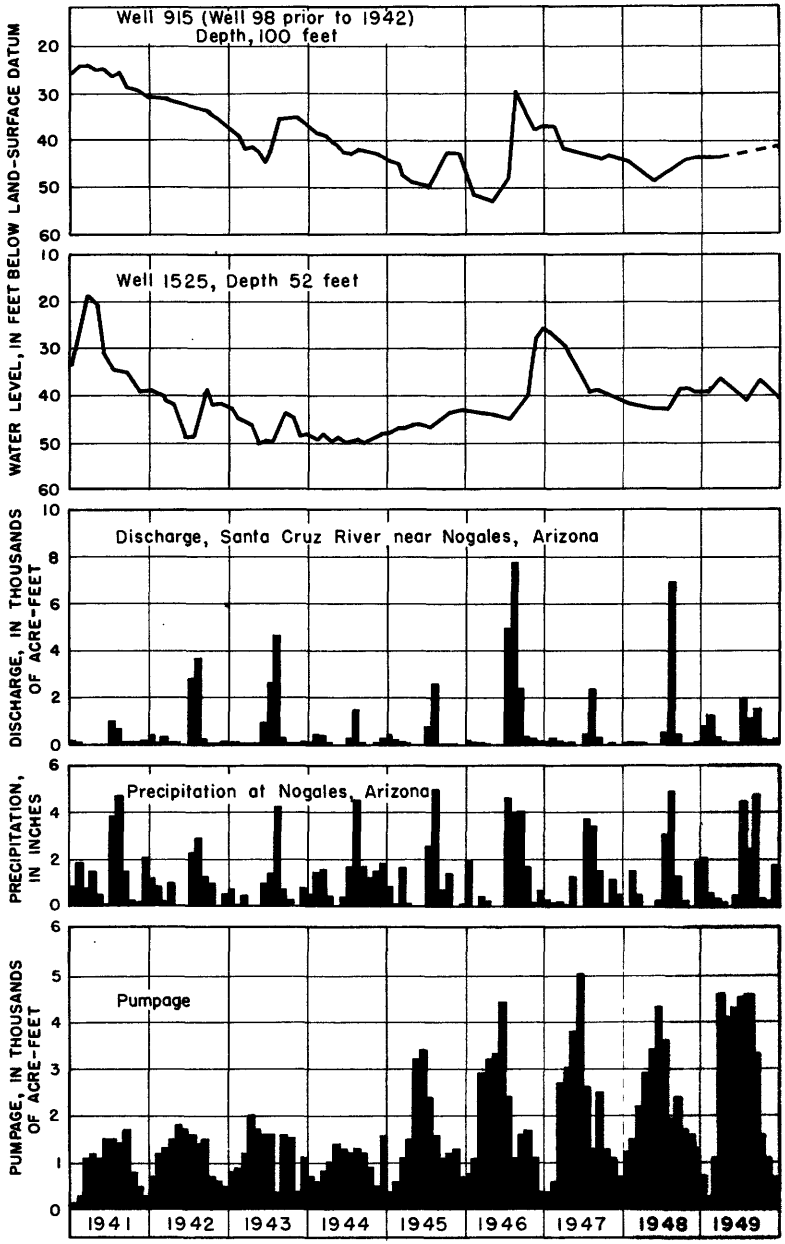

Figure 10.--Graphs showing fluctuations of water levels in observation wells in the Santa Cruz Valley, Santa Cruz County.

Well 1525 is near the Santa Cruz River and within a few hundred feet of the infiltration gallery from which the city of Nogales obtains its water supply. The graph shows the effect of pumping by the city and the recharge caused by precipitation, and by runoff in the Santa Cruz River.

Precipitation at Nogales totaled 17.70 inches in 1949, 3.78 inches more than in 1948, and 2.05 inches above normal.

Pumpage from wells in Santa Cruz County increased 3,000 acre-feet in 1949. A total of approximately 31,000 acre-feet was pumped.

Yavapai County

The only areas of Yavapai County in which the U. S. Geological Survey is making water-level measurements are Peeples Valley, Skull Valley, and Date Creek area. In the period of record 1944-49, no significant water-level trends were noted in these areas.

Yuma County

Figure 11 shows graphs of water-level fluctuations in wells 195, 680, 710, 1280, and 1520 and precipitation at Yuma. There were no significant changes in water level in well 195 in the period of record 1945-49. Pumping of water from wells for irrigation has lowered the water level about 7 feet in wells 680 and 710 since the start of record in 1945.

Well 1280 is near a large canal in the Yuma area that carries water diverted from the Colorado River. Well 1520 is in the newly developed portion of the Yuma Mesa irrigated entirely from surface water. The water-level fluctuations in both wells show that the water table is receiving appreciable amounts of recharge, principally as influent seepage from water applied to the land and from canal seepage losses.

The following table shows the amount of water pumped, in acre-feet, during the period of record.

Area	1944	1945	1946	1947	1948	1949
Dateland	4,000	4,000	4,000	4,000	5,000	8,000
Wellton-Mohawk	37,000	35,000	38,000	43,000	50,000	45,000
South Gila Valley	20,000	22,000	32,000	35,000	54,000	56,000
TOTAL	61,000	61,000	74,000	82,000	109,000	109,000

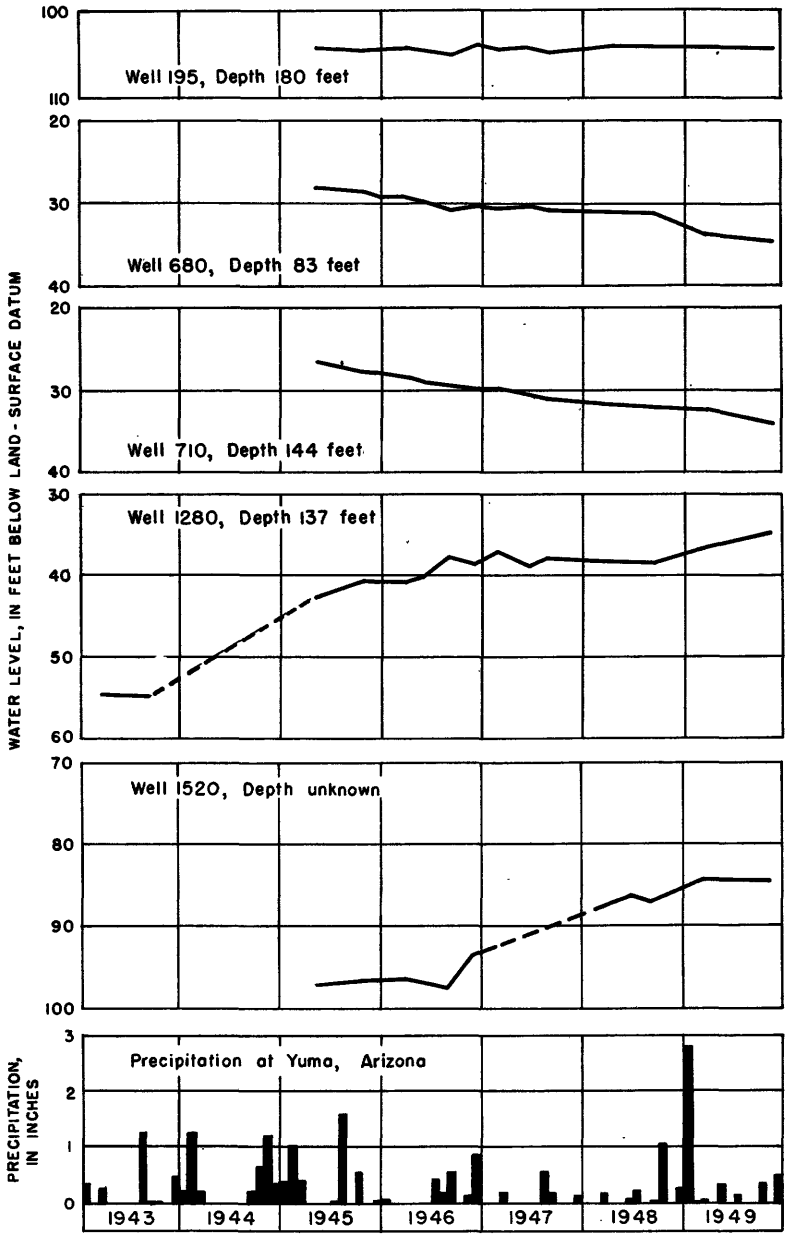

Figure 11.--Graphs showing fluctuations of water levels in observation wells in the Lower Gila region, Yuma County

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ACKNOWLEDGMENTS

Many irrigation districts, power companies, and individuals cooperated in furnishing the information contained in this report. The following organizations were particularly helpful in furnishing data on which the figures for pumpage were based: Arizona Edison Electric Company, Citizens Utilities Company, Duncan Utilities Company, Eloy Light and Power Company, Gila Water Commissioner, Goodyear Farms, Maricopa County Municipal Water Conservation District, Mohawk Municipal Water Conservation District, Rural Electrification Administration, Roosevelt Irrigation District, Roosevelt Water Conservation District, Salt River Valley Water Users' Association, San Carlos Irrigation District, Tucson Gas and Electric Company, Bureau of Indian Affairs, and Bureau of Reclamation, U. S. Department of Interior.

WELL DESCRIPTIONS AND WATER-LEVEL MEASUREMENTS

Apache County

3152. Petrified Forest National Monument. SE¼NW¼ sec. 5, T. 19 N., R. 24 E. Records available: 1945-48. No measurement made in 1949.

6601. L. M. Farr. NE¼NE¼ sec. 26. T. 13 N., R. 27 E. Records available: 1939-49. July 14, 26.71.

6709. Jacob Barth. SE¼NW¼ sec. 27, T. 13 N., R. 28 E. Records available: 1944-49. July 15, +0.93.

6716. E. L. Johns. SW¼ sec. 30, T. 13N., R. 28 E. Records available: 1944-49. July 14, 13.75.

7414. B. Y. Peterson. NE¼NW¼ sec. 4, T. 12 N., R. 28 E., at east side of U. S. Highway 666, 2.4 miles south of St. Johns. Drilled domestic and stock well, diameter 6 inches, depth 68 feet. Measurement discontinued after Aug. 9, 1944; resumed in 1949. Records available: July 14, 39.05.

7415. Max Romel. SE¼SE¼ sec. 18, T. 12 N., R. 28 E. Published as SE¼ sec. 18, T. 12 N., R 28 E. in previous reports. Records available: 1944-49. July 14, 16.20.

7416. Wallace Hall. Formerly J. B. Lampson. SE¼NE¼ sec. 7, T. 12 N., R. 28 E. Published as NE¼ sec. 18, T. 12 N., R. 28 E. in previous reports. Records available: 1944-49. July 14, 1.55.

9007. E. C. Becker. NE¼SW¼ sec. 33, T. 9 N., R. 29 E. Published as SW¼NW¼ sec. 33, T. 9 N., R. 29 E. in previous reports. Records available: 1944-49. July 14, 8.85.

10,001. C. Traweek. NE¼ sec. 20, T. 9 N., R. 31 E. Published as NW¼ sec. 33, T. 9 N., R. 29 E. in previous reports. Records available: 1944-49. July 14, 28.90.

Cochise County

St. David-Benson-Pomerene area

302A. W. N. East. SW¼SE¼ sec. 27, T. 16 S., R. 20 E. Records available: 1945, 1947-49. Mar. 8, 46.67; Aug. 24, 46.85; Dec. 7, 46.69.

305. L. A. Scott. In town of Pomerene. SW¼NE¼ sec. 34, T. 16 S., R. 20 E. Records available: 1940-42, 1944-49. Mar. 8, 77.47; Aug. 24, 77.71; Dec. 7, 77.30.

475. Earl M. Brown. NW¼NW¼ sec. 12, T. 17 S., R. 20 E. Records available: 1944-49. Mar. 8, 57.08; Dec. 7, 57.32.

477. City of Benson. SW¼SW¼ sec. 10, T. 17 S., R. 20 E. Records available: 1944-49. Mar. 8, 11.74.

Daily noon water level, from recorder graph

	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	.....	11.08	.....	.....	8.30	8.10
2	.....	.....	10.74	a13.14	a11.09	8.19	8.20
3	.....	.....	10.45	12.36	10.26	8.28	8.58
4	a13.60	.....	10.09	11.50	9.42	8.33	8.18
5	13.55	.....	9.78	12.33	9.17	8.35	8.57
6	13.00	.....	9.90	11.84	9.01	8.65	8.26
7	13.10	.....	9.98	11.35	8.78	8.50	8.25
8	.....	a13.84	9.24	11.38	8.95	8.65	8.21
9	.....	13.62	9.59	11.08	9.04	8.68	8.50
10	.....	13.48	10.05	11.05	9.72	8.47	8.05
11	a13.67	12.97	9.81	11.23	9.53	8.15	7.72
12	.....	11.90	9.72	11.35	9.44	8.50	7.64
13	.....	11.90	10.10	10.66	9.11	8.22	7.63
14	.....	11.69	11.35	10.17	8.99	8.00	7.75
15	13.95	a11.85	11.15	9.54	8.93	8.63	8.05
16	13.92	12.79	10.62	9.06	9.74	8.52	8.40
17	.....	14.50	11.36	9.34	9.35	8.30	8.55
18	.....	13.29	.....	9.09	8.73	8.20	8.34
19	.....	12.72	a11.74	10.00	8.18	8.38	8.05
20	.....	12.65	.....	9.21	8.03	8.11	8.02
21	.....	13.02	.....	8.95	8.17	8.82	8.37
22	.....	11.90	.....	8.90	8.40	8.12	8.42
23	a15.65	12.02	.....	8.95	8.69	8.15	8.16
24	.....	11.25	a10.49	9.07	8.45	8.13	8.12
25	15.90	10.40	10.35	9.35	8.17	8.82	7.95
26	16.33	10.25	9.75	9.17	8.29	8.53	8.01
27	15.24	10.22	10.40	9.27	8.41	8.12	7.71
28	15.05	11.68	12.00	9.69	8.40	8.10	8.38
29	17.70	12.20	11.33	9.96	8.65	8.22	8.90
30	.....	12.00	11.60	10.42	8.40	8.16	8.45
31		11.28	.....		8.41		8.33

a Tape measurement at odd hours.

583. Will Campbell. SE¼SW¼ sec. 31, T. 17 S., R. 21 E. Records available: 1941-42, 1944-49. Mar. 8, 20.00; Aug. 24, 22.30; Dec. 7, 21.85.

599. Boquillas Cattle Company. NW¼NW¼ sec. 32, T. 17 S., R. 21 E. Records available: 1944-49. Mar. 8, 20.12; Aug. 24, 19.05; Dec. 7, 19.87.

601. Mrs. Parley McRae. SE¼SE¼ sec. 32, T. 17 S., R. 21 E. Records available: 1944-49. Mar. 8, 3.47; Aug. 24, 3.31; Dec. 7, 2.30.

701. Leo Westfield. SE¼SE¼ sec. 1, T. 18 S., R. 20 E. Records available: 1944-49. Mar. 8, 8.30; Aug. 24, 7.34; Dec. 7, 6.70.

745. Walter Haymore. NW¼NE¼ sec. 6, T. 18 S., R. 21 E. Records available: 1944-49. Mar. 8, 31.40; Aug. 24, 31.32; Dec. 7, 31.25.

748. F. J. Miller. NW¼SE¼ sec. 6, T. 18 S., R. 21 E. Records available: 1944-47, 1949. Mar. 8, pumping; Aug. 24, 27.11; Dec. 7, 26.76.

749. A. L. Owens. SW¼NE¼ sec. 5, T. 18 S., R. 21 E. Records available: 1944-49. Mar. 8, 57.42; Aug. 24, 57.82.

753. Milton Curtis. SE¼ sec. 34, T. 18 S., R. 21 E. Records available: 1944-49. Mar. 8, 24.35; Aug. 24, 24.13; Dec. 7, 24.14.

Charleston area

950. Lon Hunt. SE¼SW¼ sec. 32, T. 20 S., R. 20 E. Records available: 1941-43, 1945-49. Mar. 9, 90.40; Aug. 26, 91.10; Dec. 8, 91.14.

951. Lon Hunt. SW¼SE¼ sec. 32, T. 20 S., R. 20 E. Records available. 1941-47, 1949. Dec. 8, 83.50.

1070. Cochise County. SW¼SW¼ sec. 31, T. 21 S., R. 21 E. Records available: 1942-43, 1945-49. Mar. 9, 286.90; Aug. 24, 287.20.

1071. E. Fry. SW¼SW¼ sec. 29, T. 21 S., R. 21 E. Records available: 1942-47, 1949. Mar. 9, 203.15, pumping recently; Aug. 24, 197.54.

1072. E. Fry. SE¼SE¼ sec. 22, T. 21 S., R. 21 E. Records available: 1941, 1944, 1946-49. Mar. 9, pumping; Aug. 24, 59.00; Dec. 9, 59.33.

1074. J. L. Parker. NE¼NE¼ sec. 11, T. 21 N., R. 21 E. Records available: 1941, 1944-49. Mar. 9, 26.91; Aug. 24, 27.20; Dec. 9, 26.90.

1126. Dept. of Army. NW¼NW¼ sec. 3, T. 22 S., R. 20 E. Records available: 1942-48. No measurement made in 1949.

1226. H. E. Fletcher. NW¼NE¼ sec. 8, T. 23 S., R. 21 E. Records available: 1941, 1944-49. Mar. 9, 65.00; measurement discontinued.

Willcox Basin of Sulphur Springs Valley

1500. Frank R. Harris. NE¼NE¼ sec. 13, T. 12 S., R. 23 E. Records available: 1942, 1945-49. Feb. 28, 72.00; July 7, dry at 75.0 feet.

1527. Owner unknown. NW¼NW¼ sec. 28, T. 12 S., R. 24 E. Records available: 1942, 1944-49. Feb. 28, 69.75, windmill pumping; May 17, 74.20, windmill pumping; July 7, 76.51, windmill pumping; Oct. 14, 79.55, windmill pumping; Dec. 15, 75.85, windmill pumping.

1576. J. D. Rutledge. NW¼NE¼ sec. 2, T. 13 S., R. 24 E. Records available: 1942, 1944-49. Feb. 28, 62.10; July 7, 72.97; Oct. 14, 64.90, irrigation well, 200 feet east, pumping; Dec. 15, 66.37.

1582. State of Arizona. NW¼NW¼ sec. 16, T. 13 S., R. 24 E. Records available: 1942, 1944-49. Feb. 28, 39.49; July 7, 41.14; Oct. 14, 42.43; Dec. 15, 42.07.

1584. J. J. Meyer. NW¼NW¼ sec. 23, T. 13 S., R. 24 E. Records available: 1942, 1944-49. Feb. 28, 41.40; July 7, dry at 44.0 feet. See well 1609A.

1585. W. A. Hines. SW¼SW¼ sec. 25, T. 13 S., R. 24 E. Records available: 1942, 1944-48. Measurement discontinued after Oct. 13, 1948.

1588. P. H. Pregenzer. NE¼SW¼ sec. 35, T. 13 S., R. 24 E. Records available: 1942, 1944-49. Feb. 10, 24.44; July 7, 27.68, nearby irrigation well pumping; Oct. 14, 28.03; Dec. 14, 16.87.

1609A. J. J. Meyer. NW¼NW¼ sec. 23, T. 13 S., R. 24 E., 50 feet south of east-west side road, Willcox-Bonita Road. Irrigation well, 16-inch casing, depth 92 feet. Records available: 1949. Nov. 1, 44.47; Dec. 15, 44.25.

1700. Fay Proctor. NE¼NW¼ sec. 36, T. 14 S., R. 23 E. Records available: 1942, 1944-49. Feb. 9, 40.38; Oct. 14, 40.87; Dec. 15, 40.22.

1725. C. A. Williamson. NW¼SW¼ sec. 13, T. 14 S., R. 24 E. Records available: 1942, 1944-49. Feb. 9, 13.75; July 7, 14.65; Oct. 14, 14.38; Dec. 15, 13.80.

1726. W. L. Woodrow. NW¼NW¼ sec. 14, T. 14 S., R. 24 E. Records available: 1942, 1944-49. Feb. 10, 15.15; Oct. 14, 19.19; Dec. 15, 15.24.

1728. Fay Proctor. NW¼NW¼ sec. 30, T. 14 S., R. 24 E. Records available: 1942, 1944-49. Feb. 10, pumping; July 7, 24.03; Oct. 14, 25.39; Dec. 15, 24.17.

1776. Dunlap Auto Court. NE¼SW¼ sec. 6, T. 14 S., R. 25 E. Records available: 1942, 1944-49. Feb. 28, 14.80; July 7, 15.10; Oct. 31, 15.19; Dec. 15, 15.20.

1953. B. B. Gibbons. NE¼NE¼ sec. 11, T. 16 S., R. 25 E. Records available: 1942, 1944-49. Feb. 9, 45.22; July 8, dry at 55 feet; Dec. 15, 45.50.

1954. Henry Gibbons. NW¼NW¼ sec. 13, T. 16 S., R. 25 E. Records available: 1942, 1944-49. Feb. 9, 46.60; July 8, 47.74; Oct. 13, 48.70, pumping; Dec. 15, 47.38.

1956. State of Arizona. SE¼NE¼ sec. 16, T. 16 S., R. 25 E. Records available: 1942, 1944-49. Feb. 10, 34.90; July 7, 35.85, pumping intermittently; Oct. 13, 38.29.

Douglas Basin of Sulphur Springs Valley

2700. M. L. Vineyard. NE¼NE¼ sec. 3, T. 20 S., R. 26 E. Records available: 1942, 1946-49. Feb. 9, 79.15; Oct. 11, 79.48.

2701. W. H. Seaver. NE¼NW¼ sec. 12, T. 20 S., R. 26 E. Records available: 1942, 1945-49. May 18, 89.46; Dec. 20, 89.90.

2702. W. P. Cheek. SE¼SE¼ sec 11, T. 20 S., R. 26 E. Records available: 1942, 1944-49. Feb. 9, 73.95; June 24, 76.67, pumping; Oct. 11, 76.60; Dec. 20, 73.30.

2709. F. O. Mackey. SE¼NE¼ sec. 33, T. 20 S., R. 26 E. Records available: 1942, 1944-49. Feb. 9, 32.05; June 24, 33.51, nearby irrigation well pumping; Oct. 11, 36.00; Dec. 20, 34.96.

3001. Owner unknown. NE¼NW¼ sec. 24, T. 21 S., R. 26 E. Records available: 1946-49. Feb. 9, 116.02; June 24, 121.90, pumping, Oct. 11, 116.27; Dec. 19, 114.76.

3350. J. E. Brophy. NE¼NW¼ sec. 28, T. 22 S., R. 26 E. Records available: 1942, 1944-49. May 18, 30.09; June 22, 31.76.

3651. McGintry. SE¼SW¼ sec. 27, T. 23 S., R. 27 E. Records available: 1943-44, 1946-49. Feb. 8, 53.65; June 21, 53.90; Oct. 11, 53.37; Dec. 19, 53.20.

3654. R. Bunker. Formerly W. E. Mason. NE¼SE¼ sec. 19, T. 23 S., R. 27 E. Records available: 1946-49. Feb. 8, 32.26; June 21, 32.37; Oct. 11, 32.54; Dec. 19, 32.40.

3800. A. Clarkson. Formerly Walter Holland. NW¼SW¼ sec. 1, T. 24 S., R. 26 E. Records available: 1942, 1944-49. Mar. 11, 106.62.

3803. Cochise County Hospital. SW¼SW¼ sec. 3, T. 24 S., R. 27 E. Records available: 1942, 1944-49.

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 2	68.19	Feb. 25	68.00	June 21	70.90	Oct. 11	69.35
8	71.82	Mar. 24	69.52	24	71.82	Dec. 19	65.16

3804. L. E. Harris. Formerly L. L. Keith. SE¼NW¼ sec. 5, T. 24 S., R. 27 E. Records available: 1942, 1944-49. Feb. 8, 57.85; June 21, 58.17; Oct. 11, 60.48; Dec. 19, 59.13.

3810. R. M. Johnston. Formerly Victor Nelson. NE¼NE¼ sec. 17, T. 24 S., R. 27 E. Records available: 1942, 1944-49. Mar. 10, 52.59; June 21, 52.83; Oct. 11, 50.03; Dec. 19, 49.14.

San Simon Valley

4200. A. R. Spikes. SW¼SW¼ sec. 6, T. 13 S., R. 29 E. Records available: 1941-42, 1944-47, 1949. Mar. 10, 12.42.

4201. U. S. Dept. of Interior. Formerly U. S. Dept. of Agriculture. NW¼SW¼ sec. 8, T. 13 S., R. 29 E. Records available: 1942, 1944, 1946-49. Mar. 10, 3.24; Nov. 2, 4.83.

4250. U. S. Dept. of Agriculture. SE¼NW¼ sec. 3, T. 13 S., R. 30 E. Records available: 1940, 1942, 1944, 1946. No measurement made in 1949.

4252. T. P. Garrett. SW¼NE¼ sec. 9, T. 13 S., R. 30 E. Records available: 1940-42, 1946-49. Mar. 10, 28.94; July 6, 27.40; Nov. 3, 27.51.

4261. Woolston. SE¼SE¼ sec. 25, T. 13 S., R. 30 E. Records available: 1940-42, 1944, 1946-49. Mar. 10, 60.18; July 6, 60.23; Nov. 2, 62.07.

4262. Carl Quinn. Formerly W. F. Lewis. NW¼SW¼ sec. 30, T. 13 S., R. 31 E. Records available: 1940-42, 1946-49. Mar. 10, 60.68; July 6, 60.80; Nov. 3, 62.86.

4366. Elmer Franklin. SE¼SW¼ sec. 30, T. 13 S., R. 31 E. Records available: 1940-42, 1944, 1946-49. July 6, 61.68; Nov. 2, 58.70.

4500. U. S. Dept. of Agriculture. NE¼SE¼ sec. 1, T. 14 S., R. 30 E. Records available: 1940-42, 1944, 1946-49. Mar. 10, 70.46; July 6, 71.31; Nov. 2, 71.91.

4600. Paul Barnes. Formerly Otto Malone. NW¼NW¼ sec. 3, T. 14 S., R. 31 E. Records available: 1941-42, 1946-49. Mar. 10, 3.03; Nov. 2, 6.35.

4606. Owner unknown. SE¼SE¼ sec. 3, T. 14 S., R. 31 E. Records available: 1941-42, 1946-49. Mar. 10, 22.80; July 6, 29.70; Nov. 2, 27.69.

4661. M. Calloway. SE¼NE¼ sec. 25, T. 14 S., R. 31 E. Records available: 1940-42, 1944, 1946-49. Mar. 10, 3.64; July 6, 9.13; Nov. 2, 7.07.

Coconino County

2001. W. G. Adams. SE¼SW¼ sec. 15, T. 21 N., R. 9 E., 0.3 mile south of U. S. Highway 66, east side of Walnut Canyon. Dug stock well, diameter 30 inches, depth 90 feet. Records available: 1944-49.

Date	Water level	Date	water level	Date	Water level
June 15, 1944	57.05	Sept.27, 1945	61.48	June 4, 1948	69.84
Aug. 11	58.42	Oct. 2, 1946	57.98	Oct. 14	59.62
June 4, 1945	59.85	June 13, 1947	59.24	July 13, 1949	56.66

2201. M. F. Farrell. SW¼SW¼ sec. 26, T. 22 N., R. 8 E., on north bank of River de Flag, 0.5 mile north of old U. S. Highway 66. Used dug domestic well, diameter 36 inches, depth 38.8 feet. Records available: 1944-49.

June 16, 1944	22.39	June 22, 1946	40.43	June 4, 1948	28.17
Aug. 12	23.30	Oct. 2	22.40	Oct. 14	38.87
June 4, 1945	29.39	June 13, 1947	30.50	July 13, 1949	20.53
Sept.27	26.93				

2401. Pinewood Dairy. SE¼SE¼ sec. 9, T. 21 N., R. 7 E., 100 yards west of Snow Bowl Road. Dug stock well, diameter 48 inches, depth 25 feet. Records available: 1944-49.

June 17, 1944	12.18	June 22, 1946	13.60	Oct. 15, 1948	19.34
Aug. 13	12.84	Oct. 3	14.15	July 13, 1949	13.38
June 5, 1945	11.93	June 13, 1947	15.28		
Sept.28	12.62	June 4, 1948	17.57		

2402. City of Flagstaff. NE¼NE¼ sec. 16, T. 21 N., R. 7 E., 100 yards west of Snow Bowl Road. Drilled unused well, diameter 12 inches, depth 74 feet. Records available: 1944-46, 1948-49. June 17, 1944, 65.40; Sept. 28, 1945, 66.37; June 22, 1946, 65.55; June 4, 1948, 65.57; Oct. 15, 1948, 65.72; July 13, 1949, 65.53.

2591. Lee Fair. SW¼SW¼ sec. 3, T. 23 N., R. 6 E., 0.1 mile east of Kendrick Park Road, 1.1 miles south of Kendrick Park. Dug stock well, diameter 30 inches, depth 22 feet. Records available: 1944-49.

Date	Water level	Date	Water level	Date	Water level
June 17, 1944	7.43	June 22, 1946	8.82	June 4, 1948	8.31
Aug. 13	8.73	Oct. 3	9.20	Oct. 15	11.21
June 5, 1945	7.34	June 13, 1947	10.54	July 12, 1949	8.76
Sept.28	9.37				

2601. Mrs. Willie Harris. SE¼SW¼ sec. 23, T. 22 N., R. 6 E., 0.01 mile north of road to Kendrick Park. Dug domestic well, diameter 48 inches, depth 12 feet. Records available: 1944-49.

June 17, 1944	4.46	June 22, 1946	5.91	June 4, 1948	8.65
Aug. 13	7.49	Oct. 3	5.16	Oct. 15	11.99
June 5, 1945	4.33	June 13, 1947	18.94	July 12, 1949	3.98
Sept.28	10.19				

2602. City of Flagstaff. NE¼NE¼ sec. 26, T. 22 N., R. 6 E., on southwest corner of intersection of road to Kendrick Park and Arizona Snow Bowl Road. Drilled unused well, diameter 16 inches. Records available: 1944-49.

Aug. 13, 1944	130.00	June 22, 1946	129.89	June 4, 1948	130.43
June 5, 1945	129.83	Oct. 3	129.74	Oct. 15	130.76
Sept.28	129.68	June 13, 1947	130.86	July 12, 1949	130.96

2603. Mr. Roundtree. NE¼NW¼ sec. 26, T. 22 N., R. 6 E., 10 feet west of wash and 10 feet south of road to Kendrick Park. Dug domestic well, diameter 48 inches, depth 9 feet. Records available: 1944-49.

June 17, 1944	5.00	June 22, 1946	5.94	June 4, 1948	5.00
Aug. 13	6.24	Oct. 9	6.32	Oct. 15	7.20
June 5, 1945	5.06	June 13, 1947	7.14	July 12, 1949	5.11
Sept.28	6.91				

3001. Ruddie Kerby. SW¼NW¼ sec. 10, T. 23 N., R. 4 E. Dug domestic and stock well, diameter 72 inches. Records available: 1944-49.

June 17, 1944	5.25	June 20, 1946	5.27	June 4, 1948	5.64
Aug. 13	5.75	Oct. 3	5.36	Oct. 15	6.76
June 5, 1945	5.10	June 13, 1947	6.74	July 12, 1949	5.16
Sept.29	5.24				

3201. C. G. McDowell. SW¼SE¼ sec. 23, T. 22 N., R. 3 E., in pump house about 200 feet west of Wagon wheel Lodge, north side of U. S. Highways 66 and 89. Dug domestic and stock well, diameter 48 inches, depth 18 feet. Records available: 1944-49.

June 17, 1944	7.43	June 22, 1946	10.22	Oct. 15, 1948	14.22
Aug. 13	11.85	Oct. 3	11.03	July 12, 1949	11.37
June 5, 1945	6.95	June 13, 1947	14.80	Aug. 17	13.40
Sept.27	11.89	June 4, 1948	14.10		

3202. Kaibab National Forest. NW¼SW¼ sec. 25, T. 22 N., R. 3 E., 400 feet north of Chalender Ranger Station, 0.4 mile south of U. S. Highways 66 and 89. Dug domestic well, diameter 48 inches, depth 6 feet. Records available: 1944-49.

Date	Water level	Date	Water level	Date	Water level
June 17, 1944	2.97	Oct. 3, 1946	1.49	July 12, 1949	2.44
Aug. 13	2.86	June 13, 1947	2.64	Aug. 14	2.50
June 5, 1945	2.31	June 4, 1948	2.77	Aug. 15	2.57
Sept.28	2.69	Oct. 15	3.73		

3401. F. M. Franks. NE¼SW¼ sec. 28, T. 22 N., R. 2 E., 100 feet south of Edison Avenue, 1.5 blocks east of North Second Street, 0.4 mile north of U. S. Highway 66. Dug unused well, diameter 72 inches, depth 9.5 feet. Records available: 1944-49.

June 19, 1944	2.70	June 22, 1946	5.66	June 4, 1948	4.98
Aug. 13	6.15	Oct. 3	5.64	Oct. 15	6.95
June 5, 1945	5.12	June 13, 1947	5.60	July 12, 1949	5.49
Sept.28	6.63				

Gila County

1. James C. Youngblood. T. 4½ N., R. 18 E., in well house, 30 feet east of State Highway 77, south side of Cienega Creek. Dug domestic well, diameter 48 inches, depth 18 feet. Records available: 1944-48.

Aug. 5, 1944	5.94	May 22, 1946	5.70	June 2, 1948	6.30
May 29, 1945	4.87	Oct. 23	6.36	Oct. 12	7.67
Sept.25	6.01	June 10, 1947	6.29		

1-C. H. B. Maurel. SW¼NW¼ sec. 23, T. 1 N., R. 15 E., on hillside, 10 feet northwest of northwest fence corner around tourist camp, 200 feet west of U. S. Highway 70, 0.5 mile north of mine rescue station at north edge of Globe. Dug domestic well, diameter 48 inches, depth 66 feet. Records available: 1946-49.

June 21, 1946	48.67	Sept.16, 1947	49.80	Apr. 5, 1949	49.05
July 18	49.52	Dec. 2	49.60	May 5	49.21
Aug. 26	48.47	Feb. 9, 1948	48.39	June 8	49.93
Oct. 8	48.14	May 11	50.02	July 6	50.10
Dec. 5	49.48	June 22	50.70	Aug. 1	50.16
Feb. 5, 1947	48.84	July 15	51.02	Sept. 7	50.06
Apr. 8	48.35	Oct. 12	49.97	Oct. 7	50.82
May 5	48.50	Dec. 14	48.98	Dec. 1	48.74
July 7	49.53	Jan. 10, 1949	48.48		

1-D. Mine rescue station. SW¼SE¼ sec. 23, T. 1 S., R. 15 E., 50 feet north of mine rescue station, 100 feet west of U. S. Highway 70, at north edge of Globe. Drilled domestic well, diameter 16 inches, depth 458 feet. Records available: 1946-49.

Apr. 12, 1946	33.28	Sept.16, 1947	a39.00	Jan. 10, 1949	37.42
June 21	a37.08	Oct. 6	36.40	Feb. 8	32.78
Aug. 26	a38.35	Nov. 3	a41.40	Mar. 8	35.15
Oct. 8	30.45	Dec. 2	36.90	Apr. 5	36.45
Nov. 12	29.96	Jan. 5, 1948	35.33	May 5	36.53
Dec. 5	32.78	Feb. 9	36.97	June 7	36.83
Jan. 6, 1947	30.60	Mar. 3	36.88	July 6	a40.00
Feb. 5	32.40	June 22	a42.20	Aug. 1	37.78
Mar. 5	34.64	Aug. 19	37.53	Sept. 7	a39.90
Apr. 8	33.70	Sept.13	38.50	Oct. 6	a46.63
May 5	34.59	Nov. 2	37.80	Nov. 9	a45.98
July 7	a40.03	Dec. 14	38.02	Dec. 1	38.27
Aug. 18	34.94				

a Pumping.

7. A. H. Bednorz. SE¼NW¼ sec. 26, T. 1 N., R. 15 E., Phillips Auto Court, at corner of Blake and Broad Streets, Globe. Dug domestic well, diameter 42 inches, depth 18 feet. Records available: 1945-49.

Date	Water level	Date	Water level	Date	Water level
Feb. 23, 1945	9.93	Apr. 8, 1947	13.10	Aug. 19, 1948	16.00
Apr. 9	7.93	18	13.38	Sept. 13	(a)
May 2	10.18	May 5	14.30	Oct. 12	(a)
June 23	10.93	June 2	13.84	Jan. 10, 1949	15.19
July 4	11.08	July 7	14.70	25	14.52
Aug. 17	10.23	Aug. 18	14.31	Feb. 8	14.20
Sept. 3	10.94	Sept. 16	15.74	Mar. 8	(a)
June 21, 1946	12.27	Oct. 6	15.40	Apr. 5	(a)
July 18	13.12	Nov. 3	13.95	May 5	(a)
Aug. 26	12.21	Dec. 2	13.11	June 8	13.77
Oct. 8	11.84	Jan. 5, 1948	13.92	July 6	14.10
Nov. 13	11.40	Feb. 9	13.95	Aug. 1	13.85
Dec. 5	11.65	Mar. 3	13.28	Sept. 7	16.26
Jan. 7, 1947	11.03	May 11	14.95	Oct. 5	(a)
Feb. 5	11.40	June 22	(a)	Nov. 9	(a)
Mar. 5	11.26	July 15	(a)	Dec. 1	(a)

a Dry.

8. Bednorz. SE¼NE¼ sec. 26, T. 1 N., R. 15 E., 150 feet west of U. S. Highway 70, at Phillips Auto Court. Dug unused well, diameter 60 inches, depth 60 feet. Records available: 1945-49.

Feb. 23, 1945	43.30	June 2, 1947	46.47	Nov. 3, 1948	53.53
Apr. 11	41.90	July 7	47.20	Dec. 13	56.98
May 24	42.94	Aug. 18	47.40	Jan. 10, 1949	53.61
July 3	44.29	Sept. 16	47.00	25	53.50
Sept. 3	44.19	Oct. 6	46.82	Feb. 8	50.30
June 21, 1946	42.91	Nov. 3	46.25	Mar. 8	53.03
July 18	46.39	Dec. 2	45.71	Apr. 5	47.05
Aug. 26	45.35	Jan. 5, 1948	42.72	May 5	46.18
Oct. 8	43.44	Feb. 9	46.15	June 8	46.33
Nov. 12	44.87	May 11	51.40	July 6	46.65
Dec. 5	44.92	June 22	53.90	Aug. 1	46.60
Jan. 6, 1947	44.64	July 15	48.42	Sept. 7	47.44
Feb. 5	44.50	Aug. 19	48.18	Oct. 6	47.98
Mar. 5	44.28	Sept. 13	48.67	Nov. 9	48.59
Apr. 8	45.34	Oct. 12	52.23	Dec. 1	48.82
May 5	45.92				

16. Inez Castaneda. SE¼NW¼ sec. 36, T. 1 N., R. 15 E., in yard, 20 feet west of owner's frame house, 30 feet east of neighboring frame house, 20 feet north of Ruiz Canyon Street, 0.25 mile west of bridge over Pinal Creek, in Globe. Dug unused well, diameter 60 inches, depth 64 feet. Records available: 1945-49.

Apr. 9, 1945	40.62	June 2, 1947	45.17	Oct. 12, 1948	48.40
May 24	41.08	July 7	45.42	Nov. 3	48.30
June 22	41.10	Aug. 18	45.59	Dec. 13	48.64
Sept. 4	41.71	Sept. 15	45.67	Jan. 10, 1949	48.75
June 21, 1946	43.57	Oct. 6	45.83	Feb. 8	49.05
July 18	43.79	Nov. 3	45.86	Mar. 8	49.25
Oct. 8	44.58	Dec. 2	46.16	Apr. 5	49.56
Nov. 13	44.70	Jan. 5, 1948	46.78	May 5	49.60
Dec. 5	44.84	Feb. 9	46.60	June 7	49.83
Jan. 6, 1947	44.80	Mar. 3	46.58	July 6	50.03
Feb. 5	44.95	May 11	46.94	Aug. 2	49.82
Mar. 4	44.82	June 21	47.20	Sept. 7	50.48
Apr. 6	45.04	July 15	47.49	Oct. 6	50.60
18	44.95	Aug. 19	47.82	Nov. 9	51.24
May 5	45.05	Sept. 13	48.00	Dec. 2	51.00

17. Ralph Sandoval. SW¼NE¼ sec. 36, T. 1 N., R. 15 E., in yard, 10 feet east of stucco house, 180 feet west of Pinal Creek, 350 feet southwest of intersection of Ruiz Canyon Street with South Broad Street, in Globe. Dug domestic well, diameter 48 inches, depth 49 feet. Records available: 1945-49.

Date	Water level	Date	Water level	Date	Water level
Apr. 11, 1945	13.09	May 5, 1947	20.93	Oct. 12, 1948	31.93
May 24	13.45	June 2	21.78	Nov. 3	32.26
June 22	15.05	July 7	23.07	Dec. 13	32.50
Aug. 17	16.40	Aug. 18	23.17	Jan. 10, 1949	32.24
Sept. 4	17.10	Sept.15	23.92	Feb. 8	29.44
June 21, 1946	23.54	Oct. 6	24.03	Mar. 8	25.25
July 18	22.01	Nov. 3	25.73	Apr. 5	23.32
Aug. 27	22.32	Dec. 2	25.78	May 5	21.86
Oct. 8	19.41	Jan. 5, 1948	26.20	June 7	23.40
Nov. 13	20.34	Feb. 9	26.70	July 6	29.00
Dec. 5	20.26	Mar. 3	26.23	Aug. 1	26.18
Jan. 6, 1947	18.40	May 11	28.14	Sept. 7	27.35
Feb. 5	19.65	June 21	30.28	Oct. 6	27.00
Mar. 4	20.48	July 15	31.40	Nov. 9	26.54
Apr. 6	20.04	Aug. 19	31.90	Dec. 2	26.72
18	20.34	Sept.13	33.30		

18. Angelo Dimario. SE¼SE¼ sec. 4, T. 1 S., R. 15 E., in yard between two houses about 20 feet apart, 10 feet west of Russell Canyon county road, 50 feet west of house at east side of road, 100 feet south of Crook National Forest boundary, 3.3 miles south of intersection of U. S. Highway 70 and State Highway 88. Dug stock well, diameter 42 inches, depth 50 feet. Records available: 1945-49.

Mar. 6, 1945	a18.05	June 2, 1947	27.97	Nov. 3, 1948	35.25
May 28	a14.17	July 8	31.04	Dec. 14	35.46
July 4	20.24	Aug. 18	32.17	Jan. 11, 1949	a35.82
Aug. 31	23.60	Sept.16	32.00	Feb. 9	a18.05
June 21, 1946	27.98	Oct. 7	32.72	Mar. 9	a 2.60
July 18	30.00	Nov. 4	32.22	Apr. 5	a 3.64
Aug. 27	30.40	Jan. 6, 1948	33.08	May 6	a11.85
Oct. 8	30.39	Feb. 9	33.20	June 7	a19.67
Nov. 13	31.72	Mar. 3	33.30	July 8	27.17
Dec. 5	31.10	May 12	34.14	Aug. 2	29.30
Jan. 7, 1947	a31.20	June 22	34.35	Sept. 7	26.79
Feb. 4	a30.80	July 15	34.38	Oct. 7	29.86
Mar. 4	a18.85	Aug. 19	34.64	Nov. 10	30.60
Apr. 6	a22.00	Sept.14	35.03	Dec. 2	31.00
May 6	26.59	Oct. 12	35.33		

a Nearby creek flowing.

19. Owner unknown. SE¼SE¼ sec. 9, T. 1 S., R. 15 E., in galvanized-iron shed in creek bottom, 20 feet southwest of channel of Russell Canyon, 30 feet southwest of Russell Canyon county road, 4.3 miles south of intersection of U. S. Highway 70 and State Highway 88. Dug stock well, diameter 48 inches, depth 20 feet. Records available: 1945-49.

Mar. 7, 1945	a 8.40	June 2, 1947	10.58	Oct. 12, 1948	21.40
May 28	a 9.04	July 8	11.40	Nov. 3	21.06
July 4	10.43	Aug. 18	a 9.58	Dec. 14	21.40
Aug. 31	10.06	Sept.16	10.20	Jan. 11, 1949	a 9.37
June 21, 1946	11.44	Oct. 6	10.95	Feb. 9	a 8.57
July 18	12.24	Nov. 4	15.50	Mar. 9	a 8.40
Aug. 27	10.54	Dec. 2	11.57	Apr. 5	a 8.44
Oct. 8	11.60	Jan. 6, 1948	10.78	May 6	a 8.85
Nov. 13	12.66	Feb. 9	11.85	June 7	9.68
Dec. 5	a 9.89	Mar. 3	12.06	July 8	11.50
Jan. 7, 1947	a 8.62	June 22	21.44	Aug. 2	10.72
Feb. 4	a 8.82	July 15	20.91	Sept. 7	12.20
Mar. 4	a 8.45	Aug. 19	20.97	Oct. 7	18.65
Apr. 6	a 9.20	Sept.14	20.70	Nov. 10	20.05
May 6	9.52			Dec. 2	20.26

a Nearby creek flowing.

34. Neal Lyall, Jr. 3.8 miles south of Globe. NW¼NW¼ sec. 14, T. 1 S., R. 15 E., in fenced yard, 75 feet southwest of frame house, 100 feet southwest of Icehouse Canyon county road, 0.35 mile south of intersection with Kellner Canyon county road. Used dug domestic and stock well, diameter 72 inches, depth 29 feet. Horizontal tunnel 92 feet in length near bottom. Records available: 1945-49.

Date	Water level	Date	Water level	Date	Water level
Apr. 7, 1945	a 6.55	Apr. 18, 1947	a 6.65	Sept.14, 1948	24.25
May 25	a 6.69	May 6	7.57	Oct. 12	(b)
July 3	12.30	June 2	12.07	Nov. 3	24.25
Aug. 31	12.77	July 8	17.99	Dec. 14	(b)
Dec. 27	18.08	Aug. 18	24.25	Jan. 11, 1949	a22.09
June 7, 1946	12.82	Sept.15	24.08	Mar. 9	a 6.59
21	14.96	Oct. 7	26.15	Apr. 5	a 6.64
July 18	16.95	Nov. 4	24.82	May 6	a 7.09
Aug. 27	16.65	Dec. 2	24.37	June 7	8.05
Oct. 8	14.03	Jan. 6, 1948	24.12	July 8	16.92
Nov. 13	14.40	Feb. 9	24.65	Aug. 2	16.85
Dec. 5	a 9.43	Mar. 3	24.85	Sept. 7	(b)
Jan 7, 1947	a 6.77	May 12	24.95	Oct. 7	(b)
Feb. 4	a 6.85	June 22	24.35	Nov. 10	(b)
Mar. 4	a 6.61	July 15	24.38	Dec. 2	(b)
Apr. 6	a 6.65	Aug. 19	24.04		

a Nearby creek flowing.
b Dry.

37. Ada Antevs. 2.5 miles southeast of Globe. Lot 11, sec. 12, T. 1 S., R. 15 E., in concrete pump house, 50 feet east of stucco house, 0.35 mile west of Pinal creek road. Used dug domestic well, diameter 48 inches, depth 71 feet. Records available: 1945-49.

Apr. 5, 1945	67.16	July 8, 1947	66.44	Jan. 11, 1949	68.90
June 21, 1946	68.34	Sept.15	67.05	Feb. 8	68.77
July 18	68.26	Oct. 6	67.50	Mar. 8	68.80
Aug. 27	66.90	Nov. 3	66.80	Apr. 5	68.87
Dec. 5	67.70	Dec. 2	67.00	May 5	69.36
Jan. 6, 1947	66.82	Jan. 5, 1948	67.21	June 7	a71.10
Feb. 5	66.62	Feb. 9	67.18	Aug. 2	68.80
Mar. 4	66.60	July 15	67.90	Sept. 7	69.19
Apr. 6	66.42	Oct. 12	68.95	Dec. 1	a70.81
14	66.71	Nov. 3	68.70		
June 2	67.40	Dec. 13	69.05		

a Pumping.

42. M. J. Vanhorne. 3.1 miles southeast of Globe. SW¼SE¼ sec. 12, T. 1 S., R. 15 E., in yard under metal tank and tower, 30 feet north of house, 50 feet east of Pinal Creek road, 250 feet southeast of bridge over Pinal Creek. Dug domestic well, diameter 48 inches, depth 44 feet. Records available: 1945-49.

Apr. 5, 1945	a10.58	June 2, 1947	31.61	Jan. 11, 1949	a (e)
June 21, 1946	37.16	July 8	38.95	25	a26.00
July 18	38.22	Aug. 18	42.66	Feb. 8	a17.60
Aug. 27	b39.35	Sept.15	45.02	Mar. 8	a14.84
Oct. 8	34.50	Oct. 6	(c)	Apr. 5	a13.90
Nov. 13	b39.07	Dec. 2	d47.73	May 5	15.10
Dec. 5	a27.36	Jan. 5, 1948	47.80	June 7	36.23
Jan. 6, 1947	a15.36	Feb. 9	47.77	July 6	48.23
Feb. 4	a15.18	Mar. 3	47.40	Aug. 2	(e)
Mar. 4	a13.52	May 12	(e)	Sept. 7	(e)
Apr. 6	a13.35	June 21	(e)	Oct. 6	(e)
14	14.31	July 15	(e)	Nov. 9	(e)
May 5	18.55	Aug. 19	(e)	Dec. 1	(e)

a Nearby creek flowing.
b Pumping recently.
c Caved in.
d Redug.
e Dry at 53 feet.

43. Grim. 5.8 miles southwest of Globe. NE¼SE¼ sec. 16, T. 1 S., R. 15 E., in yard, 20 feet south of Kellner Canyon, 75 feet southwest of frame house, 250 feet southeast of Kellner Canyon county road. Dug domestic well, diameter 48 inches, depth 25 feet. Well deepened during July 1946. Records available: 1945-49.

Date	Water level	Date	Water level	Date	Water level
May 28, 1945	a 7.25	June 2, 1947	14.82	Sept.14, 1948	46.87
July 4	12.30	July 8	46.62	Oct. 12	46.58
Aug. 31	10.24	Aug. 18	47.15	Nov. 3	46.22
June 7, 1946	19.50	Sept.16	47.16	Feb. 9, 1949	a26.00
21	21.35	Oct. 7	47.34	Mar. 9	a +.14
Aug. 27	48.72	Nov. 4	46.40	May 6	a +.50
Oct. 8	a15.70	Dec. 2	a45.90	June 7	30.45
Nov. 13	a12.82	Jan. 6, 1948	a32.95	July 8	51.15
Dec. 5	a 4.40	Feb. 9	a 5.14	Aug. 2	45.42
Jan. 7, 1947	a 4.36	Mar. 3	a 4.35	Sept. 7	51.18
Feb. 4	a 4.52	May 12	5.00	Oct. 7	47.45
Mar. 4	a 4.34	June 22	46.88	Nov. 10	54.82
Apr. 6	a 5.07	July 15	48.24	Dec. 1	45.58
May 6	5.38	Aug. 19	47.50		

a Nearby creek flowing.

44. John Belcher. 5.8 miles south of Globe. SW¼SE¼ sec. 15, T. 1 S., R. 15 E., in yard, 50 feet east of Icehouse Canyon, 100 feet west of farmhouse, 0.15 mile south of Icehouse Canyon county road. Dug domestic well, diameter 48 inches, depth 27 feet. Records available: 1945-49.

Apr. 9, 1945	a 4.77	May 6, 1947	8.15	Dec. 14, 1948	26.00
May 25	a 5.12	June 2	12.15	Jan. 11, 1949	a15.44
July 3	13.45	July 8	18.57	Mar. 9	a 5.53
Aug. 31	15.22	Aug. 18	21.44	Apr. 5	a 5.00
June 21, 1946	20.49	Sept.16	20.40	May 6	a 5.10
July 18	21.53	Oct. 7	21.12	June 7	7.16
Aug. 27	20.04	Nov. 4	21.15	July 8	14.30
Oct. 8	12.22	Dec. 2	22.52	Aug. 2	16.63
Nov. 13	15.38	Jan. 6, 1948	21.06	Sept. 7	18.06
Dec. 5	a 6.34	Feb. 9	21.75	Oct. 7	18.04
Jan. 7, 1947	a 5.72	May 12	19.92	Nov. 10	19.70
Feb. 4	ab 5.98	June 21	21.80	Dec. 2	21.27
Mar. 4	a 5.22	July 15	22.05		
Apr. 6	a 5.34	Sept.14	25.50		

a Nearby creek flowing.
b Pumping recently.

46. Frank Parker. 6.4 miles south of Globe. NW¼SW¼ sec. 23, T. 1 S., R. 15 E., in galvanized-iron shed in pasture, 100 feet west of timber corral, 30 feet south of Sixshooter Canyon, 150 feet south of Sixshooter Canyon county road. Drilled stock well, diameter 16 inches, depth 450 feet. Records available: 1945-49.

Mar. 12, 1945	a 7.53	May 6, 1947	9.86	Oct. 12, 1948	38.22
May 25	a 8.63	June 2	14.18	Nov. 2	35.38
July 3	15.15	July 8	21.74	Dec. 14	35.38
Sept. 1	20.88	Aug. 18	27.34	Jan. 11, 1949	a14.65
June 21, 1946	17.64	Sept.16	26.26	Mar. 9	a 6.84
July 18	23.33	Oct. 7	28.09	Apr. 5	a 6.90
Aug. 27	19.80	Nov. 4	b63.93	May 6	a 7.30
Oct. 8	a 7.74	Dec. 2	47.45	June 7	10.20
Nov. 13	a 7.38	Jan. 6, 1948	b75.00	July 8	16.35
Dec. 5	a 7.15	May 12	a10.30	Aug. 2	19.33
Jan. 7, 1947	a 7.13	June 21	19.27	Sept. 7	26.83
Feb. 4	a 7.30	July 15	24.45	Oct. 7	b68.00
Mar. 4	a 7.10	Aug. 19	24.42	Nov. 10	34.81
Apr. 6	a 8.15	Sept.14	27.85	Dec. 2	44.42
18	a 7.55				

a Nearby creek flowing.
b Pumping recently.

47. Frank Parker. 5.3 miles south of Globe. SE¼SE¼ sec. 14, T. 1 S., R. 15 E., in yard, 25 feet southwest of frame house, 100 feet south of Sixshooter Canyon county road, 0.6 mile southwest of road junction with Pinal Creek county road. Dug domestic and stock well, diameter 48 inches, depth 14 feet. Records available: 1945-49.

Date	Water level	Date	Water level	Date	Water level
May 25, 1945	a 2.38	June 2, 1947	8.77	Oct. 12, 1948	(b)
July 3	10.90	July 8	15.88	Nov. 2	(b)
Sept. 1	12.34	Aug. 18	13.00	Dec. 9	(b)
June 21, 1946	14.55	Sept.16	14.47	Jan. 11, 1949	a 3.[illegible]
July 18	15.82	Oct. 7	15.30	Feb. 8	a 3.00
Aug. 27	15.31	Nov. 4	(b)	Mar. 9	a 2.72
Oct. 8	a 6.75	Dec. 2	(b)	Apr. 5	a 2.58
Nov. 13	9.30	Jan. 6, 1948	(b)	May 5	a 2.18
Dec. 5	a 3.30	Feb. 9	15.00	June 7	3.96
Jan. 7, 1947	a 2.94	Mar. 3	16.10	July 8	7.30
Feb. 4	a 2.82	May 12	a 7.57	Aug. 2	7.00
Mar. 4	a 2.41	June 21	15.56	Sept. 7	8.23
Apr. 6	a 2.72	July 15	16.65	Oct. 7	8.10
18	a 2.62	Aug. 19	12.40	Nov. 9	9.66
May 6	4.98	Sept.14	15.50	Dec. 2	10.10

a Nearby creek flowing.
b Dry at 16.80 feet.

50. Mr. Waldman. 6.25 miles southeast of Globe. NE¼SW¼ sec. 24, T. 1 S., R. 15 E., at top of topographic divide, 30 feet south of county road, 75 feet east of abandoned stone ranch house. Dug and drilled stock well, diameters 48 inches and 10 inches, depth 300 feet. Records available: 1945-49.

Mar. 13, 1945	83.29	June 2, 1947	88.80	Oct. 12, 1948	88.25
June 7, 1946	90.00	July 8	88.05	Nov. 2	87.90
21	88.95	Aug. 18	88.82	Dec. 14	86.60
July 18	89.45	Sept.15	89.24	Jan. 11, 1949	87.23
Aug. 27	88.54	Oct. 6	88.64	Feb. 8	86.90
Oct. 8	88.88	Nov. 3	88.09	Mar. 8	88.87
Nov. 13	87.40	Dec. 2	89.00	Apr. 5	88.09
Dec. 5	86.40	Jan. 5, 1948	88.07	May 5	85.04
Jan. 6, 1947	86.15	Feb. 9	87.78	June 7	a97.88
Feb. 4	86.28	Mar. 3	88.30	July 8	96.04
Mar. 4	87.08	May 12	87.95	Aug. 2	87.28
Apr. 6	86.72	June 21	89.93	Sept. 7	86.80
14	86.92	July 15	90.00	Oct. 7	86.87
18	86.65	Aug. 19	b85.47	Nov. 9	84.24
May 5	a89.86	Sept.14	c87.76	Dec. 1	83.80

a Pumping recently.
b Surface water running into well.
c Redrilled and cased well to 1.3 feet above land-surface datum.

51. Kenneth Hoopes. 6.5 miles northwest of Globe. SW¼NW¼ sec. 10, T. 1 N., R. 15 E., in field, 25 feet north of fence line, 30 feet west of used irrigation well, 50 feet west of road along Pinal Creek, 0.5 mile south of junction of Bloody Tanks Wash with Pinal Creek. Drilled unused well, diameter 12 inches, depth 160 feet. Records available: 1945-49.

Mar. 20, 1945	75.00	June 2, 1947	a80.40	Nov. 2, 1948	86.32
May 25	62.63	July 7	a81.12	Dec. 13	85.94
July 3	64.99	Aug. 18	a82.12	Jan. 10, 1949	a87.14
Aug. 31	67.38	Sept.16	81.72	Feb. 8	81.32
June 21, 1946	a81.42	Oct. 6	80.00	Mar. 8	79.60
July 18	a80.92	Nov. 3	80.38	Apr. 5	78.43
Aug. 26	76.44	Jan. 5, 1948	80.61	May 5	a81.00
Oct. 8	74.73	Feb. 9	81.26	June 8	a81.13
Nov. 12	72.61	Mar. 3	80.60	July 6	81.65
Jan. 6, 1947	76.36	May 11	81.98	Aug. 1	82.83
Feb. 5	77.14	June 22	a85.43	Sept. 7	86.52
Mar. 5	78.09	Aug. 19	84.10	Oct. 6	a89.27
Apr. 8	78.30	Sept.13	84.85	Nov. 9	84.32
May 5	78.53	Oct. 12	85.07	Dec. 1	85.10

a Nearby well pumping 100 gallons a minute.

52. Schniffen. 4.6 miles southeast of Globe. NE¼SW¼ sec. 13, T. 1 S., R. 15 E., in yard, 25 feet north of barnyard fence, 25 feet west of fence, 75 feet northwest of Forester home, 200 feet west of Pinal Creek road. Drilled unused well, diameter 6 inches, depth 105 feet. Records available: 1946-49.

Date	Water level	Date	Water level	Date	Water level
June 21, 1946	14.30	Aug. 18, 1947	18.36	Dec. 13, 1948	34.55
July 18	15.14	Sept.15	18.88	Jan. 11, 1949	a16.10
Aug. 27	17.12	Oct. 6	20.66	Feb. 8	a 5.87
Oct. 8	8.89	Nov. 3	20.14	Mar. 8	a 5.36
Nov. 13	10.09	Dec. 2	21.42	Apr. 5	a 4.73
Dec. 5	a 5.68	Jan. 5, 1948	20.68	May 5	a 3.50
Jan. 6, 1947	a 5.98	Feb. 9	21.65	June 2	7.22
Feb. 4	a 5.25	Mar. 3	20.74	July 6	10.67
Mar. 4	a 5.05	May 12	24.13	Aug. 2	12.92
Apr. 6	a 5.18	June 21	b45.40	Sept. 7	9.36
14	a 5.22	July 15	28.35	Oct. 6	16.80
May 5	6.90	Sept.14	36.65	Nov. 9	18.10
June 2	10.12	Oct. 12	35.00	Dec. 1	18.50
July 8	15.48	Nov. 2	36.90		

a Nearby creek flowing.
b Pumping recently.

Graham County

No measurements made in 1949 in wells 8, 9, 11, 12, 13, 14, 17, 18, and 20 on San Carlos Indian Reservation.

51. Bert Hinton. About 1 mile northwest of Geronimo. SW¼NE¼ sec. 13, T. 4 S., R. 22 E. Records available: 1940-49.

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 24	20.00	Apr. 25	16.59	July 25	19.56	Nov. 29	20.22
Feb. 28	17.72	May 30	19.15	Sept.26	23.93	Dec. 26	19.86
Mar. 27	16.33	June 27	20.38	Oct. 31	20.73		

55A. J. G. Willis. SW¼NW¼ sec. 19, T. 4 S., R. 23 E. Records available: 1944-49.

Feb. 28	31.92	Apr. 25	36.30	Aug. 29	38.43	Dec. 26	33.44
Mar. 27	31.76	June 27	36.38	Sept.26	37.91		

56. Eliza Allen. SW¼NE¼ sec. 24, T. 4 S., R. 22 E. Records available: 1940-48. No measurement made in 1949.

60. Pat Hinton. SE¼SE¼ sec. 35, T. 4 S., R. 22 E. Records available: 1941-49. Mar. 2, 27.65; Oct. 25, 39.65.

71. Ed McEuen. SE¼SW¼ sec. 7, T. 4 S., R. 23 E. Records available: 1940-48. Dry Apr. 29, 1948, measurement discontinued.

72. Ed McEuen. SE¼SW¼ sec. 7, T. 4 S., R. 23 E. Records available: 1940-48. No measurement made in 1949.

76. E. W. Black. SW¼NW¼ sec. 18, T. 4 S., R. 23 E. Records available: 1940-48. No measurement made in 1949.

77. E. M. Claridge. NW¼SW¼ sec. 18, T. 4 S., R. 23 E. Records available: 1940-49. July 12, 41.18.

81. Mrs. J. B. Blessing. NW¼NE¼ sec. 19, T. 4 S., R. 23 E. Records available: 1940-49. July 12, 35.36; Oct. 25, 33.35.

82A. Fay Rabb. NE¼SW¼ sec. 35, T. 4 S., R. 23 E. Records available: 1944-49. Mar. 1, 19.70; July 12, 19.52; Oct. 25, 20.40.

91. Ben Montierth. SE¼NE¼ sec. 29, T. 4 S., R. 23 E. Records available: 1940-49. Mar. 1, 53.81; July 12, 53.66; Oct. 25, 54.90.

92. Wendell Montierth. SE¼SW¼ sec. 28, T. 4 S., R. 23 E. Records available: 1940-49. Mar. 1, 63.47; Oct. 25, 68.11.

93. Graham County. NE¼SE¼ sec. 27, T. 4 S., R. 23 E. Records available: 1940-48. No measurement made in 1949.

94. Graham County. NE¼SE¼ sec. 27, T. 4 S., R. 23 E. Records available: 1940-48. No measurement made in 1949.

95. Graham County. SE¼SE¼ sec. 27, T. 4 S., R. 23 E. Records available: 1940-48. No measurement made in 1949.

98. Graham County. NW¼NW¼ sec. 35, T. 4 S., R. 23 E. Records available: 1940-48. Destroyed Apr. 30, 1948, measurements discontinued.

100. C. N. Higgins. SE¼NE¼ sec. 34, T. 4 S., R. 23 E. Records available: 1940-49. Mar. 2, 10.89; July 12, 11.83; Oct. 25, 12.36.

107. Port McEuen. SW¼SW¼ sec. 35, T. 4 S., R. 23 E. Records available: 1940-49.

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 24	47.20	Apr. 25	43.08	July 25	43.65	Oct. 31	(a)
Feb. 28	44.86	May 30	42.37	Aug. 29	(a)	Nov. 28	(a)
Mar. 27	43.86	June 27	44.10	Sept.26	(a)	Dec. 26	43.70

a Dry.

108. W. O. Tyler. NW¼NE¼ sec. 2, T. 5 S., R. 23 E. Records available: 1940-49. Mar. 2, 16.53; July 12, 17.24; Oct. 25, 17.70.

122A. Elliot Montierth. NW¼NW¼ sec. 28, T. 4 S., R. 23 E. Records available: 1944-49.

Jan. 24	37.49	Apr. 25	35.27	July 25	36.22	Oct. 31	36.60
Feb. 28	36.34	May 30	34.11	Aug. 29	37.30	Nov. 28	35.45
Mar. 27	35.51	June 27	34.44	Sept.26	37.93	Dec. 26	34.48

124A. Nash C. Willis. SW¼SW¼ sec. 27, T. 4 S., R. 23 E. Records available: 1943-49. Jan. 24, 37.94; Mar. 27, 36.26; Apr. 25, 36.17; May 30, 36.22; Dec. 26, 36.60.

126. YL Ranch. SE¼NE¼ sec. 24, T. 5 S., R. 21 E. Records available: 1940-48. No measurement made in 1949.

143. R. S. Snedigar. NW¼SW¼ sec. 25, T. 5 S., R. 22 E. Records available: 1940-49. Mar. 2, 41.88; July 12, 34.10, nearby creek running; Oct. 25, 36.65.

156. Roy Layton. SW¼SE¼ sec. 1, T. 5 S., R. 23 E. Records available: 1940-49. Mar. 2, 11.50; July 12, 12.18; Oct. 25, 12.90.

157. M. J. Ferguson. SE¼SE¼ sec. 2, T. 5 S., R. 23 E. Records available: 1943-49.

Jan. 24	16.78	Apr. 25	14.22	July 25	15.31	Oct. 31	16.15
Feb. 28	16.14	May 30	14.92	Aug. 29	15.51	Nov. 28	16.30
Mar. 27	15.43	June 27	15.20	Sept.26	16.60	Dec. 26	16.30

158. W. C. Rhodes. NE¼SW¼ sec. 2, T. 5 S., R. 23 E. Records available: 1940-49. Mar. 1, 51.20; July 11, 52.76; Oct. 25, 51.64.

160. W. O. Tyler. NW¼NE¼ sec. 2, T. 5 S., R. 23 E. Records available: 1940-49. Mar. 2, 29.20; July 11, 30.98; Oct. 25, 31.63.

194A. Ed and Port McEuen. NE¼SE¼ sec. 18, T. 5 S., R. 24 E. Records available: 1945-49.

Jan. 25	19.70	Apr. 25	17.08	July 25	17.85	Oct. 31	18.46
Mar. 1	18.26	May 30	17.03	Aug. 29	19.08	Nov. 28	18.20
28	17.05	June 27	17.70	Sept.26	18.26	Dec. 26	17.98

198A. C. J. Farrington. SE¼SW¼ sec. 19, T. 5 S., R. 24 E. Records available: 1943-49.

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 24	25.71	Apr. 25	21.60	July 25	22.52	Oct. 31	23.08
Feb. 28	23.50	May 30	21.91	Aug. 29	23.26	Nov. 28	23.18
Mar. 27	22.40	June 27	22.25	Sept.26	22.78	Dec. 26	21.89

206. J. D. Colvin. SE¼NE¼ sec. 29, T. 5 S., R. 24 E. Records available: 1940-49.

Jan. 25	27.26	Apr. 25	25.86	July 25	23.06	Oct. 31	23.45
Mar. 1	27.35	May 30	24.02	Aug. 29	24.91	Nov. 28	23.42
28	27.26	June 27	23.70	Sept.26	23.20	Dec. 26	23.02

208. L. W. Farrington. SW¼SE¼ sec. 30, T. 5 S., R. 24 E. Records available: 1940-49. Mar. 1, 24.60; July 12, 24.69; Oct. 25, 25.77.

214. Graham County. NE¼NE¼ sec. 31, T. 5 S., R. 24 E. Records available: 1940-49. Mar. 1, 12.25; July 12, 14.17; Oct. 25, 14.48.

220. Lionel Hancock. NW¼NW¼ sec. 33, T. 5 S., R. 24 E. Records available: 1940-49.

Jan. 25	16.51	Apr. 25	12.14	July 25	13.04	Oct. 31	16.35
Mar. 1	16.75	May 30	12.51	Aug. 29	14.14	Nov. 28	16.71
28	14.48	June 27	13.35	Sept.26	15.51	Dec. 26	16.90

223A. Ira Hancock. NE¼SW¼ sec. 33, T. 5 S., R. 24 E. Records available: 1944-49. Mar. 2, 33.25; July 12, 32.18; Oct. 25, 33.55, pumping recently.

259. Jess Udall. SW¼NE¼ sec. 1, T. 6 S., R. 24 E. Records available: 1944-49.

Jan. 25	31.20	Apr. 25	27.91	July 25	29.15	Oct. 31	28.85
Mar. 1	30.00	May 30	26.41	Aug. 29	30.43	Nov. 28	29.42
28	28.65	June 27	27.04	Sept.26	29.64	Dec. 26	26.70

267. Wm. Carpenter. NE¼NE¼ sec. 4, T. 6 S., R. 24 E. Records available: 1940-49.

Jan. 25	24.11	Apr. 25	21.88	July 25	24.78	Nov. 28	24.38
Mar. 1	22.64	May 30	22.40	Aug. 29	24.70	Dec. 26	24.14
28	21.45	June 27	23.27	Sept.26	25.05		

269A. Silas Jarvis. NW¼NW¼ sec. 10, T. 6 S., R. 24 E. Records available: 1943-49.

Jan. 24	28.16	Apr. 25	24.85	July 25	23.09	Oct. 31	26.75
Feb. 28	27.51	May 30	21.41	Aug. 29	24.85	Nov. 28	26.88
Mar. 28	27.17	June 27	22.65	Sept.26	26.52	Dec. 26	26.77

270A. M. J. Ferguson. NW¼NW¼ sec. 9, T. 6 S., R. 24 E. Records available: 1943-49. Mar. 2, 54.72; July 12, 52.13; Oct. 25, 52.74.

273. Eldon Palmer. 3 miles west of Glenbar. SW¼NE¼ sec. 5, T. 6 S., R. 24 E. Records available: 1940-49.

Jan. 24	45.46	Apr. 25	42.02	July 25	42.32	Oct. 31	42.89
Feb. 28	43.50	May 30	43.37	Aug. 29	44.26	Nov. 28	42.67
Mar. 28	42.42	June 27	42.11	Sept.26	43.02	Dec. 26	42.27

275. Lamar Bellman. SE¼NE¼ sec. 10, T. 6 S., R. 24 E. Records available: 1940-49. Mar. 1, 27.14; July 12, 27.33; Oct. 25, 25.16.

276A. M. J. Ferguson. SW¼SW¼ sec. 11, T. 6 S., R. 24 E. Records available: 1943-49.

Jan. 24	42.01	Apr. 25	38.38	July 25	35.29	Oct. 31	36.91
Feb. 28	41.60	May 30	34.20	Aug. 29	35.73	Nov. 28	37.16
Mar. 28	40.72	June 27	34.65	Sept.26	36.54	Dec. 26	36.50

285. Guy Anderson. SE¼SE¼ sec. 13, T. 6 S., R. 24 F. Records available: 1940-49. Mar. 2, 40.96; July 12, 31.77; Oct. 25, 31.85.

289. W. J. Preston. NW¼SE¼ sec. 13, T. 6 S., R. 24 E. Records available: 1942-49. Mar. 2, 44.08; July 12, 35.73; Oct. 25, 37.23.

298. Joe Rogers. NE¼NW¼ sec. 25, T. 6 S., R. 24 E. Records available: 1940-49. July 12, 16.98; Oct. 25, 17.80, pumping recently.

302A. Mattice Bros. SE¼NE¼ sec. 23, T. 6 S., R. 24 E. Records available: 1943-49.

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 24	51.02	Apr. 25	49.48	Aug. 29	46.24	Oct. 31	46.68
Feb. 28	51.10	July 26	46.17	Sept.26	46.48	Dec. 26	46.14

318. Vance Marshall. NE¼NE¼ sec. 17, T. 6 S., R. 25 E. Records available: 1941-49. Mar. 2, 25.40; Oct. 25, 24.83.

320. Vance Marshall. SE¼SE¼ sec. 17, T. 6 S., R. 25 E. Records available: 1940-49. Mar. 2, 15.35; Oct. 25, 15.85.

321. Graham County. SW¼SE¼ sec. 7, T. 6 S., R. 25 E. Records available: 1940-48. No measurement made in 1949.

324. Graham County. SW¼NE¼ sec. 18, T. 6 S., R 25 E. Records available: 1940-48. No measurement made in 1949.

325. Graham County. SE¼NE¼ sec. 18, T. 6 S., R. 25 E. Records available: 1940-49. Mar. 2, 5.75.

326. Graham County. SW¼NE¼ sec. 18, T. 6 S., R. 25 F. Records available: 1940-48. No measurement made in 1949.

342. Ed Howard. SE¼SW¼ sec. 23, T. 6 S., R. 25 E. Records available: 1940-49. Mar. 2, 28.30; July 12, 28.70; Oct. 25, 28.72.

347. Graham County. SE¼NE¼ sec. 27, T. 6 S., R. 25 E. Records available: 1940-48. Destroyed, measurements discontinued after Apr. 28, 1948.

354. Ned Daley. SE¼SE¼ sec. 27, T. 6 S., R. 25 E. Records available: 1940-49.

Jan. 24	17.40	Apr. 25	9.06	July 25	10.79	Oct. 31	11.39
Feb. 28	13.76	May 10	8.80	Aug. 29	12.83	Nov. 28	10.40
Mar. 28	11.29	June 30	10.38	Sept.26	12.40	Dec. 26	9.74

366. Charles M. Beals. NE¼SE¼ sec. 30, T. 6 S., R. 25 E. Records available: 1940-49. Mar. 2, 23.80.

408. Roy Saline. SW¼NW¼ sec. 30, T. 6 S., R. 25 E. Records available: 1943-49.

Jan. 24	55.94	Apr. 25	55.30	July 25	50.51	Oct. 31	50.24
Feb. 28	55.88	May 30	52.81	Aug. 29	50.20	Nov. 28	49.43
Mar. 28	55.78	June 27	51.18	Sept.26	50.12	Dec. 26	48.92

409. Joe Alder. NE¼SW¼ sec. 29, T. 6 S., R. 25 E. Records available: 1943-49.

Jan. 24	7.55	Apr. 25	2.99	July 25	2.00	Oct. 31	3.25
Feb. 28	8.05	May 30	2.83	Aug. 29	4.02	Nov. 28	3.62
Mar. 28	6.15	June 27	3.03	Sept.26	3.98	Dec. 26	2.97

434. Abel Sanchez. SW¼NW¼ sec. 36, T. 6 S., R. 27 E. Records available: 1940-49. Feb. 28, dry; July 13, 20.43; Oct. 26, 22.57.

452. S. A. Clontz. SW¼SW¼ sec. 31, T. 6 S., R. 28 E. Records available: 1940-49. Feb. 28, 21.91; July 13, 22.35; Oct. 23.81.

454. Brown Canal Co. NE¼NE¼ sec. 31, T. 6 S., R. 28 E. Records available: 1940-49. Feb. 28, 20.40; July 13, 21.54; Oct. 26, 22.48.

506. Roy Layton. SW¼NW¼ sec. 2, T. 7 S., R. 25 E. Records available: 1943-49. June 27, 16.85, water in lateral; Sept. 26, 31.40, water in lateral; Dec. 26, 12.70. Dry, Jan. 24, Feb. 28, Mar. 28, Apr. 25, May 30, July 25, Aug. 29, Oct. 31, Nov. 28.

509. Ellis Welker and Eldon Palmer. SE¼SW¼ sec. 3, T. 7 S., R. 25 E. Records available: 1940-49. Mar. 2, dry; July 12, 51.50; Oct. 25, 49.67.

565A. Z. C. Prina. SW¼NW¼ sec. 8, T. 7 S., R. 26 E. Records available: 1941-49.

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 2	(a)	Apr. 26	(a)	July 30	12.42	Oct. 31	12.40
Feb. 28	12.48	May 30	12.43	Aug. 29	12.42	Nov. 28	12.36
Mar. 25	(a)	June 27	12.44	Sept.26	12.40	Dec. 26	12.36

a Dry.

566A. Z. C. Prina. SW¼NW¼ sec. 8, T. 7 S., R. 26 E. Records available: 1941-49. Mar. 2, dry at 11.60 feet. Measurement discontinued.

567A. Z. C. Prina. NW¼NW¼ sec. 8, T. 7 S., R. 26 E. Records available: 1941-49. Mar. 2, dry at 10.40 feet. Measurement discontinued.

568A. Z. C. Prina. NW¼NW¼ sec. 8, T. 7 S., R. 26 E. Records available: 1941-49. Dry, measurement discontinued after Mar. 2, 1949.

580. City of Safford. NE¼SW¼ sec. 8, T. 7 S., R. 26 E. Records available: 1940-49. Feb. 28, 26.20.

586. Ted Tidwell. SE¼SE¼ sec. 12, T. 7 S., R. 26 E. Records available: 1940-49. Feb. 28, 18.90; July 13, 17.64; Oct. 26, 18.94.

592. E. M. Claridge. SW¼SE¼ sec. 13, T. 7 S., R. 26 E. Records available: 1940-49. Feb. 28, 45.35; July 13, 31.19; Oct. 26, 21.86.

593. E. M. Claridge. SE¼SW¼ sec. 13, T. 7 S., R. 26 E. Records available: 1940-49. Feb. 28, 41.64; July 13, 30.55; Oct. 26, 23.07.

594. E. M. Claridge. NE¼SE¼ sec. 14, T. 7 S., R. 26 E. Records available: 1940-49. Feb. 28, 18.75; Oct. 26, 12.79.

597. C. M. Puraley. Near Solomonsville. NE¼SE¼ sec. 15 T. 7 S., R. 26 E. Water in nearby canal when measurements made. Records available: 1940-49.

Apr. 25	28.30	July 25	24.12	Sept.26	25.32	Nov. 28	23.11
May 30	26.23	Aug. 29	24.73	Oct. 31	24.20	Dec. 26	22.20
June 27	24.67						

598. Union Canal Co. NE¼SE¼ sec. 15, T. 7 S., R. 26 E. Records available: 1940-49. Feb. 28, 30.50; July 13, 23.09, canal running; Oct. 26, 22.65, canal running.

603. L. A. Nelson. SE¼SW¼ sec. 16, T. 7 S., R. 26 E. Records available: 1940-49.

Jan. 24	60.22	Apr. 25	48.93	July 25	43.28	Oct. 31	42.02
Feb. 28	58.18	May 30	45.26	Aug. 29	44.45	Nov. 28	42.81
Mar. 24	53.24	June 27	44.45	Sept.26	43.20	Dec. 26	39.72

623. Lee Johns. NE¼NW¼ sec. 22, T. 7 S., R. 26 E. Records available: 1940-49. Feb. 28, 52.76; July 13, 41.42; Oct. 26, 36.65.

625. Willard Welker. NE¼SE¼ sec. 22, T. 7 S., R. 26 E. Records available: 1940-49.

Jan. 24	62.37	Apr. 25	a54.70	July 25	a43.22	Oct. 31	a38.74
Feb. 28	60.34	May 30	a49.15	Aug. 29	a40.45	Nov. 28	a37.90
Mar. 24	a58.46	June 27	a48.66	Sept.26	a39.82	Dec. 26	a36.74

a Water in canal.

630. E. L. Claridge. NE¼NE¼ sec. 24, T. 7 S., R. 26 E. Records available: 1940-49.

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 24	46.85	Apr. 25	a28.85	July 25	a25.05	Oct. 31	a27.42
Feb. 28	39.36	May 30	a25.78	Aug. 29	a29.14	Nov. 28	a24.90
Mar. 24	a34.56	June 27	a28.06	Sept.26	a25.69	Dec. 26	a24.98

a Water in canal, 15 feet south.

639. Amos Cook. NW¼SE¼ sec. 31, T. 7 S., R. 26 E. Records available: 1940-48. No measurement made in 1949.

662. Mrs. Jose Somora. NE¼NE¼ sec. 2, T. 7 S., R. 27 E. Records available: 1940-49. Tape measurements made at odd hours Jan. 3, 10; Apr. 25; Aug. 8, 22, 29; Sept. 5, 12, 19.

Daily noon water level from recorder graph

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	(a)	15.66	14.49	13.36	12.94	13.47	16.09	17.02	(a)	16.44	15.21	14.76
2	(a)	15.58	14.45	13.34	12.95	13.50	16.13	17.13	(a)	16.38	15.19	14.75
3	18.20	15.52	14.42	13.32	12.96	13.52	16.18	17.23	(a)	16.32	15.18	14.73
4	(a)	15.46	14.38	13.32	12.97	13.62	16.22	17.33	(a)	16.27	15.16	14.73
5	(a)	15.40	14.34	13.31	12.98	13.74	16.24	(a)	18.57	16.21	15.14	14.71
6	(a)	15.35	14.31	13.28	13.00	13.86	16.34	(a)	(a)	16.15	15.13	14.69
7	(a)	15.28	14.28	13.26	13.01	13.97	16.44	(a)	(a)	16.10	15.11	14.68
8	(a)	15.24	14.24	13.24	13.02	14.10	16.54	17.53	(a)	16.04	15.09	14.66
9	(a)	15.20	14.20	13.21	13.03	14.26	16.63	(a)	(a)	16.00	15.07	14.65
10	17.70	15.16	14.16	13.20	13.04	14.41	16.72	(a)	(a)	15.95	15.06	14.62
11	(a)	15.10	14.10	13.19	13.06	14.52	16.79	(a)	(a)	15.91	15.05	14.63
12	(a)	15.05	14.06	13.14	13.09	14.61	16.85	(a)	18.73	15.88	15.04	14.62
13	17.51	15.02	14.02	13.12	13.11	14.65	16.93	(a)	(a)	15.84	15.02	14.60
14	17.46	15.00	13.97	13.10	13.12	14.71	17.03	(a)	(a)	15.82	15.00	14.58
15	17.37	14.96	13.93	13.09	13.13	14.79	17.10	16.94	(a)	15.78	14.98	14.56
16	17.24	14.93	13.88	13.07	13.14	14.85	17.12	17.02	(a)	15.75	14.97	14.54
17	17.13	14.89	13.85	13.05	13.16	14.93	17.18	17.10	(a)	15.68	14.96	14.53
18	17.01	14.85	13.81	13.03	13.18	15.01	17.26	17.19	(a)	15.64	14.95	14.52
19	16.88	14.81	13.77	13.01	13.20	15.03	17.33	(a)	17.80	15.60	14.93	14.50
20	16.76	14.79	13.72	13.00	13.22	15.05	17.50	(a)	(a)	15.57	14.91	14.48
21	16.64	14.76	13.69	12.99	13.23	15.17	17.54	(a)	17.47	15.53	14.91	14.48
22	16.52	14.72	13.65	12.98	13.24	15.30	17.59	17.58	17.33	15.49	14.89	14.47
23	16.42	14.68	13.61	12.95	13.26	15.40	(a)	(a)	17.20	15.46	14.87	14.46
24	16.33	14.65	13.58	12.94	13.28	15.48	(a)	(a)	17.07	15.43	14.85	14.43
25	16.24	14.62	13.54	12.92	13.30	15.53	17.57	(a)	16.95	15.40	14.84	14.43
26	16.15	14.58	13.52	12.93	13.33	15.67	17.38	(a)	16.84	15.37	14.82	14.41
27	16.07	14.55	13.49	12.91	13.35	15.79	17.21	(a)	16.75	15.33	14.81	14.40
28	15.99	14.52	13.44	12.90	13.38	15.87	17.05	(a)	16.67	15.30	14.80	14.39
29	14.92		13.43	12.89	13.41	15.94	16.90	18.18	16.59	15.28	14.79	14.38
30	15.83		13.40	12.92	13.44	16.01	16.78	(a)	16.51	15.25	14.77	14.37
31	15.72		13.36		13.45		16.91	(a)		15.24		14.37

a Float on bottom.

664. San Jose Canal Co. SW¼NE¼ sec. 2, T. 7 S., R. 27 E. Records available: 1940-49. Feb. 28, 13.16; July 13, 14.18; Oct. 26, 16.58.

674. O. H. Clonts, formerly owned by Louis Michelena. NE¼SW¼ sec. 4, T. 7 S., R. 27 E. Records available: 1940-49. Feb. 29, 12.88; July 13, 12.94; Oct. 26, 14.38.

675. O. H. Clonts, formerly owned by Louis Michelena. SE¼SE¼ sec. 4, T. 7 S., R. 27 E. Records available: 1941-49. Feb. 28, 15.51; July 13, 12.85; Oct. 26, 13.94.

676. O. H. Clonts, formerly owned by Louis Michelena. SW¼SE¼ sec. 4, T. 7 S., R. 27 E. Records available: 1940-49. Feb. 28, 14.98; July 13, 13.31; Oct. 26, 14.93.

708. Pete Bertaldo. SE¼NE¼ sec. 20, T. 7 S., R. 27 E. Records available: 1940-49.

708--Continued.

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 24	39.47	Apr. 25	39.02	July 25	38.80	Oct. 31	39.07
Feb. 28	39.55	May 30	38.56	Aug. 29	38.97	Nov. 28	38.95
Mar. 24	39.39	June 27	38.80	Sept.26	38.92	Dec. 26	39.45

Greenlee County

5. Warner Foote. SE¼NW¼ sec. 7, T. 6 S., T. 31 E. Records available: 1941-49. Mar. 1, 4.78.

14. Victor Rowden. SE¼SE¼ sec. 19, T. 6 S., R. 31 E. Records available: 1940-49. Mar. 1, 33.03; July 14, 33.86, irrigation well, 200 feet south, pumping; Oct. 27, 33.15.

31. J. C. Merritt. SW¼NW¼ sec. 4, T. 7 S., R. 31 E. Records available: 1940-49. Mar. 1, 26.64; Oct. 27, 32.72.

36. M. M. Cosper. NE¼NW¼ sec. 16, T. 7 S., R. 31 E. Records available: 1940-49. Mar. 1, 9.40; July 14, 11.80; Oct. 27, 16.47.

49. W. M. Zumwalt. NE¼NW¼ sec. 34, T. 7 S., R. 31 E. Records available: 1940-49. Mar. 1, 45.70; July 14, 39.08; Oct. 27, 47.90.

63. M. W. McKelvey. NE¼SE¼ sec. 3, T. 8 S., R. 31 E. Records available: 1940-49. Mar. 1, 58.00; July 14, 48.00; Oct. 27, 57.95.

72. Hugh Howell. SE¼SE¼ sec. 12, T. 8 S., R. 31 E. Records available: 1940-49. Mar. 1, 50.52; July 14, 51.88, pumping recently; Oct. 27, 46.37.

92. Raymond Davis. SW¼SE¼ sec. 17, T. 8 S., R. 32 E. Records available: 1940-49. Mar. 1, 66.90; July 14, 68.62; Oct. 27, 65.80.

122. O. Christensen. SE¼SW¼ sec. 32, T. 8 S.; R. 32 E. Records available: 1940-49. Mar. 1, 28.47; July 14, 29.52; Oct. 27, 28.50.

133. Floyd McDaniels. SE¼SW¼ sec. 34, T. 8 S., R. 32 E. Records available: 1940-43, 1945-49. Mar. 1, 6.60; July 14, 10.40; Oct. 27, 9.96.

136. Franklin Irrigation District well 1. SE¼NE¼ sec. 34, T. 8 S., R. 32 E. Records available: 1940-43, 1945-49. Mar. 1, 41.40; July 14, 43.07; Oct. 27, 43.47.

160. Franklin Irrigation District well 7. NE¼NE¼ sec. 3, T. 9 S., R. 32 E. Records available: 1940-48. No measurement made in 1949.

161. Franklin Irrigation District well 6. NE¼NE¼ sec. 3, T. 9 S., R. 32 E. Records available: 1940-49. Mar. 1, 3.27; July 14, 8.60; Oct. 27, 7.92.

162. Franklin Irrigation District well 5. NE¼NE¼ sec. 3, T. 9 S., R. 32 E. Records available: 1940-49. Mar. 1, 13.90.

Maricopa County

19. E. D. Edwards. NE¼NE¼ sec. 28, T. 1 N., R. 6 E. Records available: 1939-49. Feb. 12, 174.57; June 15, 180.72; Oct. 3, 182.40.

68. Osborn and Gass. NW¼SE¼ sec. 23, T. 1 N., R. 7 E. Records available: 1939-49. Feb. 12, 309.25.

84. W. A. Anderson. SW¼SE¼ sec. 11, T. 1 S., R. 7 E. Records available: 1939-49. Jan. 3, 188.05; Feb. 17, 187.44; Oct. 7, 188.55.

89. D. Cole. NE¼SE¼ sec. 18, T. 1 S., R. 7 E. Records available: 1939-49. Feb. 14, 130.43; Oct. 7, 133.84.

94. Old Clifford Place. NE¼NE¼ sec. 21, T. 1 S., R. 7 E. Records available: 1939-49. Jan. 3, 151.05; Feb. 15, 143.04; Oct. 7, 144.84.

101. Mr. Gardiner. NE¼SE¼ sec. 25, T. 1 S., R. 7 E. Records available: 1939-49. Jan. 5, 175.06; Feb. 17, 173.09; June 15, 173.92.

136. Roosevelt Water Conservation District. NE¼NE¼ sec. 25, T. 1 S., R. 6 E. Records available: 1939-49. Feb. 15, 120.16; Apr. 27, 121.88; June 15, 122.93; Oct. 3, 123.85.

151. Roosevelt Water Conservation District. SW¼SE¼ sec. 13, T. 2 S., R. 5 E. Records available: 1939-49. Jan. 3, 90.42; Feb. 15, 88.59.

177. J. O. Power. SE¼NW¼ sec. 12, T. 2 S., R. 6 E. Records available: 1940-49. Feb. 15, 182.57; Oct. 7, 188.97.

205. Joy Compton. SE¼SW¼ sec. 24, T. 2 S., R. 6 E. Records available: 1940-49. Jan. 7, 146.77; Feb. 15, 164.08.

217. Chandler Heights Citrus Irrigation District. SW¼SE¼SE¼ sec. 36, T. 2 S., R. 6 E. Previously published as SW¼SE¼ sec. 36, T. 2 S., R. 6 E., about 100 feet north of county highway, 0.9 mile west of Chandler Heights. Used drilled irrigation well, diameter 20 inches, depth 310 feet. Altitude of land-surface datum is 1447.70 feet above mean sea level. Measurements discontinued after Aug. 14, 1944; resumed in 1949. Records available: 1939-44, 1949. Jan. 12, 222.90; Oct. 6, 255.80.

218. Clyde Fitzgerald. SE¼NW¼ sec. 34, T. 2 S., R. 6 E. Records available: 1940-46, 1948. Measurements discontinued after Sept. 17, 1948. See well 218A for further water-level measurements in this area.

218A. G. W. Leech. SE¼SE¼SW¼ sec. 34, T. 2 S., R. 6 E., 0.5 mile east of Hunt Highway, 7 miles south of Higley. Used drilled irrigation well, diameter 20 inches, depth 444 feet. Records available: 1949. Jan. 7, 127.95; Feb. 15, 129.19; May 20, 136.55; Oct. 7, 145.86.

221. Roosevelt Water Conservation District. NE¼NE¼ sec. 31, T. 2 S., R. 6 E. Records available: 1940-49. Feb. 15, 53.75; Oct. 7, 61.45.

252. Jack Barnes. SE¼SE¼ sec. 9, T. 2 S., R. 7 E., about 0.5 mile north of Magma Arizona Railroad, 0.5 mile north of Rittenhouse siding. Drilled irrigation well, diameter 20 inches. Land-surface datum is 1401.06 feet above mean sea level. Measurements discontinued after Jan. 12, 1946; resumed in 1949. Records available: 1939-46, 1949. Jan. 18, 172.34.

254. Stan Turley. Formerly owned by W. J. Germann. SE¼NE¼ sec. 7, T. 2 S., R. 7 E. Records available: 1940-48. Dry, measurements discontinued after Sept. 20, 1948. See well 254A for further water-level measurements in this area.

254A. Stan Turley. SE¼NE¼ sec. 7, T. 2 S., R. 7 E., west of shed, about 0.3 mile southwest of Southern Pacific Railroad, 2.1 miles northwest of Rittenhouse siding. Drilled domestic well, diameter 8 inches. Records available: 1949. Oct. 6, 181.60.

261. Higley Ward School. NW¼NW¼ sec. 15, T. 2 S., R. 7 E. Records available: 1940-48. Measurements discontinued after Sept. 21, 1948. See well 252 for further water-level measurements in this area.

273. Leo Ellsworth. SE¼NE¼ sec. 28, T. 2 S., R. 7 E. Records available: 1939-47. No measurement made in 1949.

701. L. M. Mecham. SE¼SE¼SE¼ sec. 12, T. 2 S., R. 7 E., south of tin shed, 150 feet northwest of intersection of country roads, 3 miles south and 7 miles east of Higley. Drilled irrigation well, diameter 20 inches, depth 600 feet. Records available: 1948-49. Feb. 28, 1948, 177.00; Feb. 17, 1949, 197.05; Oct. 20, 196.70.

851. Mr. Stillwell. NE¼SE¼ sec. 23, T. 1 N., R. 6 E., 300 yards southeast of Buck Horn. Drilled domestic well, diameter 10 inches, depth 288.4 feet. Records available: 1946, 1948-49. Mar. 19, 1946, 229.20; Dec. 20, 1948, 259.84; Feb. 12, 1949, 256.58; Oct. 3, 267.60.

926. O. H. Semon. SW¼NW¼ sec. 31, T. 2 N., R. 6 E. Published incorrectly in previous water-supply papers as NW¼NW¼ sec. 31, T. 2 N., R. 6 E. Records available: 1935-49. Feb. 14, 104.10; Oct. 27, Dry; measurements discontinued.

1061. W. L. Brooks. NW¼NW¼ sec. 29, T. 3 N., R. 5 E. Records available: 1946-49. Feb. 16, 188.45; Oct. 22, 192.73.

1086. Salt River Valley Water Users' Association. SE¼SW¼ sec. 8, T. 2 N., R. 5 E. Records available: 1945-49. Feb. 14, 109.49; Oct. 27, 112.79.

1087. Salt River Valley Water Users' Association. NW¼SE¼ sec. 23, T. 2 N., R. 5 E. Records available: 1945-49. Feb. 14, 121.34; Oct. 27, 124.83.

1106. Charley Weaks. NE¼SE¼ sec. 25, T. 1 N., R. 5 E. Records available: 1935-49. Feb. 14, 108.70.

1107. Frank E. Shill. SW¼NW¼ sec. 2, T. 1 N., R. 5 E. Records available: 1946-49. Feb. 14, 87.51, nearby irrigation well pumping; Apr. 27, 88.17, nearby irrigation well pumping; June 15, 91.51; Oct. 27, 96.03.

1208. Salt River Valley Water Users' Association. NW¼NW¼ sec. 1, T. 1 S., R. 5 E. Records available: 1945-49. Feb. 14, 97.36; Apr. 27, 98.98; June 15, 98.69; Oct. 27, 103.79.

1210. Mrs. J. L. Cobb. SE¼SE¼ sec. 32, T. 1 S., R. 5 E. Records available: 1946-49. Feb. 15, 79.08; Oct. 27, 84.72.

1211. K. K. Skousen. NE¼SE¼ sec. 35, T. 1 S., R. 5 E. Records available: 1947-48. No measurement made in 1949.

1308. R. W. Hanna. SE¼SE¼ sec. 30, T. 2 S., R. 5 E. Records available: 1946-49. Feb. 14, 46.58; Apr. 27, 48.02; June 15, 48.09; Oct. 27, 48.31.

1309. A. R. Zent. Formerly Travis Moseley. NW¼NE¼ sec. 34, T. 2 S., R. 5 E. Records available: 1946-49. Feb. 14, 52.74; Oct. 27, 58.29.

1456. G. R. Finch. SW¼SW¼ sec. 15, T. 1 S., R. 4 E. Records available: 1935-49. Feb. 15, 61.75. Measurement discontinued.

1457. Ben Taylor. SW¼SW¼ sec. 29, T. 1 S., R. 4 E. Records available: 1946-48. Measurement discontinued after Oct. 8, 1948.

1458. C. W. Brooks. SE¼SE¼ sec. 27, T. 1 S., R. 4 E. Records available: 1946-49. Feb. 15, 41.44; Apr. 27, 37.52; June 15, 36.73; Oct. 27, 34.28.

1459. F. H. Hall. SE¼SW¼ sec. 29, T. 1 S., R. 4 E. Records available: 1946-49. Feb. 15, 77.52; Oct. 27, 93.89.

1502. J. B. House. SW¼NW¼ sec. 11, T. 1 N., R. 4 E. Records available: 1946-49. Feb. 15, 51.15; Oct. 28, 54.30.

1503. M. P. Bearden. SW¼NW¼ sec. 23, T. 1 N., R. 4 E. Records available: 1946-48. Dry, measurement discontinued after Oct. 11, 1948.

1601A. Stannards. SW¼NE¼ sec. 19, T. 2 N., R. 4 E. Records available: 1935-49. Feb. 21, 15.49; Apr. 27, 15.51; June 15, 15.10; Oct. 27, 11.58.

1619. Wm. Schrader. NE¼NE¼ sec. 26, T. 2 N., R. 4 E. Records available: 1946-49. Feb. 14, 75.07; Apr. 27, 76.57; June 15, 79.86; Oct. 28, 79.58.

1620. C. T. Sharp. NE¼NW¼ sec. 29, T. 2 N., R. 4 E. Records available: 1946-49. Feb. 21, 11.82; Oct. 27, 10.15.

1701. K. C. Caswell. NW¼SW¼ sec. 15, T. 3 N., R. 4 E. Records available: 1945-49. Feb. 16, 170.41; Oct. 22, 170.62.

1711. Owner unknown. SE¼SE¼ sec. 15, T. 3 N., R. 4 E. Records available: 1946-49. Feb. 16, 166.29; Oct. 22, 167.56.

1712. Owner unknown. SE¼SE¼ sec. 17, T. 3 N., R. 4 E. Records available: 1946-49. Feb. 16, 162.10; Oct. 22, 162.46.

1887. Owner unknown. NE¼SW¼ sec. 3, T. 4 N., R. 3 E. Records available: 1946-49. Feb. 16, 24.31; Oct. 22, 26.05.

1891. R. L. Jennings. SE¼SE¼ sec. 27, T. 4 N., R. 3 E. Records available: 1946-49. Feb. 16, 217.26; Oct. 22, obstructed.

1906. Maxwell. SW¼SW¼ sec. 1, T. 3 N., R. 3 E. Records available: 1946-49. Feb. 16, 184.24; Oct. 22, 184.65.

1906A. Geo. R. Putnam. NW¼NW¼ sec. 32, T. 3 N., R. 3 E. Records available: 1943-49. Feb. 21, 97.61.

1907. H. J. Love. SW¼NW¼ sec. 2, T. 3 N., R. 3 E. Records available: 1947-49. Feb. 16, 177.23; Oct. 22, 177.67.

1920. Arizona Aeronautics Corp. SW¼ sec. 14, T. 3 N., R. 3 E. Records available: 1946-49. Feb. 16, 197.54; Oct. 22, 202.36, nearby well pumping.

1924. Isabell-Hartner Ranches. NE¼NW¼ sec. 5, T. 3 N., R. 3 E. Records available: 1946-49. Feb. 21, 211.37; Oct. 27, 213.30.

1957. A. Fieks. NW¼NW¼ sec. 24, T. 2 N., R. 3 E. Records available: 1946-49. Feb. 21, 25.07.

2056. Godfrey. NW¼NE¼ sec. 36, T. 1 N., R. 3 E. Published incorrectly in previous water-supply papers as NE¼NW¼ sec. 36, T. 1 N., R. 3 E. Records available: 1935-49. Apr. 27, 45.59; Oct. 5, 47.70.

2058. Mr. Scott. Formerly owned by W. A. Campbell. SE¼SW¼ sec. 33, T. 1 N., R. 3 E. Records available: 1946-49. Feb. 23, 113.68.

2157. Bill Damon. NE¼NE¼ sec. 9, T. 2 S., R. 3 E. Records available: 1946-49. Feb. 15, 57.03.

2256. W. R. Collier. NE¼NW¼ sec. 36, T. 1 S., R. 3 E. Records available: 1946-49. Feb. 15, 93.56; Oct. 27, 105.92.

2301. A. Cheatum. SE¼SE¼ sec. 8, T. 1 S., R. 2 E. Records available: 1935-49. Feb. 23, 19.52; Oct. 5, 24.00, pumping recently.

2351. W. E. Sorenson. SW¼SW¼ sec. 3, T. 1 N., R. 2 E. Records available: 1935-49. Feb. 23, 73.88; Oct. 5, 87.85.

2353. C. Hobson. NW¼SW¼ sec. 28, T. 1 N., R. 2 E. Records available: 1946-49. Feb. 23, 31.10; Oct. 5, 38.95.

2451. V. E. Messinger. NW¼SW¼ sec. 8, T. 2 N., R. 2 E. Records available: 1935-49. Feb. 23, 85.40; Apr. 25, 87.98; June 16, 89.84; Oct. 27, 94.56.

2452. Leonard. SW¼SW¼ sec. 13, T. 2 N., R. 2 E. Records available: 1935-49. Feb. 23, 43.85; Oct. 5, 43.70.

2453. Santa Maria Produce Co. Formerly B. F. Reichenberger. SW¼SW¼ sec. 20, T. 2 N., R. 2 E. Records available: 1946-49. Feb. 23, 79.13; Oct. 27, 88.33.

2551. Charles Christopher. SE¼SE¼ sec. 24, T. 3 N., R. 2 E. Records available: 1940-49. Feb. 21, 156.95; Apr. 25, 157.85; June 16, 160.73.

2552. Lee Hopper. NW¼SW¼ sec. 7, T. 3 N., R. 2 E. Records available: 1946-49. Feb. 21, 138.24; Oct. 27, 146.97.

2553. American Institute for Foreign Trade. NW¼NW¼ sec. 8, T. 3 N., R. 2 E. Records available: 1946-49. Feb. 21, 166.90.

2555. Salt River Valley Water Users' Association. SW¼SW¼ sec. 26, T. 3 N., R. 2 E. Records available: 1944-49. Feb. 21, 146.42.

2556A. H. D. Connor. NE¼NE¼ sec. 1, T. 3 N., R. 2 E. Records available: 1948. Feb. 21, dry (irrigation well, 75 feet west, pumping); Oct. 27, dry (irrigation well, 75 feet west, pumping). No measurement made in 1949.

2651. Frank Echenique. SE¼NE¼ sec. 27, T. 4 N., R. 2 E. Records available: 1946-49. Feb. 21, 248.09; Oct. 27, 265.87.

2781. C. F. Edwards. SW¼ sec. 20, T. 5 N., R. 1 E. Records available: 1946-49. Feb. 17, 48.80; Nov. 3, 49.50, nearby well pumping.

2801. Owner unknown. NE¼NE¼ sec. 30, T. 4 N., R. 1 E. Records available: 1946-49. Feb. 17, 161.80; April 25, dry; measurement discontinued.

2802. J. G. Boswell. NW¼NW¼ sec. 5, T. 4 N., R. 1 E. Records available: 1946-48. Destroyed, measurement discontinued after Mar. 4, 1948.

2804. R. E. Grace. NW¼NW¼ sec. 34, T. 4 N., R. 1 E. Records available: 1946-49. Nov. 3, measurements discontinued. See well 2809 for water-level measurements in this area.

2809. R. E. Grace. NW¼NW¼ sec. 34, T. 4 N., R. 1 E., 1 mile west of New River and 4.25 miles north of U. S. Highway 70 and 80. Used drilled irrigation well, diameter 20 inches. Records available: 1949. Nov. 3, 194.86.

2852. J. G. Boswell. NW¼SE¼ sec. 9, T. 3 N., R. 1 E. Records available: 1946-49. Dec. 31, 1948, 122.85; Feb. 18, 1949, 123.03; Nov. 3, 133.00.

2854. J. G. Boswell. SE¼SE¼ sec. 7, T. 3 N., R. 1 E. Records available: 1926-49. Dec. 31, 1948, 132.64; Feb. 17, 1949, 130.19; Nov. 3, 141.48.

2856. Otis Cook. NE¼NW¼ sec. 35, T. 3 N., R. 1 E. Records available: 1946-49. Feb. 21, 72.10; Oct. 27, 77.56.

3051. Roosevelt Irrigation District. NE¼SE¼ sec. 12, T. 1 N., R. 1 E. Records available: 1930-49. Feb. 23, 65.82; Sept. 28, 72.50.

3053. Isabell-Hartner Co. NE¼NE¼ sec. 4, T. 1 N., R. 1 E. Records available: 1946-49. Feb. 23, 76.25; Apr. 27, 85.83; June 16, 88.29; July 1, 86.80; Sept. 28, 88.50.

3054. Owner unknown. NE¼NE¼ sec. 6, T. 1 N., R. 1 E. Records available: 1935-49. Feb. 23, 77.26; Sept. 28, 85.00.

3366. D. E. Accomazzo. SE¼NW¼ sec. 2, T. 1 S., R. 1 W. Records available: 1946-49. Feb. 23, 42.66.

3386. Goodyear Farms well 9B. NE¼SE¼ sec. 9, T. 1 N., R. 1 W. Records available: 1940-48. Measurement discontinued.

3387. Roosevelt Irrigation District. NE¼NE¼NE¼ sec. 10, T. 1 N., R. 1 W. Records available: 1929-45, 1947-49. Feb. 23, 58.20; Nov. 4, 70.50.

3388. T. C. Rhodes. NW¼NE¼ sec. 6, T. 1 N., R. 1 W. Records available: 1946-49. June 16, 105.14; Nov. 4, 95.88.

3389. A. R. Petri. NE¼NW¼ sec. 28, T. 1 N., R. 1 W. Records available: 1946-49. Feb. 23, 16.97; Oct. 6, 20.39.

3486. Goodyear Farms. SE¼NW¼ sec. 2, T. 2 N., R. 1 W. Records available: 1946-49. Feb. 18, 114.46; Dec. 13, 118.69.

3487. Goodyear Farms well 19D. NE¼NE¼ sec. 19, T. 2 N., R. 1 W. Records available: 1927-48. No measurement made in 1949.

3489. R. E. McMurchy. NW¼SW¼ sec. 13, T. 2 N., R. 1 W. Records available: 1946-49. June 16, 86.98.

3490. Goodyear Farms. NE¼NW¼ sec. 26, T. 2 N., R. 1 W. Records available: 1946-49. Feb. 18, 101.93; Nov. 4, filled with rocks.

3586. A. J. Reems. SW¼SW¼ sec. 5, T. 3 N., R. 1 W. Records available: 1946-49. Feb. 18, 225.73; measurement discontinued.

3587A. Rancho Santa Maria. NW¼NW¼ sec. 22, T. 3 N., R. 1 W. Records available: 1948-49. Dec. 13, 199.09.

3686. Maricopa County Municipal Water Conservation District No. 1. NE¼SE¼ sec. 8, T. 4 N., R. 1 W. Records available: 1946-49. Feb. 17, 211.51; Apr. 25, 214.60; June 16, 214.62; Nov. 3, 214.04.

3956. Maricopa County Municipal Water Conservation District No. 1. NW¼NE¼ sec. 4, T. 3 N., R. 2 W. Records available: 1946-48. Dry, measurement discontinued after Oct. 1, 1948.

4002. Maricopa County Municipal Water Conservation District No. 1. SW¼SE¼ sec. 4, T. 2 N., R. 2 W. Records available: 1946-49. June 16, 223.59; Nov. 4, 224.32.

4004. Goodyear Farms. NW¼NW¼ sec. 36, T. 2 N., R. 2 W., at southeast corner of intersection, 4 miles west and 1 mile south of Litchfield. Used drilled irrigation well, diameter 20 inches, depth 510 feet. Records available: 1947-49. Jan., 1947, 114.40; Mar. 17, 121.39; Aug. 27, 124.37; Feb. 23, 1949, 127.92; Nov. 4, 143.80.

4051. Roosevelt Irrigation District. SW¼SW¼ sec. 16, T. 1 N., R. 2 W. Records available: 1928-49. Feb. 23, 82.05; Oct. 6, 86.45.

4052. H. F. Hollingshead. NW¼NW¼ sec. 3, T. 1 N., R. 2 W. Records available: 1946-49. Feb. 23, 150.03; measurements discontinued.

4053. Owner unknown. NW¼SW¼ sec. 5, T. 1 N., R. 2 W. Records available: 1947-49. Feb. 23, 173.54; Oct. 6, 176.55.

4054. H. G. Frost. Formerly Jettie Robinson. NE¼SE¼ sec. 12, T. 1 N., R. 2 W. Records available: 1946-49. Feb. 23, 80.45; Oct. 6, 84.50.

4055. H. T. Kiefer. NE¼SW¼ sec. 23, T. 1 N., R. 2 W. Records available: 1946-49. Oct. 5, 40.45.

4100. Roosevelt Irrigation District. SW¼NE¼ sec. 13, T. 1 N., R. 2 W. Records available: 1928-49. Feb. 23, 65.47; Oct. 6, 71.85.

4151. Lee Hunter. NE¼NW¼ sec. 4, T. 1 S., R. 2 W. Records available: 1946-49. Feb. 24, 19.69; Oct. 6, dry at 21.50 feet.

4352. Mrs. John Hughes. NE¼SE¼ sec. 5, T. 1 S., R. 3 W. Records available: 1946-49. Feb. 24, 6.81; Apr. 27, 8.05; June 16, 8.99; Oct. 6, 9.50.

4401. Roosevelt Irrigation District. NW¼NW¼ sec. 34, T. 1 N., R. 3 W. Records available: 1928-49. Feb. 23, 59.87; Oct. 6, 61.19.

4402. Roosevelt Irrigation District. NE¼NW¼ sec. 32, T. 1 N., R. 3 W. Records available: 1937-49. Feb. 23, 66.91; Apr. 27, 75.70; June 16, 69.73; Oct. 6, 67.19.

4665. Lawrence Narramore. NW¼SW¼ sec. 13, T. 4 N., R. 4 W. Records available: 1946-49. Feb. 17, 315.64; Nov. 4, 322.54.

4711. Roosevelt Irrigation District. SW¼SW¼ sec. 31, T. 1 N., R. 4 W. Records available: 1937-49. Feb. 23, 66.54; Oct. 6, 67.96.

4712. Roosevelt Irrigation District. SW¼SE¼ sec. 34, T. 1 N., R. 4 W. Records available: 1928-49. Feb. 23, 56.28, nearby irrigation well pumping.

4714A. Ben Youngker. NW¼NE¼ sec. 19, T. 1 N., R. 4 W. Records available: 1948-49. Feb. 23, 55.00; Oct. 6, 62.05.

4715. Owner unknown. NE¼SW¼ sec. 25, T. 1 N., R. 4 W. Records available: 1946-49. Feb. 23, 71.15; Oct. 6, 72.01.

4761. Blake. NW¼SW¼ sec. 17, T. 1 S., R. 4 W. Records available: 1946-48. Destroyed, measurements discontinued after Apr. 2, 1948. See well 4761A for water-level measurements in this area.

4761A. Owner unknown. NE¼SE¼ sec. 18, T. 1 S., R. 4 W., about 10 feet west of road, 1 mile west and 0.5 mile south of Palo Verde. Drilled unused well, diameter 6 inches. Records available: 1949. Feb. 24, 6.91; Oct. 6, 9.42.

4762. George G. Sevey. NE¼SE¼ sec. 11, T. 1 S., R. 4 W. Records available: 1946-49. Feb. 24, 6.18.

5350. Owner unknown. SW¼SE¼ sec. 13, T. 5 S., R. 5 W. Records available: 1945-49. Mar. 7, 32.40; Nov. 11, 33.00.

5456. H. A. Kreager. SW¼NW¼ sec. 8, T. 2 S., R. 5 W. Records available: 1946-49. Feb. 24, 19.68; Oct. 6, 20.59, pumping recently.

5457. Bill Jagow. NE¼ sec. 20, T. 2 S., R. 5 W. Records available: 1946-49. Feb. 24, 25.63; Oct. 6, 31.13, pumping recently.

5502. Gillespie Land & Irrigation Co. SE¼SW¼ sec. 36, T. 2 S., R. 5 W. Records available: 1945-49. Mar. 7, 62.89; Nov. 11, dry.

5506. Charles Yokum. NE¼NE¼ sec. 1, T. 1 S., R. 5 W. Records available: 1946-49. Feb. 23, 68.88; Apr. 27, 78.34; June 16, 78.69; Oct. 6, 75.46.

5507. Owner unknown. NE¼ sec. 11, T. 1 S., R. 5 W. Records available: 1946-48. Measurements discontinued after Oct. 8, 1948. See well 5507A for water-level measurements in this area.

5507A. Owner unknown. NE¼ sec. 11, T. 1 S., R. 5 W., at windmill, 0.1 mile east of road, 450 feet west of west bank of Hassayampa River, 0.7 mile north of Hassayampa. Dug unused well, irregular diameter. Records available: 1949. Feb. 24, 34.72; Oct. 6, 36.88.

5606. Wheeler. SE¼ sec. 4, T. 1 N., R. 5 W. Records available: 1946-49. Feb. 24, 61.73; Oct. 6, 61.85.

5607. Spencer Wilson. NW¼NW¼ sec. 22, T. 1 N., R. 5 W. Records available: 1946-49. Feb. 24, 6.79; Oct. 6, 7.90.

5731. Carl Arnold. NE¼SE¼ sec. 26, T. 3 N., R. 5 W., south side of galvanized-iron tank, 150 feet northwest of house at ranch headquarters, 0.25 mile east of Hassayampa River, 6.5 miles north of Tonapah Road and 15.5 miles north of Hassayampa. Used dug domestic, stock and irrigation well, diameter 48 inches, depth 102 feet. Records available: 1946-47, 1948-49. Oct. 11, 1948, 87.83; Feb. 24, 1949, 87.39; July 22, 88.16.

5921. Owner unknown. SE¼SW¼ sec. 20, T. 2 N., R. 6 W. Records available: 1946-49. Mar. 4, 120.79.

5971. Mitchell. SE¼SE¼ sec. 16, T. 1 N., R. 6 W. Records available: 1946-49. Mar. 4, 86.28.

6260. Gillespie Land & Irrigation Co. NE¼NE¼ sec. 4, T. 6 S., R. 6 W. Records available: 1945-49. Mar. 7, 121.65; Nov. 11, 128.08.

6562. R. L. Ward. NW¼NW¼ sec. 19, T. 1 S., R. 7 W. Records available: 1946-48. Measurements discontinued after Oct. 13, 1948.

6564. Lee C. Underdown. NW¼NW¼ sec. 15, T. 1 S., R. 7 W., about 50 feet south of road, 5.5 miles west of road to Wintersburg, 14 miles west of Hassayampa. Drilled unused well, diameter 20 inches, depth 650 feet. Records available: 1949. Mar. 4, 178.22; July 26, 178.55.

6581. Owner unknown. NE¼NE¼ sec. 26, T. 2 N., R. 7 W. Records available: 1946-49. Mar. 4, 139.40.

6731. Leslie Ward. SW¼SE¼ sec. 13, T. 1 S., R. 8 W. Records available: 1946-49. Mar. 4, 19.19.

6732. Roy Davis. NW¼NW¼ sec. 22, T. 1 S., R. 8 W. Records available: 1946-49. Mar. 4, 56.21.

Mohave County

901. Bureau of Land Management. SE¼SE¼ sec. 9, T. 16 N., R. 13 E., at Wikieup, 300 feet north of post office, 200 feet west of Kingman-Wikieup Road. Stock and domestic well, diameter 6 inches, depth 117 feet. Records available: 1945-49. Jan. 13, 1945, 93.98; June 9, 95.50; Oct. 1, 93.18; Nov. 16, 1946, 93.72; June 7, 1948, 93.87; Oct. 19, 93.75; July 7, 1949, 95.55.

902. Lloyd Latham. NW¼SW¼ sec. 10, T. 16 N., R. 13 W., 0.1 mile northwest of house, 0.5 mile north and 0.5 mile east of Wikieup. Dug domestic well, diameter 5 feet, depth 32 feet. Records available: 1945-49. Oct. 1, 1945, 26.44; June 26, 1946, 26.81; Nov. 16, 27.69; June 16, 1947, 29.50; June 7, 1948, 28.55; Oct. 19, 28.00; July 7, 1949, 27.93.

903. Carl Duncan. SW¼ sec. 26, T. 16 N., R. 13 W., on east side of Big Sandy Wash, west of ranch buildings, west of road to Signal, 3.3 miles southeast of Wikieup. Dug stock and emergency irrigation well, diameter 12 inches. Records available: 1945-49. Jan. 12, 1945, 20.67; June 9, 20.05; Oct. 1, 21.79; June 26, 1946, 22.07; Nov. 16, 21.47; June 16, 1947, 21.30; June 7, 1948, 20.72; Oct. 19, 22.65; July 7, 1949, 21.84.

904. Dr. A. E. Carter. SE¼SE¼ sec. 35, T. 16 N., R. 13 W., at foot of hill, 200 feet east of house, west side of Big Sandy Wash, 4.5 miles south of Wikieup. Dug domestic and stock well, diameter 4 feet, depth 20 feet. Records available: 1945-49. Jan. 14, 1945, 14.78; June 8, 14.61; Oct. 1, 13.76; June 26, 1946, 14.08; Nov. 16, 14.34; June 16, 1947, 14.80; June 7, 1948, 15.93; Oct. 19, 16.10; July 7, 1949, 16.52.

905. Rual Nogales. SW¼SW¼ sec. 36, T. 16 N., R. 13 W., 50 feet north of adobe house, 0.1 mile west of Wikieup-Signal Road, about 5 miles southeast of Wikieup. Dug domestic well, diameter 12 inches, depth 15 feet. Records available: 1945-49. Jan. 12, 1945, 9.66; June 6, 10.54; Oct. 1, 10.99; June 26, 1946, 12.02; Nov. 16, 10.75; June 16, 1947, 10.79; June 7, 1948, 10.67; Oct. 19, 11.35; July 7, 1949, 11.12.

906. W. P. Hubbard. SE¼NE¼ sec. 15, T. 17 N., R. 13 W., 100 yards northwest of house, 0.5 mile east of Wikieup-Kingman Road, 12.6 miles north along road from Wikieup. Dug domestic and stock well, diameter 36 inches, depth 81 feet. Records available: 1945-49. Jan. 16, 1945, 73.10; June 8, 73.34; Oct. 1, 72.33; June 26, 1946, 73.61; Nov. 16, 74.38; June 16, 1947, 74.50; June 7, 1948, 76.62; Oct. 19, 78.46; July 7, 1949, 73.78.

1301. Mrs. Cary Gillespie. NW¼SW¼ sec. 24, T. 21 N., R. 17 W., in Kingman at 106 East Oak Street, an open casing 100 feet east of sidewalk along First Street, 3 blocks west and 2 blocks north of the Kingman Railroad Depot. Drilled unused well, diameter 6 inches, depth 165 feet. Records available: 1944-49. Aug. 14, 1944, 109.08; Jan. 11, 1945, 109.30; June 7, 109.99; Oct. 2, 109.93; June 25, 1946, 110.63; Oct. 4, 111.15; June 16, 1947, 110.82; June 8, 1948, 112.50; Oct. 19, 113.27; July 7, 1949, 113.94.

1302. E. A. Kier. SE¼SW¼ sec. 24, T. 21 N., R. 17 W., at Kingman, in shed northeast of house on south side of alley between Park Street and Golconda Avenue, 0.1 mile east of Fifth Street, 2.5 blocks south and 1 block east of Kingman Railroad Depot. Drilled domestic well, diameter 6 inches, depth 120 feet. Records available: 1944-49. August 14, 1944, 101.46; Jan. 11, 1945, 102.22; June 7, 102.43; Oct. 2, 102.58; June 25, 1946, 103.10; Oct. 4, 103.87; June 16, 1947, 106.30; June 8, 1948, 105.10; Oct. 19, 106.29; July 7, 1949, 106.21

Navajo County

2853. Simon Ranch. SW¼ sec. 27, T. 19 N., R. 15 E. Previously published as SW¼NE¼ sec. 27, T. 19 N., R. 15 E. Records available: 1944-49. July 13, 164.13.

5452. A. Smith. In Joseph City, on small knoll, one block north of store. Measurement discontinued July 13, 1949.

5652. Ben Hunt. SW¼SW¼ sec. 30, T. 18 N., R. 20 E. Records available: 1944-49. July 13, 38.99.

5653. Ben Hunt. SW¼SW¼ sec. 30, T. 18 N., R. 20 E. Records available: 1944-49. July 13, 22.05.

5654. Ben Hunt. SE¼ sec. 32, T. 18 N., R. 20 E. Records available: 1944-49. July 13, 37.09.

5656. Joseph City. SE¼NE¼ sec. 6, T. 18 N., R. 20 E., about 1.5 miles south of U. S. Highway 66 near Penzance, about 6 miles southeast of Joseph City. Drilled irrigation well. Records available: 1949. July 13, 6.72.

7451. E. B. Neuman. SW¼NW¼ sec. 1, T. 17 N., R. 20 E. Records available: 1944-49. July 13, 1.77.

7470. R. E. Whiting. NE¼SW¼ sec. 10, T. 17 N., R. 20 E. Records available: 1944-49. July 13, 30.46.

7471. R. E. Whiting. NE¼SW¼ sec. 10, T. 17 N., R. 20 E. Records available: 1944-49. July 13, 16.26.

7478. George McLaws. SE¼SW¼ sec. 10, T. 17 N., R. 20 E. Records available: 1944-49. July 13, 51.04.

7489. R. Henderson. NW¼SW¼ sec. 11, T. 17 N., R. 20 E. Records available: 1944-49. July 13, 13.64.

7493. F. J. McLaws. SE¼NW¼ sec. 12, T. 17 N., R. 20 E. Records available: 1944-49. July 13, 54.43.

7651. Ambrosia Armijo. SW¼SW¼ sec. 6, T. 17 N., R. 21 E. Records available: 1944-49. July 14, 13.62.

7652. Ambrosia Armijo. SW¼SW¼ sec. 6, T. 17 N., R. 21 E. Records available: 1944-48. Measurement discontinued July 14, 1949.

7653. State of Arizona. NW¼NW¼ sec. 7, T. 17 N., R. 21 E. Records available: 1944-49. July 14, 40.17.

7655. Noel Reynolds. Formerly John Mocko. SW¼NW¼ sec. 10, T. 17 N., R. 21 E. Records available: 1944-49. July 14, 51.84.

9976. McNeill. NE¼NW¼ sec. 25, T. 10 N., R. 21 E., about 200 feet southeast of ranch house, 0.3 mile north of U. S. Highway 60, 2 miles west of Showlow. Dug unused well, diameter 48 inches, depth 13.8 feet. Records available: 1949. July 14, 9.47.

10001. Oren Whipple. SE¼SE¼ sec. 18, T. 10 N., R. 22 E., about 50 feet north of State Highway 77, 0.8 mile west of Showlow. Drilled unused well, diameter 8 inches. Records available: 1949. July 14, 376.73.

10500. McNeil. NE¼NW¼ sec. 25, T. 10 N., R. 21 E. Records available: 1944-48. Measurement discontinued July 14, 1949; dry at 45 or 46 feet. See well 9976 for further measurements in this vicinity.

11000. Bureau of Indian Affairs. SW¼SE¼ sec. 22, T. 9 N., R. 21 E. Previously published as unsurveyed land. Records available: 1944-49. July 14, 9.38.

Pima County

454. Cortaro Farms. SE¼NE¼ sec. 11, T. 11 S., R. 10 E. Records available: 1941-49. Sept. 26, 157.80; Dec. 16, 157.24.

457. T. J. Smith. SE¼NE¼ sec. 22, T. 11 S., R. 10 E. Records available: 1940-42, 1944-48. No measurement made in 1949.

460. W. E. Anway. NW¼ sec. 27, T. 11 S., R. 10 E. Records available: 1940-42, 1944-49. Sept. 1, 148.25; Nov. 16, 148.62.

463. Bud Parker. SE¼SE¼ sec. 36, T. 11 S., R. 10 E. Records available: 1940-42, 1944-49. Sept. 1, 176.52.

466. T. V. Valenzuela. NE¼SE¼ sec. 32, T. 11 S., R. 10 E. Records available: 1946-49. Mar. 24, 161.80; Sept. 1, 163.84; Nov. 16, 163.13.

535. Cortaro Farms. NE¼NE¼ sec. 30, T. 11 S., R. 11 E. Records available: 1939-49. Dec. 16, 184.15.

1337. Cortaro Farms. NE¼NW¼ sec. 16, T. 12 S., R. 12 E. Records available: 1939-49. Jan. 26, 99.60; Sept. 26, 109.55; Dec. 16, 102.15.

1367. Grady Wilson. SE¼SE¼ sec. 28, T. 12 S., R. 12 E. Records available: 1939-49. Jan. 26, 141.00; Sept. 26, 148.60; Dec. 16, 143.29.

1428. J. E. Glover. NE¼SW¼ sec. 8, T. 12 S., R. 11 E. Records available: 1940, 1942, 1944-49. Mar. 24, 191.40; Sept. 1, 192.90; Nov. 16, 194.08.

1430. J. E. Glover. SE¼SE¼ sec. 18, T. 12 S., R. 11 E. Records available: 1940-42, 1944-47, 1949. Nov. 16, 201.34.

1432. P. Johansen. NE¼NE¼ sec. 29, T. 12 S., R. 11 E. Records available: 1940-42, 1944-47. No measurement made in 1949.

1435. Paul Becker. Previously published as S. B. Niles. SW¼SW¼ sec. 34, T. 12 S., R. 11 E. Records available: 1940-42, 1944-46, 1949. Aug. 31, 306.70; Nov. 15, 310.85.

1503. V. Valenzuela. NW¼NW¼ sec. 9, T. 12 S., R. 10 E. Records available: 1940-42, 1944-49. Mar. 24, 166.50; Sept. 1, 166.74; Nov. 16, 166.15.

1505. King Investment Co. Formerly Alonzo Stephens. SE¼SE¼ sec. 20, T. 12 S., R. 10 E. Records available: 1940, 1942, 1944-49. Mar. 24, 187.42; Sept. 1, 191.49; Nov. 16, 187.70.

1506. Harry Alexander. NE¼NE¼ sec. 26, T. 12 S., R. 10 E. Records available: 1940-42, 1944, 1946-48. No measurement made in 1949.

2651. Pima County. SW¼NE¼ sec. 7, T. 13 S., R. 12 E. Records available: 1940-42, 1944-49. Mar. 28, 36.12; Aug. 31, 37.55; Nov. 15, 37.07.

2738. Bruce Knapp. SE¼NE¼ sec. 28, T. 13 S., R. 13 E. Records available: 1939-49. Sept. 26, 62.35; Dec. 16, 55.75.

2808. Courtright Stables. SE¼SE¼ sec. 25, T. 13 S., R. 14 E. Records available: 1939-49. Sept. 27, 10.61; Dec. 15, 11.60.

4156. Charles Reynard. SW¼SE¼ sec. 7, T. 14 S., R. 15 E. Records available: 1939-49.

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 26	184.40	Apr. 27	184.76	July 27	185.05	Oct. 27	185.49
Feb. 28	184.46	May 27	184.80	Aug. 29	185.24	Nov. 25	185.58
Mar. 29	184.72	June 27	184.95	Sept. 27	185.43	Dec. 27	185.79

4375. E. L. Rogers. SE¼SE¼ sec. 34, T. 14 S., R. 13 E. Records available: 1939-42, 1944-49. Jan. 27, 49.43; Sept. 26, 58.48; Dec. 16, 54.35.

4450. Pima County. NW¼NW¼ sec. 6, T. 14 S., R. 12 E. Records available: 1940-42, 1944-49. Nov. 15, 105.64.

4452. Pima County. NW¼NW¼ sec. 17, T. 14 S., R. 12 E. Records available: 1940-42, 1945-49. Mar. 24, 79.79. Measurement discontinued after Aug. 31, 1949.

4453. Pima County. NE¼SW¼ sec. 21, T. 14 S., R. 12 E. Records available: 1940-42, 1944-49. Mar. 24, 58.76; Aug. 31, 58.83; Nov. 15, 58.65.

4601. J. Burrell. Sec. 10, T. 14 S., R. 10 E. Records available: 1940-42, 1944, 1946-49. Mar. 22, 22,90; Aug. 30, 19.40; Nov. 14, 19.98.

4602. J. Burrell. Sec. 10, T. 14 S., R. 10 E. Records available: 1940-42, 1944, 1946-49. Mar. 22, 14.96; Aug. 30, 10.23; Nov. 14, 10.84.

4604. Robert Locke. Formerly Frank R. Rendon. SW¼ sec. 24, T. 14 S., R. 10 E. Records available: 1940-42, 1944, 1946-49. Mar. 22, 304.30; Aug. 30, 306.12.

6404. Robert Locke. Formerly Everett Inscho. NE¼NE¼ sec. 29, T. 15 S., R. 10 E. Records available: 1940-42, 1944-49. Mar. 22, 143.22; Aug. 30, 143.90; Nov. 14, 143.90.

6405. C. W. Van Camp. NW¼SE¼ sec. 33, T. 15 S., R. 10 E. Records available: 1940-42, 1944-49. Mar. 22, 150.20; Aug. 30, 150.24; Nov. 14, 149.84.

6410. C. W. Van Camp. NE¼NE¼ sec. 35, T. 15 S., R. 10 E. Records available: 1940-42, 1944, 1946-49. Mar. 22, 214.65; Aug. 30, 214.54; Nov. 14, 214.46.

6575. H. C. Barker. NE¼SW¼ sec. 1, T. 15 S., R. 13 E. Records available: 1939-49. Mar. 30, 56.54; Sept. 26, 64.40; Dec. 15, dry.

6582. San Xavier School. NE¼NE¼ sec. 15, T. 15 S., R. 13 E. Records available: 1939-49. Jan. 27, 43.55. Measurements discontinued after Sept. 26, 1949.

6593. Bureau of Indian Affairs. San Xavier Reservation. SW¼SE¼ sec. 22, T. 15 S., R. 13 E. Records available: 1939-49. Jan. 27, 31.80; Sept. 26, 33.60; Dec. 16, 34.31, nearby irrigation well pumping.

6612. City of Tucson. SW¼SW¼ sec. 2, T. 15 S., R. 13 E. Records available: 1942-49.

Jan. 27	43.98	April 27	47.35	July 27	50.10	Oct. 27	52.58
Feb. 28	44.98	May 27	48.44	Aug. 29	53.17	Nov. 25	51.48
Mar. 29	46.76	June 27	51.00	Sept. 26	52.74	Dec. 27	50.02

7166. Lane Farms. SE¼SW¼ sec. 31, T. 16 S., R. 14 E. Records available: 1941-49. Mar. 30, 61.37; Dec. 15, 65.60.

8686. State Highway Department. NE¼SW¼ sec. 18, T. 17 S., R. 14 E. Records available: 1939-49. Jan. 27, 60.52; Mar. 30, 64.64; July 27, 67.36; Sept. 27, 64.53; Dec. 15, 62.43.

9230. J. B. Bull. NW¼SW¼ sec. 1, T. 18 S., R. 13 E. Records available: 1939-49. Jan. 27, 54.40; Sept. 27, 63.69; Dec. 15, 53.80.

10477. Intercontinental Ranch Co. well W1. SW¼NW¼ sec. 3, T. 19 S., R. 13 E. Records available: 1939-49. Jan. 27, 58.23; Dec. 15, 61.63

10483. Gustavo Amado. NW¼SW¼ sec. 29, T. 19 S., R. 13 E. Records available: 1939-49. Mar. 30, 34.30; July 27, 35.35; Sept. 27, 34.60; Dec. 15, 35.30.

Pinal County

23. Hart Mullins. NW¼SE¼ sec. 35, T. 1 S., R. 10 E. Records available: 1939-49. Feb. 12, 20.25; Oct. 3, 19.28.

35. E. M. Little. SW¼SW¼ sec. 8, T. 2 S., R. 10 E. Records available: 1940-49. Feb. 12, 398.42; Oct. 3, 398.50.

41. W. A. Barkley. NW¼SE¼ sec. 27, T. 2 S., R. 8 E. Records available: 1940-49. Jan. 19, 241.30. Dry, measurement discontinued after Feb. 19. See well 41A for further measurements in this vicinity.

41A. Ellsworth Bros. SE¼SE¼ sec. 27, T. 2 S., R. 8 E., 50 feet northwest of the southeast corner of sec. 27, 2 miles south and 7 miles east of the town of Queen Creek. Drilled irrigation well, diameter 20 inches, depth 614 feet. Records available: 1947, 1949. Dec. 19, 1947, 230.00; Jan. 19, 1949, 231.74; Feb. 19, 1949, 234.28; Oct. 20, 1949, 240.82.

52. Leo Ellsworth. NE¼NE¼NE¼ sec. 31, T. 2 S., R. 8 E., 50 feet southwest of NE corner sec. 31, 1 mile east of Southern Pacific Railroad, 2 miles south and 4 miles east of town of Queen Creek. Drilled irrigation well, diameter 20 inches, depth 600 feet. Records available: 1942, 1949. June 2, 1942, 164.17; Jan. 19, 1949, 193.00; Feb. 19, 192.23.

69. Elmer C. Von Glahn. NE¼NE¼ sec. 20, T. 3 S., R. 9 E., north of stock tank, at section corner, 0.5 mile southeast of Magma Arizona Railroad, about 4 miles northeast of railroad junction at Magma. Drilled irrigation well, diameter 20 inches, depth 600 feet. Records available: 1942, 1948-49. May 31, 1942, 225.00; Sept. 16, 1948, 238.00; Dec. 21, 1948, 241.43; Feb. 17, 1949, 222.70; Oct. 20, 232.17.

71. Magma Arizona Railroad. NE¼NE¼ sec. 35, T. 3 S., R. 8 E. Records available: 1940-49. Jan. 20, 180.73; Feb. 17, 175.10; Oct. 20, 171.20.

123. Bureau of Indian Affairs well 61. SW¼NE¼ sec. 36, T. 3 S., R. 4 E. Records available: 1942-49. May 16, 32.70; July 26, 32.80; Oct. 4, 34.50; Dec. 6, 32.36.

174. G. W. Yancy. NW¼SE¼ sec. 18, T. 4 S., R. 3 E. Records available: 1942-49. Jan. 31, 28.18; May 16, 29.40; July 26, 31.40; Oct. 4, 30.50; Dec. 6, 30.68.

259. Bureau of Indian Affairs well 43. SE¼NE¼ sec. 30, T. 4 S., R. 7 E. Records available: 1942-49. Feb. 7, 35.72; May 17, 36.65; July 27, 37.31; Oct. 3, 37.94; Dec. 8, 42.66.

278. Arizona Ranches, Inc. SW¼SW¼ sec. 2, T. 4 S., R. 8 E. Records available: 1941-49. Jan. 17, 175.46; Feb. 17, 175.49; Oct. 20, 178.18.

341. Bureau of Indian Affairs well 7. SW¼SW¼ sec. 7, T. 4 S., R. 11 E. Records available: 1942-49. Feb. 7, 43.57; May 16, 32.06; July 29, 27.91; Oct. 3, 26.46; Dec. 8, 26.50.

437. Bureau of Indian Affairs well 76. SE¼NE¼ sec. 29, T. 5 S., R. 9 E. Records available: 1942-49. Feb. 7, 142.50; May 17, 153.03; July 29, 150.40; Oct. 3, 149.66; Dec. 8, 146.72.

493. H. R. Montierth. SW¼NW¼ sec. 32, T. 5 S., R. 8 E. Records available: 1942-49. Feb. 7, 72.97; Dec. 7, 86.25.

503. L. D. Ulmer. NE¼NE¼ sec. 1, T. 5 S., R. 8 E. Records available: 1942-49. Feb. 7, 53.80; May 17, 54.55; July 29, 56.46; Oct. 3, 55.72; Dec. 8, 55.78.

618. Fugua. NW¼SW¼ sec. 30, T. 5 S., R. 4 E. Records available: 1942-49. Jan. 31, 108.94; May 16, 114.82.

738. A. A. Wallace. SW¼NW¼ sec. 9, T. 6 S., R. 3 E. Records available: 1942-49. Jan. 31, 146.23; Mar. 1, 148.53; Oct. 4, 156.18; Dec. 6, 154.85.

887. Paul Knobloch. SE¼NE¼ sec. 9, T. 6 S., R. 5 E. Records available: 1940-49. Jan. 31, 48.33; Apr. 13, 48.95; May 16, 49.30; July 26, 50.05; Oct. 4, 49.09; Dec. 6, 48.03.

890A. Mrs. Gus Dratzka. SE¼NE¼ sec. 15, T. 6 S., R. 5 E. Records available: 1948-49. Jan. 31, 40.96; Apr. 13, 42.10; May 16, 39.65; July 26, 36.53; Dec. 6, 32.58.

893. P. H. Ethington. SE¼NE¼ sec. 16, T. 6 S., R. 5 E. Records available: 1940-49. Jan. 31, 60.48; Apr. 13, 62.17; May 16, 61.10; July 26, 62.03; Oct. 4, 54.13; Dec. 6, 51.96.

906. Bureau of Indian Affairs well 100. SE¼NE¼ sec. 23, T. 6 S., R. 5 E. Records available: 1942-49. Jan. 31, 41.88; Apr. 13, 42.90; May 16, 41.88; July 26, 36.68; Oct. 4, 33.40; Dec. 6, 32.58.

907. Burris Bros. SE¼SE¼ sec. 23, T. 6 S., R. 5 E. Records available: 1940-49. Jan. 31, 50.80; Apr. 13, 51.63; May 16, 51.20; July 26, 42.30; Oct. 4, 38.97; Dec. 6, 37.27.

961. Floyd Smith. NE¼NE¼ sec. 7, T. 6 S., R. 6 E. Records available: 1940-49. Jan. 31, 40.24; Apr. 13, 44.23; May 16, 56.70; July 26, 48.00; Oct. 3, 44.98; Dec. 7, 42.48.

968. C. E. Sherrill. SE¼SW¼ sec. 13, T. 6 S., R. 6 E. Records available: 1940-49. Dec. 7, 70.25.

981. Gilbert Bros. SE¼SE¼ sec. 20, T. 6 S., R. 6 E. Records available: 1941-49. Feb. 8, 54.54; Apr. 13, 55.80; May 18, 56.32; July 27, 56.87; Oct. 4, 56.71; Dec. 6, 55.67.

991. Mrs. Emma Pennington. SE¼SE¼ sec. 25, T. 6 S., R. 6 E. Records available: 1940-49. Feb. 8, 64.40; Apr. 13, 68.42; May 18, 70.83; July 27, 82.36; Oct. 4, 67.00; Dec. 7, 65.36.

1002. Bureau of Indian Affairs well 103. SW¼SW¼ sec. 33, T. 6 S., R. 6 E. Records available: 1942-49. July 27, 55.50; Oct. 4, 52.15; Dec. 6, 51.80.

1066. Diwan Singh. SE¼NW¼ sec. 22, T. 6 S., R. 7 E. Records available: 1939-49. July 27, 110.97; Oct. 4, 110.94; Dec. 7, 102.60.

1072. Bureau of Indian Affairs well 85. SE¼SE¼ sec. 27, T. 6 S., R. 7 E. Records available: 1942-49. Feb. 8, 97.30; Apr. 13, 105.60; May 18, 106.75; July 27, 107.11; Oct. 4, 108.54; Dec. 7, 108.20.

1079. Bureau of Indian Affairs well 84. NE¼NE¼ sec. 35, T. 6 S., R. 7 E. Records available: 1942-48. No measurement made in 1949.

1118. Dick Shiflet. SE¼NE¼ sec. 4, T. 6 S., R. 8 E. Records available: 1940-49. July 27, 99.80.

1153. Bureau of Indian Affairs well 82. SW¼SW¼ sec. 30, T. 6 S., R. 8 E. Records available: 1942-48. No measurements made in 1949.

1157. Bureau of Indian Affairs well 78. NE¼NW¼ sec. 35, T. 6 S., R. 8 E. Records available: 1942-49. Feb. 7, 65.50; Apr. 13, 65.92; May 17, 66.42; July 27, 67.61; Oct. 5, 63.68; Dec. 7, 60.90.

1162. Mr. McFarland. SW¼SW¼ sec. 27, T. 6 S., R. 8 E. Records available: 1942-48. No measurement made in 1949.

1172. W. W. Ray. SW¼SW¼ sec. 20, T. 6 S., R. 8 E. Records available: 1944-49. Apr. 13, 132.90; May 18, 137.70; July 27, 142.21; Oct. 5, 130.86; Dec. 7, 125.60.

1405. S. C. McFarland. SE¼SW¼ sec. 11, T. 7 S., R. 7 E. Records available: 1942-49. Jan. 7, 136.80; May 18, 156.48; July 27, 164.07; Dec. 7, 139.95.

1430. Les Milligan. SW¼NE¼ sec. 2, T. 7 S., R. 7 E. Records available: 1944-49. May 18, 146.82; July 27, 156.30, nearby irrigation well pumping; Oct. 4, 139.94; Dec. 7, 136.90.

1479. Paul Brophy. SW¼SW¼ sec. 12, T. 7 S., R. 6 E. Records available: 1941-49. Feb. 4, 88.22; May 17, 92.90; July 27, 94.61; Oct. 4, dry at 114 feet.

1485. F. W. Shedd. SE¼SE¼ sec. 27, T. 7 S., R. 6 E. Records available: 1940-49. Feb. 3, 91.78; May 17, 99.10. Measurement discontinued after May 17, 1949.

1489. Albert Steinfeld. SE¼NE¼ sec. 30, T. 7 S., R. 6 E. Records available: 1942-49. Feb. 3, 77.60; May 17, 79.84; July 27, 83.25; Oct. 4, 80.12; Dec. 6, 79.93.

1539. W. S. Stephenson Estate. SE¼SE¼ sec. 22, T. 7 S., R. 5 E. Records available: 1942, 1944-49. Jan. 31, 106.54; May 16, 113.60; July 27, 115.85; Dec. 6, 112.70.

1716. Smith-Thornburg Co. SW¼NE¼ sec. 29, T. 8 S., R. 6 E. Records available: 1941-49. Feb. 3, 79.36; May 17, 82.80; July 27, 84.80; Oct. 4, 83.66; Dec. 6, 83.60.

1776. G. J. Roundtree. Formerly S. C. Milligan. SE¼NE¼ sec. 9, T. 8 S., R. 7 E. Records available: 1941-49. Oct. 5, 166.80; Dec. 9, 164.90.

1787. Sam Phillips. SE¼SE¼ sec. 15, T. 8 S., R. 7 E. Records available: 1941-49. Feb. 2, 185.20; July 28, 200.14; Oct. 5, 182.00.

1791. S. G. Wilson. SE¼NE¼ sec. 22, T. 8 S., R. 7 E. Records available: 1940-49. Feb. 2, 169.59; May 18, 203.90; July 28, 219.13, pumping recently; Oct. 5, 199.10; Dec. 9, 186.50.

1795. Jack Pretzer, Jr. SE¼SE¼ sec. 25, T. 8 S., R. 7 E. Records available: 1940-49. Jan. 7, 174.96; Feb. 1, 183.28; May 18, 207.90; Oct. 5, 207.65; Dec. 9, 198.38.

1855. D. A. Trekell. SE¼SE¼ sec. 7, T. 8 S., R. 8 E. Records available: 1941-49. Feb. 2, 193.05; May 18, 197.38; July 28, 202.32; Oct. 5, 196.78; Dec. 9, 197.20.

1884. Arizona Farm Products Co. Known locally as Jack Pretzer well 6. SE¼SW¼ sec. 33, T. 8 S., R. 8 E. Records available: 1940-49. Feb. 1, 198.35; May 19, 208.60; Oct. 5, 213.11; Dec. 9, 208.13.

2104. P. G. Wolfe. SE¼NE¼ sec. 20, T. 9 S., R. 8 E. Records available: 1942-49. Jan. 7, 194.42; May 19, 216.83; Oct. 5, 224.11; Dec. 9, 217.00.

2108. J. F. Nutt. SE¼SE¼ sec. 26, T. 9 S., R. 8 E. Records available: 1942-45. No measurement made in 1949.

2173. R. W. Dickey well 2. SE¼SE¼ sec. 15, T. 9 S., R. 7 E. Records available: 1942-49. Feb. 1, 158.26; May 19, 189.46; July 28, 198.76. Measurement discontinued after July 28, 1949.

2174. R. H. Washburn. SE¼SE¼ sec. 16, T. 9 S., R. 7 E. Records available: 1944-49. Feb. 1, 149.55; July 28, 190.50; Oct. 5, 173.59; Dec. 9, 171.90.

2233. J. Sevak. SE¼SE¼ sec. 24, T. 9 S., R. 6 E. Records available: 1941-49. Feb. 1, 99.00; May 19, 103.95; Oct. 5, 101.76; Dec. 9, 99.58.

2239. B. F. Nelssen. NW¼NE¼ sec. 10, T. 9 S., R. 6 E. Records available: 1942, 1945-49. Feb. 3, 130.22; Feb. 10, 130.40; May 12, 132.40; July 27, 134.60; Oct. 4, 136.80; Dec. 6, 137.38.

2311. J. C. Kinney. NW¼ sec. 3, T. 10 S., R. 7 E. Records available: 1941-47, 1949. Feb. 10, 121.37; Oct. 5, 127.50.

2332. J. C. Kinney. SE¼SE¼ sec. 5, T. 10 S., R. 8 E. Records available: 1941-49. Feb. 10, 185.90; Oct. 5, 200.98; Dec. 8, 196.46.

2354. H. H. Cake. SW¼NW¼ sec. 10, T. 10 S., R. 9 E. Records available: 1941-49. Jan. 24, 158.99; Feb. 22, 159.10; May 19, 159.55; July 25, 163.35; Oct. 4, 161.05; Dec. 8, 161.15.

2363A. King Investment Co. SE¼SE¼ sec. 36, T. 10 S., R. 9 E. Records available: 1942-43, 1945-49. Nov. 17, 144.48.

2383. Tom Soleng. SW¼SE¼ sec. 34, T. 10 S., R. 10 E. Records available: 1942-47, 1949. Mar. 24, 154.90.

Santa Cruz County

79. Mrs. Schenkel. SW¼NW¼ sec. 32, T. 20 S., R. 13 E. Records available: 1940-49. Mar. 30, 34.00; Sept. 27, 31.93.

908. T. T. Pendleton. SW¼SE¼ sec. 16, T. 22 S., R. 13 E. Records available: 1940-49. Mar. 30, 18.22. Measurement discontinued after Dec. 15, 1949.

915. T. T. Pendleton. SE¼SE¼ sec. 35, T. 22 S., R. 13 E. Records available: 1940-49. Mar. 30, 43.42; Dec. 15, 41.49.

1504. J. F. Dalton. SW¼NW¼ sec. 19, T. 23 S., R. 14 E. Records available: 1940-49. July 27, 16.25; Sept. 27, 13.46; Dec. 15, 13.08.

1513. Dines Nelson. NE¼NW¼ sec. 27, T. 23 S., R. 14 E. Records available: 1940-49. Jan. 18, 19.56; Mar. 30, 18.08; July 27, 19.69; Sept. 27, 19.00; Dec. 15, 18.22.

1525. T. Griffin. NW¼NW¼ sec. 36, T. 23 S., R. 14 E. Records available: 1940-49. Jan. 18, 39.15; Mar. 30, 36.11; July 27, 40.72; Sept. 27, 36.24, nearby Santa Cruz River running; Dec. 15, 39.99.

1912. Simon Mastick. SW¼NE¼ sec. 8, T. 24 S., R. 14 E. Records available: 1940-49. Mar. 30, 25.22; Sept. 27, 21.75; Dec. 15, 23.05.

2007. Neilson Brown. Buena Vista Land Grant, approximately the SE¼ sec. 7, T. 24 S., R. 15 E. Records available: 1947-49. Jan. 19, 9.39; Mar. 30, 9.20; July 27, 9.55; Sept. 27, 9.98; Dec. 15, 9.15.

Yavapai County

5. Dan Resner. SW¼NW¼ sec. 19, T. 11 N., R. 4 W., 20 feet northwest of house, 100 feet north of road, 300 feet east of U. S. Highway 89, 4.4 miles northeast of Yarnell. Drilled domestic and stock well, diameter 6 inches, depth 47 feet. Records available: 1946, 1948-49. July 3, 1946, 16.50; Sept. 3, 1948, 20.40; Oct. 21, 1948, 20.28; July 8, 1949, 18.81.

27. Mr. Towne. NE¼SE¼ sec. 25, T. 11 N., R. 5 W., 100 feet east of U. S. Highway 89, 3.2 miles northeast of Yarnell. Drilled unused well, diameter 8 inches, depth 212 feet. Records available: 1946, 1948-49. July 2, 1946, 26.35; Sept. 7, 1948, 37.03; Oct. 21, 37.68; July 8, 1949, 31.09.

307. George Hawkins. SW¼SW¼ sec. 19, T. 11 N., R. 6 W., about 2 miles southwest of Date Creek, 1.5 miles west of Hillside-Congress Junction Road. Unused well, diameter 22 inches, depth 552 feet. Records available: 1947-49. Aug. 5, 1947, 93.83; Sept. 29, 1948, 95.35; July 8, 1949, 95.90.

450. Rhy Nelson. SE¼SE¼ sec. 29, T. 13 N., R. 4 W., 100 yards east of Kirkland-Skull Valley Road, 1.6 miles northeast of Kirkland. Dug unused well, diameter 5 feet, depth 33.5 feet. Records available: 1944-49. Aug. 14, 1944, 28.83; Jan. 17, 1945, 29.21; Apr. 14, 27.70; June 19, 29.21; June 19, 1946, 29.50; Nov. 18, 29.82; June 17, 1947, 29.42; Apr. 22, 1948, 29.55; July 8, 1949, 29.59.

466. J. S. Reagan. SE¼SE¼ sec. 9, T. 13 N., R. 6 W., at Yava, 450 feet south of turn in main road, 100 feet west of lane, 12.9 miles northwest of Kirkland. Dug irrigation well, diameter 72 inches, depth 22 feet. Records available: 1945-49. Nov. 17, 1945, 13.98; Oct. 4, 14.65; July 1, 1946, 15.52; Nov. 18, 1946, 14.45; June 17, 1947, 16.62; June 9, 1948, 16.00; Oct. 21, 16.20; July 8, 1949, 16.76.

467. W. J. Satathite. NE¼NE¼ sec. 16, T. 13 N., R. 6 W., at Yava, 300 feet east of road, 0.1 mile south of Kirkland Creek bridge, 13 miles northwest of Kirkland on Kirkland-Hillside Road. Dug domestic well, diameter 48 inches, depth 22.5 feet. Records available: 1945-49. Jan. 17, 1945, 20.02; June 6, 18.80; Oct. 4, 20.23; July 1, 1946, 19.35; Nov. 18, 20.67; June 17, 1947, 19.60; June 9, 1948, 20.77; Oct. 21, 21.65; July 8, 1949, 20.42.

633. Mrs. Mary Cooper. SW¼NW¼ sec. 33, T. 14 N., R. 4 W., 50 feet west of road between Skull Valley and Iron Springs, 0.7 mile north of Skull Valley Post Office. Domestic dug well, diameter 6 feet, depth 25 feet. Records available: 1944-46, 1948-49. Aug. 14, 1944, 17.56; Jan. 17, 1945, 16.05; June 19, 1946, 18.41; Apr. 22, 1948, 17.09; July 7, 1949, 17.72.

634. M. A. Wiser. NW¼NE¼ sec. 33, T. 14 N., R. 4 W., 0.2 mile north of house, 450 feet west of narrow road, 40 feet south of fence, 0.8 mile north of Skull Valley Post Office. Drilled unused well, diameter 18 inches, depth 73 feet. Records available: 1944-49. Aug. 14, 1944, 12.15; Jan. 17, 1945, 11.90; Apr. 14, 11.03; June 19, 11.88; June 19, 1946, 11.90; Nov. 18, 12.48; June 17, 1947, 12.40; Apr. 22, 1948, 12.37; Oct. 21, 14.77; July 8, 1949, 13.92.

Yuma County

95. John R. Wood. SE¼NE¼ sec. 31, T. 6 N., R. 12 W., at Wenden, 5 miles northeast of Salome. Drilled unused well, diameter 6 inches, depth 500 feet. Records available: 1945-46, 1948-49. Jan. 6, 1945, 78.49; June 10, 79.47; Oct. 3, 79.98; Feb. 19, 1946, 80.60; Mar. 27, 80.47; June 9, 1948, 87.49; Oct. 20, 84.60; July 6, 1949, 85.78.

155. Western Farm Management Co. NE¼NW¼ sec. 19, T. 6 S., R. 12 W. Records available: 1945-49. Mar. 7, 41.35.

195. H. P. Johnson. NE¼NW¼ sec. 13, T. 7 S., R. 12 W. Records available: 1945-49. Mar. 1, 1948, 104.37; Mar. 7, 1949, 104.42; Nov. 11, 104.49.

200. Owner unknown. NW¼SW¼ sec. 18, T. 7 S., R. 12 W. Records available: 1945-49. Mar. 7, 25.31; Nov. 11, 18.89.

246. Dollie Wiley. NW¼NW¼ sec. 15, T. 5 N., R. 13 W., south side of U. S. Highway 60-70, 0.3 mile northeast of Salome. Domestic drilled well, diameter 6 inches, depth 140 feet. Records available: 1945-46, 1948-49. Jan. 6, 1945, 106.68; June 11, 106.88; Oct. 3, 106.69; Oct. 20, 1948, 106.88; July 6, 1949, 107.89.

248. Mr. Gray. Formerly Mr. Ludweid. SW¼SW¼ sec. 22, T. 5 N., R. 13 W. Records available: 1945-46, 1949. July 6, 111.49. Measurement resumed.

312. Owner unknown. SE¼SE¼ sec. 1, T. 7 S., R. 13 W. Records available: 1945-49. Mar. 7, 83.02.

501. J. S. Riley. NW¼NE¼ sec. 8, T. 4 N., R. 15 W., 300 feet north of Desert Wells store, north of U. S. Highway 60-70, 7 miles west of Hope. Drilled domestic well, diameter 8 inches. Records available: 1949. July 6, 125.62.

505. Crowder Cattle Co. NE¼NW¼ sec. 21, T. 5 N., R. 15 W., about 0.1 mile south of road, 2.5 miles south of McVay and 2 miles west of State Highway 72. Drilled stock well, diameter 6 inches. Records available: 1946, 1948-49. Feb. 22, 1946, 201.15; Nov. 11, 1948, 201.17; July 6, 1949, 203.79.

575. Mohawk Municipal Water Conservation District. NE¼SE¼ sec. 30, T. 7 S., R. 15 W. Records available: 1945-49. Mar. 10, 34.43; Nov. 11, 34.53.

625. Chester Johns. NE¼NE¼ sec. 22, T. 6 N., R. 16 W., about 150 feet southwest of State Highway 72, 7.6 miles southeast of Bouse. Drilled irrigation well, diameter 20 inches, depth 900 feet. Records available: 1948-49. June 8, 1948, 167.53. No measurement made in 1949.

626. Chester Johns. NE¼NE¼ sec. 26, T. 6 N., R. 16 W., about 150 feet southwest of State Highway 72, 9.3 miles southeast of Bouse. Drilled irrigation well, diameter 20 inches, depth 1,400 feet. Records available: 1948-49. Nov. 16, 1948, 171.54.

628. Ray Tompson. NE¼ sec. 12, T. 6 N., R. 16 W. Previously published as SW¼NW¼ sec. 12, T. 6 N., R. 16 W. Records available: 1945-46, 1948-49. July 6, 63.79.

631. Owner unknown. SE¼SE¼ sec. 9, T. 5 N., R. 16 W., on north side of road, 1 mile south and 5 miles west of McVay. Drilled unused well, diameter 7 inches, depth 146 feet. Records available: 1948-49. Nov. 12, 1948, 118.74; July 6, 1949, 118.92.

632. Owner unknown. SE¼SE¼ sec. 10, T. 5 N., R. 16 W., on north side of road, 1 mile south and 4 miles west of McVay. Drilled unused well, diameter 16 inches, depth 164 feet. Records available: 1946, 1948-49. Feb. 21, 1946, 112.60; Nov. 15, 1948, 112.74; July 6, 1949, 112.84.

680. Mohawk Municipal Water Conservation District. NE¼NE¼ sec. 33, T. 7 S., R. 16 W. Records available: 1945-49. Mar. 10, 33.58; Nov. 11, 34.34.

710. Western Farm Management Co. SE¼NW¼ sec. 11, T. 8 S., R. 16 W. Previously published as NE¼NW¼ sec. 11, T. 8 S., R. 16 W. Records available: 1945-49. Mar. 7, 32.13; Nov. 11, 33.98.

722. Smiley Air Field. NE¼NW¼ sec. 28, T. 8 S., R. 16 W. Records available: 1945-47, 1949. Nov. 11, 84.03.

758. Judge Bellows. NE¼NW¼ sec. 22, T. 7 N., R. 17 W. Previously published as NW¼ sec. 22, T. 7 N., R. 17 W. Records available: 1945-49. July 6, 32.78.

760. V. C. Tarpley. NW¼SW¼ sec. 23, T. 7 N., R. 17 W. Previously published as SW¼ sec. 23, T. 7 N., R. 17 W. Records available: 1945-49. July 6, 43.36.

762. Owner unknown. SE¼NW¼ sec. 23, T. 7 N., R. 17 W. Previously published as NW¼ sec. 23, T. 7 N., R. 17 W. Records available: 1945-49. July 6, 56.89.

764. Julian M. Jones. NE¼NW¼ sec. 35, T. 7 N., R. 17 W. Previously published as sec. 26, T. 7 N., R. 17 W. Records available: 1945-49. July 6, 33.25.

784. Mohawk Municipal Water Conservation District. SE¼NE¼ sec. 2, T. 8 S., R. 17 W. Records available: 1945-49. Mar. 10, 34.94; Nov. 11, 34.49.

795. Roy Killen. SE¼NE¼ sec. 13, T. 8 S., R. 17 W. Records available: 1945-49 Mar. 7, 31.08; Nov. 11, 32.54.

817. Gust Svensen. SW¼NW¼ sec. 33, T. 8 S., R. 17 W. Records available: 1945-49. Mar. 7, 108.27.

851. Bureau of Reclamation. NE¼NE¼ sec. 24, T. 8 S., R. 18 W., 10 feet south of section corner marker, 0.8 mile north of road between Wellton and Roll, 4.5 miles east of and 3.5 miles north of Wellton. Drilled observation well, diameter 2 inches, depth 345 feet. Records available: 1949. Mar. 10, 28.25; Nov. 11, 28.53.

865. R. B. Deason. NE¼NE¼ sec. 27, T. 8 S., R. 18 W. Records available: 1946-49. Mar. 10, 24.04; Nov. 11, 24.58.

900. Robert Welch. NE¼SW¼ sec. 5, T. 9 S., R. 18 W. Records available: 1945-49. Mar. 10, 57.81.

951. Fielder Slocum. SE¼SW¼ sec. 36, T. 8 S., R. 19 W., 75 feet north of road, 75 feet south of shack, 1.75 miles east of and 0.5 mile north of Wellton. Drilled unused irrigation well, diameter 16 inches. Records available: 1946, 1949. Feb. 7, 1946, 18.30; Mar. 10, 1949, 20.18; Nov. 11, 1949, 20.65.

975. Owner unknown. SE¼SW¼ sec. 4, T. 9 S., R. 19 W. Records available: 1945-49. Mar. 7, 23.20; Nov. 11, 24.17.

1121. Bureau of Reclamation. NE¼NE¼ sec. 18, T. 8 S., R. 20 W., on south side of trail, 4 feet west of section corner marker, 5 feet west of irrigation property line marker, 200 feet east of road, about 1.5 miles southeast of Dome, 6.45 miles northwest of east end of overpass on U. S. Highway 80. Drilled observation well, diameter 2 inches, depth 43 feet. Records available: 1949. Mar. 10, 16.13; Nov. 11, 17.67.

1280. Owner unknown. SW¼NW¼ sec. 21, T. 8 S., R. 21 W. Records available: 1943, 1945-49. Mar. 9, 36.84; Nov. 11, 33.98.

1474. J. L. Moorish. SE¼SE¼ sec. 25, T. 8 S., R. 22 W. Records available: 1946-49. Mar. 9, 30.52; Nov. 11, 29.58.

1485. Owner unknown. NW¼NW¼ sec. 34, T. 8 S., R. 22 W. Records available: 1945-49. Mar. 9, 24.75.

1520. Owner unknown. SE¼SE¼ sec. 17, T. 9 S., R. 22 W. Records available: 1945-49. Mar. 9, 84.20; Nov. 11, 84.35.

2045. Bureau of Reclamation. SW¼SE¼ sec. 2, T. 11 S., R. 25 W. Records available: 1916-49.

Jan. 17	3.50	Apr. 21	3.80	July 21	7.80	Oct. 21	5.30
Feb. 14	4.80	May 24	3.40	Aug. 16	7.50	Nov. 15	5.22
Mar. 16	3.80	June 16	4.50	Sept.20	7.30	Dec. 15	6.52

CALIFORNIA

By A. A. Garrett, E. F. LeRoux, H. G. Thomasson, Jr., H. C. Troxell, and H. D. Wilson, Jr.

SCOPE OF WATER-LEVEL PROGRAM

This report shows the progress made in 1949 in the measurement of water levels in California by the Geological Survey in cooperation or collaboration with several other Federal, State, and local agencies. Also, it reviews the general scope of certain other water-level programs in the State in which the Geological Survey did not participate, but concerning which general information is available.

The following table indicates the distribution of observation wells and the scope of water-level measurements covered by this report, arranged by counties in alphabetical sequence. As the table shows, the report lists 4,024 water-level measurements during 1949 in 518 observation wells distributed in 8 of the 58 counties in the State. One of these counties, San Joaquin, is in the central part of California; the other seven are in the southern part of the State, south of the Tehachapi Mountains. This report covers all the principal ground-water areas in San Diego and Santa Barbara Counties, but only scattered basins or areas in the others.

Distribution of observation wells in California in 1949
(for which water-level records are given in this report)

County	Number of observation wells			Number of measurements in this report	Number of wells with recording gages (R) or nonrecording gages (N)		
	Established during 1949[a]	Discontinued in 1949	At year end		All of 1949	Part of 1949	At year end
Kern County:							
Antelope Valley	1	1	4	15	0	0	0
Los Angeles County							
Antelope Valley	1	0	142	233	0	0	0
San Gabriel River basin	0	0	1	365	1R	0	1R
Coastal plain	0	0	13	420	0	0	0
Orange County:							
Coastal plain	0	5	17	448	0	0	0
Riverside County:							
San Jacinto Valley	0	0	8	33	0	0	0

Distribution of observation wells in California in 1949--Continued

County	Number of observation wells			Number of measurements in this report	Number of wells with recording gages (R) or nonrecording gages (N)		
	Established during 1949[a]	Discontinued in 1949	At year end		All of 1949	Part of 1949	At year end
San Bernardino County:							
Chino basin	0	4	0	37	0	4R	0
Mojave River basin	0	3	77	133	0	0	0
Santa Ana River basin	0	0	10	84	0	0	0
San Diego County:							
San Luis Rey River basin	0	0	17	100	0	0	0
San Dieguito River basin	0	1	5	17	0	0	0
San Diego River basin	1	1	23	86	0	0	0
Sweetwater River basin	0	0	2	5	0	0	0
Otay River basin	0	0	1	2	0	0	0
Tia Juana River basin	0	0	4	16	0	0	0
San Joaquin County:							
Mokelumne River basin	1	1	22	261	0	0	0
Santa Barbara County:							
Carpinteria basin	3	0	20	195	0	0	0
Goleta basin	0	0	25	326	1R,1N	0	1R,1N
Santa Ynez Valley	3	4	77	693	1R	4R	5R
San Antonio Valley	0	0	4	48	0	0	0
Santa Maria Valley	0	1	39	440	0	0	0
Cuyama Valley	0	0	8	67	0	0	0
The State	9	21	518	4,024	3R,1N	8R	7R,1N

a Includes wells established prior to 1949 but for which water-level records are renewed or are given for the first time in this report.

In addition to this program in which the Geological Survey participated, systematic measurements of water levels in the State were made by numerous agencies. In the southern part of the State, the Division of Water Resources (Department of Public Works, State of California) measured the water levels in about 125 wells in the Temecula Creek basin and about 75 wells in the Tia Juana River basin. In Ventura County basins, measurements were continued by the Ventura County Water Survey. In the western portion of the San Fernando Valley, in the City of Los Angeles, monthly measurements were made in about 65 piezometer wells by the U. S. Soil Conservation Service, in cooperation with the City of Los Angeles and the San Fernando Valley Soil Conservation District. In the San Bernardino Valley, the San Bernardino Valley Water Conservation District continued measurements in about 200 wells and summarized the fluctuations of groundwater levels in a mimeographed statement. The San Bernardino County Flood

Control District inaugurated an observation-well program in the desert areas of that county. In the Imperial Valley, measurements of ground water were made by the Division of Irrigation of the U. S. Soil Conservation Service, in cooperation with the Imperial Irrigation District, as follows: semiannually in 28 observation wells in the West Mesa area, and in about 11 observation wells in the Pilot Knob area; annually in 30 artesian wells in the valley floor area; and quarterly in 37 observation wells in the East Mesa area. Chemical analyses of the waters were made by the Imperial Irrigation District from samples collected by the Division of Irrigation, U. S. Soil Conservation Service.

In the Coachella Valley measurements of water levels were made by the Coachella Valley County Water District in cooperation with the U. S. Bureau of Plant Industry (Soils and Agricultural Engineering), the U. S. Bureau of Reclamation, and the University of California.

The following table shows the number of wells measured and the frequency of measurements made by a number of local agencies in the South Coastal Basin which includes the drainage basins of the Los Angeles, San Gabriel, and Santa Ana Rivers and the coastal plain in Los Angeles and Orange Counties. The Division of Water Resources of the State Department of Public Works collected records of water levels in the South Coastal Basin and in Antelope Valley. The records for 1947 have been published in the Division's Bulletin 39-P which continues the series beginning with Bulletin 39, published in 1932.

In the central and northern parts of California several water-level programs were maintained by irrigation districts and local water-conservation agencies, partly through collaboration with the Division of Water Resources in the State Department of Public Works.

Number of wells measured by local agencies in the South Coastal Basin in 1949

Subarea and agency	Frequency of measurements			
	Semi-annually	Quarterly	Monthly	More frequently
Coastal plain, Los Angeles County:				
San Gabriel Valley Protective Association, city of Long Beach, and Los Angeles County Flood Control District			100±	
Los Angeles County Flood Control District	313		27	
California Division of Water Resources (West Coastal Basin)	200		200	

Number of wells measured by local agencies in the South Coastal Basin in 1949--Continued

Subarea and agency	Frequency of measurements			
	Semi-annually	Quarterly	Monthly	More frequently
Coastal plain, Orange County:				
Orange County Flood Control District		54	392	49
San Fernando Valley:				
Los Angeles Department of Water and Power	186		110	36
Los Angeles County Flood Control District	49		262	
Soil Conservation Service (Western part of valley)			65	
San Gabriel Valley:				
Los Angeles County Flood Control District	176		45	
San Gabriel Valley Protective Association			163	
Upper Santa Ana Valley:				
Chino Basin				
San Bernardino County Flood Control District			a 29	a 23
San Bernardino Valley				
San Bernardino Valley Water Conservation District	1		66	111
City of San Bernardino	b 21	132	30	23
San Jacinto Valley (including Lake Elsinore Area):				
Riverside Flood Control and Conservation District	+200		50	

a Beginning about October end.
b Includes 16 wells measured once during year.

RAINFALL AND SNOWFALL

For the State as a whole, the precipitation during 1949 was below normal. A very brief general summary of precipitation in California for the calendar year 1949 is quoted from the annual report of climatological data issued by the U. S. Weather Bureau:

"The year 1949 began with unusually cold weather, and throughout the year a number of unusually warm or cool periods occurred. An extended period without precipitation, beginning in March and ending in May, was unfavorable for crops in many areas. In some districts, rains in November ended periods without measurable precipitation unprecedented since records began.

Subfreezing temperatures in January and February caused severe damage to citrus, truck, and other crops throughout the State and were extremely unfavorable for livestock in northern areas. Return to normal temperatures in February permitted many crops to recover and planting and replanting activities to increase. Heavy rains in March were followed by a drought, which extended in May in many districts, resulting in ranges and pastures drying prematurely and general abandonment of dry-farmed grains in the San Joaquin Valley and Southern California. Rains in May ended the extended dry period in many areas but were too late to be of much benefit. Fruits, such as, strawberries, cherries, etc. were damaged. High temperatures and low relative humidities during June contributed to unusually early fire hazards in many areas. Below-normal temperatures in August generally benefited irrigated pastures and some other crops but

slowed development of stone fruits, melons, etc. Unusually high temperatures in September benefited fruit and bean drying but caused some injury to walnuts, tomatoes, grapes, etc. Below-freezing temperatures in October damaged many crops and assisted in cotton defoliation. General rains early in November ended a record period without measurable precipitation at Red Bluff. Strong winds and below-freezing temperatures caused considerable damage in December."[1]

Because ground water is derived essentially from rain or snow, the volume in storage and the water levels in wells generally fluctuate in response to fluctuations in precipitation. Where there is a marked seasonal range in precipitation, such as prevails throughout California and the remainder of the Pacific Coast region, ground-water storage generally is greatest and natural ground-water levels are highest during or somewhat after the height of the wet season, but during the following dry season the unconfined ground-water storage is depleted by natural discharge and water levels commonly recede in wells. This depletion continues until soil-moisture deficiencies have been replenished by the first rains of the next wet season. Thus, for the climatic conditions of California, the ground-water level commonly is related less closely to precipitation within the calendar year than to precipitation within a "water year" which spans one wet season and the following dry season--that is, which ends in midautumn. For this treatment of climatic conditions and for the following summary treatment of runoff the water year is taken as ending September 30, the most practicable average date for near-maximum depletion of unconfined ground-water storage and near-minimum runoff.

The first of the Weather Bureau tables on page 69 shows the monthly distribution of State-wide average precipitation in California for the 53-year period ending in 1949. The very marked seasonal range in precipitation is apparent upon first glance at this table. Of the 23.81 inches total for the 12 months, about 80 percent falls during the 5 months November-March, and less than 4 percent falls during the 4 summer months June-September.

The second table shows the precipitstion during the water year ending September 30, 1949, at 15 representative stations in the State, expressed both in inches and in percentage of the average for the 50-year period ending September 30, 1891-1940. This table brings out that, for the State as a whole, the precipitation during the current year was below normal.

1 U. S. Department of Commerce, Weather Bureau, Climatological Data, California Section, vol. 53, No. 13, 1949.

The 15-station average was 85 percent of the 50-year average, and at only 3 of the 15 did the total for the year exceed the average. These three stations are in the arid portion of the State and the slight excess indicated for them is not significant with respect to water supplies. In the agricultural areas of the State, rainfall ranged from 55 to 90 percent of normal. The records show that 1949 was the fourth consecutive year of below-average rainfall, with 1945 being slightly above average and 1944 slightly below. Thus, since 1943 ground-water replenishment essentially has been below average and ground-water storage has been depleted. The extent of the depletion in many of the basins in the State is shown by the records of water levels in the ensuing sections of this report.

State-wide average monthly and yearly precipitation in California in 53 years 1897-1949 [2]

Month	Inches	Percent of yearly total	Month	Inches	Percent of yearly total
October	1.28	5.4	April	1.69	7.1
November	2.41	10.1	May	.94	4.0
December	3.88	16.3	June	.33	1.4
January	4.57	19.2	July	.08	.3
February	4.43	18.6	August	.10	.4
March	3.69	15.5	September	.41	1.7
	20.26	85.1		3.55	14.9
The year				23.81	100.0

Precipitation and relative wetness for year ending Sept. 30, 1949, at 15 representative climatologic stations in California

Province	Station and county	Precipitation, 1948-49	
		Inches	Percent of 50-year average [a]
Northern Coast Ranges	Eureka, Humboldt	32.24	83
Coast Ranges of central and southern California	San Francisco, San Francisco	18.25	90
	San Luis Obispo, San Luis Obispo	14.67	70
	Santa Barbara, Santa Barbara	10.95	61
	Los Angeles, Los Angeles	8.01	55
	San Bernardino, San Bernardino	4.41	89
	San Diego, San Diego	10.42	106
	Cuyamaca, San Diego	35.94	93
Great Valley (California Trough)	Red Bluff, Tehama	18.43	80
	Stockton, San Joaquin	11.50	82
	Fresno, Fresno	6.86	73
Sierra Nevada	Nevada City, Nevada	43.82	90
	West Point, Calaveras	30.80	78
Great Basin (Southwestern Bolson province)	Indio, Riverside	3.35	102
	Needles, San Bernardino	5.76	128

a Average for years ending September 30, 1891, to 1940.

2 From "Climatological Data", op. cit., monthly and seasonal precipitation for the season July 1948 to June 1949, inclusive, and for the months July-September 1949.

RUNOFF

The runoff in California streams, during the water year ending September 30, 1949, ranged from below normal in the southern part of the State to above normal in the portion north of San Francisco Bay. Representative of the runoff in the northern and central parts of the State is the year's total for Trinity River at Lewiston, in the north coastal drainage, which was 111 percent of normal; for the combined flow of Sacramento and San Joaquin Rivers and tributaries, about 63 percent;[3] and for Kings River at Piedra in the southern Sierra drainage, 64 percent. In the southern part, the 1948-49 runoff ranged from zero to 76 percent of the average annual runoff in individual drainage areas with a mean value of 19 percent. The extreme dryness of this water year is indicated by the fact that 78 percent of the drainage areas had a runoff less than 30 percent of their average annual runoff.

SUMMARIES OF PROGRAMS, HYDROLOGIC CONDITIONS, AND WATER-LEVEL FLUCTUATIONS

Coastal plain in Los Angeles and Orange Counties

Although no program of water-level measurement was undertaken by the Geological Survey in the coastal plain in Los Angeles and Orange Counties for 1949, measurements of observation wells have been furnished by several local agencies--in Orange County chiefly by the Orange County Flood Control District and in Los Angeles County chiefly by the Los Angeles County Flood Control District, the San Gabriel Valley Protective Association, the city of Long Beach, and the California Division of Water Resources.

In 1949 the Geological Survey issued a progress report dealing with salt-water contamination along the coast in Orange County.[4] In cooperation with the Orange County Flood Control District and the Orange County Water District, the investigation, in 1948, resumed the earlier work by the Geological Survey in the Long Beach-Santa Ana area (discontinued in 1945). The field work consisted chiefly of the collection of recent chloride analyses of water from wells, made by other agencies, and also of a sampling program including wells for which only few analyses were available.

In this report, records furnished by local agencies are included for 30 wells in the main coastal basin in Los Angeles and Orange Counties, and in the so-called West Basin southwest of the Newport-Inglewood uplift

3 Ingerson, I. M., and others, Report of Sacramento-San Joaquin water supervision for 1949: Calif. Dept. Public Works, Div. Water Resources Report, p. 25.

4 Garrett, A. A., Status of salt-water contamination in the coastal part of Orange County, Calif., as of 1948-49: U. S. Geol. Survey mimeographed report, 36 pp.

in Los Angeles County. For three of them, monthly measurements were also obtained by the Geological Survey.

Of the 35 wells for which records for 1948 were published in Water-Supply Paper 1131, five do not appear in this report. These five, all in Orange County, are wells for which only one measurement a year has been obtained by the Geological Survey since 1944; these are listed in the following table.

Wells for which water-level measurements were included in Water-Supply Paper 1131 but which do not appear in this report

Orange County—				
5S/11-18N1	5S/11-18P1	5S/11-29E1	5S/11-29E2	5S/12-13D1

Records published by the Weather Bureau for three rainfall stations in the coastal plain of Los Angeles and Orange Counties--Los Angeles at the north edge, Long Beach near the southwest edge, and Santa Ana near the southeast edge--suggest that rainfall in this area in the calendar year 1949 was about 70 percent of normal. In the water year (ending September 30, 1949) rainfall was only about 57 percent of normal. This difference in rainfall for the two periods, amounting to about 1.7 inches, is caused by greater rainfall in the last 3 months in 1949 than in the corresponding period in 1948. For November and December 1949, rainfall was above normal. The following table shows rainfall records for both the calendar year 1949 and the water year 1948-49. The use of the water year gives a more consistent approach to the relation of rainfall to runoff and to ground-water replenishment. However, because water-level records are tabulated in the annual reports on a calendar year basis, rainfall records are summarized for both periods.

As in the previous year, spring recovery of water level in wells in the main coastal basin was markedly suppressed, not only because of rainfall deficiencies late in 1948 and early in 1949 but also because of the increasing tendency to divert large acreages to crops requiring pre-irrigation in February and March.

Average rainfall, in inches, for three stations[a] on the coastal plain of Los Angeles and Orange Counties, Calif. (From publications of the United States Weather Bureau)

Month and year	Normal	Current	Departure	Percent
October 1948	0.64	0.06	-0.58	- 91
November	.97	0	- .97	-100
December	2.82	2.64	- .18	- 6
January 1949	2.52	2.21	- .31	- 12
February	3.20	1.59	-1.61	- 50
March	2.43	1.17	-1.26	- 52
April	1.00	.01	- .99	- 99
May	.36	.48	.12	33
June	.06	0	- .06	-100
July	.01	0	- .01	-100
August	.04	0	- .04	-100
September	.21	0	- .21	-100
The water year 1948-49	14.26	8.16	-6.10	- 43
October	.64	.03	- .61	- 95
November	.97	1.50	.53	55
December	2.82	2.91	.09	3
The calendar year 1949	14.26	9.90	-4.35	- 30

The following table summarizes water-level fluctuations in 29 selected observation wells in the coastal plain in Los Angeles and Orange Counties. In this table, water levels in 26 wells at year-end are compared to the year-end levels of 1948 and to those of the historic low-water year 1936. The data are tabulated separately in three groups: namely, the main coastal basin in Orange County, the main coastal basin in Los Angeles County, and the West Basin southwest of the Newport-Inglewood uplift. Within the main coastal basin, 15 index wells in Orange County showed an average net drop of 5.1 feet in the year 1949 and a net drop of 7.8 feet since 1936; five index wells in Los Angeles County show an average net drop of 7.4 feet in 1949, a net drop of 15.3 feet since 1936. Within the West Basin of Los Angeles County, five index wells show an average net drop of 4.2 feet during 1949 and a net drop of about 34 feet since 1936.

a Los Angeles, Long Beach, and Santa Ana.

Summary of water-level fluctuations in 26 selected observation wells on the coastal plain in Los Angeles and Orange Counties, Calif.

Well	Water level at end of December, in feet above (+) or below (-) sea level [a]			Net rise (+) or decline (-) in water level, in feet	
	1936	1948	1949	1936-49	1948-49
Wells in the main coastal basin--Orange County					
3/11-36Q2	18.2	18.3	b 12.1	- 6.1	- 6.2
4/10-22L2	10.2	7.5	4.4	- 5.8	- 3.1
4/11-19K1	10.9	6.0	2.3	- 8.6	- 3.7
5/10-9D1	10.0	9.5	3.6	- 6.4	- 5.9
5/11-2E1	4.4	3.3	- 5.2	- 9.6	- 8.5
5/11-16D2	2.0	.4	b - 4.7	- 6.7	- 5.1
5/11-25P1	3.5	- 5.9	- 3.9	- 7.4	+ 2.0
5/11-28A1	.6	- 5.6	-15.3	-15.9	- 9.7
5/12-12P1	.9	1.2	- 5.8	- 6.7	- 7.0
6/10-1E1	.2	- 2.4	- 9.1	- 9.3	- 6.7
6/10-1L2	17.1	17.9	11.9	- 5.2	- 6.0
6/10-5C1	3.5	.0.0	- 4.3	- 7.8	- 4.3
6/11-13G2	.8	- 2.1	b - 2.8	- 3.6	- .7
I-9F1	- 1.8	- 3.9	b -11.7	- 9.9	- 7.8
Averages:	5.8	3.1	- 2.0	- 7.8	- 5.2
Wells in the main coastal basin--Los Angeles County					
2/12-13A1	133.5	138.7	b 130.6	- 2.9	- 8.1
3/12-8L3	62.6	59.2	53.8	- 8.8	- 5.4
3/13-8L2	35.4	6.4	- 5.8	-41.2	-12.2
4/11-5D1	14.5	b 18.4	6.6	- 7.9	-11.8
4/12-8P1	-14.2	-30.3	-29.8	-15.6	+ .5
Averages:	46.4	38.5	31.1	15.3	7.4
Wells in the West (Coastal) Basin, tapping deposits of Pleistocene age (the Silverado water-bearing zone or its equivalent)					
2/15-34H1	- 0.8	- 3.2	- 3.4	- 2.5	- 0.1
3/13-18G2	13.4	b -43.6	-60.1	-73.5	-16.5
3/14-21B1	-11	b -43	-46	-35	- 3
3/14-36M3[c]	-13.5	-23.8	-27.7	-14.2	- 3.9
4/13-14L1[d]	.3	- 2.6	- 4.2	- 4.5	- 1.6
4/13-23G2	-34.3	-67.1	-66.0	-31.7	+ 1.1
4/13-33D1	-30.5	-55.2	-57.4	-26.9	- 2.2
Averages:	-12.7	-42.4	-46.6	-33.9	- 4.2

a Chiefly interpolated.
b Measurement on Dec. 28.
c Taps shallow deposits of Pleistocene age; excluded from averages.
d Taps deposits of Recent age (Gaspur water-bearing zone); excluded from averages.

Mojave Desert Region

Antelope Valley, Kern and Los Angeles Counties

Since Johnson's investigation[5] of the water resources of Antelope Valley in 1911 the Geological Survey has maintained a more or less systematic record of water-level changes in the valley. At the present time, measurements of water levels are made in 146 wells in Antelope Valley with a once a month to twice a year frequency. Over most of this area the water levels have shown a steady decline since Johnson's investigation.

5 Johnson, Harry R., Water Resources of Antelope Valley, Calif.: U. S Geol. Survey Water-Supply Paper 278, 1911.

The greatest observed decline in water levels in 1948-49 appears to be near the center of the valley. In wells 7/12-34E1 and 7/12-34H1, 2 miles south of Lancaster, the water levels have declined 108 feet since 1921, which would be at an average rate of about 3.9 feet per year. However, during the last 10 years the rate of decline has actually been about 6.8 feet per year. In wells 7/10-31B1 and 7/10-30G1, about 9 miles east of Lancaster, the water levels have delined steadily 130 feet since 1927, about 60 feet of which occurred during the last 10 years.

In the northwestern part of the valley (near Willow Springs) the water level in well 9/13-20H1 has declined 52 feet since 1922, which would be at an average rate of about 1.9 feet per year. The decline at this well, however, has been accelerated during the last 10 years to a rate of 3.3 feet per year. In the northeastern part, which is the lowest part of the valley, near Rosamond and Rogers Dry Lakes, the water level in well 8/10-9M1 has declined 17 feet since 1922, or about 0.6 foot per year. The decline here has been only about 0.9 foot per year during the last 10 years.

In the extreme eastern limits of the valley in the Wilsona school area the water levels in wells 6/9-4H1 and 6/9-4H2 have declined 16 feet since 1932, some 13 feet of which has occurred during the last 10 years.

In the recharge area along the southern boundary of the valley near the mouth of Little Rock Creek the water level in well 5/11-10R1 has risen 8.8 feet since 1927. However, changes in water level at this well have not been steady or uniform. Between 1927 and 1938 there was a decline of 27 feet, at a rate of about 2.5 feet per year. Then beginning with that wet year the water level rose 36 feet, which would be at a rate of about 3.3 feet per year.

In summary, the water levels in 90 wells for which 1948 and 1949 fall observations were obtained indicate an average decline of 3.1 feet during the year. However, this decline was about 1.1 feet less than that for the preceding year. As already suggested the greatest decline in water levels in 1948-49 occurred in the center of the valley, whereas the southern and extreme southwestern areas showed localized gains in water levels up to 6 feet.

Mojave River Basin, San Bernardino County

A program of water-level observations in the Mojave River Basin was begun in 1930 by the Division of Water Resources, State Department of Public Works. In the following year the program was given to the Geological Survey for continuance. Because of the various physical features along the river, that portion of the river basin in which observations have been made is divided into three sub-areas for the purpose of this analysis.

Upper sub-basin.-The Mojave River originating in the San Bernardino Mountains flows northward discharging onto the great alluvial plain. As the river emerges from the mountains much of the surface runoff is quickly absorbed into the alluvium. Large sections of the river channel downstream are dry during parts of most years. About 15 miles to the north are the Granite Mountains which form the northern boundary of the sub-basin and through which the river has cut a deep narrow channel at Victorville. This barrier has the effect of largely controlling the amount of the ground-water storage.

During the 25-year period of 1920-45 the average annual discharge of the Mojave River entering the sub-basin amounted to 73,000 acre-feet while the average annual discharge leaving the sub-basin amounted to 64,000 acre-feet. During the 1948-49 water year the Mojave River discharged 23,000 acre-feet into the sub-basin, most of which was absorbed into the alluvial fill. Within the same year 23,000 acre-feet, largely ground-water escape, left the sub-basin as surface runoff at Victorville Narrows.

The water level in well 4/3W-19R1, located in the upper portion of the sub-basin, showed a net decline of about 4 feet since 1930 although during recent wet years the water level has been much higher than it was in 1930. The water level in 5/4W-36N1, located near the river in the center of the sub-basin, showed a net decline of 1.5 feet since 1930, while in the extreme eastern side of the sub-basin, the water level in well 4/3W-1M1 showed a net decline of 2.1 feet since 1930. During 1949 the water levels in 21 wells showed an average decline of 0.7 foot.

Middle sub-basin.- This sub-basin is a long irregular narrow river valley from Victorville Narrows to Daggett, which widens to about 6 miles in the vicinity of Hinckley. During the 25-year period of 1920-45 the average

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annual surface inflow to the sub-basin at Victorville Narrows amounted to 64,000 acre-feet and the outflow at Barstow, about 8 miles above Daggett, amounted to 34,000 acre-feet. During the 1949 water year the surface inflow to the sub-basin amounted to 23,000 acre-feet while the outflow was zero.

Water level in well 8/4W-31D1 in the upper part of the sub-basin has declined 4.7 feet since 1930. About 1 mile southwest of Hinckley at well 10/3W-32C1 the water level has declined 3.7 feet since 1930. However, during 1949 the average water level of the sub-basin declined 1.4 feet on the basis of 15 well records.

Lower sub-basin.-At Daggett the river discharges onto a broad triangular shaped flood plain extending eastward to Newberry. North across the valley from Newberry the river enters a narrow canyon. The Geological Survey maintained a gaging station in this canyon near Afton for a short period of time. During the 25-year period of 1920-45 the average annual surface inflow to this sub-basin amounted to 34,000 acre-feet, while the average annual outflow has been estimated to be about 6,000 acre-feet. During the 1949 water year the surface inflow to the sub-basin amounted to zero and while outflow is no longer measured it was believed to be very small.

In the center of the valley, upstream from the Forks-of-the-Road fault, the water level in well 9/2E-18F1 has risen 0.7 foot since 1930. In the vicinity of Newberry the water level in well 9/3E-34D1 has declined 2.4 feet since 1930 while along the northern boundary about 5 miles to the north the water level in well 9/3E-3D1 declined 0.2 foot since 1930. During 1949 the water level in 23 wells showed an average decline of 1.8 feet.

Mokelumne River Basin, San Joaquin County

The East Bay Municipal Utility District continued the program of monthly measurements of water levels in selected observation wells in the Mokelumne area, in the central part of the Great Valley. Records for 24 of these wells have been used as an index to changes in ground-water storage, and they have been published by the Geological Survey since 1935. Of the original 24 wells, 5 have been destroyed or abandoned because of lowering water table. However, 3 nearby wells have been added, so that currently records for 22 wells are being published.

The following table shows the average yearly water-level changes in the index wells and the fluctuations in yearly rainfall, beginning with 1945. In this table the accumulated changes begin with 1934, as tabulated in the report for 1945 and as shown in graphic form in figure 13. It is noted that rainfall at the three stations was only 73 percent of the 40-year 1906-45 average, a considerable decrease from that of 1948 which was 97 percent of average, but still more than that for 1947 which was only 62 percent of the average.

Average yearly rise or decline of water levels in observation wells, and yearly rainfall in the Mokelumne area, 1945-49

Year	Number of wells	Water level		Rainfall[a]	
		Yearly rise (+) or decline (-) (feet)	Accumulated rise (+) or decline (-)[b] (feet)	Excess (+) or deficiency (-) (inches)	Accumulated excess (+) or deficiency (-) (inches)
1945	24	-0.06	+0.51	+9.50	+32.17
1946	22	-2.24	-1.73	-8.92	+23.25
1947	21	-2.80	-4.53	-14.69	+8.56
1948	21	-.78	-5.31	-.89	+7.67
1949	20	-.85	-6.16	-10.39	-2.72

a Average of rainfall at Electra, West Point, and Twin Lakes, 1906-45. Average yearly rainfall at these stations in this 40-year period was 38.74 inches.

b Accumulation dates from Jan. 1, 1934.

The second table shows the average change in water levels in 1949 during the periods of increasing and of diminishing withdrawals for irrigation, respectively. This table shows that recharge early in 1949 was insufficient to offset the withdrawals for irrigation, as indicated by the average decline of about 2 feet. During the last half of the year, however, water levels recovered more than a foot so that the average net change for the year was a decline of 0.8 foot.

Seasonal changes in water level, in feet, in 20 observation wells in the Mokelumne area, 1949

Period	Greatest rise	Greatest recession	Average change
Jan. 1 to May 31 (increasing withdrawal for irrigation)	+6.24	-8.32	-1.96
June 1 to Dec. 31 (diminishing withdrawal)	+7.68	-6.94	+1.13
The year	+2.07	-3.31	- .85

Figure 12 shows the location of six of the observation wells in the Mokelumne area, three near the river and three at a distance of 6 to 8 miles from the river, and also the gaging station on the Mokelumne River near Clements. Hydrographs for these wells and for the river for the period 1926-49 are shown on figure 13 . Also this figure shows the

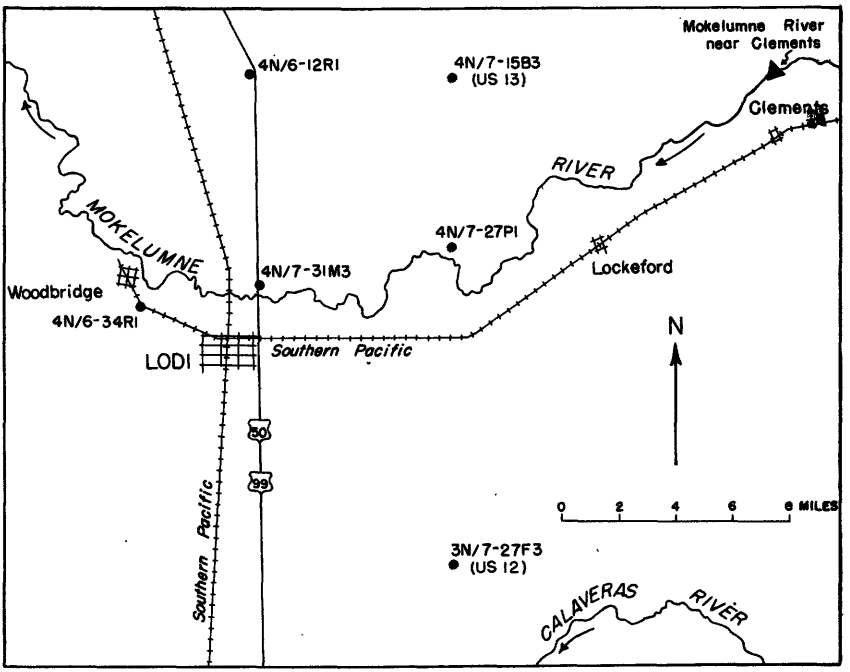

Figure 12.--Sketch map of the Mokelumne area, San Joaquin County, Calif., showing wells and stream-gaging stations.

accumulated average yearly change from 1934 of water levels in all the wells for which records have been published. The average graph for the 24 wells shows that, except for the year 1939, the period 1935-42, inclusive, was one in which a favorable balance existed between replenishment and withdrawals in the Mokelumne area, as evidenced by the rising line. Since 1944, however, the accumulated average has decreased each year, indicating that for the area as a whole the draft has exceeded the replenishment.

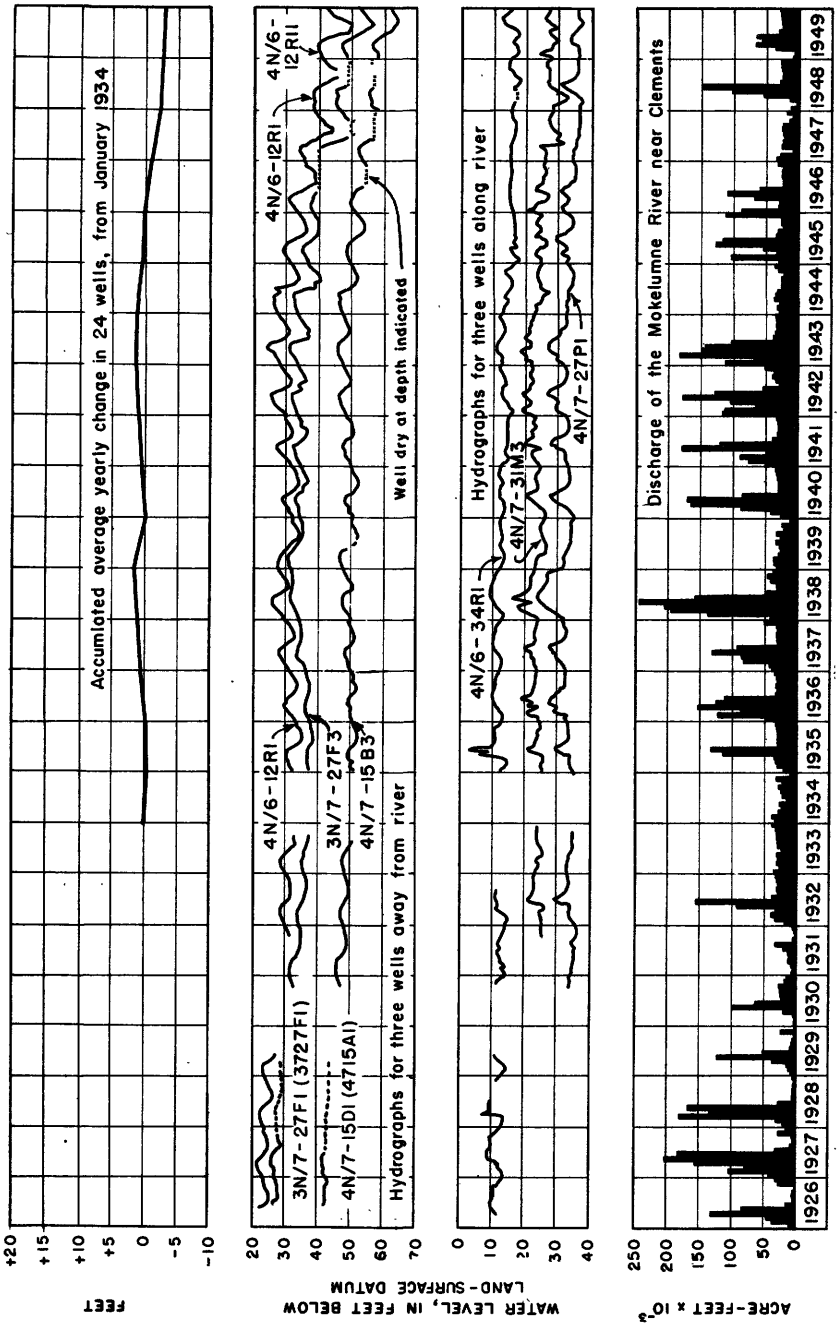

Figure 13.--Graphs showing fluctuations of water levels in six wells in the Mokelumne area, Calif.

Investigations by the Geological Survey in the late twenties and early thirties[6] indicated that at that time the water table adjacent to the river was continuous with the water surface in the stream, and that the stream lay on a water-table ridge throughout the reach covered by these observation wells. The hydrographs for the three wells along the river seem to bear out those findings, in that the water levels appear to be graded more or less to the level of the river. For example, in such years as 1939, 1944, and 1947, during which the regulated flow in the river was held to low levels throughout the year, the normal spring recovery in these wells is absent. Neither do the graphs show any material change upward or downward during the period of record.

It should be noted that the three wells away from the river are each about a mile outside of the area that received percolate from the Mokelumne River in 1932. (See Water-Supply Paper 780, pl. 1). In recent correspondence, Mr. F. B. Blanchard has indicated that although the area receiving percolate from the river appears to have expanded slightly in recent years because of increased draft and regional water-table recession, the three wells still lie outside of the area receiving percolate from the Mokelumne. Nevertheless the fluctuations of water levels in these wells serve as a good index to the change in regional water level for the parts of the Mokelumne area not affected directly by recharge from the Mokelumne River.

The hydrographs for the three wells away from the river are quite different in character from those along the river. In the first place, the seasonal fluctuations are readily related to the pumping draft and to winter and spring recovery, in contrast to the seasonal pattern for the wells along the river. The over-all pattern of fluctuation for

6 Stearns, H. T., Robinson, T. W., and Taylor, G. H., Geology and water resources of the Mokelumne area, Calif.: U. S. Geol. Survey Water-Supply Paper 619, 402 pp., 1930.

Piper, A. M., Gale, H. S., Thomas, H. E., and Robinson, T. W., Geology and ground-water hydrology of the Mokelumne area, Calif.: U. S. Geol. Survey Water-Supply Paper 780, 230 pp., 1939.

the three wells indicates a slight decline from the beginning of the graphs until about 1934 to 1935, a gradual but consistent recovery from then until about 1934 at which time the spring levels were within 3 or 4 feet of the initial levels, and a rather marked decline of 10 to 15 feet from 1944 to 1949. Thus, the levels in these three wells in 1949 ranged from 15 to 20 feet lower than the levels at the start of the record.

San Gabriel River Basin, Los Angeles County

A recording gage was in operation throughout 1949 on well 1S/10-18, the index well for the upper San Gabriel Valley, at Baldwin Park, for which records extend back to 1903. The water level in this well ranged from a high of 278.87 feet above sea level on March 15 to a low of 266.12 feet above sea level on November 15. The water level on March 15 was 50.2 feet below the highest observed elevation of 329.1 feet which occurred May 19, 1916, and the low of November 15 was 9 feet above lowest observed elevation of 257.1 feet on November 30, 1931.

Basins in San Diego County

Arthur J. Ellis and Charles H. Lee[7] in 1914 inaugurated a program of ground-water level observations which has been continued to the present time. However, due to one cause or another, most of the original wells no longer exist. In some instances nearby wells have been selected to replace lost or destroyed wells in order to give continuity to the record. The water level in 41 wells in San Diego County during 1949 showed an average decline of 1.29 feet. The following table shows in feet the extremes and average changes in water level in a number of San Diego County basins.

Summary of net water-level changes, in feet, in 41 observation wells in San Diego County, 1949

Basin	Number of wells	Number of measurements in each well	Greatest net rise	Greatest net decline	Average net change
San Luis Rey River Bonsall basin	8	4	1.44	3.65	-1.26
San Luis Rey River Mission basin	6	4 & 12	0	a 6.93	-5.10
San Dieguito River San Pasqual Valley	5	4	1.37	0	+ .67
San Diego River Below El Capitan Dam	17	4	b 12.12	5.66	- .66
Sweetwater River basin	1	4	-	-	-
Otay River basin	1	4	-	-	-
Tia Juana River Below San Ysidro	3	4	.08	1.14	- .58

a Well 11/5W-13a, San Luis Rey River basin.

b Well 15/1E-17H6, San Diego River basin recovery partly due to use of Colorado River water instead of ground water.

7 Ellis, Arthur J., and Lee, Charles H., Geology and ground waters of the western part of San Diego County, Calif. U. S. Geol. Survey Water-Supply Paper 446, 1919.

San Luis Rey River Basin

The longest continuous record of water level obtained by the Geological Survey in this basin has been at well 10/3W-15 on the Gird Ranch about 2 miles northeast of Bonsall. This record shows a 7.2 feet net decline in water level since 1923, of which 7.1 feet occurred during the last 10 years.

San Dieguito River

The records obtained at well 12/1W-33 in the San Pasqual Valley show a net rise in water level of 2.5 feet since 1926, or an average of 0.11 foot per year. However, during the last 10-year period the water level declined 6.4 feet, so that the level of 1949 was 9 feet above that of 1926.

San Diego River Basin

A continuous record of water level since 1915, at well 15/1W-28, about 1 mile west of Santee, shows a net water-level decline of 8.6 feet in 34 years, 3.8 feet of which occurred during the last 10 years. Records obtained since 1921 at well 16/2W-16, about a quarter of a mile east of the old mission in Mission Valley, show a decline of 9.6 feet during the last 10 years although a net decline of only 3.2 feet in the 28 years of record.

Tia Juana River Basin

The Geological Survey has been observing variations in the water levels in the Tia Juana River basin since 1914, however, many of the older wells then used have been destroyed or made unmeasurable in the more recent years. Continuous records of water level at well 18/2W-33 show a net decline of 10.6 feet in water level since 1927, of which 8 feet occurred during the last 10 years. Water level has declined 6.01 feet in well 18/2W-34a since 1927, of which 4 feet occurred during the last 10 years.

Santa Ana River Basin, Riverside and San Bernardino Counties

Chino Basin

In 1949, the Geological Survey published the results of its investigation of ground-water conditions at the lower end of the Chino Basin in cooperation with the San Bernardino County Flood Control District. The interpretive report concerning this area was released

in August[8]. As a part of the field program, recording gages were maintained through part of 1949 on four wells in the lower part of Chino Basin within or adjacent to the area of ground-water escape. Water-level fluctuations as indicated by these records are not representative of those existing within the main part of the basin.

San Bernardino Area

In 1949, the Geological Survey began an investigation regarding ground-water underflow across the San Jacinto fault, west of San Bernardino. This study is being made as a part of a continuing program with the San Bernardino County Flood Control District. The work accomplished by year-end consisted largely of the collection of water-level measurments, well logs, and well location data from other agencies.

The program of water-level measurements which was begun in 1914 was continued in 1949 with measurements being made in 10 wells. In eight of these, levels were measured in February, May, August, and November; in one, the Williams well, at weekly intervals; and in well 1S/3W-20B1, at monthly intervals.

The water level in well 1S/3W-17C1, the Williams well near Redlands, fluctuated from a high of 33.86 feet below land-surface datum on April 9, to a low of 48.70 feet on November 19, with the net change for the year being a decline of 9.1 feet. The highest observed stage for this year was 37.3 feet below the highest observed water level of record occurring in 1892-93 when the water was at top of well casing, 3.8 feet above land surface. The lowest observed water level for this year was 7.0 feet above the lowest of record which occurred in 1936.

The average water level during the year declined 8.1 feet, based on the fall measurements of 1948 and 1949 at six wells in the San Bernardino area.

San Jacinto Valley

The water level in well 4/2W-7J1 in the Lakeview area of the San Jacinto Valley has declined 67 feet since 1904. However, 35 feet of this

8 Garrett, A. A., Thomasson, H. G., Jr. Ground-water outflow from the Chino Basin, California, and the controlling geologic and hydrologic conditions, U. S. Geological Survey mimeographed report, 143 pp., 1949.

occurred within the last 10 years. The water level in well 5/1W-2N1, located about 1 mile northeast of Hemet, declined 36.2 feet since 1905, and 20 feet within the last 10 years. In the Perris area, well 4/3W-32E1 and its companion well No. 72, water levels have declined 32.7 feet since 1904. However, during the last 10 years the water level has shown a net rise of about 7 feet. During the 1949 water year the average decline in the water levels in seven wells in the San Jacinto Valley was 1.4 feet.

Basins in Santa Barbara County

The investigation of the ground-water resources of Santa Barbara County was continued during 1949 in cooperation with the Santa Barbara County Water Agency. A basic phase of this investigation was the measurement at monthly intervals of water levels in 172 observation wells, 6 of which were equipped with recording gages. During the year, 1,769 individual measurements were recorded. Earlier measurements, covering the period 1941 through 1948, have been published in Water-Supply Papers 941, 949, 991, 1021, 1028, 1076, 1101, and 1131, and through 1949 have been released locally in duplicated form. Water-Supply Paper 1068 contains tabulated descriptions for 2,246 wells in existence in 1942 in the seven ground-water basins of the county. The same publication also contains many water-level measurements made prior to 1942 by the city of Santa Barbara, Santa Maria Valley Water Conservation District, San Joaquin Power Division of the Pacific Gas and Electric Company, Union Sugar Company, Union Oil Company, Federal Geological Survey, and other organizations and individuals.

Descriptions of the seven principal ground-water areas of the county are given in Water-Supply Paper 949. Reports on the ground-water resources of the Santa Ynez River basin, the south-coast basins, the Santa Maria Valley, and the Cuyama Valley are in course of publication as water-supply papers.[9]

9 Upson, J. E., Thomasson, H. G., Jr., and others, Geology and water resources of the Santa Ynez River Valley, Santa Barbara County, Calif.: U. S. Geol. Survey Water-Supply Paper 1107 (in press).

Upson, J. E., Thomasson, H. G., Jr., and others, Geology and ground-water resources of the south-coast basins of Santa Barbara County, Calif. with a section on surface-water resources: U. S. Geol. Survey Water-Supply Paper 1108 (in press).

Worts, G. F., Jr., and Thomasson, H. G., Jr., Geology and ground-water resources of the Santa Maria Valley area, Santa Barbara County, Calif. with a section on surface-water resources: U. S. Geol. Survey Water-Supply Paper 1000 (in press).

Upson, J. E., and Worts, G. F., Jr., Ground water in the Cuyama Valley, Calif.: U. S. Geol. Survey Water-Supply Paper 1110 (in press).

In 1949 water-level measurements were made by the City of Santa Maria and the Santa Maria Valley Water Conservation District, in addition to those made by the Geological Survey, and are included in this report. Of the 172 observation wells being maintained at the end of 1948, 5 were discontinued during 1949 and 5 new wells were established, making a total of 172 active at the end of the year.

Recharge is dependent principally upon precipitation, rate of infiltration and the capacity of a formation to transmit water. In Santa Barbara County ground water withdrawn from storage during the irrigating season is usually replaced in the winter, either in full or in part, depending on whether or not infiltration is sufficient to meet the needs of pumping for irrigation and the losses due to evapotranspiration. Since 1945 precipitation has been below normal and, consequently, the rate at which ground water has been withdrawn from the underground reservoirs has been considerably greater than in earlier years. The evident unbalance between pumpage and recharge which existed through the late forties has seriously depleted vast stores of ground water in most of the basins of the county. Water levels in the Santa Maria Valley and in the Carpinteria and Goleta Basins have been declining at an alarming rate while lesser but still critical declines have been observed in most of the remaining valleys of the county.

The average annual rainfall in Santa Barbara County ranges from about 6 inches in the Cuyama Valley to about 30 or more inches in the higher parts of the Santa Ynez and San Rafael Mountains. For the year ending September 30, 1949, the fifth consecutive year of below-normal rainfall, precipitation ranged from 40 to 90 percent of the annual average. At stations with long-time records, such as Santa Barbara in the southeast corner of the county, 10.95 inches (7.06 inches below normal) was recorded, and at Santa Maria in the northwest corner of the county, 9.09 inches (5 inches below normal) was recorded.

For the past several years estimates of withdrawals from most of the ground-water basins of the county have been made by the Geological Survey on the basis of electrical energy consumed and factors derived from

pumping tests as to the amount of energy required to pump 1 acre-foot of water. Additional estimates have been made of withdrawals by pumping plants that are powered by diesel fuel, gas, or gasoline.

During 1949, the total pumpage in Santa Barbara County for agricultural irrigation alone is estimated to have been about 215,000 acre-feet. Because in some areas a part of the water applied to crops seeps downward, returning to the water table, the estimated figure for pumpage is not the total removed from underground storage. The amount of return probably ranges from none to as much as 35 percent in the different areas. The average return is estimated roughly as 15 percent and the net pumpage for irrigation for the year as about 180,000 acre-feet.

Figure 14 shows water-level fluctuations in 10 wells and precipitation at 3 stations for the 9-year period, 1941-49. The hydrographs show that spring high water levels in most of these wells were fairly uniform until about 1945 but that since that time, the consecutive years of below-normal rainfall and increased pumpage have produced lower levels each succeeding year in most wells under observation. Because hydrologic conditions are different in each of the ground-water basins of the county, the fluctuations of water levels are discussed separately by individual basins.

Carpinteria Basin

The total pumpage of ground water is estimated to have been about 6,400 acre-feet for the period May 1, 1949 to April 30, 1950. With the cessation of pumping at the end of the irrigation season, water levels rose during the winter months, reaching their highest levels in March and April. The peak levels reached in these months, however, were generally below those of the previous year. Declines of 3 to 15 feet were observed in the northeastern part of the basin where pumping is highly concentrated. Little or no change in water levels was observed in the central area of confined water which includes most of the alluvial plain. Declines of as much as 6 feet were observed along the northern fringe of the alluvial plain. At the western end of the basin, water levels recovered by small but varying amounts.

A comparison of year-end levels shows a net decline of about 6 to 8 feet for the basin as a whole. Since 1945 water levels have dropped

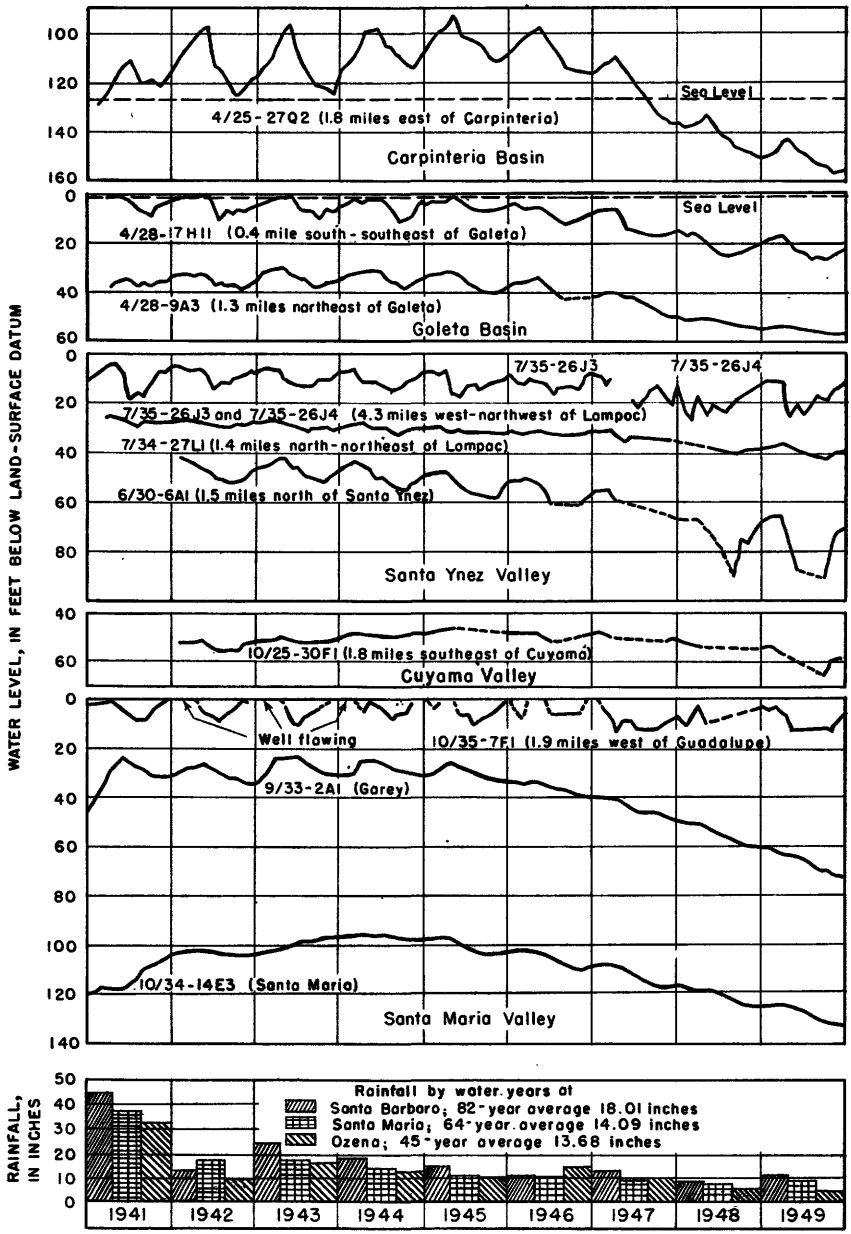

Figure 14.--Graphs showing water-level fluctuations in 10 wells in Santa Barbara County and seasonal rainfall at Santa Barbara, Santa Maria, and Ozena.

about 40 feet. Each successive year of deficient rainfall brought about an increased demand for ground water, the pumping period extended beyond the normal irrigating season and, as a result, the winter recovery of water levels became less and less. In well 4/25-27Q2 (figure 14) in the eastern part of the basin, the maximum spring level of 1949 was about 8 feet below the maximum level of 1948. For the same well the decline from the spring of 1947 to the spring of 1948 was about 24 feet, indicating that there was a better balance between recharge and ground-water withdrawals in the year 1949. Despite this encouraging condition, water levels in most observation wells continued to decline and are considerably below sea level in many wells along the coastal edge of the basin.

To observe any ocean-water encroachment that may be taking place, an extensive ground-water sampling program was initiated but no definite encroachment of sea water has been shown to date. A few wells sampled showed a chloride content in excess of 1,000 parts per million, but not enough samples have been collected to establish any definite trends.

Goleta Basin

Total pumpage in the Goleta Basin during the 12-month period May 1, 1949, to April 30, 1950 is estimated as about 8,400 acre-feet. Net ground-water withdrawals in excess of the safe yield have caused water levels in most wells of the basin to continue the downward trend which began in 1945.

Year-end water levels in nearly all observation wells were about 3 feet lower than at the close of 1948. In the central and northern parts of the basin, water levels declined from 1 to 7 feet in the areas in which withdrawals for irrigation were heaviest. In general, water levels in wells throughout most of the year were lower than at corresponding times in 1948, and in about one-half of the basin water levels were below sea level. With each year of below-normal precipitation and increased pumpage, the area in which water levels were below sea level has extended farther.

A ground-water sampling program similar to the Carpinteria program has been initiated to detect any salt-water intrusion into the potable ground-water supplies. There has been no surely identified ocean-water encroachment observed to date.

Santa Ynez River Valley

In previous reports pumpage was reported for the middle Santa Ynez River valley and the lower Santa Ynez River valley but the division of the valley at longitude 120°20' is being discontinued. In this and future reports pumpage will be estimated for (1) that part of the valley which lies between San Lucas Bridge and Robinson Bridge, including the Santa Ynez Upland and (2) that part of the valley which lies below Robinson Bridge (essentially the Lompoc Plain).

Total pumpage in the Santa Ynez River valley between Robinson Bridge and San Lucas Bridge during 1949 is estimated as about 22,000 acre-feet, about 7,000 acre-feet greater than the estimated pumpage for 1948. In the alluvial deposits adjacent to the river, ground-water levels have declined about 3 or 4 feet since 1945 and about 5 feet during the period 1941 to 1949. Water levels in December 1949 were about 1 foot lower than those of December 1948.

In the upland area east of Ballard, the downward trend of water levels has been more pronounced. Year-end levels ranged from about the same to as much as 4 feet below the levels of 1948. The water level in well 6/30-6A1 (figure 14) considered representative of the upland, declined about 20 feet from the end of 1945 to the end of 1949. The decline was greatest near Los Olivos and least in the southern part of the area.

In the Lompoc Plain there was a general decline of water levels averaging about 1 foot per year for the period 1945 to 1949. For the eastern part of the plain, the decline averaged about 1½ to 2 feet per year up until the end of 1948. Water levels at the end of 1949 were about 1 foot lower than at the end of 1948. The hydrograph of well 7/34-27L1 (figure 14), about 1¼ miles downstream from Robinson Bridge, shows a water-level decline of about 8 feet from the winter of 1945 to the end of 1949. In the area northeast of Robinson Bridge the water table declined as much as 12 feet during the same period as a result of decreased recharge and increased pumpage.

At the western end of the plain, lesser declines have been observed than those recorded to the east. The hydrograph of well 7/35-26J4 (figure 14) which replaced destroyed well 26J3, considered representative of conditions at the western end of the plain, shows a recovery of 1 foot

from year-end 1948 to year-end 1949. At the end of 1949 the water level in this well was about 8 feet below the highest water level recorded since the start of record in 1930. Water levels observed in additional wells in the area indicate that there has been little over-all net change of water levels in the past 19 years.

Total pumpage has increased from about 10,000 acre-feet in the early forties to about 20,000 acre-feet during the year 1949.

San Antonio Valley

Water levels in wells in the San Antonio Valley fluctuated only slightly in 1949. Both the year-end and maximum levels were lower than the corresponding levels of 1948 by amounts ranging from 0.1 foot to 1 foot; the total decline from December 1943, the date of the earliest recorded measurements, to the end of 1949 was less than 5 feet. No estimates of pumpage have been made, principally because the valley is relatively small and pumpage low. In 1949 ground-water withdrawals from the 15 to 20 irrigation wells in the valley probably did not exceed 2,000 to 3,000 acre-feet.

Santa Maria Valley

Total pumpage in the Santa Maria Valley during 1949 is estimated as 122,000 acre-feet, a twofold increase since 1935. As a result of increasing pumpage and deficient rainfall water levels have been declining for several years. Annual recharge has been so small through the late forties that little or no recovery is observed during the winter months while water levels in the other basins and valleys of the county have recovered. As a result of the prolonged overdraft and below-normal precipitation, there has been a serious depletion of ground-water supplies. This can be expected to grow even more serious unless a balance between recharge and withdrawals can be achieved in the years ahead.

In the central and eastern parts of the valley the ground water is unconfined whereas in the western 8 miles of the valley the permeable sand and gravel deposits are overlain by relatively impermeable clays. In this area of confined ground water, water levels have declined on the average about 10 feet since 1941; and in the area of unconfined water, levels have dropped about 33 feet during the same period.

From December 1948 to December 1949, water levels for the valley as a whole declined an average of about 6 feet. Water levels in wells along

the river above Fugler Point declined from 7 to 16 feet. Below Fugler Point, in the central and eastern parts of the valley, lesser declines were observed ranging from 4 to 10 feet. At the western end of the valley, in the area of confined water, water levels declined 1 to 3 feet. The decline in well 10/34-14E3 (figure 14) is probably representative of the average in the central area of heavy pumping, and that in well 9/33-2A1 is representative of declines in wells along the river above Fuglers Point.

Cuyama Valley

Starting in 1939 the growth of irrigated acreage in the Cuyama Valley has been very rapid, and many wells have been constructed to meet the increased demands for water. As a result, pumpage has increased from an estimated 1,800 acre-feet in 1939 to about 35,000 acre-feet in 1949. At the end of 1949, water levels in most observation wells in the main part of the valley were about 5 feet lower than at the end of 1948. Average declines were greater in the eastern part than in the wester part. The graph for well 10/25-30F1 (figure 14) shows the fluctuations in the area of heavy pumping.

OTHER INVESTIGATIONS BY THE GEOLOGICAL SURVEY

In addition to the programs described on preceding pages, for which water-level fluctuations have been summarized, the Ground Water Branch of the Geological Survey has been engaged in several other investigations in 1949 for which no water-level measurements are included in this report.

For the cooperative investigations with the California Division of Water Resources, which began in 1948 and are concerned chiefly with geologic features of ground-water basins of California, work during the year was concentrated in the Sacramento Valley and in valleys north of San Francisco Bay.

Investigation in the Sacramento Valley is being made by hydrologic units to obtain an estimate of ground-water storage capacity to a depth of 200 feet below the land surface; also to prepare a report on the geology of the water-bearing deposits of the valley with respect to physical and hydrologic character, thickness, distribution, and structural features.

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The study has included the assembly of about 6,000 well logs, of which 4,800 were identified in the field: 3,200 by the Survey and 1,600 by other agencies. A peg model of the valley, based on drillers' logs, was constructed to help to delineate hydrologic units and geologic features. Also, well-log data were classified in several categories, to which arbitrary specific yield values were assigned, in order to provide a basis for estimating water-holding capacity of the deposits.

In November a summary statement on ground-water storage capacity[10] was approved for publication as an appendix to Bulletin 1 of the California Division of Water Resources on the "California Water Plan."

As a byproduct of this investigation the Survey began in September the preparation of a report on the geologic features and ground-water storage capacity of the Sutter-Yuba area, to be published with the bulletin in preparation by the California Division of Water Resources on the hydrology of that area.

In September 1949 cooperative ground-water investigations were started in Napa, Sonoma, Petaluma, and Santa Rosa Valleys north of San Francisco Bay. The proposed work includes study of geologic features of ground-water occurrence and movement, a canvass of irrigation wells, collection of well logs, sampling of well waters to determine general chemical character, and an estimate of ground-water storage capacity. By year-end, about 1,000 well logs had been collected and 650 wells had been identified in the field; the well canvass was about half completed.

In Solano County, northeast of San Francisco, the usable underground storage capacity of the Putah Creek fan is an important element in the proposed Solano project of the Bureau of Reclamation, particularly as it pertains to the size of the surface reservoir that would be required. At the request of the Bureau, the Geological Survey started an investigation in April 1948 with the following objectives: (1) to make an estimate of the perennial yield and storage capacity of the ground-water basins underlying the extent of the proposed Solano project;

10 Poland, J. F., Davis, G. H., Olmsted, F. H., and Kunkel, Fred, Summary statement on ground-water storage capacity of the Sacramento Valley, Calif: U. S. Geol. Survey typewritten report, 21 pp.; November 1950.

(2) to ascertain the effective or usable capacity (recharge capacity) of the basins; and (3) to determine where and how recharge can be accomplished. During 1949 the collection of basic data from all available sources was continued and the area of investigation was extended to include the Fairfield-Suisun area to the southwest. Water-level measurements were made in about 500 wells during February and again during November. About 125 wells were measured monthly and about 50 of these were measured biweekly. Continuous recording gages were in operation on 7 wells during the year. Water samples from about 120 wells and 15 surface sources were collected for chemical analysis. The well canvass of the Fairfield-Suisun area begun in June was about 80 percent completed by the end of the year.

WELL-NUMBERING SYSTEM

The well-numbering system used by the Geological Survey in California shows the locations of wells according to the rectangular system of public-land surveys. These symbols or "numbers" were assigned to all Geological Survey observation wells in the State in Water-Supply Paper 991 which contained a cross-reference table of previous numbers and location symbols.

The system is illustrated by the following example. For well 9/12-21D1, in Antelope Valley in Kern County, the part of the symbol that precedes the hyphen indicates the township and range (T. 9 N., R. 12 W.). Letters indicating cardinal directions appear in this part of the symbol only in the event a basin or area spans two or more quadrants of a particular base and meridian. The digits between the hyphen and the letter indicate the section (sec. 21), and the letter indicates the 40-acre block within the section as shown by the accompanying diagram. Within the 40-acre tract, the wells are numbered serially as indicated by the final digit of the symbol. Thus, well 9/12-21D1 was the first well listed by the Geological Survey in the NW¼NW¼ sec. 21, township 9 north, range 12 west.

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

For a well whose location is known only approximately, the symbol is shortened to the designation of township, range, and section only. Two or more such wells in a single section would be differentiated by the use of a lower-case letter following the section number--for example, wells 10/3W-1 and 10/3W-1a in the San Luis Rey River basin in San Diego County. For areas which have never been subdivided by public-land surveys, the rectangular system has been projected, commonly after private surveys or after projections made by local officials for purposes of land assessment.

The description and records are given by counties in alphabetical sequence, and for each county by valleys or ground-water basins. Thus, each group of data pertains to a distinct ground-water area as indicated by sub-headings in the report. Under each sub-head, the records are presented in numerical order of the location symbols.

WELL DESCRIPTIONS AND WATER-LEVEL MEASUREMENTS

Kern County

Antelope Valley
Measurements by Los Angeles County Flood Control District

9/12-21D1. Southern Pacific Lands Agency. In Rosamond. Records available: 1932-49. Mar. 8, 45.35. Measurements discontinued.

9/13-20H1. Harry White. Records available: 1921-49. Mar. 8, 77.15; July 12, 87.6, adjacent well pumping; Sept. 21, 88.9; Nov. 29, 90.1.

9/14-24Q1. DeFone. Records available: 1941, 1943-49. Dec. 2, 115.2.

9/14-29M1. Records available: 1941-49. Dec. 7, 178.1.

9/15-25D1. H. W. Hunter. 200 feet east of 170th St. West, 100 feet south of section line 24-25. Drilled well, diameter 8 inches, reported depth 334 feet. Elevation 2,710 feet. Records available: 1948-49. Jan. 21, 1948, 227.2; Mar. 2, 229.5; July 14, 230.2; Dec. 1, 228.0; Mar. 9, 1949, 223.7; July 12, 227.5; Sept. 21, 228.1; Dec. 12, 228.0.

Los Angeles County

Antelope Valley

5/9-6B1. Records available: 1940-49. Nov. 21, 43.62.

5/9-20J1. L. M. Nixon. Records available: 1942, 1944-49. Nov. 29, 240.9.

5/9-28A1. R. C. Wiess. Records available: 1947-49. Nov. 21, dry.

*5/10-6N1. Little Rock Irrigation District. Records available: 1938, 1940-49. Nov. 15, 110.35.

*5/10-7E1. Calavalley. Records available: 1938, 1940-49. Nov. 15, 148.25.

*5/10-7R1. Tamarack Park. Records available: 1938, 1940-45, 1947-49. Nov. 18, 214.5.

5/10-12B1. Ed Sanner. Records available: 1940-41, 1943-49.

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 26	53.41	Apr. 25	54.01	July 26	54.88	Oct. 25	55.47
Feb. 23	53.57	May 26	54.21	Aug. 23	55.02	Nov. 21	55.73
Mar. 25	53.87	June 22	54.32	Sept.26	55.27	Dec. 27	55.80

5/10-21J1. Records available: 1945-49. Nov. 2, 21.83.

5/10-26B1. R. J. Darling. Records available: 1940-42, 1945-49. Nov. 21, 46.91.

*5/11-4E1. Sam Yellen. Records available: 1948-49. Nov. 18, 150.1.

*5/11-4R1. Joe Martin. Records available: 1940-49. Nov. 18, 144.1.

*5/11-9Q1. Records available: 1940-46, 1948-49. Nov. 15, 47.6.

*5/11-10R1. Records available: 1927-28, 1930, 1937-49.

Feb. 2	94.7	May 26	93.8	Sept. 29	97.5	Nov. 16	98.4
Mar. 3	92.25	July 13	94.7	Oct. 19	99.1	Dec. 28	98.25
Apr. 12	92.6	Aug. 2	96.1				

*5/11-12Q1. Wheelock. Records available: 1940-49. Nov. 15, 152.85.

*5/11-12R1. Carr and Bones. Records available: 1948-49. Nov. 15, 161.4.

*5/11-13J1. Little Rock Irrigation District. Records available: 1944-49. Nov. 15, 232.10.

*5/11-22D1. Totem Pole Ranch. Records available: 1947-49. Apr. 20, 28.2; Dec. 14, 31.1.

6/8-10N2. W. G. Baguet. Formerly Robert Barnett. Records available: 1947-48. No measurement made in 1949.

6/8-18D1. Huff. Records available: 1939-41, 1944-49. Nov. 23, 160.04.

6/8-32P1. M. B. Scofield. Records available: 1940-45, 1948. No measurement made in 1949.

6/9-4H1. Wilsona School. Records available: 1932-49. Destroyed, measurement discontinued.

* Measurements by Los Angeles County Flood Control District.

6/9-4H2. Northeast corner of NE¼ of SE¼, 100 feet west of center line of 170th Street east and 150 feet northeast of Wilsona schoolhouse. Diameter 10 inches, depth 336 feet. Records available: 1949. Nov. 23, 120.56.

6/9-31R1. Barlow. Records available: 1940-49. Nov. 23, 36.17.

6/10-9E1. Records available: 1940-43, 1945, 1948-49. Nov. 29, 193.05.

6/10-9Q1. N. C. and O. C. Riley. Records available: 1940-43, 1945, 1948. No measurement made in 1949.

6/10-10Q1. Records available: 1943-49. Nov. 29, 74.48.

6/10-20P1. Mrs. Johnson. Records available: 1940-49. Feb. 23, obstruction in casing; Nov. 21, 196.15; Dec. 27, 193.88.

6/10-27B1. Records available: 1940-41, 1943-49. Nov. 21, 150.80.

6/10-32E1. McAlester. Records available: 1940-47. No measurement made in 1949.

6/10-32F1. McAlester. Records available: 1940-48. Nov. 21, obstruction at 114 feet; no measurement made in 1949.

6/11-4C1. Lyons Bros. Records available: 1942-43, 1945-49. May 25, 204.45, pumping; Nov. 28, 189.41.

6/11-5A1. Lyons Bros. Records available: 1939-47, 1949. May 25, 195.4, pumping.

6/11-8E1. Palmdale Irrigation District. Records available: 1942-44, 1946-49. May 25, 202.3; Nov. 28, 201.10.

6/11-8R1. Records available: 1940-49. May 25, 205.3; Oct. 5, 209.8; Nov. 28, 212.55.

*6/11-9F1. Elmer Benson. Records available: 1940-43, 1945-47, 1949. May 25, 195.9.

6/11-12M1. E. J. Ball. Records available: 1941-43, 1945-49. Nov. 29, 205.04.

6/11-12Q1. E. J. Ball. Records available: 1941-42, 1945-49. Nov. 29, 201.78.

*6/11-18P1. Elmer Richardson. Records available: 1940-41, 1947-49. May 25, 236.3; Oct. 5, 240.45; Nov. 29, 238.03.

*6/11-19E1. Palmdale Irrigation District. Records available: 1930, 1937-49. May 24, 257.5.

*6/11-20P1. Alternate for well 6/11-20R2. Mrs. F. C. Smith. Records available: 1941-46, 1949. May 24, 238.7; Oct. 5, 241.35; Nov. 18, 241.8.

6/11-20R2. About 3 miles northeast of Palmdale. Records available: 1946-49. May 24, 241.65; Nov. 28, 243.98.

*6/11-21E1. Mata Hari Ranch. Formerly P. M. Gregory. Records available: 1949. May 26, 232.5.

*6/11-21N1. Mortgage Company. Formerly Yellen. No measurement made in 1949.

6/11-26J1. L. A. Hudson. Records available: 1947, 1949. Nov. 29, 146.85.

*6/11-28E1. Pierce. Records available: 1927-44, 1949. May 24, dry at 222 feet.

*Measurements by Los Angeles County Flood Control District.

*6/11-28N1. Records available: 1941-49. May 24, 96.4; Nov. 18, 96.4.

*6/11-32P1. Palmdale Rancho. Records available: 1940-43, 1945-46. No measurement made in 1949.

*6/12-25N1. Records available: 1927-30, 1937-49.

Date	Water level	Date	Water level	Date	Water level	Date	Water level
May 24	295.4	Aug. 2	297.5	Oct. 5	298.4	Nov. 16	298.0
July 6	296.6	Sept. 21	298.3	19	297.9	Dec. 28	297.8

*6/13-12J1. Glick. Records available: 1940-49. Nov. 22, 249.8.

7/9-28M1. Records available: 1948-49. Nov. 23, 144.45.

7/9-17N1. Ernest Koch. Records available: 1945-48. No measurement made in 1949.

7/10-5N3. Ella E. Cunningham. Records available: 1945-47, 1949. Nov. 27, 127.26.

7/10-6R1. Mrs. Jessie Hollingsworth. Records available: 1945-49. Nov. 22, 128.15.

7/10-7B1. Boege. Records available: 1932-49. Nov. 22, dry.

7/10-12H1. Records available: 1944-49.

Jan. 26	130.63	Mar. 25	129.93	June 22	131.17	Nov. 22	134.51
Feb. 23	129.51	May 26	130.80	Sept. 26	133.72	Dec. 27	135.02

7/10-21A1. Records available: 1943-49. Nov. 22, 167.33.

7/10-30G1. E. J. Ball. About 10 miles east of Lancaster. Records available: 1940-43, 1946-47, 1949. Nov. 29, 198.10.

7/10-31N1. H. O. Bakken. Records available: 1940-41, 1943, 1945-48. No measurement made in 1949.

7/11-1Q1. H. L. Gordon. Records available: 1943-46, 1948-49. Nov. 22, 123.69.

7/11-8P1. Mae Avery. Records available: 1933-49. Nov. 22, 74.92.

7/11-16B1. Records available: 1943-49. Nov. 22, 106.16.

7/11-19N1. Records available: 1945-49. Nov. 23, 155.60.

7/11-23L1. Barnes. Records available: 1940-43, 1945-49. Nov. 23, 143.69.

7/11-24C1. Stevenson. Records available: 1944-49.

Jan. 26	143.20	May 26	148.98	Sept. 26	156.27	Nov. 22	154.64
Feb. 23	144.58	July 26	153.44	Oct. 25	156.96	Dec. 27	152.70
Mar. 25	144.36	Aug. 23	154.98				

7/11-27F1. James N. Provonyance. Records available: 1940-41, 1943, 1947-48. No measurement made in 1949.

7/11-28E1. Leshin. Records available: 1943, 1945-49. Nov. 23, 171.23.

7/11-28L1. Records available: 1937-49. Nov. 23, 155.36.

*7/12-4P2. Records available: 1940-49. Mar. 8, 9.20; July 13, 20.70, windmill pumping fast; Sept. 21, obstructed at 18 feet; Nov. 23, 16.6.

*7/12-6D1. Records available: 1943-45, 1947-49. Nov. 23, dry.

*7/12-8D1. Records available: 1943-49. Nov. 23, 24.9.

* Measurements by Los Angeles County Flood Control District.

*7/12-15F1. A. H. Powell. In Lancaster. Records available: 1942-49. Mar. 8, 47.7; July 13, 70.25; Sept. 21, 72.30.

*7/12-15F2. Los Angeles County Water District 4. Records available: 1943-45, 1947-49. Nov. 29, 90.4.

*7/12-22J1. F. La Horgue. Records available: 1942-49.

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 2	111.45	May 26	115.7	Sept. 2	122.6	Nov. 16	119.15
Mar. 3	110.65	June 8	116.85	Oct. 19	122.5	Dec. 28	121.75
Apr. 12	111.2	July 13	118.2				

*7/12-29P1. Records available: 1939-43, 1945-47, Nov. 22, 157.70.

*7/12-34E1. G. Lane. Records available: 1941, 1944, 1947-49. Nov. 22, 219.2.

*7/13-3D1. F. Gorrindo. Records available: 1945-49. Dec. 8, 75.0.

*7/13-3D2. F. Gorrindo. Records available: 1946-49. Dec. 2, 57.15.

*7/13-6A1. Records available: 1936-45. No measurement made in 1949.

*7/13-11D1. Records available: 1942-49. Nov. 23, 5.75.

*7/13-11D3. Long. Records available: 1945, 1947-49. Mar. 9, 35.2; July 13, 38.6.

*7/13-17D1. Records available: 1937, 1939-45, 1947-48. No measurement made in 1949.

*7/13-21J2. L. H. Benson. Records available: 1942-45, 1947-49. Dec. 2, 99.2.

*7/13-21J3. L. H. Benson. Records available: 1942-44, 1946-47, 1949. Dec. 9, 86.85.

*7/13-27N1. A. F. Godde. Records available: 1941-43, 1945-49. Dec. 9, 156.3.

*7/13-28P1. Crenmer. Records available: 1941, 1944-47, 1949. Dec. 2, dry at 206 feet.

*7/13-35E1. George Lane. Records available: 1937-49. Dec. 9, 199.6.

*7/14-10F1. F. A. Ullman. Records available: 1942-43, 1945-49. Mar. 9, 192.3; July 13, 195.35; Sept. 21, 197.7; Dec. 9, 195.4.

8/9-4N2. U. S. Army Reservation. Records available: 1941-49. Nov. 22, 15.41.

8/9-4P1. U. S. Army Reservation. Records available: 1941-43, 1945-49. Nov. 22, 25.10.

8/9-6N1. U. S. Army Reservation. Records available: 1941-49. Nov. 22, 14.06.

8/9-6R1. U. S. Army Reservation. Records available: 1942-43, 1945-47, 1949. Nov. 22, 13.06.

8/10-2P1. U. S. Army Reservation. Records available: 1941, 1945-49. Nov. 22, 21.25.

8/10-8R3. J. G. Walsh. Records available: 1947-49. Jan. 26, 30.12; Feb. 23, 30.00; July 26, 38.16; Nov. 22, 33.74; Dec. 27, 32.80.

* Measurements by Los Angeles County Flood Control District.

8/10-9M1. J. M. Hamilton. Records available: 1921-49.

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 26	25.14	Apr. 25	25.50	July 26	26.41	Oct. 25	27.26
Feb. 23	25.16	May 26	25.84	Aug. 23	26.80	Nov. 22	27.11
Mar. 25	25.31	June 22	26.06	Sept.26	27.13	Dec. 27	27.09

8/10-19Q1. Union Trust and Savings Bank. Records available: 1939-48. No measurement made in 1949.

8/10-32N1. John Demuth. Records available: 1948-49.

Jan. 26	71.67	May 26	77.45	Aug. 23	80.53	Nov. 22	78.33
Feb. 23	71.08	June 22	78.91	Sept.26	81.30	Dec. 27	76.63
Mar. 25	a74.48	July 26	79.82				

a Pumping.

8/11-8P1. Records available: 1945-49. Nov. 22, 17.89.

8/11-10N1. E. R. Siple. Records available: 1945-49. Nov. 22, 26.94.

8/11-20L1. Records available: 1943-47, 1949. Nov. 22, dry.

8/11-22N2. Lewis Prothro. Records available: 1937, 1942-44, 1946-47. No measurement made in 1949.

8/11-22N3. Lewis Prothro. Records available: 1937, 1939-49. Nov. 22, 81.38.

8/11-30R1. Records available: 1941, 1943-49. Nov. 22, 37.94.

*8/12-4K1. Records available: 1943-47, 1949. Nov. 29, 15.3.

*8/12-20B1. Records available: 1941-49. Nov. 29, 25.85.

*8/12-22D1. Records available: 1940-49. July 12, 10.4; Nov. 22, 16.8.

*8/12-22M1. Records available: 1943-49. Nov. 22, 13.60.

*8/12-22M2. Records available: 1943-49. Nov. 22, 14.5.

*8/12-22R1. I. B. Wibigler. Records available: 1941-49. Nov. 29, 24.3.

8/12-24R1. Records available: 1941-49. Nov. 22, 18.06.

*8/12-30Q1. Records available: 1943-49. Nov. 22, 22.2.

8/13-2C1. Alternate for well 9/13-35P1. Records available: 1942-45, 1948. Nov. 29, well obstructed at 52 feet. No measurement made in 1949.

*8/13-7H1. Lone Butte Ranch. About 10.5 miles northwest of Lancaster. Records available: 1940-44, 1946-49. Dec. 6, 127.9.

*8/13-8C1. A Boulin. Records available: 1940-48. No measurement made in 1949.

*8/13-20M1. O. T. Kelly & Son. Records available: 1945-49. Dec. 6, 132.20.

*8/13-22K1. A. G. Andrews. Records available: 1942-43, 1945-49. Dec. 2, 85.75.

*8/13-32N1. Pedro Lizarraga. Records available: 1945-49. Dec. 2, 131.5.

* Measurements by Los Angeles County Flood Control District.

*8/13-33Q2. Records available: 1946-49. Nov. 29, 85.5.

*8/14-2R1. Records available: 1942-43, 1945-49. Dec. 2, 146.2.

*8/14-12A1. H. G. Ranch No. 1. Records available: 1940-49. Dec. 2, 142.9.

*8/14-12D1. H. G. Ranch No. 1. Records available: 1939-40, 1942-49. Dec. 2, 148.35.

*8/14-14R1. Records available: 1943-49. Dec. 2, 155.2.

*8/14-17Q1. Marl Craven-Tibola. Records available: 1946-49. Dec. 7, 160.3.

*8/14-25C2. Records available: 1945, 1947-49. Dec. 2, 149.2.

*8/14-25D1. Records available: 1946, 1948-49. Dec. 2, 156.8.

*8/15-10P1. Scott. Records available: 1945-48. No measurement made in 1949.

*8/15-17R1. Canfield. About 4.5 miles northwest of Fairmont. Equipped with recording gage. Records available: 1946-49.

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 18	112.8	Mar. 29	111.85	June 8	111.20	Sept.21	110.9
Mar. 9	112.17	May 5	111.55	July 12	111.1	Dec. 7	110.75

*8/15-20N1. About 4.5 miles northwest of Fairmont. Records available: 1946-49. Mar. 9, 153.8; July 12, 154.0; Sept. 21, 154.1.

*8/15-22N1. Barnes. About 3 miles northwest of Fairmont. Records available: 1946-49. Mar. 9, 171.65; July 12, 177.2, windmill pumping; Sept. 21, 169.7; Dec. 7, 169.4.

*8/15-24B2. Charles L. Schneider. Records available: 1946-49. Mar. 9, 144.5; July 12, 147.6, shut down pump to measure; Sept. 21, 145.8; Dec. 7, 145.3.

*8/15-27R1. I. T. Brandt. Records available: 1945-49. Mar. 9, 142.2; July 13, 140.95; Dec. 7, 139.65.

*8/15-29M1. U. S. Soil Conservation Service. Records available: 1945-49. Mar. 9, dry.

*8/15-33G1. Correll. About 2.5 miles west of Fairmont. Records available; 1946-49. July 12, 207.3.

*8/15-36M1. Fairmont School. Records available: 1943-45, 1947-49. Dec. 9, 84.5.

*8/16-5N1. Carpy (International Harvester Co.). Records available: 1942-49. Mar. 9, 196.55; July 12, 195.9; Sept. 21, 196.1; Dec. 9, 195.95.

*8/16-14K1. Snyder. Records available: 1946-49. Mar. 9, 112.8; July 12, well filled with rock to 114 feet, dry.

*8/16-14L1. Snyder. Records available: 1945-47, 1949. July 12, 120.1, windmill pumping; Sept. 21, 128.95; Dec. 9, 129.10.

*8/16-18H1. Neenach School. Records available: 1942-49. Dec. 9, 98.6.

* Measurements by Los Angeles County Flood Control District.

San Gabriel River Basin

1S/10-18. At Baldwin Park. Records available: 1903-49.

Mean daily water level, in feet, from recorder graph

Day	January		February		March		April	
	Below land-surface datum	Above sea level	Below land-surface datum	Above sea level	Below land-surface datum	Above sea level	Below land-surface datum	Above sea level
1	108.55	278.45	108.31	278.69	108.23	278.77	108.28	278.72
2	108.52	278.48	108.30	278.70	108.23	278.77	108.29	278.71
3	108.53	278.47	108.29	278.71	108.22	278.78	108.32	278.68
4	108.55	278.45	108.28	278.72	108.21	278.79	108.37	278.63
5	108.55	278.45	108.28	278.72	108.22	278.78	108.40	278.60
6	108.53	278.47	108.27	278.73	108.20	278.80	108.39	278.61
7	108.51	278.48	108.25	278.75	108.19	278.81	108.42	278.58
8	108.50	278.50	108.26	278.74	108.18	278.82	108.45	278.55
9	108.49	278.51	108.27	278.73	108.16	278.84	108.48	278.52
10	108.50	278.50	108.24	278.76	108.15	278.85	108.51	278.49
11	108.49	278.51	108.22	278.78	108.15	278.85	108.55	278.45
12	108.47	278.53	108.22	278.78	108.15	278.85	108.59	278.41
13	108.47	278.53	108.23	278.77	108.14	278.86	108.62	278.38
14	108.49	278.51	108.24	278.76	108.14	278.86	108.67	278.33
15	108.48	278.52	108.23	278.77	108.13	278.87	108.71	278.29
16	108.47	278.53	108.22	278.78	108.14	278.86	108.74	278.26
17	108.46	278.54	108.20	278.80	108.14	278.86	108.76	278.24
18	108.45	278.55	108.20	278.80	108.15	278.85	108.78	278.22
19	108.43	278.57	108.21	278.79	108.14	278.86	108.81	278.19
20	108.42	278.58	108.22	278.78	108.15	278.85	108.84	278.16
21	108.41	278.59	108.22	278.78	108.14	278.86	108.88	278.12
22	108.39	278.61	108.22	278.78	108.14	278.86	108.93	278.07
23	108.38	278.62	108.21	278.79	108.14	278.86	108.98	278.02
24	108.36	278.64	108.23	278.77	108.14	278.86	109.02	277.98
25	108.36	278.64	108.24	278.76	108.17	278.83	109.08	277.92
26	108.38	278.62	108.22	278.78	108.18	278.82	109.13	277.87
27	108.36	278.64	108.21	278.79	108.17	278.83	109.18	277.82
28	108.36	278.64	108.23	278.77	108.15	278.85	109.22	277.78
29	108.36	278.64			108.21	278.79	109.28	278.72
30	108.33	278.67			108.22	278.78	109.34	277.66
31	108.32	278.68			108.24	278.76		

Mean daily water level, in feet, from recorder graph

Day	May		June		July		August	
	Below land-surface datum	Above sea level	Below land-surface datum	Above sea level	Below land-surface datum	Above sea level	Below land-surface datum	Above sea level
1	109.42	277.58	111.17	275.83	113.35	273.65	115.72	271.28
2	109.50	277.50	111.22	275.78	113.42	273.58	115.82	271.18
3	109.59	277.41	111.29	275.71	113.51	273.49	115.89	271.11
4	109.66	277.34	111.34	275.66	113.59	273.41	115.94	271.06
5	109.69	277.31	111.41	275.59	113.69	273.31	116.00	271.00
6	109.78	277.22	111.52	275.48	113.81	273.19	116.07	270.93
7	109.86	277.14	111.61	275.39	113.86	273.14	116.14	270.86
8	109.93	277.07	111.68	275.32	113.92	273.08	116.19	270.81
9	109.99	277.01	111.74	275.26	113.99	273.01	116.25	270.75
10	110.05	276.95	111.82	275.18	114.05	272.95	116.33	270.67
11	110.10	276.90	111.87	275.13	114.10	272.90	116.40	270.60
12	110.16	276.84	111.94	275.06	114.15	272.85	116.46	270.54
13	110.23	276.77	112.06	274.94	114.23	272.77	116.53	270.47
14	110.28	276.72	112.11	274.89	114.34	272.66	116.60	270.40
15	110.34	276.66	112.16	274.84	114.42	272.58	116.65	270.35
16	110.38	276.62	112.23	274.77	114.51	272.49	116.72	270.28
17	110.42	276.58	112.34	274.66	114.62	272.38	116.78	270.22
18	110.47	276.53	112.39	274.61	114.72	272.28	116.85	270.15

18/10-18--Continued.

Mean daily water level, in feet, from recorder graph

Day	May		June		July		August	
	Below land-surface datum	Above sea level	Below land-surface datum	Above sea level	Below land-surface datum	Above sea level	Below land-surface datum	Above sea level
19	110.50	276.50	112.45	274.55	114.80	272.20	116.92	270.08
20	110.53	276.47	112.52	274.48	114.89	272.11	116.99	270.01
21	110.54	276.46	112.58	274.42	114.95	272.05	117.06	269.94
22	110.56	267.44	112.65	274.35	115.02	271.98	117.14	269.86
23	110.59	276.41	112.73	274.27	115.10	271.90	117.21	269.79
24	110.63	276.37	112.84	274.16	115.18	271.82	117.29	269.71
25	110.69	276.31	112.91	274.09	115.24	271.76	117.37	269.63
26	110.74	276.26	113.00	274.00	115.32	271.68	117.44	269.56
27	110.82	276.18	113.08	273.92	115.40	271.60	117.52	269.48
28	110.89	276.11	113.15	273.85	115.48	271.52	117.60	269.40
29	110.96	276.04	113.20	273.80	115.51	271.49	117.68	269.32
30	111.03	275.97	113.28	273.72	115.58	271.42	117.76	269.24
31	111.11	275.89			115.64	271.36	117.85	269.15

Mean daily water level, in feet, from recorder graph

Day	September		October		November		December	
	Below land-surface datum	Above sea level	Below land-surface datum	Above sea level	Below land-surface datum	Above sea level	Below land-surface datum	Above sea level
1	117.93	269.07	119.58	267.42	120.52	266.48	120.48	266.52
2	117.95	269.05	119.62	267.38	120.57	266.43	120.47	266.53
3	117.99	269.01	119.66	267.34	120.63	266.37	120.47	266.53
4	118.04	268.96	119.69	267.31	120.70	266.30	120.46	266.54
5	118.10	268.90	119.73	267.27	120.75	266.25	120.45	266.55
6	118.14	268.86	119.76	267.24	120.81	266.19	120.44	266.56
7	118.21	268.79	119.80	267.20	120.82	266.18	120.44	266.56
8	118.30	268.70	119.84	267.16	120.84	266.16	120.43	266.57
9	118.40	268.60	119.87	267.13	120.86	266.14	120.42	266.58
10	118.46	268.54	119.89	267.11	120.88	266.12	120.42	266.58
11	118.53	268.47	119.93	267.07	120.87	266.13	120.42	266.58
12	118.58	268.42	119.95	267.05	120.83	266.17	120.40	266.60
13	118.63	268.37	119.98	267.02	120.78	266.22	120.38	266.62
14	118.69	268.31	120.02	266.98	120.74	266.26	120.34	266.66
15	118.73	268.27	120.05	266.95	120.71	266.29	120.30	266.70
16	118.78	268.22	120.08	266.92	120.70	266.30	120.29	266.71
17	118.83	268.17	120.11	266.89	120.68	266.32	120.29	266.71
18	118.88	268.12	120.12	266.88	120.67	266.33	120.27	266.73
19	118.91	268.09	120.15	266.85	120.66	266.34	120.24	266.76
20	118.96	268.04	120.16	266.84	120.63	266.37	120.24	266.76
21	119.01	267.99	120.20	266.80	120.62	266.38	120.20	266.80
22	119.06	267.94	120.23	266.77	120.60	266.40	120.18	266.82
23	119.14	267.86	120.27	266.73	120.58	266.42	120.16	266.84
24	119.21	267.79	120.30	266.70	120.56	266.44	120.14	266.86
25	119.27	267.73	120.33	266.67	120.55	266.45	120.12	266.88
26	119.32	267.68	120.36	266.64	120.55	266.45	120.08	266.92
27	119.38	267.62	120.41	266.59	120.53	266.47	120.05	266.95
28	119.45	267.55	120.44	266.56	120.53	266.47	120.02	266.98
29	119.49	267.51	120.46	266.54	120.51	266.49	120.01	266.99
30	119.52	267.48	120.49	266.51	120.48	266.52	119.98	267.02
31			120.50	266.50			119.96	267.04

Coastal plain

2S/12-13A1. Lycan Bros. Records furnished by San Gabriel Valley Protective Association. Records available: 1928-49.

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 5	41.81	Apr. 6	37.09	July 6	44.62	Oct. 5	51.04
12	41.28	13	37.47	13	45.35	12	51.26
19	40.74	20	38.00	20	45.97	19	51.48
26	40.06	27	38.60	27	46.62	26	51.65
Feb. 2	39.40	May 4	39.25	Aug. 3	47.24	Nov. 2	51.85
9	38.93	11	39.97	10	47.81	9	52.06
16	38.45	18	40.62	17	48.35	16	51.87
23	38.11	25	41.02	24	48.82	23	51.59
Mar. 2	37.91	June 1	41.46	31	49.28	30	51.43
9	37.63	8	42.10	Sept. 7	49.69	Dec. 7	51.38
16	37.29	15	42.76	14	50.06	14	51.24
23	37.07	22	43.34	21	50.40	21	51.00
30	37.00	29	44.62	28	50.72	28	50.45

2S/15-34H1. Don Benshoof. All water levels are lower than sea level. Records furnished by California Division of Water Resources. Records available: 1929-49.

Jan. 31	133.7	Apr. 28	136.2	Aug. 5	135.1	Oct. 3	134.6
Feb. 26	134.6	June 1	136.4	Sept. 2	134.9	Nov. 21	133.4
Mar. 28	136.3	27	133.5				

3S/12-8L3. Los Angeles County Farm. Records furnished by San Gabriel Valley Protective Association. Records available: 1930-49.

Jan. 3	32.62	Apr. 4	35.60	July 4	46.16	Oct. 3	45.89
10	33.10	11	37.58	11	45.65	10	44.80
17	32.30	18	39.05	18	46.80	17	44.53
24	31.70	25	39.89	25	47.35	24	44.25
31	31.91	May 2	40.54	Aug. 1	46.77	31	45.05
Feb. 7	31.10	9	42.22	8	46.75	Nov. 7	44.93
14	31.09	16	40.27	15	47.12	14	41.84
21	31.72	23	37.64	22	46.81	21	41.67
28	31.48	30	41.24	29	47.91	28	40.76
Mar. 7	31.55	June 6	43.88	Sept. 5	47.03	Dec. 5	40.49
14	32.08	13	44.07	12	47.43	12	39.50
21	32.58	20	45.10	19	46.79	19	38.68
28	33.34	27	45.42	26	46.43	26	38.44

3S/13-8L2. H. N. Edison. Records furnished by California Division of Water Resources. Records available: 1930-49.

Jan. 31	121.0	Apr. 28	122.6	Aug. 1	a129.4	Oct. 3	127.6
Feb. 24	120.2	June 1	125.6	Sept. 1	a130.3	Nov. 14	a132.4
Apr. 1	120.4	28	127.1				

a Water level lower than sea level.

3S/13-18G2. Union Oil Co. All water levels are lower than sea level. Records furnished by California Division of Water Resources. Records available: 1930-33, 1935-41, 1944-49.

Feb. 1	174.8	Apr. 28	181.0	June 28	184.3	Sept. 1	187.0
24	173.4	May 27	183.1	Aug. 1	185.0	Oct. 3	184.6
Mar. 29	179.0						

3S/14-3K1. Southern California Water Co., Yukon plant well 1. About 2 miles southeast of Inglewood. All water levels are lower than sea level. Records furnished by Southern California Water Co. Records available: 1941-49.

Jan. 2	128	Apr. 1	123	July 1	146	Oct. 1	146
7	123	7	126	7	142	7	142
14	125	14	130	14	145	14	144
21	123	21	131	21	145	21	144
Feb. 1	124	May 1	132	Aug. 1	146	Nov. 1	145
7	123	7	136	7	145	7	145
14	121	14	132	14	145	14	139
21	121	21	133	21	147	21	140
Mar. 1	123	June 1	139	Sept. 1	148	Dec. 1	139
7	124	7	139	7	146	7	134
14	124	14	142	14	146	14	132

3S/14-21B1. Southern California Water Co., Rosecrans plant well 1. All water levels are lower than sea level. Records furnished by Southern California Water Co. Records available: 1931-37, 1939-49.

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 1	106	Apr. 1	104	July 1	113	Oct. 1	112
7	102	7	104	7	114	7	113
14	101	14	107	14	115	14	114
21	100	21	107	21	117	21	112
Feb. 1	100	May 1	107	Aug. 1	117	Nov. 1	112
7	100	7	109	7	117	7	110
14	100	14	109	14	117	14	110
21	100	21	109	21	115	21	110
Mar. 1	100	June 1	109	Sept. 1	115	Dec. 1	109
7	104	7	109	7	115	7	109
14	102	14	109	14	115	14	109
21	104	21	112	21	114	21	109

3S/14-36M3. H. T. Potomkin. All water levels are lower than sea level. Records furnished by California Division of Water Resources, except as indicated. Records available: 1910, 1928-49. Jan. 3, 75.3; June 29, 80.9; Aug. 1, 78.0; Sept. 1, 78.4; Oct. 5, 78.7; Nov. 15, 78.3; Dec. 6, 78.1.

4S/11-5D1. V. Capovilla. Records furnished by Orange County Flood Control District. Records available: 1930-49.

Jan. 26	28.13	Apr. 29	38.42	July 27	a64.99	Oct. 26	a59.80
Feb. 18	27.20	May 31	a57.12	Aug. 30	a66.58	Nov. 25	a52.06
Mar. 19	28.32	June 28	a64.54	Sept. 22	a64.20	Dec. 22	39.59

a Water level lower than sea level.

4S/12-8P1. Montana Land Co. All water levels are lower than sea level. Records furnished by city of Long Beach. Records available: 1903, 1914-19, 1923-49.

Jan. 3	98.38	Apr. 4	94.55	July 4	117.62	Oct. 3	118.40
10	96.97	11	94.19	11	118.55	10	116.83
17	96.40	18	98.17	18	119.61	17	113.94
24	95.15	25	100.85	25	120.55	24	111.60
31	94.75	May 2	102.69	Aug. 1	120.60	31	113.48
Feb. 7	94.39	9	103.95	8	121.25	Nov. 7	111.88
14	94.98	16	103.65	15	120.11	14	108.04
21	94.69	23	104.27	22	120.16	21	112.63
28	94.58	30	106.80	29	120.75	28	110.35
Mar. 7	95.04	June 6	109.49	Sept. 5	121.32	Dec. 5	109.54
14	91.22	13	111.32	12	122.38	12	107.17
21	90.38	20	112.76	19	120.85	19	99.45
28	93.06	27	116.27	26	119.91	26	99.69

4S/13-14L1. Southern California Edison Co., Ltd. In Long Beach. All water levels are below sea level. Records furnished by city of Long Beach. Records available: 1930-49.

Jan. 3	29.74	Apr. 1	29.62	July 4	31.43	Oct. 3	31.92
11	29.66	11	29.97	11	31.26	10	31.68
17	29.67	18	30.02	18	31.31	17	31.69
24	29.49	25	30.31	25	31.53	24	31.69
31	29.49	May 2	30.42	Aug. 1	31.64	31	31.79
Feb. 7	29.44	9	30.37	8	31.73	Nov. 7	31.74
14	29.52	16	30.31	15	31.48	14	31.51
21	29.52	23	30.24	22	31.56	21	31.57
28	29.53	30	29.91	29	31.76	28	31.61
Mar. 7	29.50	June 6	31.01	Sept. 5	31.57	Dec. 5	31.59
14	29.50	13	31.32	12	31.57	12	31.53
21	29.50	20	31.14	19	31.52	19	31.29
28	29.36	27	31.38	26	31.64	26	31.29

4S/13-23G2. City of Long Beach. All water levels are below sea level. Records furnished by city of Long Beach. Records available: 1932-49.

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 3	91.9	Mar. 31	89.3	June 20	101.1	Oct. 3	102.8
10	88.7	Apr. 11	92.5	July 11	101.9	10	100.3
17	89.7	18	92.6	25	103.1	17	99.9
24	88.4	25	94.9	29	104.1	24	99.9
31	88.7	May 2	96.0	Aug. 8	104.1	Nov. 7	100.6
Feb. 7	99.7	9	97.9	15	103.0	11	96.8
14	88.2	16	97.9	22	103.4	21	97.5
21	88.2	23	97.5	31	105.4	30	95.6
28	88.1	31	99.7	Sept.12	102.3	Dec. 12	94.2
Mar. 7	87.6	June 6	100.5	19	103.7	19	93.0
14	87.2	13	100.4	28	102.9	27	91.0
21	86.5						

4S/13-33D1. City of Los Angeles, Wilmington plant well 14. In Wilmington. All water levels are below sea level. Records furnished by California Division of Water Resources. Records available: 1931-49.

Jan. 7	87.8	Mar. 30	85.8	Aug. 3	98.6	Oct. 10	96.5
Feb. 14	87.8	June 30	97.9	Sept. 7	97.8	Nov. 17	96.8
Mar. 2	87.6						

Orange County

Coastal plain

(Except as otherwise indicated the following records were furnished by the Orange County Flood Control District.)

3S/11-36Q2. M. Del Giorgio. Records available: 1930-49.

Jan. 5	76.10	Mar. 30	73.03	June 29	95.65	Oct. 5	95.47
12	72.84	Apr. 6	75.20	July 6	97.59	12	94.00
19	71.43	13	78.96	20	97.76	19	91.63
26	70.60	20	80.74	27	98.26	26	92.58
Feb. 2	70.21	27	84.30	Aug. 3	99.05	Nov. 2	91.71
9	69.90	May 4	89.44	10	99.17	9	93.90
16	70.89	11	90.88	17	99.29	16	89.11
23	71.56	18	88.09	24	96.88	23	86.22
Mar. 2	71.33	25	88.72	31	97.40	30	85.01
9	71.71	June 1	88.49	Sept. 7	97.59	Dec. 7	85.82
11	71.80	8	91.61	14	97.45	14	84.05
16	72.34	15	93.50	21	95.25	21	81.55
23	72.80	22	94.39	28	96.89	28	79.50

4S/9-7B1. Dowling & Prentice. Records available: 1928-49. Mar. 9, 193.05; Mar. 16, 192.66; Apr. 6, 191.52: Apr. 13, 191.14; Apr. 20, 191.11.

4S/10-22L2. Halderman & Callens. Records available: 1928-49.

Jan. 14	127.79	Apr. 8	126.91	Aug. 11	a135.97	Oct. 14	136.50
Feb. 10	124.77	29	a128.42	31	a135.93	15	134.85
25	a124.21	July 1	a132.80	Sept. 8	ab136.18	Dec. 9	133.54
Mar. 10	124.53	29	a135.30	27	a135.94		

a By Geological Survey.
b Water level lower than sea level.

4S/11-19K1. Los Alamitos Sugar Co. Records furnished by city of Long Beach except as indicated. Records available: 1901, 1903, 1929-49.

4S/11-19K1.--Continued.

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 3	22.23	Apr. 4	b30.48	July 5	b47.70	Sept. 28	b46.16
10	22.87	11	b32.08	11	b48.67	Oct. 3	b43.46
17	22.22	18	b34.22	18	b49.39	10	b41.70
24	21.13	25	b34.65	25	b49.96	17	b41.96
28	a24.43	29	b37.33	29	b51.48	24	b41.16
31	25.58	May 2	b36.53	Aug. 1	b51.12	28	b38.68
Feb. 7	27.75	9	b37.20	8	b49.12	31	b38.35
14	28.05	13	b36.60	12	b49.52	Nov. 7	b37.93
21	b28.71	23	b35.15	15	b47.94	14	b34.60
25	b28.89	27	b36.29	22	b46.54	21	b32.75
28	b28.60	31	b36.57	29	b47.43	28	b31.52
Mar. 7	b29.74	June 6	b39.88	31	b48.21	30	b33.78
14	b31.44	13	b41.52	Sept. 5	b47.43	Dec. 5	b30.02
21	b33.22	20	b42.00	12	b47.25	12	b30.70
28	b32.97	22	b46.03	19	b46.41	19	b29.38
31	b32.58	July 1	b47.57	26	b45.49	27	26.49

a By Geological Survey.
b Water level lower than sea level.

5S/10-9D1. Julio Martinez. Records available: 1922, 1924-25, 1927-28, 1930-49.

Jan. 14	63.37	Apr. 8	70.79	July 14	a79.22	Oct. 14	a76.47
Feb. 10	65.59	May 12	a77.25	Aug. 11	a83.51	Nov. 15	a75.28
Mar. 10	71.67	June 10	a76.24	Sept. 8	a80.12	Dec. 9	72.21

a Water level lower than sea level.

5S/10-28B1. John Sturtevant. About 3.5 miles southwest of Santa Ana. Records available: 1935-49.

Jan. 18	37.22	May 13	a58.28	July 15	a70.57	Oct. 18	a51.31
Feb. 11	42.09	June14	a64.85	Aug. 12	a71.92	Dec. 13	a46.30

a Water level lower than sea level.

5S/11-2E1. Western Trust and Savings Bank. Records available: 1929-49.

Jan. 1	44.48	Mar. 8	a59.21	May 10	a63.40	Nov. 14	a58.52
Feb. 8	47.70	Apr. 7	a58.22	Oct. 11	a64.67	Dec. 8	a52.26

a Water level lower than sea level.

5S/11-16D2. Anaheim Sugar Co. All water levels are below sea level. Records available: 1929-49.

Jan. 5	14.99	Apr. 6	26.69	July 6	32.44	Oct. 5	32.34
12	18.22	13	27.78	13	34.37	12	31.26
19	18.97	20	27.22	20	35.13	19	30.37
26	19.97	27	26.69	27	35.12	26	29.29
Feb. 2	18.82	May 4	25.68	Aug. 3	33.72	Nov. 2	27.36
9	27.00	11	26.19	10	32.73	9	27.19
16	30.76	18	25.91	17	33.42	16	25.61
23	33.38	25	26.23	24	33.36	23	24.56
Mar. 2	34.51	June 1	25.87	31	33.02	30	23.95
9	34.63	8	27.60	Sept. 7	32.72	Dec. 7	23.21
16	33.75	15	30.82	14	32.92	14	24.13
23	31.21	22	30.32	21	33.27	21	21.70
30	28.94	29	31.15	28	33.90	28	20.66

5S/11-25P1. E. J. Lecrivain. Except as noted, water levels are lower than sea level. Records available: 1930-49.

Jan. 18	a47.40	Apr. 12	56.49	July 15	59.15	Oct. 18	56.04
Feb. 11	54.71	May 13	54.95	Aug. 12	58.74	Nov. 17	54.35
Mar. 15	63.69	June 14	55.81	Sept.13	58.47	Dec. 13	53.41

a Above sea level.

5S/11-28A1. A. Ruoff. All water levels are lower than sea level. Records available: 1930-49.

Jan. 18	11.11	June 14	21.56	Sept. 13	31.39	Nov. 17	25.32
Apr. 12	23.70	July 15	26.42	Oct. 18	31.05	Dec. 13	23.09
May 13	21.34	Aug. 12	28.32				

5S/11-29C4. Sunset Land and Water Co. All water levels are lower than sea level. Records available: 1941-49.

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 18	10.14	Apr. 12	16.34	July 15	21.09	Oct. 18	20.81
Feb. 11	15.39	May 13	14.72	Aug. 12	21.53	Nov. 17	18.02
Mar. 15	20.77	June 14	18.19	Sept.13	22.08	Dec. 13	16.37

5S/12-12P1. U. S. Naval Depot. About 1 mile east of Seal Beach. All water levels are lower than sea level. Records furnished by city of Long Beach. Records available: 1930-49.

Jan. 21	18.01	May 6	22.95	July 29	27.87	Oct. 21	26.18
Feb. 11	20.85	27	23.13	Aug. 19	27.59	Nov. 11	25.13
Mar. 4	25.16	June17	24.75	Sept. 8	27.55	Dec. 2	22.88
25	25.09	July 7	26.08	30	27.85	23	21.61
Apr. 20	23.45						

6S/10-1E1. Frank Ey. About 3.5 miles northeast of Costa Mesa. All water levels are lower than sea level. Records available: 1930-49.

Jan. 3	35.87	Mar. 28	64.91	July 11	56.97	Oct. 10	51.74
10	35.94	Apr. 4	62.40	18	63.83	17	51.49
17	35.76	11	57.96	25	66.82	24	50.97
24	35.99	25	54.47	Aug. 1	63.86	31	51.42
31	37.27	May 2	49.97	8	59.96	Nov. 7	50.08
Feb. 7	38.42	9	48.46	15	59.21	21	46.98
14	49.31	16	45.74	22	57.39	28	46.11
21	50.15	23	44.06	29	56.44	Dec. 5	45.19
28	52.61	June 6	49.57	Sept.12	55.62	12	45.27
Mar. 7	55.29	13	51.09	19	53.26	19	44.78
14	59.85	20	53.79	26	52.29	27	43.62
21	63.28	27	55.94	Oct. 3	52.07		

6S/10-1L2. I. A. W. Henry. About 3.5 miles northeast of Costa Mesa. Records available: 1904, 1921-49.

Jan. 20	20.46	Apr. 19	26.22	Aug. 16	35.44	Oct. 20	31.72
Feb. 15	21.67	May 17	24.27	Sept.15	33.92	Dec. 15	28.81
Mar. 17	21.26	June 16	26.83				

6S/10-5C1. Robert Gisler. About 3 miles northeast of Huntington Beach. Except as noted, all water levels are lower than sea level. Records available: 1931-49.

Jan. 3	a18.90	Apr. 11	30.29	Aug. 15	31.35	Oct. 24	27.83
10	a18.78	25	27.11	22	31.00	31	27.60
17	a18.57	May 2	26.50	29	30.82	Nov. 7	27.91
24	19.54	16	26.36	Sept. 6	30.81	21	25.58
31	20.73	23	26.21	12	30.76	28	24.85
Feb. 7	22.64	June 20	29.56	19	30.33	Dec. 5	25.07
14	28.74	27	29.64	26	30.35	12	24.83
Mar. 21	41.83	July 25	33.50	Oct. 3	29.22	19	24.04
28	38.68	Aug. 1	31.80	10	28.58	27	23.70
Apr. 4	34.26	8	31.54	17	28.15		

a Above sea level.

6S/11-13G2. Surf Land and Water Co. About 1.5 miles east of Huntington Beach. All water levels are lower than sea level. Records available: 1930-49.

Jan. 5	4.67	Apr. 6	10.89	July 6	7.27	Oct. 5	6.80
12	4.36	13	9.55	13	8.01	12	6.57
19	6.90	20	8.80	20	7.84	19	6.62
26	2.18	27	8.27	27	8.41	26	6.45
Feb. 2	3.00	May 4	8.00	Aug. 3	7.89	Nov. 2	6.32
9	4.20	11	7.25	10	7.88	9	6.32
16	11.40	18	6.87	17	7.87	16	5.79
23	14.38	25	6.48	24	7.92	23	5.62
Mar. 2	15.60	June 1	6.63	31	7.96	30	5.49
9	16.08	8	6.64	Sept. 7	7.72	Dec. 7	5.44
16	15.36	15	6.94	14	7.98	14	5.77
23	14.55	22	7.55	21	7.42	21	5.69
30	12.55	29	6.86	28	7.42	28	5.62

I-9F1. The Irvine Co. About 3 miles south of Santa Ana. All water levels are lower than sea level except as indicated. Records available: 1932-49.

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 5	53.48	Mar. 16	70.57	July 6	80.77	Oct. 19	73.63
19	51.39	Apr. 27	72.30	Aug. 17	82.50	26	72.03
Feb. 2	a49.67	May 11	73.57	Sept. 7	76.45	Nov. 2	70.95
9	b51.00	25	74.34	14	73.89	9	69.83
16	52.64	June 1	71.50	21	72.60	16	67.58
23	54.87	8	72.10	28	72.02	23	66.55
Mar. 2	58.84	15	73.04	Oct. 5	73.49	30	64.35
9	65.25	22	74.64	12	73.30	Dec. 21	65.48

a Above sea level.
b At sea level.

Riverside County

Santa Ana River Basin, San Jacinto Valley

3/2W-35Q1. I. E. Facemire. Records available: 1921-49. Feb. 24, 18.70; May 24, 59.59; Aug. 24, 27.30.

4/2W-7J1. Albert McDonald. Records available: 1904-44, 1946-49.

Jan. 26	83.64	Apr. 25	85.44	July 27	93.27	Oct. 27	96.22
Feb. 24	81.52	May 24	87.43	Aug. 24	94.57	Nov. 22	94.68
Mar. 24	82.20	June 28	91.67	Sept.26	95.81		

4/3W-32E1. James Malcom. At Perris, Riverside County. Records available: 1929-49. Feb. 24, 63.11; May 24, 63.45; Aug. 24, 63.85; Nov. 22, 63.92.

4/4W-1L1. B. H. LeCont. Records available: 1914-49. Feb. 24, 40.89; May 24, 41.16; Aug. 24, 42.57; Nov. 22, 42.56.

5/1W-2N1. J. A. Barger. Records available: 1905-49. Feb. 24, 76.96; May 24, 79.53; Aug. 24, 94.67; Nov. 22, 92.73.

5/2W-24A1. L. Wilhelm. Records available: 1914-49. Nov. 22, 44.57.

5/2W-27E2. Fred Harvey. Formerly L. L. Whiting. Records available: 1930-49. Feb. 24, 34.76; May 24, 35.69; Aug. 24, 37.15.

6/3W-4A2. Menifee School. Records available: 1925-34, 1936, 1938-49. Feb. 24, 58.53; May 24, 64.13; Nov. 22, 60.79.

San Bernardino County

Chino Basin

3S/7W-8A. (D-783.) U. S. Government. Formerly owned by Chino Gun Club. About 6 miles southeast of Chino. Records available: 1947-49. Measurements discontinued.

Jan. 3	28.61	Jan. 31	28.53	Mar. 1	28.53	May 11	28.74
10	28.59	Feb. 7	28.47	7	28.52	16	28.75
17	28.60	14	28.53	May 2	28.68	23	28.77
24	28.46	21	28.54				

3S/7W-8B. (D-783c.) U. S. Government. About 6 miles southeast of Chino. Records available: 1947-49. Measurements discontinued. Jan. 3, 28.42; Jan. 10, 28.38; Jan. 17, 28.38; Jan. 24, 28.20; Jan. 31, 28.25; Feb. 7, 28.15; Feb. 14, 28.19.

3S/7W-9D. Test well 1. Constructed by Geological Survey on property of the U. S. Government. Records available: 1948-49. Measurements discontinued.

Jan. 3	9.50	Jan. 24	8.95	Feb. 14	8.89	Mar. 7	8.78
10	9.39	31	9.02	21	8.90	May 2	4.05
17	9.27	Feb. 7	8.88	Mar. 1	8.85	12	10.21

3S/7W-17K. (D-7881.) U. S. Government. In Riverside County. Records available: 1947-49. Measurement discontinued. Jan. 3, 5.92; Jan. 10, 5.82; Jan. 17, 4.43; Jan. 31, 4.25.

Mojave River Basin

3/3W-6E1. Mike Spranger. Records available: 1929-32, 1935-49. May 11, 6.57; Nov. 14, dry.

3/3W-6E2. Records available: 1948-49. May 11, 6.10; Nov. 14, 35.91.

3/4W-12J1. Olive. Records available: 1929-49. May 10, 5.44; Nov. 14, dry.

3/4W-13B1. Olive. Records available: 1922-23, 1929-33, 1935-49. May 10, 74.08; Nov. 14, 82.90.

4/3W-1M1. E. D. S. Pope. Records available: 1930-33, 1935-43, 1945-49. May 11, 203.36; Nov. 15, 204.31.

4/3W-6B1. A. J. Lintner. Records available: 1931-32, 1934-49. May 10, 57.04; Nov. 14, 58.08.

4/3W-6D1. A. W. Phillips. Records available: 1917, 1930-49. May 10, 57.20; Nov. 14, 59.00.

4/3W-17M1. Arrowhead Reservoir & Power Co. Records available: 1905, 1916, 1922-23, 1930-49. May 10 and Nov. 14, dry at 24.17 feet.

4/3W-18E1. C. O. Evans. Records available: 1930-32, 1935, 1938-49. May 10, 27.34; Nov. 14, 31.43.

4/3W-19G1. G. W. McLister. Records available: 1917, 1931-32, 1935-37, 1939-49. May 10, 27.25; Nov. 14, 38.38.

4/3W-19R1. Arrowhead Reservoir & Power Co. Records available: 1905, 1907, 1930-49. May 10, 24.69; Nov. 14, 38.68.

4/3W-20L1. J. M. Allison. Records available: 1923, 1930-49. May 10, 34.84; Nov. 14, 39.39.

4/3W-21A1. W. O. Wade. Records available: 1917, 1923, 1930-42, 1944-49. May 11, 257.72; Nov. 15, 258.20.

4/3W-30E1. A. W. Cole. Records available: 1917, 1930-33, 1935-49. May 10, 38.80; Nov. 14, 46.71.

5/3W-3D1. Dick Lewis. Records available: 1948-49. May 11, 72.26; Nov. 15, 72.48.

5/3W-13D1. Eva V. Case. Records available: 1948-49. May 11, 89.41; Nov. 15, 89.46.

5/3W-9K1. F. A. Fletcher. Records available: 1917, 1930-48. May 10, well filled and destroyed. Measurement discontinued.

5/3W-18F1. J. D. Humiston. Records available: 1917; 1923, 1930-32, 1935, 1937-49. May 10, 108.97; Nov. 15, 110.82.

5/3W-22A1. Jack Rothwell. Records available: 1948-49. May 11, 89.61; Nov. 15, 89.65.

5/3W-24N1. Douglas. Records available: 1948-49. May 10, 89.50; Nov. 15, 89.75.

5/4W-10M1. In Victorville. Records available: 1930-32, 1935, 1937-49. May 10, 44.87; Nov. 14, 44.57.

5/4W-11P1. Lee Saul. Records available: 1931-32, 1935, 1937-49. Nov. 14, 55.62.

5/4W-11P2. Lee Saul. Records available: 1931-32, 1935-45, 1947-49. May 10, 50.60; Nov. 15, 48.90.

5/4W-35A1. A. Sorenson. On Verde Ranch. Records available: 1917, 1930-31, 1945, 1948-49. Nov. 14, flows about ½ sec.-ft.

5/4W-36N1. Verde Ranch. Records available: 1917, 1930-45, 1947-49. Jan. 6, 1947, 4.56; Dec. 1, 1948, 11.15; Nov. 14, 1949, 9.54.

6/3W-28R1. Records available: 1948-49. May 11, 126.00; Nov. 15, 126.39.

7/4W-30C1. Records available: 1930-32, 1935-49. May 9, 58.17; Nov. 15, 58.72.

8/3E-3E1. C. W. Beaverstock. Records available: 1930-32, 1935-49. May 17, 5.25; Nov. 18, 7.41.

8/3E-3F1. Records available: 1930-32, 1935-49. May 17, 21.35; Nov. 18, 21.94.

8/3E-4B1. Lyle Graham. Records available: 1930-32, 1935-49. May 17, 3.45; Nov. 18, 4.21.

8/3E-4B2. Lyle Graham. Records available: 1922, 1930-32, 1935-36, 1938-49. May 17, 4.14; Nov. 18, 4.79.

8/3W-4M1. Everett Swing. Records available: 1930-33, 1939-49. May 9, 13.53; Nov. 15, 15.50.

8/4E-7E1. Records available: 1919, 1922, 1930-32, 1938-48. No measurement made in 1949.

8/4E-9C1. Records available: 1947-49. May 17, 1.10; Nov. 18, dry at 9.3 feet.

8/4E-12L1. Mojave Camp service station. Records available: 1930, 1932, 1935-45, 1947-49. May 17, 30.55; Nov. 18, 30.60.

8/4W-2Q1. Records available: 1930-32, 1934-49. May 9, 23.92; Nov. 15, dry.

8/4W-12Q1. Holcomb Bros. Records available: 1931-32, 1935-37, 1939-41, 1943-49. Nov. 15, 11.68.

8/4W-20N1. Lord. Records available: 1930-32, 1934-41, 1943-47. No measurement made in 1949.

8/4W-31D1. F. H. Merrell. Records available: 1930-32, 1939-49. May 9, 44.29; Nov. 15, 48.76.

8/4W-31R1. Records available: 1930-32, 1934-48. No measurement made in 1949.

9/1E-12D1. Records available: 1930, 1932, 1934-35, 1937-45, 1947-49. May 16, 44.83.

9/1E-13E1. Records available: 1925-28, 1930-49. May 16, 66.47; Nov. 17, 67.27.

9/1E-13E2. Records available: 1925-27, 1930-33, 1935-49. May 16, 67.19; Nov. 17, 68.36.

9/1E-18E1. B. A. Funk. Records available: 1925-28, 1930-32, 1934-49. Nov. 16, 38.13

9/1E-24D1. Records available: 1930, 1932-49. May 16, 70.98; Nov. 17, 72.18.

9/1W-10A1. Gibbs. Records available: 1925, 1927-28, 1930-32, 1935, 1937-45, 1947-48. Measurement discontinued.

9/1W-10D2. R. E. Hettick. Records available: 1945-49. May 9, 11.72; Nov. 16, 13.25.

9/1W-10M1. Greystone Auto Camp. Records available: 1930, 1932, 1935, 1938-49. May 16, 58.18.

9/1W-13B1. F. Ryerse. Records available: 1925-28, 1930-32, 1935 1938-49. May 16, 22.97; Nov. 16, 33.52.

9/2E-3A1. Bruce McCormick. Records available: 1919, 1922, 1930-35, 1937-49. May 16, 15.44; Nov. 16, 19.19.

9/2E-3A2. Bruce McCormick. Records available: 1931-35, 1937-49. May 16, 18.93; Nov. 16, 22.56.

9/2E-4D1. Records available: 1930-32, 1934-35, 1937-49. May 16, 20.38; Nov. 16, 21.33.

9/2E-8J1. Annie Escholtz. Records available: 1919, 1925, 1928, 1930-33, 1935-49. Nov. 17, 40.22.

9/2E-12N1. Hunter. Records available: 1919, 1924-27, 1930-35, 1937-49. May 17, 5.67; Nov. 17, 6.12.

9/2E-14N1. Scobel & Haimut. Records available: 1919, 1922, 1930, 1932-33, 1935, 1938-48. No measurement made in 1949.

9/2E-14N2. Scobel & Haimut. Records available: 1925, 1927-28, 1930-35, 1937-49. May 17, 21.91; Nov. 17, 22.51.

9/2E-14N3. Scobel & Haimut. Records available: 1924-28, 1930-33, 1935, 1937-49. May 17, 17.92; Nov. 17, 18.67.

9/2E-18F1. Records available: 1924-28, 1930-40, 1942-43, 1945-49. May 16, 55.33; Nov. 17, 56.49.

9/2E-20Q1. Daggett Airport. Records available: 1932, 1941-48. No measurement made in 1949.

9/2W-19B1. Shobel. Domestic well. Records available: 1930-32, 1935, 1937-49. May 16, 64.56; Nov. 15, 65.75.

9/3E-3D1. Records available: 1919, 1926, 1930-35, 1937-49. May 17, 44.53; Nov. 17, 41.67.

9/3E-10D1. Bozarth. Records available: 1922, 1930-35, 1937-43, 1945-49. May 17, 35.19.

9/3E-12E1. B. Nicholas. Records available: 1922, 1930-33, 1935, 1937-44, 1946-49. May 17, 24.94.

9/3E-19E1. Records available: 1919, 1922, 1930-32, 1935, 1938-49. May 17, well destroyed. No measurement made in 1949.

9/3E-34D1. Clinkenbeard. Records available: 1919, 1922, 1930-32, 1934-44, 1947-49. Nov. 17, 30.41.

9/3W-10P1. Records available: 1930-32, 1934-49. May 9, 89.52; Nov. 16, 89.99.

9/3W-10R1. Osborn. Records available: 1930-32, 1935-49. May 9, dry at 12 feet; Nov. 16, dry.

9/3W-14D1. Bullock. Records available: 1930-32, 1934-49. May 9, 21.15; Nov. 16, 23.30.

9/3W-28A1. J. Slagill. Records available: 1930-36, 1938-49. May 9, 9.29; Nov. 16, 20.29.

9/3W-34R1. Nellie Storey. Records available: 1930-33, 1935-36, 1938-42, 1944-45, 1947-49. May 9, 125.82; Nov. 15, 125.93.

9/4E-31K1. A. M. Monroe. Records available: 1930-32, 1935-49. May 17, 13.02; Nov. 18, 13.57.

10/1W-31C1. Nelson. Records available: 1930-32, 1935, 1938-49. Nov. 16, 50.06.

10/2E-32P1. Yermo Mutual Water Co. Records available: 1919-22, 1924, 1929-49. May 16, 28.74; Nov. 16, 30.65.

10/2E-34L1. Records available: 1919, 1922, 1930-32, 1934-35, 1937-49. May 16, 58.08; Nov. 16, 59.48.

10/2W-19P1. Loftus. Records available: 1930-33, 1935, 1937-45, 1947-49. May 9, 67.88; Nov. 16, 68.46.

10/2W-30N1. J. D. Rich. Records available: 1930-46, 1948-49. Nov. 16, 25.46.

10/3E-34E2. G. M. Bond. Records available: 1947-49. May 16, 8.71; Nov. 17, 9.85.

10/3W-32C1. Records available: 1931-32, 1934, 1936-49. May 9, 58.22; Nov. 16, 58.40.

11/3W-28R1. S. F. Edwards. Records available: 1930-32, 1935-40, 1944-49. May 9, 27.15; Nov. 16, 27.07.

11/3W-34F1. Records available: 1930-32, 1934-49. May 9, 34.36; Nov. 16, 34.35.

Santa Ana River Basin, San Bernardino Area

1N/4W-28R1. S. F. Kelley. Records available: 1900, 1904, 1906-07, 1909, 1912, 1914-49. Feb. 21, 63.30.

1N/4W-36F1. G. M. Cooley. Records available: 1900, 1904, 1906, 1914-49. Feb. 21, 55.24; May 25, 57.52; Aug. 22, 61.36; Sept. 21, 62.34.

1S/3W-3N1. R. C. Gerber. Records available: 1920-49. Feb. 28, 112.88; Aug. 24, 118.66; Nov. 25, 125.31.

1S/3W-16L1. S. Ronzone. Records available: 1900, 1904, 1906-07, 1909, 1912, 1914-33, 1940-49. Feb. 21, 87.70; May 25, Aug. 22, Nov. 21, dry at 93 feet.

1S/3W-17C1. Williams well. Records furnished by Gage Canal Co. Records available: 1892-94, 1896, 1898-1949.

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 1	39.20	Apr. 9	33.86	July 9	39.95	Oct. 8	46.95
8	38.95	16	33.86	16	40.53	15	47.36
15	38.53	23	34.20	23	41.03	22	47.87
28	38.20	30	34.62	30	41.70	29	48.20
29	37.70	May 5	35.03	Aug. 6	42.12	Nov. 5	48.36
Feb. 5	37.03	14	35.62	13	42.70	12	48.53
12	36.70	21	36.20	20	43.20	19	48.70
19	36.20	28	36.62	27	43.78	26	48.70
26	35.70	June 4	37.12	Sept. 3	44.36	Dec. 3	48.70
Mar. 5	35.20	11	37.70	10	44.86	10	48.62
12	34.78	18	38.36	17	45.36	17	48.53
19	34.36	25	39.20	24	45.95	24	48.45
26	34.12	July 2	39.36	Oct. 1	46.45	31	48.28
Apr. 2	33.95						

1S/3W-20B1. Emmet Martin. Records available: 1900, 1904, 1906-07, 1909, 1912, 1914-49.

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 31	48.64	May 2	50.12	July 28	52.95	Oct. 31	54.17
Feb. 21	48.66	25	50.69	Aug. 31	54.09	Dec. 1	55.95
Mar. 28	48.70	June 28	52.00	Sept. 26	54.79	29	55.93

1S/3W-28E1. George Hinckley. Records available: 1900, 1904, 1906, 1909, 1912, 1914-49. Well dry 45 feet below surface, Feb. 21, May 25, and Nov. 21.

1S/3W-29K1. J. Yount. Records available: 1900, 1904, 1906-07, 1909, 1912, 1914-37, 1940-49. Feb. 21, 41.80; May 25, 44.42.

1S/3W-32C1. W. H. Martin. Records available: 1900, 1906, 1909, 1912, 1914-49. Feb. 21, 66.94; May 25, 67.82; Aug. 22, 69.36; Nov. 21, 73.20.

1S/4W-4K1. W. J. Walsh. Records available: 1915-49. Feb. 21, 16.22; May 25, 20.41; Aug. 22, 25.72; Nov. 21, 23.06.

San Diego County

San Luis Rey River Basin

10/3W-1. On San Luis Rey Ranch. About 4 miles west of Pala. Records available: 1923-34, 1937-49. Jan. 3, 8.04; Apr. 4, 6.89; July 5, 11.97.

10/3W-1a. On San Luis Rey Ranch. Records available: 1937-49. Jan. 3, 8.50; Apr. 4, 8.04; July 5, 8.87; Oct. 3, 11.79.

10/3W-1b. On San Luis Rey Ranch. Records available: 1937-49. Jan. 3, 6.89; Apr. 4, 6.48; July 5, 7.19; Oct. 3, 10.12.

10/3W-1c. Fallbrook Public Utility District observation well. On San Luis Rey Ranch. Records available: 1939-49. Jan. 3, 9.84; Apr. 4, 7.45; July 5, 8.51; Oct. 3, 11.20.

10/3W-15. Gird Ranch, about 2.5 miles east of Bonsall. Records available: 1923-34, 1937-49. Jan. 3, 14.81; Apr. 4, 10.71; July 5, 8.35; Oct. 3, 11.40.

10/3W-20P3. Formerly listed as 10/3W-20. Bonsall School. At Bonsall. Records available: 1920-24, 1937-49. Jan. 3, 9.78; Apr. 4, 8.90; Oct. 3, 11.42.

10/3W-29C2. F. M. Sickler. Records available: 1948-49. Jan. 3, 8.60; Apr. 4, 7.80; July 5, 8.91; Oct. 3, 10.31.

10/3W-30. Fallbrook Public Utility District observation well. On property of San Diego County Water Co. Records available: 1939-49. Jan. 3, 13.03; Apr. 4, 11.00; July 5, 12.03; Oct. 3, 13.47.

11/4W-5. City of Oceanside observation well. On Stokes property. Records available: 1939-48. No measurement made in 1949.

11/4W-8. Carlsbad Mutual Water Co. observation well. At San Luis Rey. Measurements by Carlsbad Mutual Water Co. Records available: 1939-49. Jan. 5, dry at 21.10; Apr. 4, dry at 21.70; July 5, dry at 21.75; Oct. 3, dry at 21.75. Measurements in the following four wells were made by the city of Oceanside.

11/4W-9F1. City of Oceanside observation well. On Williams Ranch. Records available: 1940-49.

Jan. 8	28.38	Apr. 11	28.76	July 9	31.18	Oct. 10	34.10
Feb. 21	27.72	May 14	28.93	Aug. 12	32.64	Nov. 7	34.43
Mar. 14	28.22	June 13	29.60	Sept.10	34.78	Dec. 10	34.10

11/4W-18. Carlsbad Mutual Water Co. observation well. Near San Luis Rey. Measurements by Carlsbad Mutual Water Co. Records available: 1939-49. Jan. 5, 32.6; Apr. 4, 33.89; July 5, 42.09; Oct. 3, 49.78.

11/5W-13a. City of Oceanside. On city property, about 2 miles northeast of Oceanside. Records available: 1937-49.

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 8	20.42	Apr. 11	24.66	July 9	25.00	Oct. 10	31.33
Feb. 21	16.75	May 14	20.75	Aug. 12	28.33	Nov. 7	32.17
Mar. 14	19.33	June 13	24.58	Sept. 10	30.33	Dec. 10	24.40

11/5W-13b. City of Oceanside. On city property, about 2 miles northeast of Oceanside. Records available: 1937-49.

Jan. 8	19.75	Apr. 11	18.25	July 9	23.92	Oct. 10	27.75
Feb. 21	17.92	May 14	20.67	Aug. 12	25.75	Nov. 7	28.75
Mar. 14	17.75	June 13	22.33	Sept. 10	26.67	Dec. 10	26.92

11/5W-13c. City of Oceanside. On city property, about 2 miles north of Oceanside. Records available: 1937-49.

Jan. 8	17.42	Apr. 11	17.75	July 9	20.66	Oct. 10	24.66
Feb. 21	15.50	May 14	18.25	Aug. 12	22.83	Nov. 7	25.42
Mar. 14	16.50	June 13	19.58	Sept.10	23.92	Dec. 10	21.33

11/5W-15. City of Oceanside. On city property, north of Oceanside. Records available: 1939-49.

Jan. 8	11.66	Apr. 11	12.21	July 9	14.46	Oct. 10	18.17
Feb. 21	10.17	May 14	12.33	Aug. 12	16.33	Nov. 7	18.79
Mar. 14	10.83	June 13	13.37	Sept. 10	17.12	Dec. 10	15.58

San Dieguito River Basin

12/1W-31H2. City of San Diego. Records available: 1929-49. Jan. 16, 9.37; July 6, 10.51; Oct. 5, 11.49; Dec. 30, 11.04.

12/1W-33. H. G. Fenton. West of San Pasqual. Records available: 1926-49. Jan. 16, 17.18; July 6, 17.45; Oct. 5, 19.16; Dec. 30, 18.39.

12/1W-33a. F. B. Gierman. Records available: 1943-49. Jan. 16, 1.64; July 6, 3.50; Oct. 5, 6.26; Dec. 30, 6.56.

12/1W-35K1. June Chase. Records available: 1945-49. Jan. 16, 8.69; Dec. 30, 12.94.

12/1W-36D1. Jorgensen. Records available: 1945-49. Jan. 16, 8.27; Oct. 5, 18.04; Dec. 30, 20.78.

San Diego River Basin

14/1W-36R1. City of San Diego. Records available: 1948-49. Apr. 6, 34.16; June 28, 34.90; Sept. 27, 35.72; Dec. 29, 36.52.

15/1E-2. San Diego County. At El Monte Park. Records available: 1931-32, 1934-49. Measurements discontinued after Dec. 29, 1949. Apr. 6, 50.51; June 28, 51.45.

15/1E-2R2. San Diego County. 7.5 feet north of pump house over well 15/1E-2. Diameter 2 inches, depth 65 feet. Lsd is 509 feet above msl. Records available: 1949. Sept. 27, 54.35; Sept. 29, 55.94.

15/1E-7. San Diego Products Co. At Lakeside. Records available: 1932-49. Dry Apr. 6, June 28, Sept. 27, Dec. 29.

15/1E-10. Foster Dairy. Records available: 1948-49. Apr. 6, 33.18; Sept. 27, 34.31; Dec. 29, 34.50.

15/1E-16C1. Pratt test well. Records available: 1937-49. Dry Apr. 6, June 28, Sept. 27, Dec. 29.

15/1E-17a. Dr. Irey Ranch. Records available: 1927-33, 1935, 1937-49. Dry Apr. 6, June 28, Sept. 27, Dec. 29.

15/1E-17b. In San Diego County yard. Records available: 1927-34, 1937-49. Dry Apr. 6, June 28, Sept. 27, Dec. 29.

15/1E-17B1. Truttman Ranch. Records available: 1937-49. Apr. 6, 49.90; June 28, 49.86; Sept. 27, 48.56; Dec. 29, 45.90.

15/1E-17H6. Irrigation District Well. About 1,000 feet north of El Monte pumping plant. Records available: 1929-32, 1934-49. Apr. 6, 52.75; June 28, 51.48; Sept. 27, 49.35; Dec. 29, 45.71.

15/1E-19. Davidson and Brown. Records available: 1937-49. Apr. 6, 19.97; June 28, 22.13; Sept. 27, 25.06; Dec. 29, 26.16.

15/1E-20B1. De Matteo. Records available: 1948-49. Apr. 6, 25.18; June 28, 31.08; Sept. 27, 36.28; Dec. 29, 35.71.

15/1W-13N2. Riverview well 3. At Riverview. Records available: 1930, 1934-49. Apr. 6, 14.45; June 28, 17.06; Sept. 27, 20.20; Dec. 29, 20.65.

15/1W-13R5. Levi. Records available: 1927-49. Apr. 6, 23.52; June 28, 26.86. Dry Sept. 27, Dec. 29.

15/1W-23H3. City of San Diego. At Riverview. Records avsilable: 1946-49. Apr. 6, 12.95; June 28, 13.84; Sept. 27, 15.77; Dec. 29, 16.97.

15/1W-24a. E. G. Squires. Records available: 1945-49. Apr. 6, 17.85; June 28, 21.79; Dec. 29, 23.80. Dry Sept. 27.

15/1W-24D7. Riverview well 2. Records available: 1937-49. Apr. 6, 13.74; June 28, 21.75; Sept. 27, 24.63; Dec. 29, 21.03.

15/1W-27. On County Farm. Records available: 1927-49. Apr. 6, 13.68; June 28, 16.82; Sept. 27, 18.65; Dec. 29, 17.15.

15/1W-28. Dr. Good. Records available: 1915, 1919-49. Apr. 6, 14.57; June 28, 15.53; Sept. 27, 16.47; Dec. 29, 16.81.

16/2W-16. Jaussaud. Records available: 1921-49. Apr. 6, 13.51; June 28, 23.77, pumping ; Sept. 27, 18.76; Dec. 29, 19.35.

16/2W-16a. Jaussaud. Records available: 1937-49. Apr. 6, 13.89; June 28, 19.79, pumping ; Sept. 27, 19.27; Dec. 29, 19.74.

16/3W-22. H. Tatreau. Records available: 1922-49. Apr. 6, 13.99; dry June 28, Sept. 27, Dec. 29.

16/3W-23. S. H. McIntosh. In Mission Valley, near Murray Canyon Road. Records available: 1927-49. Apr. 6, 7.62; June 28, 9.21; Sept. 27, 10.74; Dec. 29, 11.17.

16/3W-24. R. I. Officer. About 1,600 feet west of city of San Diego pumping plant. Records available: 1925-33, 1937-49. Apr. 6, 10.06; June 28, 10.96; Sept. 27, 12.51; Dec. 29, 12.99.

Sweetwater River Basin

17/1W-19. L. C. Kincaid. Records available: 1927-35, 1937-49. Dec. 28, dry.

17/1W-19a. California Water and Telephone Co. Formerly L. C. Kincaid. Records available: 1943-49. Mar. 29, 32.70; June 21, 34.21; Sept. 26, 36.83; Dec. 28, 38.29.

Otay River Basin

18/2W-22. G. W. St. Clair. At Otay. Records available: 1916-49. Mar. 29, 21.76; June 21, 24.78.

Tia Juana River Basin

18/2W-33. On Hewitt Bros. Hog Ranch. Records available: 1927-49. Mar. 29, 13.59; June 21, 14.89; Sept. 26, 19.20; Dec. 28, 16.71.

18/2W-34. P. Vanderpool. Records available: 1927-49. Mar. 29, 12.83; June 21, 14.40; Sept. 26, 20.09; Dec. 28, 19.58.

18/2W-34a. C. Iguchi. Formerly Evans Ranch. Records available: 1927-49. Mar. 29, 10.15; June 21, 12.40; Sept. 26, 14.59; Dec. 28, 14.21.

19/2W-4. At Nestor Bridge. Records available: 1933-49. Mar. 29, 7.87; June 21, 11.95; Sept. 26, 16.10; Dec. 28, 16.51.

San Joaquin County

Mokelumne River Basin

3N/6-17D1. Otto Helmie. Records available: 1936-49. Well found destroyed April 1, measurements discontinued. See records for replacement well 3N/6-17D11. Jan. 3, 15.67; Feb. 1, 15.21; Mar. 7, 14.67.

3N/6-17D11. A. Delu. About 4.5 miles southwest of Lodi, about 1,290 feet east and 150 feet south of northwest corner of section 17, and 100 feet south of well 3N/6-17D1. Irrigation well, diameter 12 inches, in bottom of 3 by 5 foot pit 11 feet deep, total depth below land surface 93 feet. Land-surface datum is 23.80 feet above mean sea level. (Altitude by East Bay Municipal Utility District.) Records available: 1949.

Date	Water level	Date	Water level	Date	Water level	Date	Water level
May 2	14.63	July 7	19.28	Sept. 6	17.28	Nov. 1	17.72
June 3	15.83	Aug. 1	20.12	Oct. 3	19.05	Dec. 1	16.42

3N/6-36R2. Leland W. Bunch. Records available: 1926-29, 1935-49.

Jan. 4	26.82	Apr. 1	28.00	July 6	31.17	Oct. 5	33.32
Feb. 1	29.35	May 2	28.54	Aug. 1	31.59	Nov. 1	32.49
Mar. 8	28.97	June 2	28.98	Sept. 6	32.33	Dec. 1	30.47

3N/7-3C1. Jacob Knoll. Records available: 1935-49.

Jan. 5	39.03	Apr. 1	39.12	July 6	36.32	Oct. 7	39.35
Feb. 1	39.22	May 3	37.53	Aug. 1	37.68	Nov. 1	39.58
Mar. 8	39.56	June 2	32.79	Sept. 6	38.83	Dec. 1	39.69

3N/7-6M8. R. E. and Ruth F. Coker. Records available: 1935-49.

Jan. 17	26.81	Apr. 1	26.94	July 6	(a)	Oct. 5	27.67
Feb. 1	26.75	May 2	27.16	Aug. 1	27.00	Nov. 1	(a)
Mar. 8	26.97	June 2	25.69	Sept. 6	27.60	Dec. 1	27.51

a Dry 27.4 feet below land-surface datum.

3N/7-7M1. J. and Rachel Goetken. Records available: 1935-49.

Jan. 4	34.59	Apr. 1	36.13	July 6	39.90	Oct. 5	37.53
Feb. 1	34.17	May 2	41.42	Aug. 1	38.92	Nov. 1	36.98
Mar. 8	34.92	June 2	40.08	Sept. 6	38.19	Dec. 1	35.86

3N/7-10L3. Edward Preszler. Records available: 1935-49.

Jan. 5	47.16	Apr. 1	48.19	July 6	(b)	Oct. 7	(b)
Feb. 1	46.57	May 2	(b)	Aug. 1	48.34	Nov. 1	49.74
Mar. 8	a47.81	June 2	50.50	Sept. 6	47.48	Dec. 1	(b)
9	47.86						

a Pumping nearby.
b Dry 50 feet below land-surface datum.

3N/7-10L4. Edward Preszler. Records available: 1935-49.

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 5	46.37	May 2	59.50	Aug. 1	56.17	Nov. 1	50.58
Feb. 1	46.53	June 2	55.19	Sept. 6	53.88	Dec. 1	49.13
Apr. 1	48.10	July 6	a55.68	Oct. 7	51.89		

a Pumped recently.

3N/7-15P2. Eugene R. Hieb. Records available: 1935-49.

Jan. 5	51.69	Mar. 8	49.82	May 2	52.50	July 5	(a)
Feb. 1	50.62	Apr. 1	49.48	June 2	(a)		

a Dry 54.1 feet below land-surface datum.

3N/7-18N12. Joe Garnero. Records available: 1946-49.

Jan. 4	34.47	Apr. 1	34.59	July 6	a41.62	Oct. 5	37.28
Feb. 1	34.25	May 2	35.81	Aug. 1	42.81	Nov. 1	36.18
Mar. 9	34.71	June 2	42.20	Sept. 6	38.92	Dec. 1	35.34

a Pumping.

3N/7-27F3. John F. Heitzmann. Records available: 1935-49.

Jan. 4	48.96	Mar. 1	47.12	June 2	51.16	Oct. 6	55.54
9	47.77	9	46.90	July 1	a53.03	Nov. 1	54.37
10	47.62	Apr. 1	46.26	Aug. 1	55.47	Dec. 1	53.22
Feb. 1	47.92	May 2	48.60	Sept. 1	56.19		

a By Woodbridge Irrigation District.

4N/6-12R11. A. T. Carlson. Records available: 1948-49.

Jan. 3	41.19	Apr. 1	39.22	July 5	49.09	Nov. 1	44.40
Feb. 1	40.47	May 2	40.34	Sept. 6	49.94	Dec. 1	43.16
Mar. 7	39.73	June 1	43.53	Oct. 5	48.27		

4N/6-34R1. E. M. Smith. Records available: 1926-29, 1935-49.

Jan. 3	15.28	Apr. 1	17.05	July 5	a17.58	Oct. 3	12.66
Feb. 1	16.89	May 2	a15.38	Aug. 1	a16.70	Nov. 1	12.72
Mar. 7	17.62	June 1	a16.95	Sept. 6	13.25	Dec. 1	14.14

a Pumping nearby.

4N/6-36D1. D. D. Smith and S. H. and I. Zimmerman. Records available: 1926-29, 1935-49.

Jan. 3	23.81	Apr. 1	23.85	July 5	26.79	Oct. 4	23.90
Feb. 1	24.38	May 2	a28.83	Aug. 1	27.31	Nov. 1	23.46
Mar. 7	24.66	June 2	27.45	Sept. 6	24.25	Dec. 1	23.88

a Pumping nearby.

4N/7-15B3. Robert L. Carter. Records available: 1935-49.

Jan. 5	(a)	Mar. 1	57.27	June 2	c58.53	Oct. 10	63.80
7	(a)	9	56.40	July 1	60.91	Nov. 1	63.34
9	b57.94	Apr. 1	56.00	Aug. 1	62.54	Dec. 1	62.28
10	57.69	May 3	57.25	Sept. 1	63.81		

a Dry 56 feet below land-surface datum.
b Borehole cleaned out before measurement.
c Pumping nearby.

4N/7-18N3. Martha Eddlemon. Records available: 1935-49.

Jan. 3	42.65	Mar. 7	40.70	May 3	40.40	July 1	(a),(b)
Feb. 1	41.76	Apr. 1	39.95	June 1	(a)	Oct. 5	(a)

a Dry 42.7 feet below land-surface datum.
b By Woodbridge Irrigation District.

4N/7-22Q4. Adolphus Eddlemon. Records available: 1935-49.

Jan. 5	47.17	Apr. 1	45.81	July 6	(a)	Oct. 7	(a)
Feb. 1	46.63	May 3	46.56	Aug. 1	(a)	Nov. 1	(a)
Mar. 9	46.15	June 2	48.56	Sept. 7	(a)	Dec. 1	49.25

a Dry 50 feet below land-surface datum.

4N/7-22Q5. Adolphus Eddlemon. Records available: 1935-49.

Jan. 5	47.19	Apr. 1	46.05	July 6	59.14	Oct. 7	51.86
Feb. 1	46.69	May 3	51.17	Aug. 1	57.68	Nov. 1	50.69
Mar. 9	46.37	June 2	55.66	Sept. 7	a54.40	Dec. 1	49.08

a Pumping nearby.

4N/7-27P1. Frank H. and Leonard W. Buck. Records available: 1935-49.

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 5	35.73	Apr. 1	35.24	July 6	34.86	Oct. 10	36.42
Feb. 1	36.26	May 3	33.60	Aug. 1	35.99	Nov. 1	36.31
Mar. 9	36.00	June 2	a33.91	Sept. 7	37.43	Dec. 1	36.02

a Irrigating land nearby.

4N/7-30E4. Charles Weber. Records available: 1941-49.

Jan. 3	37.19	Apr. 1	34.42	July 5	41.85	Oct. 5	37.61
Feb. 1	35.65	May 3	37.87	Aug. 1	42.73	Nov. 1	37.33
Mar. 7	34.94	June 1	42.00	Sept. 6	40.29	Dec. 1	36.52

4N/7-31M3. Charles H. Woest. Records available: 1935-49.

Jan. 3	a28.02	Apr. 1	a27.98	Aug. 1	a29.30	Nov. 1	a26.45
Feb. 1	a24.18	May 3	29.65	Sept. 6	27.10	Dec. 1	26.97
Mar. 8	27.50	July 6	26.71	Oct. 5	25.95		

a Water running into well.

4N/7-31N5. Jacob Goehring. Records available: 1935-49.

Jan. 3	11.40	Apr. 1	12.17	July 6	8.49	Oct. 5	9.86
Feb. 1	12.66	May 3	7.92	Aug. 1	9.19	Nov. 1	10.37
Mar. 8	12.60	June 1	7.56	Sept. 6	9.56	Dec. 1	11.39

4N/7-34G1. John J. Schmiedt. Records available: 1935-49.

Jan. 5	10.36	Apr. 1	9.44	July 6	9.28	Oct. 7	10.34
Feb. 1	10.99	May 3	8.69	Aug. 1	10.01	Nov. 1	10.40
Mar. 8	10.05	June 2	8.01	Sept. 7	10.38	Dec. 1	10.10

Santa Barbara County

Carpinteria Basin

4/25-19F4. M. F. Lewis. Records available: 1942-49.

Jan. 19	114.71	Apr. 27	107.33	July 28	113.98	Nov. 7	118.98
Feb. 18	112.20	May 23	109.30	Sept. 6	117.13	Dec. 29	115.96
Mar. 25	109.12	July 1	111.48	Sept. 30	117.91		

4/25-19J5. Lyman & Young. Records available: 1942-49.

Jan. 19	79.85	Mar. 25	72.53	May 23	75.20	Dec. 13	85.16
Feb. 18	76.08	Apr. 27	a85.03	Nov. 7	92.50	29	83.46

a Nearby well pumping.

4/25-20L4. Carpinteria County water District. About 1 mile north of Carpinteria, 150 feet north of State Highway 150 (Foothill Road), 60 feet east of Santa Monica Creek. Drilled drainage well, diameter 10 inches, depth 254 feet, casing perforated 62 to 254 feet. Land-surface datum is 110 feet above mean sea-level datum of 1929 (by barometric leveling.) Records available: 1949.

May 23	128.83	July 28	144.33	Sept. 30	148.40	Dec. 13	140.24
July 1	136.26	Sept. 6	146.54	Nov. 7	150.39	29	137.74

4/25-20Q2. J. B. Romero. Records available: 1941-49.

Jan. 19	61.44	Apr. 27	59.10	July 28	66.99	Nov. 7	74.74
Feb. 18	58.16	May 23	60.84	Sept. 6	71.60	Dec. 14	67.66
Mar. 25	55.69	July 1	67.49	30	85.72	29	66.12

4/25-21R1. Ben Moore. Records available: 1941-49.

Jan. 19	118.87	Apr. 27	108.95	July 28	113.88	Nov. 7	117.19
Feb. 18	110.11	May 23	118.25	Sept. 6	113.56	Dec. 14	117.03
Mar. 25	109.27	July 1	112.88	30	116.08	29	116.98

4/25-26A1. Moses Mesa Associates Co. Records available: 1946-49.

Jan. 20	298.47	Apr. 27	294.37	July 28	315.93	Nov. 7	343.48
Feb. 18	293.55	May 23	298.89	Sept. 7	330.91	Dec. 12	328.06
Mar. 25	289.90	July 1	307.06	30	336.20	29	322.54

4/25-26C2. Shepard Mesa Mutual Water Co. Records available: 1946-49.

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 20	305.89	Mar. 25	294.27	May 23	309.51	Dec. 12	329.66
Feb. 18	300.27	Apr. 27	311.40	July 1	319.10	29	325.89

4/25-27G3. H. S. Russell. Records available: 1938, 1941, 1947, 1949. Apr. 27, 152.50 nearby well pumping'; July 1, 165.73.

4/25-27Q2. A. F. Heimlich. Records available: 1941-49.

Jan. 19	149.41	Apr. 27	142.62	July 28	151.07	Nov. 7	157.76
Feb. 18	146.94	May 23	a147.28	Sept. 7	a153.07	Dec. 15	156.24
Mar. 25	144.06	July 1	149.12	30	153.83	29	155.42

a Nearby well pumping.

4/25-27R2. W. H. Yule. Records available: 1941-49.

Jan. 20	151.76	Apr. 27	151.80	July 28	165.93	Dec. 14	162.44
Feb. 18	148.21	May 23	151.96	Sept. 30	170.15	29	157.07
Mar. 25	145.37	July 1	159.04				

4/25-28J1. W. C. and C. A. Catlin. Records available: 1919, 1930, 1937-38, 1940-49.

Jan. 19	105.89	Mar. 25	99.79	Nov. 7	122.85	Dec. 29	114.78
Feb. 18	102.75	Apr. 27	a125.82	Dec. 15	116.58		

a Pumping.

4/25-28M1. Mrs. A. Baylor. Records available: 1941-49.

Jan. 19	67.86	Apr. 27	72.08	July 28	87.40	Nov. 7	86.03
Feb. 18	64.97	May 23	84.69	Sept. 6	84.17	Dec. 14	77.93
Mar. 25	62.45	July 1	86.26	30	87.71	29	75.98

4/25-29D1. H. Sturmer. Records available: 1928-29, 1938, 1941-49.

Jan. 20	39.68	May 4	33.62	July 28	48.96	Dec. 13	46.75
Feb. 18	35.66	23	37.05	Sept. 30	55.17	29	45.15
Mar. 25	32.47	July 1	45.11	Nov. 7	54.16		

4/25-29R1. Carpinteria Union High School. Records available: 1941-49.

Jan. 20	39.05	Apr. 27	52.25	Sept. 7	49.90	Dec. 14	42.81
Feb. 18	38.22	Aug. 1	54.39	30	58.81	29	41.91
Mar. 25	37.68	3	52.41	Nov. 7	49.02		

4/25-30D1. Sandyland Beach Club. Records available: 1947-49.

Jan. 20	26.11	May 4	22.49	Aug. 1	33.00	Dec. 7	a53.70
Feb. 18	26.55	23	27.83	Sept. 7	40.72	13	48.05
Mar. 25	19.98	July 28	34.11	30	36.67		

a Pumping.

4/25-30D2. California State Highway Department. About 1.5 miles west of Carpinteria, 210 feet north of north edge of U. S. Highway 101, 165 feet west of intersection of Sandy Land Cove Road and U. S. Highway 101. Drilled unused well, diameter 8 inches, depth 93.5 feet. Records available: 1949. Aug. 3, 37.92; Sept. 6, 41.19; Dec. 7, 39.38; Dec. 13, 38.87; Dec. 29, 37.49.

4/25-34F2. T. H. Canfield. About 1.5 miles east of Carpinteria, 800 feet north of U. S. Highway 101, and 260 feet west of east property line. Drilled unused gravel-pack well, diameter 12 inches, depth 563 feet, casing perforated 83 to 563 feet. Land-surface datum is 154.1 feet above mean sea-level datum of 1929. Records available: 1949.

June 2	125.50	July 28	126.48	Sept. 30	127.40	Dec. 14	128.23
22	125.91	Sept. 7	127.17	Nov. 7	127.99	29	128.38
July 1	126.14						

4/25-35B1. R. Nichols. Records available: 1941-49.

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 20	99.81	Apr. 27	a83.77	July 28	a106.57	Nov. 7	b117.08
Feb. 18	94.00	May 23	88.16	Sept. 7	102.19	Dec. 13	103.88
Mar. 25	a86.79	July 1	100.77	30	123.63	29	101.87

a Nearby well pumping.
b Pumping.

4/26-23A2. Frank Wymond. Records available: 1947-49.

Jan. 19	53.69	Apr. 27	55.66	Sept. 30	66.28	Dec. 12	54.57
Feb. 18	53.29	July 1	65.60	Nov. 7	61.71	29	48.75
Mar. 25	54.44	Aug. 11	66.77	Dec. 7	54.56		

4/26-24F2. A. F. Thurmond. Records available: 1938, 1941-49.

Jan. 20	16.68	May 4	a36.74	Aug. 1	a33.40	Nov. 7	a39.80
Feb. 18	13.84	23	30.11	Sept. 7	a42.33	Dec. 13	19.07
Mar. 25	15.12	July 1	a37.31	30	b36.59	29	17.89
Apr. 21	a28.55						

a Nearby well pumping.
b Pumping.

Goleta Basin

4/27-6N1. John McCaughy. Records available: 1941-49. Jan. 21, 98.24; Feb. 25, 99.03; Mar. 28, 99.38; Apr. 26, 101.48; May 24, 97.72; July 7, 105.26.

4/27-21B1. City of Santa Barbara. Records available: 1948-49.

Jan. 17	66.17	Apr. 18	62.60	July 18	76.85	Oct. 10	87.64
24	64.55	25	65.14	25	77.53	17	88.05
31	63.45	May 2	66.47	Aug. 1	78.13	24	88.79
Feb. 7	62.52	9	68.19	8	79.46	31	89.20
14	61.88	16	69.27	15	81.03	Nov. 7	89.52
21	61.22	23	69.67	22	82.17	14	89.75
28	60.56	30	70.14	29	83.19	21	90.64
Mar. 7	60.06	June 6	70.52	Sept. 5	84.10	28	89.29
14	59.44	13	71.16	12	84.87	Dec. 5	89.14
21	58.80	20	71.44	19	85.48	12	88.36
28	58.12	27	74.31	26	86.16	19	86.49
Apr. 4	57.90	July 4	75.69	Oct. 3	86.89	26	85.47
11	59.65	11	76.08				

4/28-2N2. County of Santa Barbara, Tucker's Grove. Records available: 1943-49.

Jan. 21	45.44	Apr. 26	43.86	Aug. 2	44.98	Oct. 29	47.32
Feb. 25	45.94	May 24	42.70	Sept. 7	46.19	Dec. 6	47.98
Mar. 28	42.92	July 7	44.24	30	46.90	23	48.17

4/28-3E2. Peter Cavalletto. Records available: 1941-49.

Jan. 21	34.94	Apr. 26	19.36	July 1	a29.38	Dec. 6	32.06
Feb. 25	28.63	May 24	18.06	Sept. 30	34.49	23	27.68
Mar. 28	23.40						

a Nearby well pumping.

4/28-3M3. L. W. Fowler. Records available: 1947-49.

Jan. 20	119.54	Apr. 26	a138.29	Aug. 2	a140.58	Oct. 29	132.59
Feb. 25	117.21	May 24	123.51	Sept. 8	a152.07	Dec. 6	125.18
Mar. 28	115.47	July 1	121.54	30	145.24	23	123.16

a Nearby well pumping.

4/28-3Q2. A. J. Haverland. Records available: 1943-49.

Jan. 21	125.51	Apr. 26	a131.30	Aug. 2	134.56	Oct. 29	a137.67
Feb. 25	123.62	May 24	124.66	Sept. 7	134.37	Dec. 6	a136.49
Mar. 28	122.30	July 7	a129.28	30	133.67	23	130.84

a Nearby well pumping.

4/28-4Q2. R. S. Rowe. Records available: 1941-49.

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 20	100.85	Apr. 26	a105.14	Aug. 2	a106.79	Oct. 29	a106.42
Feb. 25	a93.93	May 24	93.26	Sept. 8	102.23	Dec. 6	100.84
Mar. 28	91.93	July 1	103.62	30	111.82	23	99.84

a Nearby well pumping.

4/28-5R4. E. J. Ewing. Records available: 1937-38, 1941, 1943-49.

Jan. 21	60.74	Apr. 26	60.81	Sept. 8	64.23	Dec. 6	64.86
Feb. 25	60.55	July 7	64.21	Oct. 29	64.80	23	64.73
Mar. 28	60.16						

4/28-8C2. G. B. Cavalletto. Records available: 1941, 1945-49.

Jan. 21	75.95	Apr. 26	74.74	Aug. 2	78.40	Oct. 29	81.52
Feb. 25	75.17	May 24	75.82	Sept. 8	79.98	Dec. 6	81.15
Mar. 28	74.13	July 6	77.40	30	80.77	23	80.88

4/28-9A3. L. M. Cavalletto. Records available: 1941-49. Undated entries are highest and lowest levels between dates of observation, from nonrecording gage.

	64.14	Mar.	63.80	July 1	65.11	Sept.	67.26
	64.66		64.17		64.85	30.	66.72
Jan. 21	64.48	Apr. 26	64.14		66.80		66.72
	64.21		64.14	Aug. 2	66.10		67.29
	64.55		65.23		65.93	Oct. 29	67.24
Feb. 25	64.33	May 24	64.80		66.33		60.59
	63.37		64.39	Sept. 7	66.29		68.04
	64.33		64.91		66.29	Dec. 23	67.04
Mar. 28	63.80						

4/28-9E1. A. T. Spaulding. Records available: 1941, 1943-49.

Jan. 21	57.85	Apr. 26	59.54	July 7	57.87	Dec. 6	63.43
Feb. 25	57.65	May 24	59.13	Sept. 30	64.36	23	63.21
Mar. 28	56.91						

4/28-10A1. C. C. Lee. Records available: 1941-49. Jan. 21, 124.05; Feb. 25, 128.59; Mar. 28, 128.80; Apr. 26, 130.41; May 24, 125.82; July 7, 129.16.

4/28-10F1. J. S. Edwards. Records available: 1932-33, 1937-38, 1941-49.

Jan. 21	84.65	Apr. 26	84.18	Oct. 1	89.29	Dec. 6	89.47
Feb. 25	84.36	May 24	84.16	29	91.87	23	89.02
Mar. 28	84.03	Aug. 2	88.77				

4/28-10K2. W. G. Troup. Records available: 1941-49.

Jan. 21	112.67	Mar. 28	110.70	July 1	116.12	Dec. 6	118.81
Feb. 25	111.48	Apr. 26	117.76	Oct. 29	121.83	23	117.61

4/28-11K4. Giovanni Cavalli. Records available: 1947-49.

Jan. 21	87.59	Mar. 28	86.78	Aug. 2	92.67	Dec. 6	93.89
Feb. 17	87.38	May 24	89.48	Oct. 1	93.45	23	93.22

4/28-12L4. Frank Bottine. Formerly L. More. Records available: 1941-49.

Jan. 21	73.90	Apr. 26	73.00	Aug. 2	90.25	Oct. 29	97.14
Feb. 17	76.09	May 24	75.81	Sept. 7	105.72	Dec. 6	87.78
Mar. 25	71.09	July 1	91.57	Oct. 1	97.86	23	69.67

4/28-16F2. John Begg. Records available: 1941, 1943-49.

Jan. 21	49.27	Apr. 26	60.44	Aug. 2	a85.29	Oct. 29	60.55
Feb. 28	48.17	May 24	62.38	Sept. 8	65.95	Dec. 6	59.52
Mar. 25	47.53	July 1	80.62	30	69.23	23	54.78

a Nearby well pumping.

4/28-16F3. John Begg. Records available: 1941, 1943-49.

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 21	17.34	Apr. 26	16.76	Aug. 2	a17.22	Dec. 6	18.04
Feb. 25	17.44	May 24	16.82	Sept. 8	17.44	23	17.74
Mar. 25	16.46	July 1	16.87	Oct. 29	17.79		

a Nearby well pumping.

4/28-16R1. Pacific Lighting Corp. Records available: 1941, 1945-49.

Jan. 21	28.80	Mar. 25	25.37	May 24	28.80	Aug. 2	41.07
Feb. 25	26.88	Apr. 26	26.05	July 1	35.84	Dec. 23	35.80

4/28-17H3. Elmo Littls. Formerly owned by J. J. Mathews. Records available: 1941-49.

Jan. 21	9.68	Apr. 26	8.79	Aug. 2	9.47	Oct. 29	10.31
Feb. 25	9.38	May 24	8.85	Sept. 7	9.97	Dec. 6	10.14
Mar. 28	8.65	July 1	9.19	30	10.10	23	9.46

4/28-17H11. Mrs. L. Oakley and Mrs. M. Bonetti. Records available: 1941-49.

Jan. 21	29.08	Apr. 26	30.84	Aug. 2	37.00	Oct. 29	35.54
Feb. 25	27.18	May 24	33.72	Sept. 8	35.51	Dec. 6	33.64
Mar. 25	26.70	July 1	34.37	30	37.11	23	32.74

4/28-18G2. T. B. Bishop Co. Records available: 1942-49.

Jan. 21	32.17	Apr. 26	29.96	Aug. 2	45.99	Oct. 29	35.92
Feb. 25	33.24	May 24	37.46	Sept. 7	35.98	Dec. 6	34.35
Mar. 28	30.38	July 1	31.49	30	43.42	23	32.94

4/28-18N3. T. M. Storke. Records available: 1942-49.

Jan. 21	18.00	Apr. 26	17.56	Aug. 2	29.62	Oct. 29	24.91
Feb. 25	17.75	May 24	20.47	Sept. 7	28.23	Dec. 6	23.14
Mar. 28	17.18	July 1	23.26	30	25.11	23	22.52

4/29-13K2. T. B. Bishop Co. Records available: 1942-49.

Jan. 21	51.00	Apr. 26	51.64	Aug. 2	53.65	Oct. 29	54.68
Feb. 25	52.36	May 24	52.26	Sept. 7	53.80	Dec. 2	53.61
Mar. 28	51.93	July 1	52.57	30	54.49	23	53.04

4/29-14A3. Frank Baker. Records available: 1942-49.

Jan. 21	80.12	Apr. 26	80.97	Aug. 2	82.14	Oct. 29	a81.91
Feb. 25	79.95	May 24	80.99	Sept. 30	86.00	Dec. 23	81.65
Mar. 28	79.99	July 1	81.88				

a Nearby well pumping.

Santa Ynez Valley

6/30-6A1. Sam Torrence. Records available: 1942-49.

Jan. 28	66.95	Apr. 5	66.59	Sept. 29	a91.66	Dec. 6	72.55
Mar. 7	65.84	June 3	88.41	Nov. 14	74.32	30	71.06

a Pumping.

6/30-7K1. Mrs. W. Anderson. Records available: 1941-49.

Mar. 7	a40.13	June 3	b46.12	July 29	b47.99	Dec. 6	b48.20
May 3	b45.17	July 7	b52.39	Sept.29	a46.29	30	45.85

a Pumping.
b Nearby well pumping.

6/30-9N1. San Lucas Ranch. Records available: 1941-49. Mar. 7, 33.60; Apr. 5, 33.74; June 3, 33.69; July 7, 34.99; Dec. 6, 34.20; Dec. 30, 34.14.

6/30-21B1. Rancho Juan y Lolita. About 2.5 miles southeast of town of Santa Ynez near south bank of Santa Ynez River, about 0.8 mile downstream from San Lucas Bridge on State Highway 150. Drilled irrigation well, diamter 12 inches, depth 58 feet. Records available: 1933, 1948-49. Dec. 15, 1948, 22.42; Jan. 28, 1949, 21.60; Mar. 7, 21.69; Apr. 5, 11.80; Oct. 24, 20.83; Dec. 6, 21.24; Dec. 30, 20.89.

6/30-29E1. Rancho Juan y Lolita. Records available: 1933-49.

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 28	22.93	Apr. 5	21.53	June 25	19.68	Oct. 24	21.61
Feb. 1	22.94	May 3	21.04	July 29	20.33	Dec. 6	22.43
Mar. 7	22.76	June 3	19.33	Sept. 29	21.26	30	22.75

6/31-2K1. Sam de la Cuesta (Rancho Alamo Pintado). Records available: 1947-49. Jan. 28, 32.35; Mar. 7, 31.81; Apr. 5; 31.16; May 3, 31.77; Nov. 14, 37.59; Dec. 30, 36.31.

6/31-13D1. Mrs. W. E. Parker. Records available: 1941-49. Jan. 28, 109.92; Mar. 7, 111.44; May 3, 110.07; June 3, 110.07; June 25, 110.08; July 29, 110.56; Dec. 30, 120.64.

6/31-17F1. J. R. Orton. Records available: 1931-49.

Jan. 28	20.47	May 3	19.98	July 29	26.77	Dec. 5	a24.12
Mar. 7	19.00	June 2	a19.70	Sept. 29	a24.44	30	22.75
Apr. 5	a18.88	25	a20.67	Oct. 25	24.70		

a Pumping.

6/31-21H2. Petan Dairies. Formerly Alisal Corp. Records available: 1931-49. Jan. 28, 11.25; Mar. 7, 10.46; Apr. 5, 10.39; May 3, 10.55; June 2, 10.52; Oct. 24, 11.13; Dec. 30, 11.47.

6/31-24F2. William Vett. About 2 miles southwest of town of Santa Ynez, 400 feet west of Santa Ynez-Refugio Pass Road, at foot of terrace in southwest corner of small field on Santa Ynez River flood plain. Drilled domestic well, diameter 12 inches, reported depth 44 feet. Records available: 1949. June 25, 10.98; July 29, 10.97; Sept. 29, 10.83; Oct. 24, 10.36; Dec. 5, 10.38; Dec. 30, 10.25.

6/32-6K1. Mrs. M. Barker. Records available: 1932-34, 1942-49.

Jan. 27	a23.52	June 2	a29.57	Sept. 3	18.21	Dec. 5	18.77
Apr. 5	17.91	25	18.74	28	18.29	30	18.36
May 2	21.25	July 27	18.04	Oct. 26	18.45		

a Pumping.

6/32-9A1. Owen Hollister. Records available: 1932-49. Jan. 27, 31.39; Apr. 5, 31.70; June 25, 31.99; Sept. 28, 33.34; Oct. 26, 32.58, pumping recently.

6/32-12J2. A. Bodine. Records available: 1941-49.

Jan. 27	32.60	May 2	34.10	July 27	33.29	Oct. 25	33.70
Mar. 3	33.15	June 2	34.66	Sept. 3	35.68	Dec. 5	32.73
Apr. 5	33.85	25	36.26	28	38.47	30	33.54

6/32-16P3. Channing Peake. Records available: 1941-49.

Mar. 7	45.48	May 2	45.78	Sept. 1	48.91	Dec. 5	49.03
Apr. 5	45.44	June 2	46.57	Oct. 27	49.12	30	46.60

6/33-9P1. Hollister Estate. Records available: 1932-49.

Jan. 13	47.10	July 6	a57.40	Sept. 29	49.42	Dec. 5	45.53
Mar. 7	44.93	Sept. 1	50.07	Oct. 28	46.63	29	44.75
June 1	a57.38						

a Nearby well pumping.

6/34-2A1. C. Madsen Estate. Records available: 1930-31, 1939-46. Destroyed, measurements discontinued.

6/34-2A6. C. Madsen Estate. Records available: 1948-49.

Jan. 27	41.36	May 2	40.19	Sept. 28	41.34	Nov. 15	41.42
Mar. 7	40.53	July 6	44.72	Oct. 27	41.31	Dec. 30	40.85
31	39.82	27	41.24				

6/34-6C2. Bank of America. Records available: 1930-39, 1943-49.

Feb. 1	58.27	Apr. 29	63.97	July 27	70.03	Nov. 4	62.91
Mar. 4	57.81	June 1	64.99	Aug. 31	66.28	Dec. 29	59.37
31	56.26	July 6	66.88	Sept. 28	64.72		

7/31-23P1. F. L. Mattei. Records available: 1942-49. Jan. 28, 45.60; Mar. 7, 44.33; Apr. 5, 43.34; July 29, 49.23; Sept. 29, 52.39; Nov. 14, 53.29.

7/31-25L1. Dr. Ina M. Richter and Mrs. Virginia Lee. Formerly Russell Smith. Records available: 1942-49.

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 28	76.39	June 3	81.16	Sept. 3	a78.03	Dec. 6	77.28
Mar. 7	75.33	July 7	78.51	29	77.64	30	77.16
Apr. 5	a76.38	29	a80.47	Nov. 14	77.42		

a Pumping.

7/31-36G2. Laura Grossi. Records available: 1947-49.

Jan. 28	39.19	May 3	41.19	July 29	44.07	Nov. 14	45.11
Mar. 7	39.05	June 3	42.00	Sept. 3	46.23	Dec. 6	44.46
Apr. 5	39.01	July 7	43.62	29	45.28	30	43.81

7/31-36L2. D. B. Kilbourne. Records available: 1942-49.

Jan. 26	31.10	May 3	34.89	July 29	38.78	Dec. 6	37.51
Mar. 7	30.72	June 3	35.32	Sept. 3	40.77	30	36.58
Apr. 5	30.71	July 7	38.04	29	40.54		

7/33-30C1. John Valla. Records available: 1941-49.

Jan. 27	a152.66	May 2	152.45	July 27	153.01	Oct. 27	153.36
Mar. 3	a152.67	June 2	152.75	Sept. 3	153.14	Dec. 5	153.45
31	152.54	25	152.91	28	153.27	30	153.48

a Nearby well pumping.

7/34-9H3. U. S. Geol. Survey. Union Oil Co. Purisima Lease. Records available: 1948-49. Highest daily water level, from recorder charts.

Jan. 7	10.94	Apr. 2	11.17	July 6	9.92	Nov. 9	9.82
12	10.98	8	11.33	13	9.80	17	9.74
17	10.93	29	11.04	27	9.62	20	10.00
Feb. 1	10.74	May 4	10.91	Aug. 3	9.56	25	9.72
8	10.53	9	10.91	Sept. 3	9.32	30	9.70
Mar. 3	10.63	June 1	10.63	28	9.42	Dec. 4	9.78
8	10.89	8	10.61	Oct. 1	9.41	9	9.67
13	10.93	14	10.30	5	9.44	29	9.86
18	10.98	18	9.84	Nov. 3	9.80	31	9.84
28	11.17						

7/34-9H4. U. S. Geol. Survey. Union Oil Co. Purisima Lease. Records available: 1948-49.

Jan. 13	5.40	Mar. 3	1.42	May 2	3.27	July 6	4.48
Feb. 1	4.83	Apr. 1	2.41	June 1	4.12	27	4.72

7/34-12E1. U. S. Geol. Survey. Union Oil Co. Purisima Lease. About 5 miles northeast of Lompoc in upland area north of Lompoc Plain, at foot of Purisima Hills in east branch of Purisima Canyon, 0.6 mile northeast of Union Oil Co. dehydration plant and 70 feet northwest of County road. Drilled observation well. Diameter 8 inches to 6 inches, depth 385 feet; casing perforated 345-385 feet. Land-surface datum is 385.83 feet above mean sea-level datum of 1929. Records available: 1949.

June 25	301.70	Aug. 31	301.79	Oct. 6	301.79	Dec. 5	302.05
July 27	301.79	Sept. 29	301.92	Nov. 3	301.92	29	301.96

7/34-14F1. Walter F. Ziesche. Records available: 1947-49.

Jan. 27	196.15	May 2	196.12	July 27	196.53	Dec. 5	196.96
Mar. 3	196.10	June 2	196.35	Aug. 31	196.67	29	196.93
31	195.90	25	196.48	Nov. 4	196.86		

7/34-21E1. U. S. Geol. Survey. Camp Cooke. Military Reservation. Records available: 1948-49.

Feb. 1	18.45	June 1	19.48	Aug. 31	20.68	Nov. 4	20.36
Mar. 3	18.19	June 25	20.00	Sept. 5	20.55	Dec. 5	19.93
Apr. 1	17.97	July 27	20.78	29	20.39	29	19.57
May 2	19.39						

7/34-22H1. H. E. Harris. Records available: 1941-42, 1946-49.

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 27	a25.48	May 2	27.09	July 27	27.97	Nov. 23	26.50
Mar. 3	25.33	June 2	26.80	Aug. 31	26.93	Dec. 29	25.33
31	a25.99	July 6	27.11	Sept. 29	26.99		

a Pumping.

7/34-22Q4. U. S. Geol. Survey. A. Scolari property. Records available: 1947-49.

Feb. 1	20.34	June 2	18.84	Aug. 31	20.40	Dec. 5	21.15
Apr. 1	17.10	July 6	19.52	Sept. 29	20.73	29	20.60
May 2	17.99	27	19.88	Nov. 4	21.00		

7/34-26A2. K. McConnell. Records available: 1941-49.

Jan. 27	41.70	May 2	42.31	July 27	42.75	Nov. 4	42.80
Mar. 3	41.56	June 2	42.40	Aug. 31	42.82	21	42.60
31	41.58	July 6	42.74	Sept. 28	42.97	Dec. 30	42.24

7/34-27A4. U. S. Geol. Survey. L. H. Schuyler property. Records available: 1947-49.

Feb. 1	14.80	June 2	13.49	Aug. 31	14.95	Nov. 4	15.50
Apr. 1	12.54	July 6	14.06	Sept. 29	15.23	Dec. 29	15.20
May 2	12.73	27	14.44				

7/34-27J3. U. S. Geol. Survey. L. H. Schuyler property. Records available: 1943-45, 1947-49. Feb. 1, 24.15; Apr. 1, 22.95; May 2, 22.80; June 2, 23.39; July 6, 23.84; July 27, 24.30.

7/34-27L1. Mrs. Susan Van Clief. Records available: 1941-49.

Apr. 1	37.00	July 27	41.78	Sept. 29	43.33	Nov. 22	39.75
June 2	39.41	Aug. 31	41.94	Nov. 4	40.88	Dec. 29	39.04

7/34-28A2. U. S. Geol. Survey. S. B. Westrope property. Records available: 1947-49. Feb. 1, 30.13; Apr. 1, 28.29; May 2, 27.10; June 2, 31.29; July 6, 31.87.

7/34-28H2. T. M. Parks. Records available: 1930-39, 1942-49.

Feb. 1	30.95	May 2	33.96	July 27	40.07	Nov. 4	34.92
Mar. 7	31.12	June 2	32.95	Aug. 31	35.78	23	32.97
Apr. 1	29.89	July 6	35.67	Sept. 29	35.61	Dec. 29	32.13

7/34-28R1. A. C. Zvolanek. Records available: 1930-49. Feb. 1, 13.16; Mar. 7, 13.13; Apr. 1, 12.60; May 2, 16.73.

7/34-28R2. U. S. Geol. Survey. A. C. Zvolanek property. Records available: 1943-49.

Feb. 1	12.41	Apr. 1	11.82	June 2	13.14	Dec. 5	14.26
Mar. 7	12.14	May 2	12.78	July 6	13.37	29	13.93

7/34-29A3. U. S. Geol. Survey. Charles Everett property. Records available: 1947-48. Well destroyed; measurements discontinued.

7/34-29E4. W. H. Sanor. Records available: 1945-49.

Feb. 1	21.77	Apr. 29	34.77	Sept. 29	26.09	Dec. 5	26.39
Mar. 7	21.26	June 1	28.93	Nov. 4	28.26	29	23.04
Apr. 1	22.99	Aug. 31	29.47				

7/34-29E5. U. S. Geol. Survey. W. H. Sanor property. Records available: 1945-49.

Feb. 1	23.60	July 27	24.13	Sept. 29	23.88	Dec. 5	23.61
Mar. 7	23.23	Aug. 31	24.18	Nov. 4	23.76	29	23.43
Apr. 1	22.79						

7/34-30L2. Union Sugar Co. Records available: 1930-35, 1941-42, 1945-49.

Feb. 1	20.22	July 6	40.63	Sept. 28	26.42	Dec. 5	23.46
Mar. 7	19.33	July 27	31.56	Nov. 4	25.87	29	21.33
Apr. 1	19.51	Aug. 31	27.93				

7/34-30L3. U. S. Geol. Survey. Union Sugar Co. property. Records available: 1945-49.

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 1	19.67	Apr. 29	a21.53	July 27	23.31	Nov. 4	21.23
Mar. 7	19.06	June 1	a20.29	Aug. 31	22.80	Dec. 5	20.81
Apr. 1	18.54	July 6	22.46	Sept. 28	22.27	29	20.23

a Nearby well pumping.

7/34-30R1. Mrs. E. Manfrina. Records available: 1930-49.

Feb. 1	22.18	Apr. 29	22.76	July 27	22.89	Nov. 4	22.48
Mar. 7	21.95	June 1	22.45	Aug. 31	22.89	Dec. 5	21.94
Apr. 1	21.70	July 6	22.24	Sept. 28	22.64	29	21.94

7/34-31C2. Union Sugar Co. Records available: 1947-49.

Feb. 1	22.08	June 1	28.18	Sept. 28	27.39	Dec. 2	26.15
Mar. 4	21.65	July 6	32.88	Nov. 4	27.28	29	22.96
31	21.23						

7/34-31C3. U. S. Geol. Survey. Union Sugar Co. property. Records available: 1947-49.

Feb. 1	17.89	Apr. 29	13.68	July 27	a16.37	Nov. 4	18.11
Mar. 4	16.31	June 1	15.93	Aug. 31	a16.44	Dec. 2	18.74
31	17.84	July 6	16.69	Sept. 28	17.25	29	18.63

a Nearby well pumping.

7/34-32A1. O. F. Benn. Records available: 1947-49.

Feb. 1	29.14	May 2	39.86	Sept. 29	35.08	Dec. 5	38.91
Mar. 7	28.72	July 27	43.57	Nov. 4	36.07	29	30.89
Apr. 1	32.84	Aug. 31	35.92				

7/34-32A4. U. S. Geol. Survey. O. F. Benn property. Records available: 1947-49.

Feb. 1	28.10	May 2	29.28	July 27	29.80	Nov. 4	30.10
Mar. 7	28.32	June 1	a28.91	Aug. 31	30.07	Dec. 5	30.45
Apr. 1	28.27	July 6	a29.39	Sept. 29	30.17	29	30.70

a Nearby well pumping.

7/34-32P5. U. S. Geol. Survey. J. Bodger and Sons property. Records available: 1947-49.

Feb. 1	27.47	Apr. 29	30.69	July 27	30.48	Nov. 4	31.26
Mar. 4	29.05	June 1	30.09	Aug. 31	31.19	Dec. 2	31.16
31	28.50	July 6	30.48	Sept.28	31.11	28	30.63

7/34-34H1. Mrs. M. Balaam. Records available: 1941-49.

Feb. 1	47.43	June 2	48.32	Aug. 31	51.22	Nov. 17	49.96
Apr. 1	46.25	July 6	49.86	Nov. 4	52.32	Dec. 29	48.77
May 2	50.54						

7/34-34H2. U. S. Geol. Survey. Mary Skaarup property. Records available: 1943-49. Feb. 1, 47.92; Apr. 1, 46.56; May 2, 47.65; June 2, 46.77; July 6, 48.29.

7/34-35F2. Valla Bros. Records available: 1930-49. Jan. 27, 28.87; Mar. 7, 29.44; Mar. 31, 25.78; July 27, 30.46, nearby well pumping; Nov. 4, 30.50; Nov. 18, 30.75; Dec. 30, 29.12.

7/34-35F6. U. S. Geol. Survey. M. Schuyler property. Records available: 1943-49. Feb. 1, 51.04; Apr. 1, 49.59; June 2, 50.92; Dec. 29, 50.82.

7/34-35F16. M. Schuyler. Records available: 1947-49.

Feb. 1	50.50	June 2	51.65	Aug. 31	53.02	Nov. 18	52.99
Apr. 1	48.19	July 27	53.70	Nov. 4	52.58	Dec. 29	50.80

7/34-35K2. Mrs. M. McDonald. Records available: 1930-49.

Jan. 27	14.75	May 2	14.57	July 27	15.02	Oct. 27	15.02
Mar. 3	12.29	June 2	17.65	Aug. 31	16.74	Nov. 18	14.43
31	14.24	July 6	17.32	Sept. 28	14.99	Dec. 30	14.72

7/34-35P1. W. P. and N. L. Robinson. Records available: 1930-49. Jan. 27, 49.60; Mar. 7, 49.18; Mar. 31, 44.00; May 2, 47.72.

7/35-18J1. Department of the Army. Camp Cooke Military Reservation. Records available: 1930-49. Feb. 1, 0.14; Mar. 4, +0.45. Measurement discontinued.

7/35-20J1. Department of the Army. Camp Cooke Military Reservation. Records available: 1930-49.

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 1	9.81	Apr. 29	9.62	July 27	10.58	Nov. 4	10.68
Mar. 4	9.25	June 1	9.89	Aug. 31	10.64	Dec. 2	10.28
Apr. 1	9.08	July 6	10.31	Sept. 28	10.86	29	10.06

7/35-22F2. U. S. Geol. Survey. Camp Cooke Military Reservation. Records available: 1947-49.

Feb. 1	5.29	June 1	4.97	Aug. 31	5.28	Dec. 2	5.63
Mar. 31	4.82	July 6	4.93	Sept. 28	5.20	29	5.28
Apr. 29	4.77	27	5.05	Nov. 4	5.77		

7/35-22J1. Union Sugar Co. Records available: 1930-35, 1941-42, 1945-49.

Mar. 7	13.12	Apr. 29	18.54	Aug. 31	17.21	Dec. 2	14.65
Apr. 1	12.96	July 6	18.61	Nov. 4	15.17	29	13.74

7/35-22M1. Department of the Army. Camp Cooke Military Reservation. Records available: 1947-49.

Feb. 1	8.66	June 1	11.26	Aug. 31	11.39	Dec. 2	10.84
Mar. 31	8.61	July 6	10.93	Sept. 28	12.84	29	10.04
Apr. 29	10.79	27	12.30	Nov. 4	10.67		

7/35-22M2. U. S. Geol. Survey. Camp Cooke Military Reservation. Records available: 1947-49.

Feb. 1	14.38	June 1	13.54	Aug. 31	14.25	Dec. 2	14.45
Mar. 31	12.95	July 6	13.73	Sept. 28	14.52	29	14.19
Apr. 29	13.19	27	13.93	Nov. 4	14.54		

7/35-23E2. Union Sugar Co. Records available: 1930-35, 1941-43, 1945-49. Feb. 1, 18.67; Mar. 7, 17.65; July 27, 33.06; Nov. 4, 20.07; Dec. 2, 19.29; Dec. 29, 18.66.

7/35-23E4. U. S. Geol. Survey. Union Sugar Co. property. Records available: 1947-49.

Feb. 1	19.30	June 1	a20.82	Aug. 31	a20.26	Dec. 2	19.48
Mar. 7	18.95	July 6	a19.97	Sept. 28	a20.67	29	19.21
Apr. 1	18.14	27	19.67	Nov. 4	19.63		

a Nearby well pumping.

7/35-23J2. Union Sugar Co. Records available: 1947-49.

Feb. 1	16.65	July 6	23.13	Sept. 28	21.33	Dec. 2	18.14
Mar. 4	16.71	27	a24.75	Nov. 4	18.64	29	17.01
June 1	27.36	Aug. 31	21.97				

a Nearby well pumping.

7/35-23J3. U. S. Geol. Survey. Union Sugar Co. property. Records available: 1947-49.

Feb. 1	19.45	Apr. 29	a21.70	July 27	21.73	Nov. 4	21.22
Mar. 4	18.97	June 1	21.65	Aug. 31	22.40	Dec. 2	20.38
Apr. 1	a20.18	July 6	21.53	Sept. 28	21.87	29	19.67

a Nearby well pumping.

7/35-23N2. U. S. Geol. Survey. Union Sugar Co. property. Records available: 1945-49.

Feb. 1	a13.38	Apr. 29	13.43	July 27	a14.04	Nov. 4	14.26
Mar. 7	13.22	June 1	a11.93	Aug. 31	13.94	Dec. 2	13.99
Apr. 1	12.86	July 6	13.39	Sept. 28	a14.36	29	13.65

a Nearby well pumping.

7/35-24J1. T. M. Parks. Records available: 1941-43, 1947-49.

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 1	29.43	Apr. 29	29.80	July 27	31.67	Nov. 4	31.85
Mar. 7	28.95	June 1	30.39	Aug. 31	32.23	Dec. 5	31.45
Apr. 1	28.58	July 6	31.77	Sept. 28	32.11	29	30.89

7/35-24J2. U. S. Geol. Survey. T. M. Parks property. Records available: 1947-49. Feb. 1, 28.05; Mar. 7, 28.00; Apr. 1, 27.75; Apr. 29, 29.09; June 1, 28.69; July 6, 29.32.

7/35-25F5. Union Sugar Co. Records available: 1945-48. Measurements discontinued.

7/35-25F6. U. S. Geol. Survey. Union Sugar Co. property. Records available: 1945-49.

Feb. 1	11.90	June 1	11.32	Aug. 31	11.80	Dec. 5	13.78
Mar. 7	12.49	July 6	a11.21	Sept. 28	13.23	29	13.55
Apr. 1	12.56	27	12.15	Nov. 4	13.60		

a Nearby well pumping.

7/35-26F1. Union Sugar Co. Records available: 1947-49.

Feb. 1	9.38	Apr. 1	9.85	July 27	18.89	Nov. 4	11.90
Mar. 7	9.01	July 6	27.09	Aug. 31	14.87	Dec. 2	11.61

7/35-26F3. U. S. Geol. Survey, Union Sugar Co. property. Records available: 1947-49.

Feb. 1	9.79	Apr. 29	a10.12	July 27	13.29	Nov. 4	11.35
Mar. 7	9.13	June 1	9.09	Aug. 31	11.47	Dec. 2	11.48
Apr. 1	8.85	July 6	10.65	Sept. 28	a12.07	29	10.96

a Nearby well pumping.

7/35-26J4. County of Santa Barbara, Artesia School District. Records available: 1947-49.

Feb. 1	11.03	June 1	19.93	Aug. 31	17.30	Nov. 4	14.11
Mar. 4	11.67	25	25.18	Sept. 28	19.08	Dec. 2	13.93
31	11.59	July 27	21.82	Oct. 28	15.01	29	11.71
Apr. 29	a26.55						

a Pumping recently.

7/35-27C2. Southern Pacific Railroad. Records available: 1930-32, 1941-49. Feb. 1, 12.86; Nov. 4, 14.73, pumping.

7/35-35A3. Gus Aquistapace. Records available: 1947-49.

Feb. 1	11.25	June 1	16.68	July 27	19.01	Dec. 2	12.97
Mar. 4	10.87	July 6	18.45	Nov. 4	15.46	29	11.95
31	9.82						

7/35-35A4. U. S. Geol. Survey. Gus Aquistapace property. Records available: 1947-49.

Feb. 1	10.81	Apr. 29	a9.28	July 27	11.36	Dec. 2	12.65
Mar. 4	7.74	June 1	10.89	Aug. 31	a12.25	29	12.53
31	7.14	July 6	12.59	Nov. 4	11.14		

a Nearby well pumping.

7/35-35C2. Dept. of the Army. Camp Cooke Military Reservation. Records available: 1947-49.

Feb. 1	1.36	Apr. 29	3.00	July 27	5.76	Nov. 4	4.10
Mar. 4	1.08	June 1	3.38	Aug. 31	6.66	Dec. 2	2.72
31	a0.43	July 6	5.39	Sept. 28	6.04	29	1.93

a Flowing.

7/35-35C4. U. S. Geol. Survey. Camp Cooke Military Reservation. Records available: 1947-49.

Feb. 1	3.51	Apr. 29	3.99	July 27	3.05	Dec. 2	4.34
Mar. 4	2.03	June 1	3.35	Aug. 31	3.11	29	3.88
31	2.73	July 6	3.24	Sept. 28	3.35		

7/35-36J6. Denholm Seed Co. Records available: 1947-49.

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Mar. 4	21.55	July 6	29.93	Sept. 28	28.11	Dec. 2	25.98
31	20.55	Aug. 31	27.13	Nov. 4	26.27	29	22.79

7/35-36J7. U. S. Geol. Survey. Denholm Seed Co. property. Records available: 1947-49.

Feb. 1	23.46	Apr. 28	a25.27	July 27	a29.18	Nov. 4	25.16
Mar. 4	22.07	June 1	a26.10	Aug. 31	26.88	Dec. 2	24.90
31	21.20	July 6	26.46	Sept. 28	26.41	29	23.89

a Nearby well pumping.

San Antonio Valley

8/32-30K2. John Parma. Records available: 1943-49.

Jan. 27	2.49	Apr. 29	1.73	July 26	4.67	Nov. 3	4.70
Mar. 3	1.84	June 1	2.73	Aug. 30	5.47	Dec. 2	3.84
30	1.26	24	3.64	Sept. 27	4.82	28	3.48

8/33-20K1. Virginia Barca Estate. Records available: 1943-49.

Jan. 27	22.63	Apr. 29	22.88	July 26	25.89	Nov. 3	a36.79
Mar. 3	22.30	June 1	a37.23	Aug. 30	37.85	Dec. 2	25.32
30	21.98	24	a37.56	Sept. 27	31.50	28	24.40

a Nearby well pumping.
b Pumping.

8/33-20R1. Virginia Barca Estate. Records available: 1943-49.

Jan. 27	22.50	Apr. 29	a31.19	July 26	a30.14	Nov. 3	a35.28
Mar. 3	22.22	June 1	32.86	Aug. 30	a34.53	Dec. 2	24.04
30	22.14	June 24	a36.10	Sept. 27	31.41	28	23.05

8/34-23B1. Josephine Harris Estate. Records available: 1943-49.

Jan. 27	16.09	Apr. 29	a16.77	July 26	a17.61	Nov. 3	a16.38
Mar. 3	a15.91	June 1	a16.18	Aug. 30	a17.17	Dec. 2	16.29
30	17.62	24	a17.63	Sept. 27	a16.69	28	16.13

a Nearby well pumping.

Santa Maria Valley

9/32-7N1. Valerio Tognazzini. Records available: 1924, 1930, 1932-33, 1938-49.

Jan. 1	a82.48	Apr. 1	a85.35	July 1	a92.12	Nov. 2	b97.36
26	83.07	May 31	89.28	Aug. 30	95.89	Dec. 1	96.20
Mar. 2	84.32	June 24	89.94	Oct. 1	a95.84	28	96.62
30	85.23						

a By Santa Maria Valley Water Conservation District.
b Nearby well pumping.

9/32-17G1. Caldrone Estate. Formerly E. C. Lyman. Records available: 1941-49.

Jan. 26	58.03	Apr. 28	a66.24	July 26	62.45	Nov. 2	62.86
Mar. 2	a59.34	May 31	62.42	Aug. 30	63.38	Dec. 2	63.20
30	59.37	June 24	a62.47	Sept. 27	62.69	28	63.50

a Pumping.

9/33-2A1. Santa Maria Realty Co. Records available: 1930-33, 1936, 1938-49.

Jan. 1	a60.74	Apr. 1	a63.18	July 1	a66.41	Nov. 2	71.60
26	61.37	28	64.36	Aug. 30	69.89	Dec. 1	72.09
Mar. 2	62.62	May 31	65.24	Sept. 27	70.54	28	72.64
30	63.28	June 24	66.51	Oct. 1	a70.32		

a By Santa Maria Valley Water Conservation District.

9/33-15D1. South Basin Oil Co. Records available: 1947-49. Jan. 26, 333.48; Mar. 2, 336.07; Mar. 30, 334.67; May 31, 345.26; June 24, 344.12; July 26, 346.26.

9/34-3N3. City of Santa Maria well 3. Measurements by city of Santa Maria. Records available: 1933-49. Jan. 1, 156.9; Mar. 31, 156.9; Apr. 30, 156.9; May 31, 156.9; June 25, 157.6; Oct. 31, 159.2.

9/34-8K1. C. Muscio. Records available: 1947-49. Mar. 2, 151.28; Dec. 28, 159.30.

10/33-7R2. P. T. Bonetti. Records available: 1944-49.

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 26	116.78	Apr. 28	114.74	July 26	121.11	Dec. 1	124.51
Mar. 2	116.09	May 26	119.12	Aug. 30	123.52	27	124.13
30	117.32	June 23	121.73	Nov. 2	124.02		

10/33-18G1. La Brea Securities Co. well 8. Measurements by Santa Maria Valley Water Conservation District. Records available: 1939-49. Jan. 1, 120.60; Apr. 1, 120.90; July 1, 125.90, pumping recently; Oct. 1, 127.50.

10/33-19B1. Owen T. Rice. Records available: 1927, 1929-49.

Jan. 1	a115.00	Apr. 1	a114.92	July 26	122.10	Nov. 2	121.56
26	114.65	June 24	119.22	Aug. 30	130.95	Dec. 1	122.16
Mar. 2	114.79	July 1	a119.25	Oct. 1	a121.65	28	121.28
30	114.72						

a By Santa Maria Valley Water Conservation District.

10/33-21N2. Frank Costa Jr. Records available: 1944-49.

Jan. 26	113.54	Apr. 28	a118.67	July 26	125.02	Nov. 2	a126.92
Mar. 30	a115.36	May 31	120.32	Aug. 30	125.95	Dec. 28	122.99

a Nearby well pumping.

10/33-27G1. W. C. Adam. Measurements by Santa Maria Valley Water Conservation District. Records available: 1929-33, 1936, 1938-49. Jan. 1, 87.45; Apr. 1, 88.20; July 1, 102.10, pumping recently; Oct. 1, 109.12, pumping recently.

10/33-27K1. L. M. Adam. Formerly Newhall Land and Farming Co. Records available: 1941-49.

Jan. 20	85.23	Apr. 28	a84.18	July 26	a91.75	Nov. 2	94.42
Mar. 2	82.19	May 31	a87.69	Aug. 30	a93.62	Dec. 1	92.13
30	80.00	June 24	a89.60	Sept.27	a94.58	28	91.27

a Nearby well pumping.

10/33-28A1. Joe Soares. Records available: 1929-49.

Jan. 1	a96.48	Apr. 1	a96.38	Oct. 1	a105.22	Dec. 1	102.65
26	95.42	July 1	ab102.50	Nov. 2	104.94	28	101.38
Mar. 2	94.79						

a By Santa Maria Valley Water Conservation District.
b Pumping recently.

10/33-33H1. E. L. Sargent. Records available: 1947-49.

Jan. 20	193.01	May 31	195.50	Aug. 30	197.46	Dec. 1	199.63
Mar. 2	193.59	June 24	195.94	Sept. 27	198.15	28	207.90
30	194.09	July 26	196.63	Nov. 2	a199.18		

a. Pumping.

10/33-35B1. Newhall Land and Farming Co. Records available: 1944-49. Apr. 28, 56.58. Measurements discontinued.

10/34-2R1. Gracio Apalatequi. Records available: 1929-30, 1933, 1938-49.

Jan. 1	a113.60	Mar. 30	113.70	May 26	115.90	Oct. 1	a120.60
26	113.51	Apr. 1	a113.60	July 1	ab148.85	Nov. 2	122.42
Mar. 2	113.90	28	115.74	Aug. 30	122.51	Dec. 1	119.54

a By Santa Maria Valley Water Conservation District.
b Pumping recently.

10/34-4R1. Gerald Donovan. Records available: 1945-49. Jan. 26, 100.25; Mar. 2, 99.39; Mar. 30, 99.86; June 24, 104.38; July 26, 106.20; Dec. 1, 109.07; Dec. 28, 108.19.

10/34-6N1. Grisingher & Signorelli. Records available: 1930, 1934, 1936-49.

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 1	a69.80	Apr. 1	a68.68	July 1	ab76.30	Nov. 2	79.00
26	69.17	May 31	73.70	Oct. 1	a78.90	Dec. 28	75.95
Mar. 2	69.53						

a By Santa Maria Valley Water Conservation District.
b Pumping recently.

10/34-9F1. Mrs. A. E. Preisker. Measurements by Santa Maria Valley Water Conservation District. Records available: 1942-49. Jan. 1, 97.60; Apr. 1, 96.63; July 1, 102.62, pumping recently; Oct. 1, 106.80.

10/34-14E3. City of Santa Maria. Measurements by city of Santa Maria, except as indicated. Records available: 1917-49.

Jan. 2	125.44	Apr. 3	124.81	July 3	128.44	Oct. 2	132.69
9	125.29	10	124.98	10	128.77	9	132.87
16	125.21	17	125.19	17	129.10	16	133.04
23	125.21	24	125.44	24	129.48	23	133.21
26	a125.06	28	a125.50	26	a129.50	30	133.37
30	125.17	May 1	125.71	31	129.92	Nov. 2	a133.25
Feb. 6	125.08	8	126.10	Aug. 7	130.19	6	133.35
13	125.00	15	126.48	14	130.60	13	133.52
20	124.92	22	126.71	21	130.98	20	133.50
27	124.96	26	a126.76	28	131.31	27	133.50
Mar. 2	a124.80	29	126.96	30	a131.30	Dec. 1	a133.36
6	124.48	June 5	127.29	Sept. 4	131.58	4	133.50
13	124.83	12	127.54	11	131.92	11	133.54
20	124.79	19	127.85	18	132.19	18	133.40
27	124.75	24	a127.95	25	132.42	24	133.40
30	a124.60	26	128.17	27	a132.41	28	a133.10

a By Geological Survey.

10/34-20H1. Ulisse Tognazzini. Records available: 1944-49.

Jan. 26	86.34	Apr. 28	88.85	Sept. 27	94.74	Dec. 1	94.15
Mar. 2	86.29	May 31	90.10	Nov. 2	94.67	28	96.38
30	86.26	Aug. 30	94.79				

10/34-22R1. George J. Wheat. Records available: 1931, 1934, 1938-49.

Jan. 1	ab116.00	Apr. 1	a115.42	July 26	121.12	Nov. 2	b123.57
26	116.11	28	117.40	Aug. 30	122.63	Dec. 1	123.17
Mar. 2	115.78	May 31	119.08	Sept. 27	123.31	28	123.99
30	115.46	July 1	a120.00	Oct. 1	ab123.20		

a By Santa Maria Valley Water Conservation District.
b Pumping recently.

10/34-23H1. Marion B. Rice. Records available: 1929-30, 1933, 1938-49.

Jan. 1	a133.00	Mar. 2	131.83	July 1	a136.17	Oct. 1	ab142.70
20	133.10	Apr. 1	a131.75				

a By Santa Maria Valley Water Conservation District.
b Pumping recently.

10/34-31F1. Union Sugar Co. Records available: 1944-49.

Jan. 27	89.98	Apr. 28	90.83	July 26	93.88	Nov. 3	95.92
Mar. 2	89.79	June 1	91.58	Aug. 30	95.22	Dec. 1	95.65
30	89.58	24	92.95	Sept. 27	95.52	28	95.08

10/35-7F1. M. J. Ellis. Records available: 1929-36, 1938-49.

Jan. 1	a2.75	Mar. 30	5.51	June 24	13.96	Oct. 1	a12.20
27	4.07	Apr. 1	a3.61	July 1	a12.70	Nov. 3	b13.37
Mar. 2	3.40	28	13.14	Sept. 27	13.89	Dec. 28	5.16

a By Santa Maria Valley Water Conservation District.
b Nearby well pumping.

10/35-7G3. John Jenkins. Records available: 1942-49.

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 27	12.25	Apr. 28	22.45	July 26	27.47	Nov. 3	a23.36
Mar. 2	12.40	June 1	19.26	Aug. 30	26.31	Dec. 1	20.45
30	15.11	24	23.90	Sept. 27	23.83	28	13.26

a Nearby well pumping.

10/35-9F1. Waller-Franklin Seed Co. Records available: 1930, 1933, 1935-36, 1938-49.

Jan. 1	a24.25	Apr. 1	a24.50	July 1	a38.00	Oct. 1	a39.50
27	24.64	28	39.52	26	42.71	Nov. 3	37.41
Mar. 2	26.07	June 1	34.30	Aug. 30	41.29	Dec. 1	35.85
30	29.31	24	39.81	Sept. 27	39.62	28	29.29

a By Santa Maria Valley Water Conservation District.

10/35-9N1. Agnes King. Measurements by Santa Maria Valley Water Conservation District. Records available: 1930, 1938-49. Jan. 1, 22.80; Apr. 1, 27.30; July 1, 40.15; Oct. 1, 46.55, pumping recently.

10/35-12M1. E. and G. LeRoy. Records available: 1924, 1927, 1930-32, 1938-49.

Jan. 1	a56.50	Mar. 30	58.15	July 1	ab69.35	Nov. 2	c81.77
26	56.22	Apr. 1	a57.43	Oct. 1	a68.00		

a By Santa Maria Valley Water Conservation District.
b Pumping recently.
c Pumping.

10/35-21B1. Mathison & Shaw. Formerly C. P. Mathison. Records available: 1938-49.

Jan. 1	a16.72	Mar. 30	25.55	July 1	ab38.27	Oct. 1	a38.40
27	18.94	Apr. 1	a21.63	Sept.27	c35.64	Nov. 3	d50.75
Mar. 2	19.48	June 1	28.62				

a By Santa Maria Valley Water Conservation District.
b Pumping recently.
c Nearby well pumping.
d Pumping.

10/35-24B1. Union Sugar Co. Records available: 1934, 1938-49.

Jan. 1	a59.55	Apr. 1	a58.74	July 26	71.36	Oct. 1	a73.10
27	58.94	28	68.06	Aug. 30	73.69	Nov. 3	69.63
Mar. 2	59.75	July 1	ab73.15	Sept. 27	71.06	Dec. 28	64.74
30	60.27						

a By Santa Maria Valley Water Conservation District.
b Pumping recently.

11/34-19Q1. Frank Silva. Records available: 1947-49.

Jan. 26	231.48	Apr. 28	a237.66	July 26	a244.35	Nov. 3	240.26
Mar. 2	231.36	May 31	236.74	Aug. 30	244.43	Dec. 1	240.76
30	231.03	June 24	a242.29	Sept. 27	241.81	28	235.41

a Pumping.

11/34-30Q1. Mary Bolton. Records available: 1930, 1933, 1936, 1938-49.

Jan. 1	a67.82	Mar. 2	67.08	July 1	ab71.42	Dec. 28	73.20
26	67.42	Apr. 1	ab67.15	Oct. 1	ab74.50		

a By Santa Maria Valley Water Conservation District.
b Pumping recently.

11/34-34J1. L. O. Fox. Records available: 1947-49.

Jan. 26	103.19	Apr. 28	a94.74	July 26	91.80	Nov. 2	96.00
Mar. 2	95.09	May 26	91.73	Aug. 29	92.35	Dec. 28	98.34
30	92.52	June 23	95.52	Sept. 27	93.06		

a Pumping.

11/35-20E1. Union Sugar Co. Records available: 1938-49.

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 1	a5.65	May 31	10.68	Oct. 1	ab42.70	Dec. 1	11.95
26	6.82	July 1	ab38.00	Nov. 3	c99.41	28	7.05
Apr. 1	a6.10						

a By Santa Maria Valley Water Conservation District.
b Pumping recently.
c Pumping.

11/35-25H1. M. J. Mendoza. Records available: 1944-49.

Jan. 26	50.55	Apr. 28	51.07	July 26	52.38	Nov. 2	54.23
Mar. 2	50.51	May 31	51.34	Aug. 30	53.15	Dec. 1	54.53
30	50.54	June 24	51.80	Sept. 27	53.69	28	54.73

11/35-26M2. Sam Tognazzini. Records available: 1944-49.

Jan. 26	40.58	Apr. 28	a57.84	July 26	a59.89	Nov. 3	a56.84
Mar. 2	41.18	May 31	a55.17	Aug. 30	a61.22	Dec. 1	48.97
30	41.10	June 24	a59.38	Sept. 27	52.78	28	44.47

a Nearby well pumping.

11/35-28M1. Union Sugar Co. Measurements by Santa Maria Valley Water Conservation District. Records available: 1934, 1938-1949. Jan. 1, 20.83; Apr. 1, 20.50; July 1, 36.90; Oct. 1, 36.10 (pumping recently).

11/35-33G1. H. E. Pezzoni. Records available: 1930, 1933-34, 1938-49.

Jan. 1	a30.97	Mar. 30	31.58	July 1	a44.13	Nov. 3	39.58
26	30.09	Apr. 1	a31.07	Oct. 1	ab44.48	Dec. 1	38.45
Mar. 2	31.33	June 24	43.76				

a By Santa Maria Valley Water Conservation District.
b Pumping recently.

11/35-35A1. Elmer A. Runels. Formerly Bello Estate. Records available: 1925, 1930, 1938-49.

Jan. 1	a51.05	Mar. 30	49.71	May 31	54.67	July 1	a56.63
26	50.22	Apr. 1	a48.92	June 24	b63.09	Oct. 1	a59.50
Mar. 2	50.56						

a By Santa Maria Valley Water Conservation District.
b Nearby well pumping.

Cuyama Valley

7/24-13C1. Ventura County, Apache School District. Records available: 1941-49. Jan. 24, 21.73; Apr. 27, 24.21; May 25, 23.41; Sept. 26, 25.33; Oct. 31, 26.55.

9/24-19Q1. W. C. Ramelli. Records available: 1941-49.

Jan. 25	52.12	Apr. 27	b54.38	July 25	56.39	Oct. 31	58.20
Mar. 1	53.12	May 25	54.91	Aug. 29	57.33	Nov. 29	58.77
29	a53.50	June 23	55.68	Sept. 26	57.92	Dec. 27	59.21

a Pumping recently.
b Pumping.

10/25-21G1. E. H. Mettler. Records available: 1947-49. Jan. 25, 87.08; Mar. 1, 87.03; Mar. 28, 87.58; Apr. 27, 89.44; Oct. 31, 93.88; Nov. 29, 92.99; Dec. 27, 92.02.

10/25-30F1. Adolph Kirschenmann. Records available: 1942-49. Jan. 25, 54.14; Mar. 1, 56.28; Mar, 28, 57.10; Sept. 26, 66.51; Oct. 31, 59.50; Nov. 29, 59.17, pumping recently.

10/26-9R2. H. S. Russell. Records available: 1947-49.

Jan. 25	23.68	Apr. 27	31.60	June 23	a50.28	Nov. 30	31.84
Mar. 1	24.19	May 25	30.70	Oct. 31	40.29	Dec. 27	28.05
29	25.58						

a Nearby well pumping.

10/26-22A1. W. C. Ramelli. Formerly Edward Kirschenmann. Records available: 1941-49.

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 25	2.99	Apr. 27	23.03	July 25	24.91	Oct. 31	6.59
Mar. 1	2.21	May 25	25.88	Aug. 29	26.56	Nov. 29	4.41
29	7.71	June 23	22.70	Sept. 26	23.35	Dec. 27	3.78

10/27-11C1. A. P. Anderson. Records available: 1947-49. Jan. 25, 29.45; Mar. 1, 31.46; Mar. 29, 25.48; May 25, 29.94; Nov. 1, 25.99; Nov. 30, 28.34; Dec. 27, 25.44.

10/27-12R1. William Kirschenmann Estate. Records available: 1941-49.

Jan. 25	43.40	July 25	49.08	Sept. 26	48.22	Nov. 30	47.32
Mar. 1	45.51	Aug. 29	50.36	Nov. 1	46.70	Dec. 27	46.81
Apr. 27	45.35						

HAWAII

By D. A. Davis

SCOPE OF WATER-LEVEL PROGRAM

Investigations of ground-water resources of Hawaii were continued in 1949 in cooperation with the Hawaii Division of Hydrography. Water levels were measured in observation wells throughout the islands and salinity determinations were made on water from typical wells in various ground-water areas. Studies of the geology and ground-water resources of the island of Kauai were continued. Field work was continued in the compilation of data for further reports on the ground-water resources and the preparation of ground-water maps of the Hawaiian Islands. In this report tables show data on ground water in Hawaii in 1949, including artesian head, water levels, and the chloride content of water. At the end of the report ground-water draft from all principal sources is shown tabulated by islands. In the tables of well records the measurements of artesian head or water levels are given in feet with reference to both mean sea level and land-surface datum. The data are shown in two columns designated A and B. Under column A the figures indicate feet above mean sea level; under B the figures are in feet above or below land-surface datum. The plus symbol in column B indicates that the artesian head or water level is above land-surface datum; no symbol indicates the level is below land-surface datum. For some of the wells the figure given is the water level in the well measured directly; for others, it is the height to which the water would rise in a casing as indicated by the shut-in pressure.

ISLAND OF OAHU

During 1949 the Geological Survey made 339 water-level measurements and 389 chloride determinations in 91 wells on the island of Oahu. The Board of Water Supply, City and County of Honolulu, made 187 measurements in 96 wells, 91 of which were measured more than once. Recording gages were maintained on 1 well by the Geological Survey and on 16 wells by the Board of Water Supply. In all basal artesian areas in the Honolulu district levels in

wells indicative of water-level conditions showed a net loss in 1949. This drop in water level ranged from a minimum of 0.14 foot in Wilhelmina Rise area (Area 5) to a maximum of 1.30 feet in the St. Louis Heights area (Area 1). In the Pearl Harbor area (Area 6) three of the six observation wells had a net loss ranging from 0.24 to 0.36 foot. In two wells a gain was indicated, while in the sixth well there was no appreciable change. In Gilbert (11) and Mokuleia (12) areas small rises in water levels were shown in observation wells. Throughout Oahu the net changes in water levels were, in general, negative; however, the losses during 1949 were, for the most part, less than the gains during 1948. The decline in water levels is due, in part, to deficiency in rainfall during the year and, in part, to increased draft from basal water bodies during 1949. The following table compiled by the Honolulu Board of Water Supply shows the monthly rainfall index based on the records of selected stations in the Honolulu watershed area. The index of 77 for 1949 is substantially lower than the 1948 index which was 109.

Rainfall in the Honolulu area in percentage of normal, 1949

Month	Rainfall	Month	Rainfall	Month	Rainfall
January	252	May	33	September	24
February	108	June	46	October	35
March	83	July	88	November	66
April	57	August	67	December	82
Percentage of normal					77

Month of high and low heads in artesian areas and net gain or loss in static head, in feet, as shown by typical wells on the island of Oahu, 1949

Area	Name	Well	High	Low	Net gain or loss
1	St. Louis Heights	2	January	October	-1.30
2	Makiki-Pacific Heights	36A	April	November	-.62
3	Kapalama	132	April	November	-.63
4	Moanalua	T-24	March	November	-.24
5	Wilhelmina Rise	a Shaft 7	January	December	-.14
6	Pearl Harbor	201	January	October	-.24
		244	January	October	+.03
		266	January	October	+1.79
7	Waialua	326	January	July	-.04
8	Kahuku	356	January	October	-.89
		396	February	September	-.89
9	Kahana	405	January	December	-.88
10	Kaaawa	406	March	November	-.79
11	Gilbert	T-5	January	July	+.13
12	Mokuleia	286	January	July	+.17
		308	December	April	+.62

a Nonartesian but indicative of artesian conditions.

Water levels in feet above mean sea level (A), and below land-surface datum (B), in five wells and one test boring in the Honolulu area, 1949

(Mean daily measurements furnished by Board of Water Supply, City and County of Honolulu, from recorder charts)

Area		1		2		3		4		5		5	
Well No.		2		36A[1]		132		T-24		1-A		Shaft 7	
		A	B	A	B	A	B	A	B	A	B	A	B
Jan.	5	27.48	9.52	28.65	14.35	27.60	15.40	24.17	34.23	8.21	9.79	9.40	150.60
	12	27.64	9.36	28.84	14.16	27.63	15.37	24.34	34.06	8.28	9.72	9.44	150.56
	19	27.77	9.23	29.08	13.92	27.86	15.14	24.65	33.75	....	....	9.62	150.38
	26	27.77	9.23	29.30	13.70	28.07	14.93	25.01	33.39	8.37	9.63	9.56	150.44
Feb.	2	27.57	9.43	29.38	13.62	28.26	14.74	25.34	33.06	8.32	9.68	9.54	150.46
	9	27.57	9.43	29.59	13.41	28.44	14.56	25.47	32.93	8.22	9.78	9.58	150.42
	16	27.57	9.43	29.75	13.25	28.65	14.35	25.73	32.67	8.19	9.81	9.55	150.45
	23	27.42	9.58	29.83	13.17	28.72	14.28	25.78	32.62	....	....	9.49	150.51
Mar.	2	.....	....	29.88	13.12	28.81	14.19	25.82	32.58	8.32	9.68	9.46	150.54
	9	.....	....	30.10	12.90	29.02	13.98	25.79	32.61	8.22	9.78	9.44	150.56
	16	27.38	9.62	30.22	12.78	29.06	13.94	25.74	32.66	8.19	9.81	9.44	150.56
	23	27.44	9.56	30.20	12.80	29.10	13.90	25.68	32.72	....	....	9.39	150.61
	30	27.62	9.38	30.26	12.74	29.13	13.87	25.59	32.81	....	....	9.34	150.66
Apr.	6	27.66	9.34	30.32	12.68	29.10	13.90	25.57	32.83	8.07	9.93	9.34	150.66
	13	27.74	9.26	30.36	12.64	29.15	13.85	25.56	32.84	8.07	9.93	9.31	150.69
	20	27.60	9.40	30.29	12.71	29.05	13.95	25.48	32.92	8.06	9.94	9.31	150.69
	27	27.76	9.24	30.28	12.72	29.02	13.98	25.46	32.94	8.07	9.93	9.30	150.70
May	4	27.59	9.41	30.21	12.79	28.93	14.07	25.34	33.06	8.12	9.88	9.36	150.64
	11	27.45	9.55	29.97	13.03	28.68	14.32	25.22	33.18	8.11	9.89	9.33	150.67
	18	27.45	9.55	29.82	13.18	28.64	14.36	25.17	33.23	8.11	9.89	....	.....
	25	27.30	9.70	29.74	13.26	28.63	14.37	25.08	33.32	8.08	9.92	9.34	150.66
June	1	27.34	9.66	29.77	13.23	28.57	14.43	25.08	33.32	8.02	9.98	9.26	150.74
	8	27.24	9.76	29.57	13.43	28.37	14.63	24.91	33.49	8.06	9.94	9.30	150.70
	15	27.20	9.80	29.43	13.57	28.30	14.70	24.78	33.62	8.04	9.96	9.32	150.68
	22	27.19	9.81	29.36	13.64	28.25	14.75	24.78	33.62	8.05	9.95	9.30	150.70
	29	27.11	9.89	29.27	13.73	28.20	14.80	24.74	33.66	8.06	9.94	9.33	150.67
July	6	27.16	9.84	29.30	13.70	28.19	14.81	24.85	33.55	....	....	9.32	150.68
	13	26.95	10.05	29.19	13.81	27.97	15.03	24.65	33.75	8.06	9.94	9.32	150.68
	20	27.00	10.00	29.14	13.86	27.89	15.11	24.66	33.74	8.13	9.87	9.30	150.70
	27	26.79	10.21	29.00	14.00	27.70	15.30	24.54	33.86	8.11	9.89	9.29	150.71
Aug.	3	26.47	10.53	28.68	14.32	27.27	15.73	24.37	34.03	....	....	9.27	150.73
	10	26.20	10.80	28.49	14.51	27.16	15.84	24.22	34.18	....	....	9.28	150.72
	17	25.90	11.10	28.23	14.77	26.90	16.10	24.03	34.37	8.01	9.99	9.29	150.71

* See footnote at end of table.

Water levels in feet above mean sea level (A), and below land-surface datum (B), in five wells and one test boring in the Honolulu area, 1949--Continued

(Mean daily measurements furnished by Board of Water Supply, City and County of Honolulu, from recorder charts)

Area	1		2		3		4		5		5	
Well No.	2		36A[1]		132		T-24		1-A		Shaft 7	
	A	B	A	B	A	B	A	B	A	B	A	B
Aug. 24	26.04	10.96	28.16	14.84	26.89	16.11	24.00	34.40	....	....	9.29	150.71
31	25.89	11.11	28.06	14.94	26.74	16.26	23.94	34.46	8.02	9.98	9.28	150.72
Sept. 7	25.90	11.10	27.96	15.04	26.75	16.25	23.92	34.48	8.01	9.99	9.30	150.70
14	25.75	11.25	27.81	15.19	26.59	16.41	23.75	34.65	7.96	10.04	9.27	150.73
21	25.62	11.38	27.76	15.24	26.52	16.48	23.63	34.77	7.96	10.04	9.28	150.72
28	25.64	11.36	27.77	15.23	26.53	16.47	23.55	34.85	7.98	10.02	9.28	150.72
Oct. 5	25.50	11.50	27.64	15.36	26.46	16.54	23.44	34.96	....	.....	9.24	150.76
12	25.52	11.48	27.64	15.36	26.47	16.53	23.66	34.74	7.97	10.03	9.26	150.74
19	25.69	11.31	27.69	15.31	26.52	16.48	23.34	35.06	7.97	10.03	9.25	150.75
26	.....	.....	27.64	15.36	26.40	16.60	23.15	35.25	8.00	10.00	9.24	150.76
Nov. 2	25.62	11.38	27.60	15.40	26.30	16.70	23.03	35.37	7.92	10.08	....	.....
9	25.58	11.42	27.64	15.36	26.32	16.68	23.12	35.28	7.92	10.08	9.21	150.79
16	25.72	11.28	27.66	15.34	26.41	16.59	23.21	35.19	7.91	10.09	9.21	150.79
23	25.78	11.22	27.65	15.35	26.34	16.66	23.21	35.19	7.97	10.03	9.20	150.80
30	25.91	11.09	27.68	15.32	26.46	16.54	23.28	35.12	8.02	9.98	9.23	150.77
Dec. 7	25.95	11.05	27.67	15.33	26.42	16.58	23.33	35.07	8.01	9.99	9.20	150.80
14	26.17	10.83	27.66	15.34	26.48	16.52	23.30	35.10	8.02	9.98	9.19	150.81
21	26.27	10.73	27.79	15.21	26.60	16.40	23.51	34.89	....	....	9.19	150.81
28	26.26	10.74	27.97	15.03	26.81	16.19	23.74	34.66	....	....	9.20	150.80
31	26.17	10.83	27.96	15.04	26.81	16.19	23.80	34.60	7.98	10.02	9.20	150.80

[1] Well 36A, Board of Water Supply, Honolulu. On Wilder Avenue east of Punahou school grounds. Drilled in 1912, diameter 12 inches, depth 395 feet. Basalt of Koolau volcanic series. Well 36A replaced well 83 as the standard observation well in Area 2.

Lowest head in 1926, 1948, and 1949 and net change in head, in feet above sea level, in observation wells on Oahu

Area	Name	Well	1926	1948	1949	Net change 1926-1949
1	St. Louis Heights	2	20.88	25.25	25.50	+4.62
2	Makiki-Pacific Heights	36A	a23.52	26.13	27.60	+4.08
3	Kapalama	132	24.84	25.40	26.30	+1.46
4	Moanalua	T-24	b24.00	22.32	23.03	-.97
6	Pearl Harbor	201	17.09	16.86	16.95	-.14
		244	17.27	18.15	18.77	+1.50
		266	15.75	16.01	16.63	+.88
7	Waialua	326	10.34	10.14	10.34	0
8	Kahuku	356	13.05	10.01	10.35	-2.70
		396	18.78	17.99	17.39	-1.39
12	Mokuleia	308	17.55	17.84	17.94	-.39

a Estimated from well 83.
b Estimated from well 144.

Water levels in feet in four test borings in the Pearl Harbor and Waialua areas, 1949

(Mean daily measurements furnished by Board of Water Supply, City and County of Honolulu, from recorder charts)

Area	6		6		6		7	
Well No.	T-25		T-26[1] T-41		T-27		T-28	
	A	B	A	B	A	B	A	B
Jan. 5	.....	....	20.60	61.60	19.75	27.25	11.27	23.73
12	19.15	5.23	22.70	59.50	20.30	26.70	11.58	23.42
19	.....	....	24.25	57.95	21.20	25.80	.....	.....
26	19.98	4.42	25.11	57.09	21.65	25.35	11.78	23.22
Feb. 2	.....	....	24.25	57.95	21.70	25.30	11.61	23.39
9	.....	....	24.60	57.60	21.82	25.18	11.69	23.31
16	20.42	3.98	24.90	57.30	22.20	24.80	11.46	23.54
23	20.36	4.04	23.52	58.68	22.02	24.98	11.39	23.61
Mar. 2	20.37	4.03	23.40	58.80	22.01	24.99	11.25	23.75
9	20.12	4.28	22.85	59.35	21.85	25.15	11.35	23.65
16	20.00	4.40	22.60	59.60	21.77	25.23	11.19	23.81
23	19.90	4.50	22.40	59.80	21.60	25.40	10.93	24.07
30	19.78	4.62	22.10	60.10	21.42	25.58	10.92	24.08
Apr. 6	.....	....	21.95	60.25	21.35	25.65	10.69	24.31
13	19.62	4.78	21.95	60.25	21.20	25.80	10.69	24.31
20	19.64	4.76	22.00	60.20	.....	.....	10.67	24.33
27	19.70	4.70	21.55	60.65	.....	.....	10.75	24.25
May 4	19.36	5.04	21.15	61.05	.....	.....	10.73	24.27
11	19.40	5.00	21.16	61.04	.....	.....	10.90	24.10
18	19.25	5.15	21.10	61.10	20.72	26.28	10.65	24.35
25	19.20	5.20	20.85	61.35	20.57	26.43	10.74	24.26
June 1	19.16	5.24	21.30	60.90	20.65	26.35	10.73	24.27
8	19.00	5.40	20.40	61.80	20.46	26.54	10.64	24.36
15	18.92	5.48	20.45	61.75	20.38	26.62	10.78	24.22
22	18.90	5.50	20.40	61.80	20.23	26.77	10.79	24.21
29	18.82	5.58	20.85	61.35	20.12	26.88	10.69	24.31
July 6	.....	....	.....	.....	20.50	26.50	10.94	24.06
13	18.80	5.60	20.25	61.95	19.93	27.07	10.59	24.41
20	18.72	5.68	20.10	62.10	19.80	27.20	10.64	24.36
27	18.80	5.60	19.85	62.35	19.85	27.15	10.54	24.46
Aug. 3	18.50	5.90	19.55	62.65	19.52	27.48	10.68	24.32
10	18.43	5.97	.....	.....	19.37	27.63	10.59	24.41
17	18.27	6.13	18.70	65.30	19.10	27.90	10.56	24.44
24	18.42	5.98	18.75	65.25	19.13	27.87	10.65	24.35
31	18.15	6.25	18.42	65.58	.....	.....	10.58	24.42
Sept. 7	18.15	6.25	.....	.....	19.06	27.94	10.75	24.25
14	17.95	6.45	18.25	65.75	18.76	28.24	10.53	24.47
21	17.90	6.50	18.00	66.00	18.65	28.35	10.65	24.35
28	17.75	6.65	17.80	66.20	18.45	28.55	10.58	24.42

Water levels in feet in four test borings in the Pearl Harbor and Waialua areas, 1949--Continued

Area	6		6		6		7	
Well No.	T-25		T-26 T-41		T-27		T-28	
	A	B	A	B	A	B	A	B
Oct. 5	17.65	6.75	17.60	66.40	18.30	28.70	.....	.....
12	17.57	6.83	17.40	66.60	18.20	28.80	10.42	24.58
19	17.52	6.88	17.30	66.70	18.10	28.90	10.49	24.51
26	17.35	7.05	17.50	66.50	17.96	29.04	10.57	24.43
Nov. 2	17.35	7.05	17.55	66.45	18.03	28.97	10.62	24.38
9	17.80	6.60	18.40	65.60	18.25	28.75	.....	.....
16	17.67	6.73	18.20	65.80	18.23	28.77	10.54	24.46
23	17.60	6.80	18.50	65.50	18.23	28.77	10.60	24.40
30	17.75	6.65	18.80	65.20	18.37	28.63	10.63	24.37
Dec. 7	17.75	6.65	18.50	65.50	18.38	28.62	10.46	24.54
14	17.90	6.50	18.70	65.30	18.30	28.64	10.46	24.54
21	18.23	6.17	.....	.....	18.85	28.15	.....	.....
28	18.42	5.98	21.19	62.81	19.23	27.77	11.23	23.77
31	18.47	5.93	21.04	62.96	19.26	27.74	11.29	23.71

1 Test boring T-41, Board of Water Supply Honolulu. About 1.5 miles southwest of Waipahu on east side of old Waianae road near junction with Kunia road, 76 feet southeast of T-26. Replaces T-26 which was sealed on Aug. 9, 1949. Drilled in August 1949, diameter 12 inches, depth 113 feet. Aquifer, Koolau basalt.

Schofield Barracks shaft 4. Records available: 1936-49.

Water level, from recorder charts

	A	B		A	B
Jan. 1	278.75	571.25	June 1	281.38	568.62
Feb. 1	278.96	571.04	4	281.39	568.61
Mar. 1	279.90	570.10	6	281.42	568.58
Apr. 2	280.08	569.92	29	281.63	568.37
7	280.14	569.86	30	281.60	568.40
14	280.34	569.66	July 1	281.60	568.40
15	280.37	569.63	Aug. 1	281.50	568.50
25	280.71	569.29	Sept. 5	281.18	568.82
May 1	280.71	569.29	Oct. 2	280.74	569.26
19	281.11	568.89	Nov. 1	280.20	569.80
28	281.31	568.69	Dec. 1	279.63	570.37
29	281.33	568.67			
30	281.32	568.68			

Artesian head, in feet, above mean sea level (A) and above or below land-surface datum (B), and chloride, in parts per million (C), in typical wells in Oahu

1B. Area 5. Bishop Estate. North side of Waialae Golf Links, Kaimuki. Records available: 1935-49.

	A	B	C		A	B	C
Jan. 25	8.42	9.80	169	July 28	8.02	10.20	214
Feb. 24	8.33	9.89	169	Aug. 25	8.08	10.14	220
Mar. 30	8.12	10.10	214	Sept.27	8.11	10.11	250
Apr. 28	8.05	10.17	210	Oct. 26	8.06	10.16	237
May 24	8.07	10.15	226	Nov. 29	7.97	10.25	208
June 23	7.99	10.23	220	Dec. 28	7.97	10.25	201

9. Area 1. J. J. Gouveia, Kapahulu Road, Honolulu. Records available: 1935-49.

Jan. 24	27.65	+11.57	58	July 27	26.71	+10.63	59
Feb. 23	27.28	+11.20	59	Aug. 24	25.91	+9.83	59
Mar. 30	27.47	+11.39	59	Sept.26	25.67	+9.59	60
Apr. 28	27.67	+11.59	62	Oct. 26	25.67	+9.59	61
May 23	27.08	+11.00	59	Nov. 29	25.77	+9.69	62
June 22	27.27	+11.19	58	Dec. 28	26.27	+10.19	60

Artesian head, in feet, above mean sea level (A) and above or below land-surface datum (B), and chloride, in parts per million (C), in typical wells in Oahu--Continued

81. Area 2. A. Young. Young St., Honolulu. Records available: 1935-49.

	A	B	C		A	B	C
Jan. 24	29.11	+11.07	82	July 27	28.77	+10.73	87
Feb. 23	29.64	+11.60	81	Aug. 24	27.87	+9.83	87
Mar. 30	30.08	+12.04	82	Sept.26	27.53	+9.49	91
Apr. 28	29.93	+11.89	86	Oct. 26	27.53	+9.49	91
May 23	29.64	+11.60	85	Nov. 29	27.33	+9.29	91
June 22	29.23	+11.19	86	Dec. 28	27.68	+9.64	91

119. Area 3. Honolulu Gas Co. Honolulu. Records available: 1935-49.

Jan. 25	26.42	+22.20	424	July 26	25.94	+21.72	386
Feb. 25	.....	.....	403	Aug. 24	25.34	+21.12	396
Mar. 30	27.34	+23.12	421	Sept.29	25.24	+21.02	421
Apr. 28	26.94	+22.72	403	Oct. 26	25.20	+20.98	438
May 24	27.34	+23.12	403	Nov. 29	25.84	+21.62	423
June 22	26.44	+22.22	407	Dec. 28	25.74	+21.52	430

153. Area 4. S. Damon Estate. Monalua Gardens. Honolulu. Records available: 1935-49.

Jan. 24	25.01	+4.63	53	July 28	24.84	+4.46	54
Feb. 23	25.89	+5.51	52	Aug. 25	24.11	+3.73	53
Mar. 29	25.90	+5.52	54	Sept.26	23.75	+3.37	52
Apr. 27	25.63	+5.25	52	Oct. 26	23.32	+2.94	51
May 24	25.32	+4.94	54	Nov. 29	23.33	+2.95	56
June 23	24.96	+4.58	52	Dec. 28	23.73	+3.35	57

187B. Area 6. U. S. Navy. Near Aiea railroad station. Records available: 1936-49.

Jan. 24	22.75	+12.80	140	July 27	21.15	+11.22	125
Feb. 23	23.10	+13.17	142	Aug. 24	20.50	+10.57	125
Mar. 29	22.41	+12.48	137	Sept.26	20.07	+10.14	135
Apr. 27	22.28	+12.35	134	Oct. 26	19.33	+9.40	131
May 23	21.70	+11.77	134	Nov. 29	19.76	+9.83	137
June 22	21.25	+11.32	125	Dec. 28	20.75	+10.82	128

190. Area 6. C. B. Cooper. 0.5 mile west of Aiea. Records available: 1935-49.

Jan. 24	22.76	+0.03	200	July 27	21.18	1.55	204
Feb. 23	22.99	+.26	202	Aug. 24	20.41	2.32	204
Mar. 29	22.42	.31	200	Sept.26	20.07	2.66	212
Apr. 27	22.30	.43	203	Oct. 26	19.38	3.35	212
May 23	21.76	.97	202	Nov. 29	19.84	2.89	212
June 22	21.35	1.38	197	Dec. 28	20.78	1.95	217

193. L. L. McCandless Estate. In Waimalu Valley, 1 mile northwest of Aiea. Records available: 1935-49.

Jan. 24	.....	.....	152	July 27	.....	.....	200
Feb. 23	.....	.....	165	Aug. 24	.....	.....	191
Mar. 29	.....	.....	182	Sept.26	.....	.....	204
Apr. 27	.....	.....	190	Oct. 26	.....	.....	208
May 23	.....	.....	197	Nov. 29	18.88	+5.83	248
June 22	.....	.....	202	Dec. 28	19.85	+6.80	255

201. Area 6. Bishop Estate. In Pearl City. Records available: 1935-49.

Jan. 25	20.25	+11.08	1,100	July 27	18.76	+9.59	670
Feb. 23	20.58	+11.41	922	Aug. 24	18.22	+9.05	971
Mar. 29	19.87	+10.70	1,100	Sept.26	17.70	+8.53	981
Apr. 27	19.77	+10.60	922	Oct. 26	16.95	+7.78	779
May 23	19.45	+10.28	1,050	Nov. 29	17.39	+8.22	935
June 22	19.05	+9.88	1,000	Dec. 28	18.18	+9.01	1,060

Artesian head, in feet, above mean sea level (A) and above or below land-surface datum (B), and chloride, in parts per million (C), in typical wells in Oahu--Continued

244. Area 6. Bishop Estate. In Waipahu. Records available: 1935-49.

	A	B	C		A	B	C
Jan. 24	24.25	+13.78	108	July 27	20.57	+10.10	105
Feb. 23	23.63	+13.16	105	Aug. 24	20.11	+9.64	106
Mar. 29	22.57	+12.10	110	Sept.26	19.57	+9.10	110
Apr. 27	22.27	+11.80	106	Oct. 26	18.77	+8.30	112
May 23	21.68	+11.21	107	Nov. 29	19.47	+9.00	114
June 22	21.08	+10.61	105	Dec. 28	20.88	+10.41	112

266. Area 6. Honouliuli Ranch. 1.75 miles northeast of Ewa. Records available: 1935-49.

Jan. 24	23.91	+11.25	191	July 27	18.42	+5.76	201
Feb. 23	22.16	+9.50	178	Aug. 24	17.84	+5.18	203
Mar. 29	20.38	+7.72	184	Sept.26	.....	.....	210
Apr. 27	19.92	+7.26	191	Oct. 26	16.63	+3.97	213
May 23	19.84	+7.18	197	Nov. 29	17.92	+5.26	203
June 22	18.98	+6.32	190	Dec. 28	20.52	+7.86	184

276. Area 11. Ewa Plantation Co. 4.5 miles west of Ewa. Records available: 1936-49. Figures are monthly averages furnished by owner.

Jan.	13.52	27.06	516	July	12.52	28.06	572
Feb.	13.40	27.18	541	Aug.	12.31	28.27	573
Mar.	12.77	27.81	560	Sept.	12.36	28.22	575
Apr.	12.43	28.15	556	Oct	12.23	28.35	577
May	12.48	28.10	554	Nov.	12.13	28.45	578
June	12.40	28.18	568	Dec.	12.81	27.77	552

286. Area 12. Waialua Agricultural Co. In Mokuleia. Records available: 1935-49.

Jan. 26	17.43	+5.89	159	July 28	16.85	+5.31	146
Feb. 24	16.96	+5.42	148	Aug. 25	16.95	+5.41	176
Mar. 24	16.99	+5.45	172	Sept.27	16.89	+5.35	160
Apr. 29	16.89	+5.35	176	Oct. 28	16.91	+5.37	163
May 24	17.11	+5.57	177	Nov. 28	17.08	+5.54	175
June 23	16.98	+5.44	143	Dec. 27	17.42	+5.88	175

308. Area 12. J. F. Mendonca. 1.5 miles west of Waialua Mill. Records available: 1935-49.

Jan. 26	18.82	+10.36	102	July 28	18.28	+9.82	96
Feb. 24	18.35	+9.89	100	Aug. 25	18.38	+9.92	99
Mar. 24	18.14	+9.68	93	Sept.27	18.64	+10.18	108
Apr. 29	17.94	+9.48	97	Oct. 28	18.44	+9.98	104
May 24	18.25	+9.79	97	Nov. 28	18.84	+10.38	108
June 23	18.14	+9.68	100	Dec. 27	19.24	+10.78	111

326. Area 7. Waialua Agricultural Co. About 0.5 mile south of Waialua. Records available: 1935-49.

Jan. 26	11.64	+5.45	95	July 28	10.34	+4.15	94
Feb. 24	11.32	+5.13	93	Aug. 25	10.49	+4.30	98
Mar. 24	10.87	+4.68	96	Sept.27	10.61	+4.42	104
Apr. 29	10.60	+4.41	96	Oct. 28	10.55	+4.36	106
May 24	10.59	+4.40	97	Nov. 28	10.80	+4.61	109
June 23	10.55	+4.36	96	Dec. 27	11.27	+5.08	106

337. Area 8. Waialee Training School for Boys. Records available: 1935-49.

Jan. 26	13.10	8.35	112	July 28	13.09	8.36	126
Feb. 24	12.85	8.60	110	Aug. 25	13.26	8.19	122
Mar. 24	12.98	8.47	134	Sept.27	13.41	8.04	121
Apr. 29	13.18	8.27	129	Oct. 28	13.39	8.06	120
May 24	13.25	8.20	132	Nov. 28	13.48	7.97	121
June 23	13.05	8.40	125	Dec. 27	13.22	8.23	122

356. Area 8. Kahuku Plantation Co. At sugar mill in Kahuku. Records available: 1935-49.

	A	B	C		A	B	C
Jan. 26	14.41	+5.58	248	July 28	10.57	+1.74	343
Feb. 24	12.27	+3.44	253	Aug. 25	12.03	+3.20	319
Mar. 24	11.24	+2.41	347	Sept. 27	10.64	+1.81	346
Apr. 29	10.52	+1.69	403	Oct. 28	10.35	+1.52	329
May 24	10.66	+1.83	453	Nov. 28	10.98	+2.15	304
June 23	10.37	+1.54	450	Dec. 27	12.43	+3.60	306

396. Area 8. Kahuku Plantation Co. In Hauula. Records available: 1935-49.

Jan. 26	20.07	+9.71	64	July 28	18.54	+8.18	64
Feb. 24	20.19	+9.83	63	Aug. 25	18.53	+8.17	63
Mar. 24	19.60	+9.24	63	Sept. 27	17.39	+7.03	74
Apr. 29	19.22	+8.86	65	Oct. 28	17.43	+7.07	74
May 24	19.04	+8.68	66	Nov. 28	17.65	+7.29	78
June 23	18.93	+8.57	65	Dec. 27	18.31	+7.95	77

405. Area 9. M. E. Foster Estate. In Kahana. Records available: 1936-49.

Jan. 26	17.24	+11.48	37	July 28	16.50	+10.74	38
Feb. 24	17.67	+11.91	40	Aug. 25	16.20	+10.44	38
Mar. 28	17.56	+11.80	38	Sept. 27	16.06	+10.30	40
Apr. 29	17.26	+11.50	39	Oct. 28	15.86	+10.10	40
May 24	17.17	+11.41	39	Nov. 28	15.81	+10.05	40
June 23	17.16	+11.40	38	Dec. 27	15.66	+9.90	41

406. Area 10. F. M. Swanzy. In Kaaawa Valley. Records available: 1935-49.

Jan. 26	14.53	+4.26	227	July 28	14.25	+3.98	230
Feb. 24	14.68	+4.41	238	Aug. 25	14.07	+3.80	239
Mar. 28	14.89	+4.62	226	Sept. 27	13.91	+3.64	259
Apr. 29	14.42	+4.15	238	Oct. 28	13.75	+3.48	248
May 24	14.75	+4.48	226	Nov. 28	13.47	+3.20	243
June 23	14.62	+4.35	236	Dec. 27	13.48	+3.21	255

Water levels, in feet, above mean sea level (A) and below land-surface datum (B), and chloride, in parts per million (C), in test borings in Oahu, 1949

Test boring Oahu T1 (tributary to area 12). Waialua Agricultural Co. In Kaukonahua Gulch, 4 miles south of Waialua. Records available: 1938-49.

Feb. 1	13.68	259.93	21	June 29	15.58	258.03	10
Feb. 28	13.08	260.53	21	Aug. 1	16.58	257.03	10
Apr. 2	15.60	258.01	31	Aug. 31	14.98	258.63	21
May 2	16.08	257.53	21	Sept. 30	16.38	257.23	21
June 2	16.28	257.33	21	Dec. 3	15.70	257.91	31

Test boring Oahu T2 (tributary to area 7). Waialua Agricultural Co. Near Anahulu Canyon, 3.5 miles east of Haleiwa. Records available: 1938-49.

Jan. 4	5.11	336.77	42	June 29	5.51	336.37	31
Feb. 1	4.66	337.22	42	Aug. 1	5.01	336.87	62
Feb. 28	5.21	336.67	62	Aug. 31	5.31	336.57	62
Apr. 2	4.99	336.89	52	Sept. 30	4.79	337.09	52
May 2	5.21	336.67	42	Nov. 1	4.49	337.39	31
June 2	5.11	336.77	52	Dec. 3	4.71	337.17	104

Test boring Oahu T5 (tributary to area 11). Suburban Water Works, Honolulu, 5 miles west of Ewa, on main highway. Records available: 1939-49.

	A	B	C		A	B	C
Jan. 25	5.03	74.10	176	July 27	4.29	74.84	214
Feb. 25	4.72	74.41	109	Aug. 26	4.39	74.74	233
Mar. 31	4.50	74.63	123	Sept. 28	4.57	74.56	277
Apr. 27	4.51	74.62	134	Oct. 27	4.44	74.69	398
May 25	4.50	74.63	174	Nov. 25	4.57	74.56	343
June 24	4.35	74.78	182	Dec. 29	4.80	74.33	311

Test boring Oahu T15. Suburban Water Works, Honolulu, 1.8 miles above mouth of Nanakuli Gulch. Records available: 1940-49.

Jan. 25	1.91	476.73	87	July 27	2.01	476.63	92
Feb. 25	1.85	476.79	89	Aug. 26	1.99	476.65	89
Mar. 31	2.37	476.27	93	Sept. 28	2.10	476.54	95
Apr. 27	2.24	476.40	91	Oct. 27	1.94	476.70	92
May 25	2.19	476.45	92	Nov. 25	1.84	476.80	95
June 24	2.10	476.54	92	Dec. 29	1.95	476.69	97

Test boring Oahu T20 (tributary to area 6). U. S. Navy, 2 miles northwest of Ewa, on main highway to Waianae. Records available: 1942-49.

Jan. 25	18.20	121.30	201	July 27	17.33	122.17	209
Feb. 25	18.50	121.00	209	Aug. 26	17.15	122.35	195
Mar. 31	17.87	121.63	200	Sept. 28	17.02	122.48	219
Apr. 27	17.70	121.80	196	Oct. 27	16.82	122.68	210
May 25	17.46	122.04	197	Nov. 25	16.82	122.68	217
June 24	17.28	122.22	198	Dec. 29	17.35	122.15	212

ISLAND OF MAUI

Data are not available for comparison of 1949 water levels with those of 1948 in Hawaiian Commercial and Sugar Co. wells on the Maui Isthmus. On the west end of West Maui a net decline occurred in all wells during 1949. The decline in water level was accompanied by a rise in the chloride content of water from the wells. A rise in chloride content also occurred in many of the wells on the isthmus of Maui. Rainfall in 1949 was below normal over the whole island. Ground-water draft on the island was 60,700 million gallons in 1949 as compared with 38,900 million gallons in 1948. The increase was mainly in pumpage from wells of the Hawaiian Commercial and Sugar Company. During the year 59,700 million gallons of water were delivered to the Maui Isthmus in East Maui Irrigation Company ditches.

Data in the following table were furnished by the Hawaiian Commercial and Sugar Company and the Pioneer Mill Co.

Chloride, in parts per million, and water levels in feet above sea level and net loss in static level in wells on Maui, 1949

Name or number		Geol. Survey well No.	Chloride	Date	Water level	
New No.	Old No.				Height	Loss
Hawaiian Commercial & Sugar Co.						
1	1 (Kihei)	14	380	....	....	....
2	2	25	389	....	....	....
3A-C	3 (Kihei)	15	413	....	....	....
4	4	24	436	....	....	....
5	5	19	434	....	....	....
6	6	18	399	....	....	....
7	7	16	424	....	....	....
8	8 (Mill, HC&S)	17	428	....	....	....
9	3	22	382	....	....	....
11A-B	10 & 11 (Maliko)	32	507	....	....	....
12	12 (Kuau)	31	291	....	....	....
13A+B	8 & 13 (Mill, MA)	29	357	....	....	....
16 A,B,D	1, 5, & 6 (Lower Paia)	30	457	....	....	....
17	7 (Paia School)	28	332	....	....	....
18A-B	3 & 4 (Kaheka)	27	310	....	....	....
Pioneer Mill Co.						
Kaanapali		3	704	Dec. 31	1.43	-1.45
Kahoma		5	297	Dec. 31	2.40	-1.38
Lahaina		9	537	Dec. 31	2.08	-.75
Mill		7	632	Dec. 31	3.10	-.50
Olowalu		10	324	Dec. 31	3.40	-.66
Ukumehame		12	412	Dec. 31	5.40	-.17

Owing to changes in pumping installations, accuracy of water-level measurements for wells owned by the Hawaiian Commercial and Sugar Co. is uncertain. Listing of water-level data discontinued until altitudes of measuring points are reestablished.

Water levels, in feet, above mean sea level (A) and below land-surface datum (B), and chloride, in parts per million (C), in test borings on Maui

(Measurements furnished by Wailuku Sugar Co.)

Test boring Maui T102 (Iao Valley). U. S. Geol. Survey. In Iao Valley 1 mile west of Wailuku. Records available: 1940-49.

	A	B	C		A	B	C
Jan. 14	25.9	428.0	23	July 15	23.4	430.5	26
Feb. 16	26.5	427.4	23	Aug. 17	24.1	429.8	26
Mar. 16	26.0	427.9	22	Sept. 14	23.3	430.6	24
Apr. 14	26.2	427.7	22	Oct. 19	21.6	432.3	26
May 19	23.6	430.3	24	Nov. 17	22.1	431.8	26
June 16	23.6	430.3	25	Dec. 15	24.2	429.7	26

Test boring Maui T110 (Puu Hele). Wailuku Sugar Co., 2 miles north of Maalaea. Records available: 1940-49.

Jan. 14	7.1	305.6	251	July 15	7.2	305.5	239
Feb. 16	6.8	305.9	247	Aug. 17	7.4	305.3	262
Mar. 16	7.0	305.7	243	Sept. 14	7.6	305.1	245
Apr. 14	7.1	305.6	240	Oct. 19	7.5	305.2	237
May 19	7.2	305.5	223	Nov. 17	7.6	305.1	249
June 16	7.1	305.6	245	Dec. 15	7.9	304.8	237

Test boring Maui T112. Wailuku Sugar Co., 0.5 mile southwest of Wailuku. Records available: 1944-49.

	A	B	C		A	B	C
Jan. 14	24.8	432.3	....	July 15	22.2	434.9	....
Feb. 16	25.4	431.7	....	Aug. 17	a22.3	434.8	....
Mar. 16	a24.4	432.7	....	Sept. 14	a21.5	435.6	....
Apr. 14	25.1	432.0	....	Oct. 19	a19.1	438.0	....
May 19	a21.0	436.1	....	Nov. 17	20.6	436.5	....
June 16	a21.9	435.2	....	Dec. 15	22.7	434.4	....

a Pumps in Wailuku shaft operating.

Test boring Maui T113. Wailuku Sugar Co. At Wailuku Mill. Records available: 1944-49.

Jan. 14	18.6	162.5	108	July 15	17.6	163.5	113
Feb. 16	18.6	162.5	111	Aug. 17	17.8	163.3	113
Mar. 16	18.3	162.8	113	Sept. 14	17.8	163.3	113
Apr. 14	18.2	162.9	107	Oct. 19	17.6	163.5	112
May 19	18.0	163.1	108	Nov. 17	18.0	163.1	114
June 16	17.8	163.3	113	Dec. 15	17.7	163.4	115

ISLAND OF MOLOKAI

On Molokai total water pumped during 1949 was 77 million gallons, as compared with 46 million gallons during 1948.

An important deep well was completed during the year near Kalae on Wailuku gulch. The well was drilled by the Hawaiian Homes Commission to a depth of 1,095 feet from a starting elevation of 1,004 feet. The water level is approximately 10 feet above sea level and the chloride content of the water is about 120 parts per million.

Water levels, in feet, above mean sea level (A) and below land-surface datum (B), in observation wells on Molokai

Kamalo well. 0.5 mile northeast of Kamalo wharf. Records available: 1938-49.

	A	B		A	B
Jan. 29	5.10	38.13	Sept. 14	4.42	38.81
July 7	a3.43	39.80	Oct. 22	4.50	38.73
8	4.34	39.89	Dec. 1	a3.70	39.53
Aug. 23	4.52	38.71	17	a3.35	39.88

a Pumping.

Ualapue well. 2.75 miles east of Kamalo well. Records available: 1938-49.

Jan. 29	5.44	38.27	Sept. 13	a4.99	38.72
July 7	a4.96	38.75	14	a5.11	38.60
8	4.94	38.77	Oct. 22	4.99	38.72
Aug. 23	a4.81	38.90	Dec. 1	a4.90	38.81
			17	4.90	38.81

a Pumping.

Conant-Kawela well. Molokai Ranch Co. 5 miles east of Kaunakakai. Records available: 1947-49.

Jan. 29	3.80	33.84	Oct. 22	3.34	34.30
July 8	3.39	34.25	Dec. 1	a3.29	34.35
Sept. 14	3.84	33.80	17	a3.37	34.27

a Pumping.

Test boring Molokai T4. County of Maui. In Kaunakakai, 0.25 mile north of post office. Records available: 1947-49.

Date	A	B	Date	A	B
Jan. 29	2.52	12.86	Oct. 22	2.40	12.98
July 7	2.40	12.98	Dec. 16	2.29	13.09
Aug. 22	2.43	12.95	Dec. 17	2.37	13.01
Sept.13	2.48	12.90			

ISLAND OF LANAI

Draft of ground water on Lanai increased from 327 million gallons for the year 1948 to 409 million gallons for 1949. Development of additional ground water for irrigation was begun by Hawaiian Pineapple Company with the drilling of the first of three additional deep wells.

Water levels, in feet, above mean sea level (A) and below land-surface datum (B), in observation wells on Lanai

Maunalei shaft 1. 4 miles north-northeast of Lanai City. Records furnished by Hawaiian Pineapple Co. Records available: 1936-49.

Jan. 1	2.39	291.61	July 1	2.39	291.61
Feb. 1	2.39	291.61	Aug. 1	2.42	291.58
Mar. 1	2.41	291.59	Sept. 1	2.39	291.61
Apr. 1	2.39	291.61	Oct. 1	2.39	291.61
May 1	2.39	291.61	Nov. 1	2.39	291.61
June 1	2.39	291.61	Dec. 1	2.43	291.57

ISLAND OF HAWAII

In the Olaa shaft the water level ranged from a high of 22.85 feet above sea level on January 8, to a low of 13.43 feet on September 18. There was a net fall of 2.17 feet during the year. In the Paauilo shaft of the Hamakua Mill Co. the water level was 3.2 feet above sea level on December 31, or 0.1 foot below the level of the same date in 1948. The average chloride content of water from the Paauilo shaft during 1949 was 176 parts per million.

Water levels, in feet, above mean sea level (A) and below land-surface datum (B), and chloride, in parts per million (C), in observation wells on Hawaii.

Olaa shaft. Records furnished by Olaa Sugar Co., Ltd. Records available: 1936-49.

Jan. 8	22.85	197.15	Apr. 10	16.29	203.71
15	22.19	197.81	17	16.09	203.91
22	22.03	197.97	24	15.86	204.14
29	20.76	199.24	May 1	15.86	204.14
Feb. 6	19.98	200.02	8	15.43	204.57
13	19.46	200.54	15	15.50	204.50
20	18.69	201.31	22	15.28	204.72
27	18.39	201.61	29	15.11	204.89
Mar. 6	17.79	202.21	June 5	14.04	205.96
13	17.46	202.54	12	14.10	205.90
20	17.21	202.79	19	14.03	205.97
27	16.75	203.25	26	14.52	205.48
Apr. 3	16.40	203.60	July 3	14.44	205.56

Olaa shaft--Continued.

Date	A	B	Date	A	B
July 10	14.40	205.60	Oct. 9	13.59	206.41
17	13.98	206.02	16	13.54	206.46
24	14.10	205.90	23	13.56	206.44
31	13.68	206.32	30	13.84	206.16
Aug. 7	13.69	206.31	Nov. 6	13.84	206.16
14	13.85	206.15	13	13.87	206.13
21	13.82	206.18	20	13.84	206.16
28	13.76	206.24	27	13.65	206.35
Sept. 4	13.65	206.35	Dec. 4	13.75	206.25
11	13.62	206.38	11	13.80	206.20
18	13.43	206.57	18	14.44	205.56
25	13.58	206.42	25	14.86	205.14
Oct. 2	13.67	206.33	31	15.21	204.79

Ookala shaft. Records furnished by Kaiwiki Sugar Co. All measurements in old (domestic supply) tunnel. Records available: 1937-49.

Date	A	B	C	Date	A	B	C
Jan. 13	5.75	294.25	9	July 15	5.33	294.67	16
Feb. 21	....	....	31	21	5.33	294.67	17
28	....	....	16	Aug. 16	....	....	35
Mar. 12	....	....	27	24	....	....	43
Apr. 6	....	....	16	29	....	....	55
11	....	....	33	Sept. 6	....	....	19
23	....	....	30	12	....	....	27
29	....	....	29	20	....	....	33
May 13	....	....	36	27	6.08	293.92	27
19	....	....	39	Oct. 3	....	....	52
25	....	....	60	14	5.08	294.92	12
June 6	....	....	23	Nov. 9	5.08	294.92	11
29	....	....	9	Dec. 7	4.92	295.08	10
July 11	....	....	38				

ISLAND OF KAUAI

In the Kealia and Wailua areas of Kauai water-level data were insufficient to determine the trend during 1949. In the Kekaha area no marked change in water levels occurred, but, in general, the water levels stood higher during the summer months than during the same period of 1948. Ground-water draft on Kauai was 5,710 million gallons during 1949, an increase of 426 million gallons over 1948.

Artesian head, in feet, above mean sea level (A) and above or below land-surface datum (B), and chloride, in parts per million (C), in typical artesian wells on Kauai, 1949

2F. In Kealia. Records furnished by East Kauai Water Co. Records available: 1937-49.

	A	B	C		A	B	C
Jan. 11	9.86	+1.81	....	Dec. 21	....	....	44
25	a9.82	a+1.77	39				

a Water-level measurements interrupted owing to change in construction of well during installation of a pump.

7. In Wailua. Records available: 1937-49.

	A	B	C		A	B	C
Jan. 11	....	....	155	July 18	....	....	157
Mar. 16	....	....	157	Sept. 4	....	....	160
May 18	....	....	154	Nov. 4	....	....	160

8. In Wailua. Records available: 1937-49.

Jan. 11	9.74	2.21	129	July 18	....	....	100
Mar. 16	10.02	1.93	112	Sept. 4	10.71	1.24	111
May 18	10.19	1.76	120	Nov. 4	....	....	111

14N. In Koloa. Records furnished by Koloa Sugar Co. Records available: 1937-49.

Apr. 30	31.02	55.00	37	Aug. 27	a17.52	68.50	43
July 30	31.02	55.00	39	Oct. 3	a 9.72	76.30	39

a Pumping.

Artesian head, in feet, above mean sea level (A), and above or below land-surface datum (B), and chloride, in parts per million (C), in the Kekaha Sugar Co.'s artesian wells on Kauai, 1949.

(Records furnished by Kekaha Sugar Co.)

35. Near Kekaha. Records available: 1937-49.

Jan. 18	9.32	+1.50	261	July 15	8.42	+.60	376
Feb. 15	9.36	+1.54	...	Aug. 15	8.55	+.73	394
Mar. 17	9.14	+1.32	352	Sept.15	8.44	+.62	540
Apr. 18	8.91	+1.09	376	Oct. 17	8.42	+.60	504
May 20	9.02	+1.20	273	Nov. 15	8.24	+.42	534
June 15	8.95	+ .77	279	Dec. 15	8.27	+.45	534

37. 4 miles northwest of Kekaha. Records available: 1937-49.

Jan. 18	9.72	0.26	249	July 15	9.02	0.96	394
Feb. 15	9.68	.30	255	Aug. 15	8.72	1.26	328
Mar. 17	9.65	.33	309	Sept.15	8.91	1.07	370
Apr. 18	9.22	.76	237	Oct. 17	9.06	.92	273
May 20	9.40	.58	267	Nov. 15	8.59	1.39	346
June 15	9.06	.92	316	Dec. 15	8.30	1.68	394

PUMPAGE

The following table gives the draft during 1949 from all major ground-water installations in the Territory of Hawaii for irrigation, domestic, and industrial supplies. The numbers in parentheses in the records for Oahu and Maui are those used by the U. S. Geological Survey.

During 1949 the total draft of ground water from all sources was 191,000 million gallons. This is 34,200 million gallons greater than the draft of 1948. The rise is mainly the result of an increase in pumping for irrigation during the year to offset the effects of deficient rainfall.

Draft from wells entering the main basalt aquifer of Oahu, which is not included in the tables, is estimated to be about 30 million gallons a day.

Pumpage, in millions of gallons, from wells and tunnels in the Territory of Hawaii, 1949

(Data furnished by owners)

Island of Hawaii				
Hamakua Mill Co.				
Paauilo well		a	650	
Hawaiian Agricultural Co.				
Pahala shaft			386	
Hutchinson Sugar Plantation Co.				
Honuapo well		a	756	
Kaiwiki Sugar Co.				
Domestic tunnel	a	61		
Cane-cleaning plant tunnel		307	368	
Kohala Sugar Co.				
Hoea pump		649		
Kohala pump		1,816		
Waikane pump		351		
Honokane tunnel	a	453		
Kohala domestic well	a	46	3,315	
Olaa Sugar Co.				
Olaa shaft			815	
Pepeekeo Sugar Co.			a 75	
Total			6,365	

Island of Kauai[b]				
County of Kauai				
Hanapepe Water Works		190		
Waimea Water Works		98	288	
Kekaha Sugar Co.				
Well 9		623		
Wells K-1 to K-5		867		
Wells M-1 to M-5		1,425		
Kekaha pump		730		
Mana pump		182		
Waiawa pump		309		
Well 16		3	4,139	
Lihue Plantation Co.				
Domestic shaft	a	550		
Kealia wells	a	200		
Hanamaulu shaft	a	10	760	
Olokele Sugar Co.				
Domestic shaft			a 520	
Total			5,707	

Island of Lanai			
Hawaiian Pineapple Co.			
Tunnel 1	66		
Shaft 2	68		
Well 1	47		
Well 2	228	409	
Total			409

Island of Maui			
Hawaiian Commercial and Sugar Co.			
Pump 1 (14)	733		
Pump 2 (25)	3,768		
Pump 3 A-C (15)	5,680		
Pump 4 (24)	2,489		
Pump 5 (19)	2,114		
Pump 6 (18)	4,452		
Pump 7 (16)	6,149		
Pump 8 (17)	3,983		
Pump 9 (22)	3,340		
Central power plant (20)	2,580		
Pump 11 A-B (32)	439		
Pump 12 (31)	709		
Pump 13 A-B (29)	4,030		
Pump 16 A,B,D (30)	818		
Pump 17 (28)	2,117		
Pump 18 A-B (27)	2,969		46,370
Pioneer Mill Co.			
Pump A (9) Lahaina	716		
Pump B (8) Lahaina	1,898		
Pump C (7) Mill	2,245		
Pump D (3) Kaanapali	1,827		
Pump F (2) Honokowai	1,051		
Pump G (4) Hahakea	820		
Pump H (3) Kaanapali	2,394		
Pump L (6) Wahikuli			
Pump M (5) Kahoma	2,051		
Pump N (10) Olowalu	358		
Pump O (11) Olowalu	106		
Pump P (12) Ukumehame	48		13,514
Maui Pineapple Co.			
Kahului Cannery (11)			a 100
Wailuku Sugar Co.			
Wailuku shaft			a 725
Total			60,709

* See footnotes at end of table.

Pumpage, in millions of gallons, from wells and tunnels in the Territory of Hawaii, 1949--Continued

Island of Molokai			
County of Maui			
Conant-Kawela well		10	
Kamakana well		13	
Kamalo well		2	
Ualapue well		8	33
California Packing Corp.			
Kualapuu well			39
Libby, McNeill & Libby			
West Molokai well	a		5
Total			77
Island of Oahu			
Ewa Plantation Co.			
Pump 1 (268)		1,521	
Pump 2 (257)		1,062	
Pump 3 (264)		3,484	
Pump 4 (264)		3,174	
Pump 5 (259)		2,068	
Pump 6 (259)		2,784	
Pump 7 (263)		2,516	
Pump 8 (270)		468	
Pump 10 (276)		2,530	
Pump 11 (276)		1,613	
Pump 12 (276)		1,245	
Pump 13 (276)		30	
Pump 15 (shaft 3)		2,889	
Pump 16 (shaft 3)		4,204	
Pump 20 (dug well 20)		755	
Pump 21 (dug well 21)		504	
Pump 22 (dug well 22)		439	
Pump 23 (dug well 23)		2,835	
Pump 24 (dug well 24)		703	
Pump 25 (254)		385	35,209
California Packing Corp.			
Kunia well (330-5)			5
Hawaiian Electric Co.			
Wells and tunnel (199-1 and shaft 8)		4,369	
Kaluaoopu spring		2,180	6,549
Honolulu Board of Water Supply			
Kalihi station (Shaft 6)		2,574	
Waialae station (Shaft 7)		158	
Halawa station (Shaft 12)		4,378	
Kaimuki station (7)		1,210	
Beretania station (88)		2,446	
Kalihi station (128)		1,576	12,342
Island of Oahu--Continued			
Honolulu Suburban Water System			
Aiea (190-1-B)		31	
Pearl City (shaft 9)		108	
Waipahu (241)		18	
Nanakuli (dug well 16)		6	
Lualualei (shaft 2)		53	
Waialua (well 333)		13	
Hauula (394)		21	
Kaaawa (shaft 10)		28	
Haiku tunnel		663	
Kahaluu tunnel		629	
Waimanalo tunnel		84	
Waianae tunnels		226	1,880
Kahuku Plantation Co.			
Pump 1 (353)		1,295	
Pump 2 (341)		2,504	
Pump 3 (362)		1,143	
Pump 5 (352)		2,266	
Pump 6 (362-1)		262	
Pump 7 (363)		162	
Pump 8 (357)		218	
Pump 12 (361)		190	
Pump 14 (338)	a	106	
Pump 15 (348)		339	
Pump 17 (362)		108	
Pump 20 (377)		1,035	
Pump 23 (387)		131	
Pump 25 (373)		156	
Pump 26 (392)		219	
Pump 27 (396)		162	
Mill pump (355)	a	537	10,833
Oahu Sugar Co.			
Waipahu Section			
Pump 1 (247)		1,435	
Pump 2 (249)		1,481	
Pump 3 (249)		548	
Pump 4 (248)		1,007	
Pump 5 (274)		2,711	
Pump 6 & 6B (239)		1,903	
Pump 7 (246)		3,368	
Pump 8 (Waikele Spring)		2,464	
Pump 9 (Waiawa Spring)		22	
Aiea Section			
Pump 2 (196)		961	
Pump 3 (186)		1,064	
Pump 4 (197)		1,219	
Pump 5 & 5B (189)		1,129	
Pump 6 (Kalawao Spring)		84	
Pump 16 (199-1)		(c)	
Pump 21 & 21B (Shaft 13)		1,645	21,041

* See footnotes at end of table.

Pumpage, in millions of gallons, from wells and tunnels in the Territory of Hawaii, 1949--Continued

Island of Oahu--Continued		
Private wells in Honolulu		d 4,161
U. S. Army		
Schofield (Shaft 4)		1,260
U. S. Navy		
Aiea (Shaft 5)	667	
Red Hill (Shaft 11)	3,673	
Barbers Point (Shaft 14)	695	
Aiea wells (187)	9	
Wahiawa radio station (330-2)	7	
Moanalua (156)	0	
Pearl City wells	1,060	
Lualualei tunnel	141	6,252
Wahiawa Water Co. (deep wells 330-3, & 330-6)		496
Waialee Training School		
Sunset Beach (337-1 & 2)	a 9	
School pump(337-1 & 2)	a30	39
Waialua Agricultural Co.		
Pump 1 (321)	927	
Pump 2 (322)	4,500	
Pump 3 (331)	3,207	
Pump 4 (334)	2,079	
Pump 5 (285)	1,123	
Pump 6 (298, 299 & 301)	154	
Pump 7 (324)	707	
Pump 8 (329)	364	
Pump 9 (327)	212	
Pump 10 (323)	2,404	
Pump 11 (296)	70	
Pump 12 (332)	239	
Pump 13 (328)	234	
Pump 15 (317)	50	
Pump 16 (316)	116	
Mill (319)	1,379	17,765
Total		117,832
Grand total		191,099

a Estimated.

b McBryde Sugar Co. not included. Three pumps in Hanapepe and one pump in Lawai Valley pump both surface water and ground water. It is not possible to separate the ground-water draft from the surface water.

c Pumpage from Pump 16 (199-1) included with that of Hawaiian Electric Co.

d Reported by Honolulu Board of Water Supply. Includes pumpage from wells belonging to military establishments in Honolulu.

NEW MEXICO

By C. S. Conover and H. O. Reeder

SCOPE OF WATER-LEVEL PROGRAM

Investigation of ground-water resources, mainly in areas where ground water is used for irrigation, was continued in 1949 in cooperation with the State Engineer of New Mexico. Studies of ground water have been in progress in certain areas since 1925.

Many observation wells are measured in January or February of each year when the major part of the recovery from pumping effects of the previous pumping season has taken place and comparison with water levels in previous years can best be made. The winter meaurements indicate the amount of ground water in storage, and comparisons of water-level measurements between years show the changes of storage which result from changes in recharge, primarily from precipitation, and in discharge, primarily by pumping for irrigation. Measurements are also made in selected groups of observation wells at approximately 2-month intervals in order to note seasonal fluctuations in water levels caused by precipitation and changes in pumping schedules. Estimates of the amount of ground water pumped during the year in each area are made to determine the part played by artificial withdrawal on the yearly changes in water level.

About 3,050 measurements of water levels were made during 1949 in about 1,250 observation wells, exclusive of the Virden Valley in Hidalgo County, and including about 185 measurements of water levels made in 30 of the observation wells that were equipped with recording gages.

SUMMARY OF CHANGES OF WATER LEVELS

The water levels in areas where ground water is used for irrigation generally showed net annual rises. In those areas in which the water levels did decline, the declines were considerably smaller than normally occur. The net rises and smaller than normal declines were the result mainly of reduced pumpage because of the above-normal rainfall and from the favorable soil moisture in the spring.

Pumpage of ground water for irrigation in 1949 in New Mexico with the exception of the Gila and Rio Grande Valleys, for which there is little information, is estimated at about 475,000 acre-feet and the irrigated acreage as about 310,000 acres including lands given ground water to supplement inadequate surface water. Revised estimates for 1947 and 1948 are 530,000 and 520,000 acre-feet and 205,000 and 240,000 acres, respectively. About 40 percent of the total acreage and about 60 percent of the total pumpage in 1949 was in the Roswell basin.

The artesian pressures in the Roswell basin reached their lowest annual pressures on record in three of the six wells equipped with recording gages. The artesian pressure in 1949, as represented by an average of the mean annual pressures in these six wells, showed a rise of about 1.8 feet as compared with a decline of 1.4 feet in 1948. However, because of the declines of the last few years, the mean artesian head for 1949 was 6.8 feet below the average.

The water levels in the shallow aquifer that overlies the artesian aquifer in the Roswell basin showed net rises for 1949 of more than 4 feet in the pumped areas west of Dexter and from about 3 miles south of Artesia northward to the Chaves-Eddy county line. In the southern end of the basin, around Lakewood, the shallow-water levels generally rose more than 6 feet. In the remainder of the Roswell basin where shallow water is used for irrigation the water levels showed net declines for 1949. The declines, in general, were less than 2 feet and occurred in the pumped areas near Roswell, northwest of Dexter, and from north to southwest of Hagerman. At the end of 1949 water levels in parts of the heavily pumped area southwest of Hagerman were more than 55 feet below the level in 1927, when records began.

Ground-water levels rose in the Carlsbad area in 1949 as a result of an increased supply of surface water and above-normal rainfall. Water levels in the area east of the Southern Canal were, in general, from 2 to 7 feet higher at the end of 1949 than at the end of 1948. In spite of the rises in water levelsin the last 2 years in the area near Otis, the levels at the end of 1949 were still about 2 feet below those of January 1947, when records began. In the area west of the canal and east of the airport where irrigation is only by ground water, the water levels rose as much as 7 feet in 1949. However, in one small area west of the canal, the water levels

declined to a level as much as 20 feet below that in January 1947. Water levels in the airport wells rose more than 7 feet to a level about 13 feet below that in January 1943, when records began.

Ground-water levels in the Portales Valley in 1949 showed net declines in the irrigated area northwest of Portales and net rises in the area southeast of Portales. The maximum observed decline for the year was 1.40 feet, in a well about 5 miles northwest of town. The water levels showed a net decline in 1949 of more than 1 foot under about 2 square miles as compared with a like decline in 1948, also a year of above-normal precipitation, under about 60 square miles. The levels showed net rise in 1949 of more than 2 feet under a nearly circular area of about 4 square miles centered about 3 miles southeast of Portales.

Water levels in the irrigated area near Deming continued to decline in 1949 as in previous years although some slight reduction in pumping resulted from slightly above-normal rainfall. Net declines of water levels of more than 3 feet occurred in 1949 under about 9 square miles and more than 1 foot under about 148 square miles. Like declines occurred in 1948 under 19 and 177 square miles, respectively. The main area in which water levels declined is centered about 6 miles south and includes all the area south of Deming. Recharge to the water body from flood flows in the Mimbres River during January 1949 are reflected in a rise in water levels in 1949 of as much as 10 feet in wells near Spalding northwest of Deming and small rises in a few wells in the shallow-water area about 8 miles east of Deming.

In the recently developed ground-water irrigated area in Animas Valley, southwest of Lordsburg, the water level in one well in sec. 35, T. 25 S., R. 20 W., showed a net decline in 1949 of more than 5 feet. Water levels declined more than 2 feet under 22 square miles and more than 4 feet under 1.4 square miles as compared with like declines in 1948 under 14 and 0.6 square miles, respectively. Since the beginning of record in April 1948, water levels in the center of the area of concentrated pumping have declined as much as 9 feet while in the outlying areas the water levels have declined fractions of a foot.

In the High Plains area of Lea County the irrigated land in 1949 was more than triple that in 1948 and resulted in increased pumpage of ground

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water. However, because of the above-normal precipitation, which at Lovington was more than 11 inches above average, the pumpage per acre was considerably reduced. Ground-water levels declined throughout most of the area in which pumping occurred. In the areas of concentrated pumping the levels generally declined more than 1 foot in 1949 as compared with more than 2 feet in like areas in 1948. The areas under which the water levels declined more than 1 foot totaled about 24 square miles in 1949 as compared with about 94 square miles in 1948. In the area of concentrated pumping northeast, west, and east of Lovington, net rises of water levels occurred in 1949. Net rises also occurred in outlying wells northwest of Lovington, in an area about 10 miles northeast of Lovington, and south of the edge of the plains near Pearl and Monument.

Ground-water levels in the House area, Quay County, showed small declines in 1949 as compared with previous years. The water levels declined under a nearly circular area of 7 square miles centered about 3 miles north of House and declined more than 1 foot under an area of about one-third of a square mile. Declines of more than 1 foot occurred in 1948 under an area of 5 square miles and in 1947 under an area of 18 square miles. Water levels in the remainder of the area, principally east of House, showed net rises in 1949 of as much as 1.7 feet.

The declines of water level in the Estancia Valley in 1949 were similar in both magnitude and area to those of 1948. The water levels declined more than 1 foot in three areas covering 80 square miles, namely, a circular area of 19 square miles, 7 miles southeast of Estancia; a north-south elongated area of 41 square miles extending from Estancia to 2 miles south of Moriarty; and a nearly circular area of 20 square miles centered about 5 miles north of Moriarty.

In the Grants-Bluewater area, an increased supply of surface water and above-normal precipitation, and a decrease in pumping of ground water from 9,300 acre-feet in 1948 to 6,900 acre-feet in 1949 resulted in a net rise in water levels in 1949 in all but one of the observation wells. The average change in water level in 14 wells was a rise of 1.4 feet in 1949 as compared with a rise of 0.2 foot in 1948 and declines of 3.9 feet in 1947 and 5.9 feet in 1946--a decline of about 2 feet per year, therefore, from the beginning of record in February 1946 to February 1950.

The greatest rises in 1949, as in 1948, occurred in the upper part of the area near Bluewater, where pumping of ground water is small. The maximum recorded rise in 1949 was 5.2 feet in a well adjacent to the canal, about 2 miles downstream from Bluewater Canyon.

PRESENTATION AND SIGNIFICANCE OF DATA

Measurements for most of the observation wells in New Mexico are listed by counties in which the wells are situated. Measurements of artesian head in the Roswell artesian basin and of water levels in the artesian-intake area of that basin are listed under the common heading "Chaves and Eddy Counties (Roswell Basin)." Measurements of water levels in the Santa Fe County part of the Estancia Valley are listed under Torrance County.

The data for the counties are presented in five parts. Part 1 for each county gives the program of work, the number of observation wells and measurements made in them during the year, the amounts of precipitation and pumpage, and a general discussion of the changes in water levels for the year. The descriptions of wells are, in general, given in the water-supply papers covering the year in which the record begins (next to last column in part 2). The descriptions of a few wells whose records began in the latter part of a year have been published in the water-supply paper for the year previous to that given in part 2 as the year when record began. Also, in a few cases, the description of a well was published in the water-supply paper for the year succeeding that given as the year when the record began.

Part 2 lists the water levels in January or February for all observation wells, the change since the measurements of the preceding January, and, for comparison, the highest and lowest recorded levels during January of past years, along with the length of record. For years in which January readings were not made, February readings were used if available. If any reading is used other than January or February, a footnote is added stating the month. The lowest recorded level as published for a well is a nonpumping level, that is, a static level, so far as could be determined, except in some instances where windmills were pumping and the water level was not lowered appreciably by the pumping. The year of beginning of record is considered as the first year in which a January or February measurement was made. The years of missing record are succeeding years in which a January or February measurement was not made or when the measurement made was

affected by pumping to the extent that it would be the lowest recorded level. If a measurement made while the well is being pumped is lower than a previous low, then the present year will not be reported as missing until the following year if at that time it is still the lowest level. In some cases a previous year will be reported as missing because of a low reading as a result of the effects of pumping, yet a yearly change will be shown. For wells having recording gages, the highest and lowest recorded levels for the month of January are used, except in Torrance and Valencia Counties where the levels for February are used. However, for the wells equipped with recording gages, the measurement reported for the present year and the yearly change are taken from the tape measurements in order to keep the records of these wells comparable with those of the other observation wells. The lowest reported level when taken from recorder records is the lowest of the highest daily water levels in order to avoid recording nonrepresentative lowest levels resulting from the effects of pumping. The years are all in the present century and the "19" of the year and also the apostrophe commonly used to indicate omission of the "19" are omitted for the sake of brevity. The year 1942, for instance, is shown simply as 42. Part 2 shows clearly the current and past changes in the amount of water stored underground in the vicinity of the well. It presents the most critical data concerning the district, that is, the current status of the ground-water reserve.

Part 3 gives the data for wells measured at fixed periods, generally bimonthly throughout the year. The readings for January are also given in part 2. These records show the seasonal trend of water levels in the area.

Part 4 presents the data for the wells on which recording gages are maintained. These show the day-to-day fluctuations of water levels in typical wells. In some wells they serve to show the effects of precipitation in recharging the ground-water reservoir, in others the effects of transpiration, and in others the effects of nearby pumping.

Part 5 lists miscellaneous data concerning the observation wells, such as revisions of the well-location number, descriptions of new wells, a few miscellaneous water-level records that do not conform to the other tables and, when available, data useful in interpreting the changes in water levels in the particular well. Reference to part 5, and to other parts, is given in column 3 in part 2.

Nine standard footnotes that are used frequently are given below:

a Pumping.
b Pumping recently.
c Nearby well pumping.
d Nearby well pumping recently.
e Dry at depth given.
f From recorder chart.
g Estimated.
h Tape measurement at odd hour.
i Possible discrepancy of a few tenths of a foot between present and previous land-surface data.

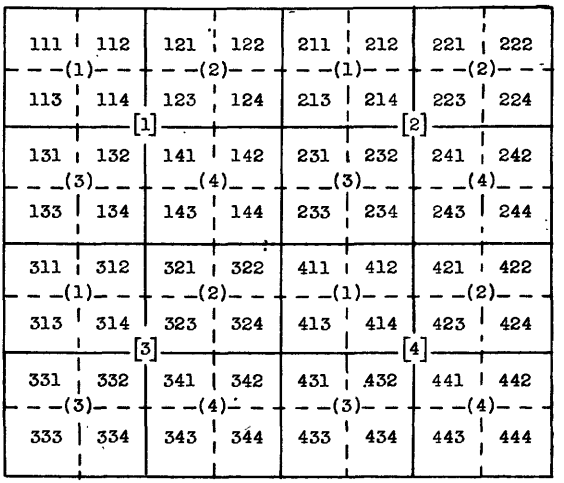
WELL-NUMBERING SYSTEM

The system of numbering wells in New Mexico, used in all counties except in the Virden Valley of the Gila River, in Hidalgo County, and the thermal wells in the Hot Springs area, in Sierra County, is based on the common subdivisions in sectionized land, and, by means of it, the well number in addition to designating the well, locates its position to the nearest 10-acre tract in the land net. The number is divided into four segments by periods. The first segment denotes the township north or south of the New Mexico base line, the second denotes the range east or west of the New Mexico principal meridian, and the third denotes the section. In a county such as Roosevelt, where wells are situated both north and south of the base line, an N is added to the first segment of the well number if the well is north of the base line, but no letter is added if the well is south of the base line. Similarly, in a county where wells are both east and west of the meridian, an E is added to the second segment of the well number of those wells east of the meridian. In counties where all the wells are within a single quadrant, the direction north or south of the base line or east or west of the meridian is not given.

The fourth segment of the number, which consists of three digits, denotes the particular 10-acre tract in which the well is situated. For this purpose, the section is divided into four quarters, numbered 1, 2, 3, and 4, in the normal reading order, for the northwest, northeast, southwest, and southeast quarters, respectively. The first digit of the fourth segment gives the quarter section, which is a tract of 160 acres. Similarly, the quarter section is divided into four 40-acre tracts numbered in the same manner, and the second digit denotes the 40-acre tract. Finally, the 40-acre tract is divided into four 10-acre tracts, and the third digit denotes the 10-acre tract. Thus, well 12.36.24.123 in Lea County is in the

SW¼NE¼NW¼ sec. 24, T. 12 S., R. 36 E. If a well cannot be located accurately to a 10-acre tract, a zero is used as the third digit, and if it cannot be located accurately within a 40-acre tract, zeros are used for both the second and third digits. If the well cannot be located more closely than the section, the fourth segment of the well number is omitted. When it becomes possible to locate accurately a well in whose number zeros have been used, the proper digit or digits are substituted for the zeros. In Water-Supply Paper 911 and earlier reports the digits corresponding to unknown 10-acre and 40-acre tracts were simply omitted, but this practice caused some confusion in cataloging the wells. In Water-Supply Paper 941, and subsequent reports, wells the last segment of whose numbers end in one or two zeros correspond to wells whose numbers in earlier reports are the same except for the omission of the last one or two zeros. Letters a, b, c, ... are added to the last segment to designate the second, third, fourth, and succeeding wells inventoried in the same 10-acre tract.

The following diagram shows the method of numbering the tracts within a section.



CHAVES AND EDDY COUNTIES (ROSWELL BASIN)

Part 1. General Discussion

The program of maintaining records of water levels and artesian head in the Roswell basin was continued in 1949 in cooperation with the State Engineer. Most of the Roswell basin is in Chaves County, but a considerable part lies in northern Eddy County. (See fig. 15 and fig. 16.)

The first intensive investigation by the Federal Geological Survey of the artesian-water resources of the Roswell artesian basin was begun by A. G. Fiedler and S. S. Nye in 1925, and an intensive investigation of the shallow-water resources was begun by A. M. Morgan in 1937. The findings of these investigations have been published in Geological Survey Water-Supply Paper 639 and in the 7th to 13th biennial reports of the State Engineer. A comprehensive report on the hydrology and agricultural development of the Pecos Valley was published in 1942 by the National Resources Planning Board as part 10 of the Regional Planning series, "The Pecos River Joint Investigation in the Pecos River Basin in New Mexico and Texas."

Records of mean monthly and mean annual artesian head in the Roswell basin are expressed as water levels, in feet above mean sea level. Measurements are given in feet below a precisely established land-surface datum which approximates closely the land surface at the well. Shallow water-level measurements from 1926 to 1938, Water-Supply Paper 845, for Chaves and Eddy Counties are given in feet below land-surface datum and not below measuring point as captioned.

Artesian Wells

Records obtained from continuous recording gages on six observation artesian wells were used to compute the mean monthly and mean annual artesian heads. The mean monthly head was computed by averaging the daily maximum and minimum heads throughout the month. The mean annual head is the average of the mean monthly heads. Values for missing days were estimated by inspection of the recorder charts where feasible, otherwise they were obtained by simple interpolation. A day of record is considered as one in which both a maximum and a minimum water-level reading were recorded or estimated. In the table on page 167, the mean

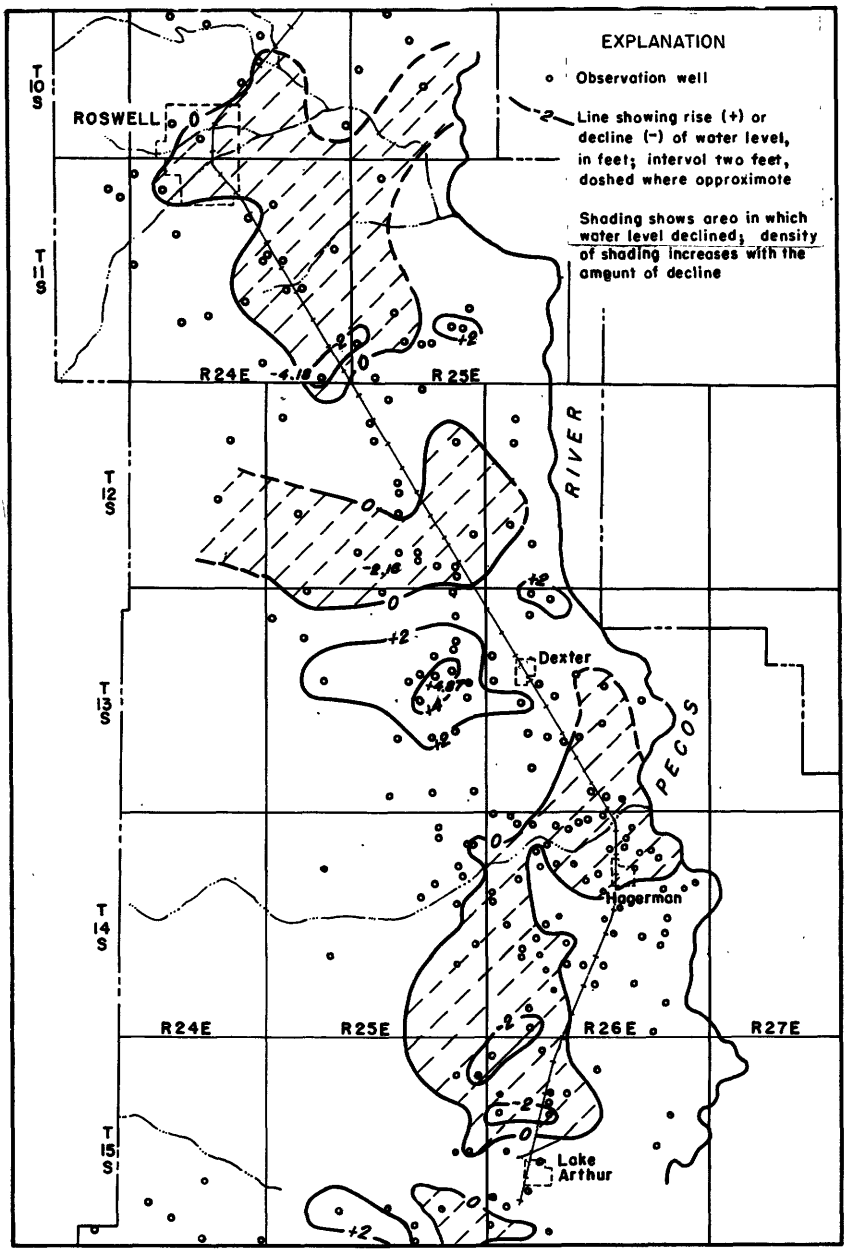


Figure 15.--Map showing change in water levels in northern part of Roswell basin, Chaves County, 1949.

monthly and mean annual water levels are given in feet above mean sea level in conformity with previously published reports, but the daily maximum water levels are given in feet below land-surface datum.

Artesian-Intake Area Wells

Measurements of water levels in the intake area of the Roswell artesian basin were continued in 1949 to show the change in ground-water storage and the change in recharge to the artesian aquifer. Water levels in the intake area respond to changes in the rate of draft on the aquifer by the artesian wells many miles to the east as well as to changes in storage resulting from variations in the rates of recharge and natural discharge.

Shallow Wells

Water levels were measured in 403 shallow wells in the Roswell basin in January or February 1949, most of which had been measured in January or February 1948. Water levels were also measured in about 52 of these wells every other month and recording gages were maintained intermittently on 5 of them. A total of 697 measurements was made during the year on the shallow wells including 265 bimonthly measurements and about 30 in the recorder wells. Of the shallow observation wells, 268 are in Chaves County and 135 in Eddy County.

Precipitation and Pumpage

Variation in the amount of precipitation in the Roswell basin affects the water levels by changing the amount of pumping necessary for irrigation of growing crops and the amount of water that recharges the ground-water body, particularly that in the intake area of the artesian aquifer to the west. Years of deficient precipitation, such as 1947, are characterized by large declines in water levels, both during the pumping season and annually, while years of excessive precipitation, such as 1941, are characterized by net annual rises in water levels.

The precipitation for 1949, as reported by the U. S. Weather Bureau, was above normal at all stations in the Roswell basin, except at Roswell, and averaged more than 3 inches greater than in 1948. The precipitation

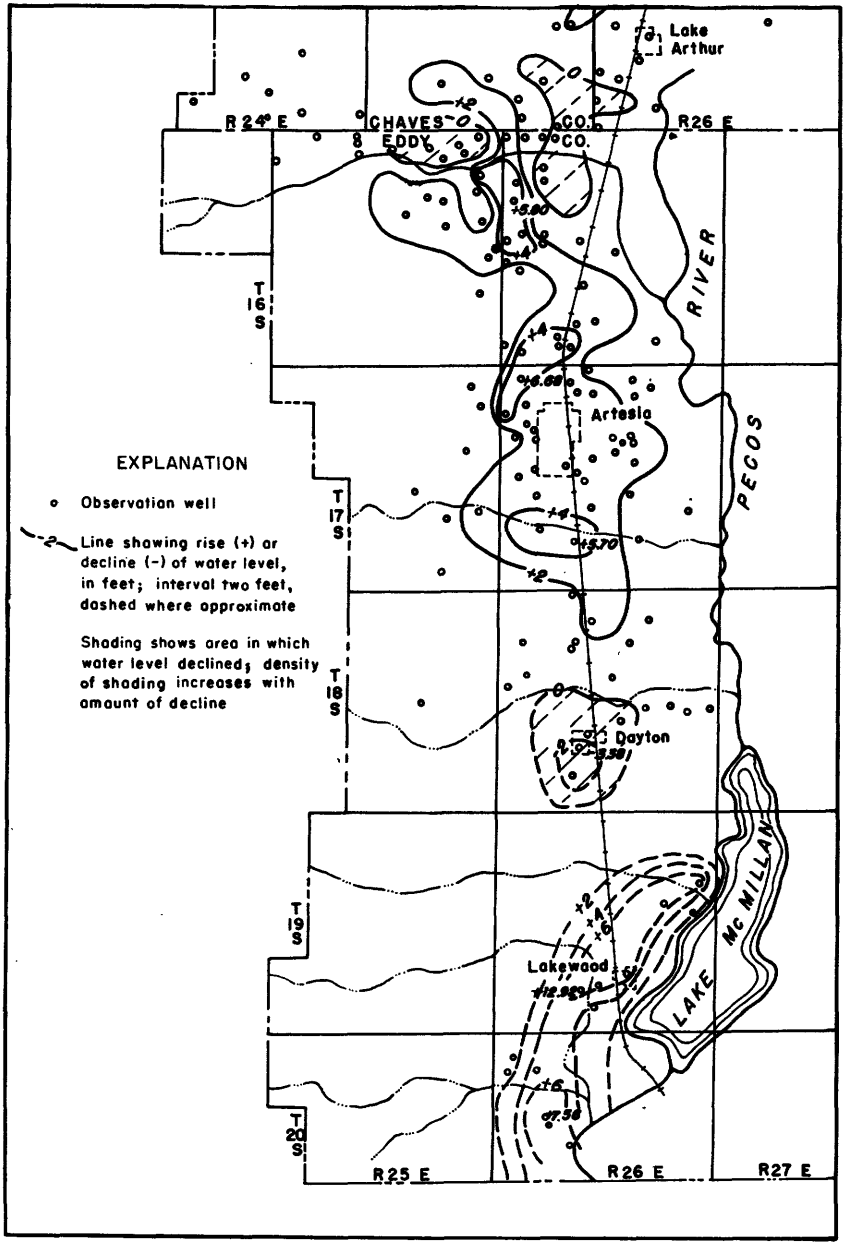


Figure 16.--Map showing change in water levels in southern part of Roswell basin, Chaves and Eddy Counties, 1949.

at Roswell was 97 percent of normal, at Hagerman, 40 percent above normal, at Artesia, 17 percent above normal, and at Carlsbad, an estimated 39 percent above normal for an average of 23 percent above normal as compared with 12 percent below normal in 1948. Precipitation during the main part of the growing season, April through September, likewise was generally above normal with most of the excess occurring during June, July, and August. The distribution of precipitation was generally favorable for agricultural purposes.

Precipitation and departures from normal, in inches, at stations in Roswell basin and vicinity, 1949

Month	Roswell		Hagerman		Artesia		Carlsbad	
	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure
Jan.	1.70	+1.17	1.41	+0.98	1.40	+1.04	2.31	+1.97
Feb.	.42	-.17	T	-.36	.05	-.46	.05	-.34
Mar.	T	-.74	0	-.53	.03	-.61	.20	-.35
Apr.	.50	-.39	.23	-.62	.33	-.65	.38	-.42
May	.75	-.34	.50	-1.59	.22	-1.25	1.46	+.27
June	2.84	+1.17	3.03	+1.06	4.46	+3.18	4.81	+3.18
July	3.25	+.99	5.47	+3.88	1.33	-.64	1.57	-.58
Aug.	1.33	-.82	3.56	+1.78	1.82	+.29	.46	-1.34
Sept.	1.87	-.24	2.85	+.99	3.64	+1.95	5.81	+3.89
Oct.	1.10	-.32	.99	+.23	.96	-.28	1.24	-.25
Nov.	.01	-.84	T	-.38	0	-.54	0	.54
Dec.	.81	+.15	.29	-.22	.35	-.20	--	--
Total	14.58	-.38	18.33	+5.22	14.59	+2.07		
Apr.-Sept.	10.54	-.37	15.64	+5.50	11.80	+2.88	14.49	+5.00

T - Trace.

The precipitation during 1949 was more favorable for the growing of crops than in 1948. Records of power and fuel used in 1949 for 895 wells, for which comparable records were also available in 1948, indicate that, on the average, about 19 percent less water was pumped in 1949 than in 1948. It is probable, therefore, that about 172,000 acre-feet of artesian water and about 98,000 acre-feet of shallow water was used for irrigation in 1949 in the main part of the Roswell basin. Additional ground water of an undetermined amount was pumped onto an estimated 6,000 to 7,000 acres of newly developed lands in the northern extension of the Roswell basin in the vicinity of Salt Creek and Macho Draw.

Changes of Artesian Heads and Water Levels

Artesian Wells

In spite of the favorable precipitation, new record low mean annual artesian heads were set in 1949 in three of the six artesian wells equipped

with recording gages in the Roswell basin. The record low annual artesian heads occurred in the Berrendo-Smith and Mountain View wells, in the northern part of the basin, and in the Artesia well, in the southern part of the basin. Record low annual artesian heads also occurred in these wells in 1948. The mean annual artesian head for the Berrendo well, which is also in the northern part of the basin, showed an annual decline of 0.7 foot and reached a mean annual head in 1949, 1.1 feet above the previous mean annual low head set in 1940. The mean annual artesian heads for the remaining wells, Orchard Park and Greenfield, which are near the middle of the basin, showed rises of 5.27 feet and 6.95 feet, respectively, and were 5.8 feet and 9.5 feet, respectively, above the record low mean annual artesian heads set in these wells in 1947.

Departures from the average mean annual artesian head ranged from less than 1 foot in the Greenfield well to 22.8 feet in the Artesia well. The average departure of the mean annual heads in 1949 in the six artesian wells from the average since the beginning of records is a decline of 6.8 feet, as compared with 9.3 feet in 1948 and 8.5 feet in 1947.

The effect of the reduction in pumping caused by the above-normal precipitation in June, July, and August was noticeable in the artesian head in these six wells. Normally slight rises in artesian head in April and May are followed by large declines with a seasonal low level in August. However, in 1949 the summer decline was comparatively minor so that the artesian head for August was generally only slightly below that in April. In general the artesian heads for the last half of the year were higher than for the same time in 1948. In the Greenfield well the mean artesian head for August was 35 feet above that in 1948 and 13 feet above the average for this well.

The difference in artesian heads between the highest mean annual, which was in 1942 for all the wells, except Greenfield which was in 1941, and the lowest mean annual, which was in 1947 or 1949 for five of the six wells, ranged from 7.8 feet in the Berrendo-Smith well, in the northern part of the basin, to 35.3 feet in the Artesia well, in the southern part of the basin. Mean annual artesian heads for 1949 are below the previous low mean annual heads of 1940 and 1941 from 3.0 feet in the Berrendo-Smith well to 19.4 feet in the Artesia well.

Departure in 1949 from average for period of record and change from 1948 to 1949 of mean monthly and mean annual heads in artesian wells in Roswell Basin, in feet

	Berrendo 10.24. 9.330		Berrendo Smith 10.24. 21.212		Mountain View 11.24. 29.242		Orchard Park 12.25. 23.110		Greenfield 13.25. 27.211		Artesia 18.26. 5.330	
	Avg. to 1949	1948-49	Avg. to 1949	1948-49	Avg. to 1949	1948-49	Avg. to 1949	1948-49	Avg. to 1949	1948-49	Avg. to 1949	1948-49
Jan.	-3.7	-2.19	-4.8	-2.58	-5.8	-2.93	+0.8	-5.02	-1.2	-2.53	-19.1	-5.32
Feb.	-3.2	-2.13	-3.6	-1.80	-4.5	-2.32	+2.0	-1.84	+1.6	-1.45	-17.4	-2.28
Mar.	-4.0	-3.02	-5.1	-3.53	-6.3	-3.98	-24.5	-14.33	-29.8	-23.11	-33.0	-12.51
Apr.	-5.4	-1.98	-5.3	-1.25	-6.4	-1.85	-18.7	+5.70	-16.1	+2.87	-29.2	-1.76
May	-4.4	-1.08	-4.8	- .88	-4.7	- .36	-4.8	+8.38	+2.1	+17.31	-22.7	+3.26
June	-4.1	-2.11	-2.9	-2.02	-3.6	-1.95	- .4	+1.61	+10.4	+4.57	-18.5	-4.93
July	-4.5	- .24	-3.6	+ .57	-3.2	+1.41	-3.2	+21.68	+1.2	+22.42	-28.5	-1.97
Aug.	-4.1	+1.20	-2.5	+2.13	-1.7	+3.42	-2.5	+28.05	+13.2	+35.09	-36.2	+ .51
Sept.	-3.9	+1.53	-2.4	+2.60	-1.7	+4.46	-5.2	+13.24	+5.6	+19.21	-24.5	+8.73
Oct.	-3.7	+ .50	-3.7	+ .59	-3.5	+1.82	-5.0	-.55	- .4	+3.69	-17.3	+5.69
Nov.	-3.1	+ .43	-3.3	+ .54	-3.7	+ .87	+2.8	+2.14	+4.7	+2.35	-15.3	+1.27
Dec.	-3.1	+ .66	-3.2	+ .82	-3.6	+1.11	+3.0	+4.14	+3.0	+3.03	-13.8	+4.05
Year	-3.8	- .71	-4.2	- .40	-4.4	- .02	-4.6	+5.27	- .9	+6.95	-22.8	- .44
Beginning of record	June 1926		June 1940		July 1940		Aug. 1925		May 1940		Apr. 1931	

Mean monthly and mean annual artesian heads in artesian wells in 1949 and highest and lowest mean annual and mean monthly artesian heads, in feet above mean sea level

	Berrendo 10.24.9.330		Berrendo-Smith 10.24.21.212		Mountain View 11.24.29.242		Orchard Park 12.25.23.110		Greenfield 13.25.27.211		Artesia 18.26.5.330	
1949	Days of record	Head	Days of record	Head	Days of record	Head	Days of record	Head	Days of record	Head	Days of record	Head
Jan.	20	3566.72	31	3566.45	31	3563.91	31	3534.47	j28	3527.58	31	3370.49
Feb.	28	3567.03	28	3567.16	28	3564.81	28	3531.77	j26	3523.45	28	3369.29
Mar.	31	3565.17	31	3563.88	31	3560.72	j11	3496.68	j29	3474.58	19	3347.95
Apr.	21	3561.92	30	3560.04	30	3556.25	30	3493.52	4	3472.25	30	3344.27
May	29	3562.93	31	3561.76	31	3558.61	31	3510.38	17	3597.67	31	3353.78
June	30	3562.94	30	3561.76	30	3558.66	20	3513.67	19	3503.29	30	3356.20
July	j31	3561.26	31	3559.76	31	3557.08	31	3507.90	j14	3490.06	30	3342.87
Aug.	31	3560.91	31	3559.30	31	3556.20	31	3505.94	j29	3494.88	21	3331.15
Sept.	30	3562.49	30	3561.77	30	3558.33	26	3510.81	30	3500.67	23	3348.40
Oct.	31	3564.75	31	3563.99	31	3561.07	27	3523.30	31	3516.41	28	3366.06
Nov.	30	3566.23	30	3566.04	30	3563.55	30	3535.95	30	3529.70	30	3372.94
Dec.	31	3567.02	31	3566.97	31	3564.78	31	3537.46	31	3530.63	15	3376.00
Mean annual	j343	3564.11	365	3563.24	365	3560.33	j327	3516.82	j288	3505.09	j316	3356.62

Mean annual:	Date	Head	Date	Head	Date	Head	Date	Head	Date	Head	Date	Head
Highest	1942	3571.8	1942	3571.0	1942	3569.6	1942	3528.1	1941	3517.5	1942	3391.9
Lowest	1940	3563.0	1949	3563.24	1949	3560.33	1947	3511.03	1947	3495.55	1949	3356.62
First year of record	1927	3571.2	1941	3566.2	1941	3564.2	1926	3525.7	1941	3517.5	1932	3384.6

Mean monthly:	Date	Head	Date	Head	Date	Head	Date	Head	Date	Head	Date	Head
Highest	Dec.'26	3574.8	Jan.'43	3574.4	Jan.'43	3573.7	Jan.'42	3544.0	Jan.'42	3535.4	Jan.'43	3402.1
Lowest	Aug.'48	3559.71	Aug.'48	3557.17	Aug.'48	3552.78	Aug.'48	3477.89	Aug.'48	3459.79	Aug.'48	3330.64
Beginning of record	June 1926		June 1940		July 1940		Aug. 1925		May 1940		Apr. 1931	

j A few days estimated.

Records of Artesian Head

10.24.9.330. Berrendo well. Maximum recorded daily fluctuation, 1949: Apr. 5, 3.81 feet.

Highest daily water level, from recorder charts

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept	Oct.	Nov.	Dec.
1	19.32	18.84	18.65	23.30	.....	24.15	23.18	23.48	24.42	22.18	20.23	19.38
2	19.32	18.77	18.64	23.14	.....	23.88	23.20	23.74	24.22	22.07	20.21	19.30
3	19.32	18.76	18.82	22.52	23.19	24.27	24.19	23.98	24.95	22.00	20.16	19.27
4	19.43	18.76	18.77	22.32	23.01	23.84	24.94	23.43	24.82	21.92	20.14	19.25
5	19.49	18.74	18.72	22.63	22.87	23.59	25.12	23.27	24.70	21.77	20.12	19.18
6	19.53	18.71	18.75	22.97	22.74	23.27g	25.16	23.31	24.80	21.68	20.10	19.16
7	19.48	18.68	18.71	23.43	22.64	22.99g	25.20	23.35	24.89	21.60	20.04	19.15
8	19.45	18.67	18.71	23.50	22.45	22.82	25.36	23.27	24.93	21.57	20.00	19.15
9	19.45	18.70	18.83	23.50	22.40	22.75	25.52	23.35	24.95	21.47	19.98	19.08
10	19.47	18.65	18.93	23.39	22.37	22.68	25.77	23.40	23.72	21.41	19.91	19.03
11	.....	18.60	19.06	23.02	22.35	22.37	26.10	23.43	23.39	21.48	19.88	19.06
12	.....	18.58	19.17	23.23	22.24	22.12	26.86	23.79	23.30	21.62	19.89	19.06
13	.....	18.63	19.29	23.32	22.03	22.07	24.85	24.55	23.16	21.63	19.81	19.05
14	.....	18.62	19.47	23.53	21.93	22.03	24.50	23.72	22.98	21.57	19.77	19.02
15	.....	18.63	19.90	23.63	21.81	21.98	23.78	23.58	22.77	21.50	19.75	18.96
16	.....	18.67	19.68	23.66	21.76	21.91	23.53	24.48	22.66	21.34	19.75	18.94
17	.....	18.70	19.96	23.12	21.77	21.93	23.35	24.65	22.51	21.24	19.72	18.91
18	.....	18.70	20.79	22.98	21.84	21.95	23.37	24.38	22.35	21.15	19.67	18.89
19	.....	18.73	20.33	22.90	21.93	21.83	23.65	25.00	22.26	21.07	19.63	18.86
20	.....	18.79	20.17	22.87	21.96	21.77	23.77	25.32	22.17	21.02	19.60	18.83
21	.....	18.80	20.05	22.79	22.02	21.92	23.80	24.45	22.10	20.98	19.59	18.85
22	19.02	18.82	20.53	.....	22.05	21.93	23.40	24.26	22.06	20.85	19.54	18.87
23	19.00	19.71	20.85	.....	22.06	21.89	23.16	24.27	22.09	20.75	19.49	18.82
24	18.99	19.02	21.35	.....	22.38	21.93	22.89	24.36	21.99	20.67	19.47	18.74
25	18.99	18.78	21.57	.....	22.69	21.95	22.82	24.29	21.89	20.62	19.49	18.73
26	18.94	18.76	21.64	.....	23.46	22.18	22.86	24.23	21.81	20.55	19.44	18.71
27	18.92	18.80	21.72	.....	23.59	22.09	22.95	24.24	22.39	20.48	19.38	18.74
28	18.95	18.69	21.67	.....	23.10	22.49	22.93	24.18	22.28	20.43	19.37	18.70
29	18.93		22.57	.....	23.10	22.62	22.83	23.98	22.15	20.35	19.37	18.68
30	18.84		22.45	.....	23.05	22.92	22.86	24.35	22.29	20.33	19.41	18.67
31	18.85		22.74		23.93		23.54	24.54		20.27		18.69

g Estimated.

10.24.21.212. Berrendo-Smith well. Maximum recorded daily fluctuation, 1949: Apr. 11, 5.28 feet.

Highest daily water level, from recorder charts

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept	Oct.	Nov.	Dec.
1	14.28	13.60	13.35	19.49	18.60	20.12	19.61	18.01	20.32	17.52	15.01	14.01
2	14.30	13.50	13.38	18.90	18.37	20.58	19.26	18.68	19.95	17.44	15.00	13.90
3	14.26	13.48	13.63	18.52	18.95	20.22	19.30	19.25	19.96	17.38	14.90	13.83
4	14.42	13.52	13.71	18.18	19.12	20.29	19.32	19.42	19.66	17.50	14.90	13.82
5	14.43	13.49	13.78	18.72	18.78	19.48	19.45	19.18	19.42	17.36	14.87	13.72
6	14.49	13.45	13.92	19.08	18.41	19.14	20.14	18.98	20.05	17.16	14.80	13.69
7	14.45	13.42	13.82	19.82	18.15	18.68	20.62	18.99	20.27	16.95	14.67	13.71
8	14.43	13.40	13.92	20.15	17.95	18.47	21.00	18.79	20.49	16.99	14.68	13.78
9	14.42	13.46	14.13	20.16	17.91	18.42	21.13	19.12	20.53	16.84	14.67	13.73
10	14.35	13.42	14.31	19.63	17.75	18.41	21.18	19.10	19.74	16.68	14.61	13.62
11	14.27	13.35	14.51	19.05	17.99	17.81	20.63	19.07	19.20	16.83	14.55	13.66
12	14.22	13.28	14.60	19.54	17.79	17.45	21.51	19.67	19.02	16.96	14.59	13.68
13	14.15	13.30	14.63	19.64	17.48	17.37	21.10	20.05	18.78	16.98	14.45	13.65
14	14.15	13.25	14.58	19.72	17.37	17.54	20.65	19.32	18.34	16.92	14.41	13.64
15	14.17	13.31	15.38	20.49	17.24	17.46	20.03	19.07	17.97	16.77	14.40	13.61
16	14.19	13.35	15.10	20.48	17.17	17.38	19.64	19.84	17.79	16.52	14.45	13.56
17	14.00	13.35	15.47	19.12	17.30	17.43	19.35	20.17	17.62	16.41	14.37	13.51
18	13.93	13.30	15.87	18.90	17.37	17.43	19.36	20.80	17.43	16.32	14.36	13.48
19	13.93	13.37	16.03	18.83	17.62	17.23	20.17	20.96	17.33	16.25	14.27	13.39
20	13.88	13.39	16.00	18.87	17.69	17.10	20.18	21.32	17.20	16.18	14.27	13.40
21	13.85	13.39	15.83	18.73	17.73	17.42	20.37	20.31	17.09	16.08	14.25	13.50
22	13.85	13.40	17.03	18.86	17.77	17.50	19.63	20.05	17.02	15.79	14.18	13.52
23	13.82	13.44	17.55	19.12	17.66	17.60	19.11	20.38	16.98	15.61	14.14	13.45

10.24.21.212--Continued.

Highest daily water level, from recorder charts

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept	Oct.	Nov.	Dec.
24	13.80	13.49	18.03	18.60	18.50	17.63	18.68	20.73	16.87	15.54	14.10	13.30
25	13.86	13.44	18.35	18.44	18.67	17.69	18.48	20.60	16.73	15.49	14.12	13.27
26	13.80	13.35	18.43	18.67	18.61	17.95	18.69	20.52	16.64	15.43	14.07	13.25
27	13.73	13.43	18.18	18.65	19.01	17.68	18.70	20.47	16.81	15.37	13.97	13.31
28	13.75	13.37	18.04	18.75	19.29	18.16	18.50	20.07	17.04	15.32	13.92	13.27
29	13.72		18.72	18.84	19.32	18.65	18.33	19.73	17.40	15.15	13.97	13.27
30	13.58		19.06	19.00	19.14	19.08	18.35	20.55	17.64	15.07	14.08	13.24
31	13.59		19.34		19.95		18.12	20.87		15.03		13.19

11.24.29.242. Mountain View well. Maximum recorded daily fluctuation, 1949: Apr. 4, 2.57 feet.

Highest daily water level, from recorder charts

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept	Oct.	Nov.	Dec.
1	63.53	62.38	62.54	70.51	68.86	70.14	68.27	68.40	71.19	67.50	64.36	62.93
2	63.47	62.20	62.63	70.05	68.73	70.70	68.35	69.07	70.80	67.04	64.29	62.85
3	63.42	62.18	62.71	69.82	69.33	71.12	68.40	69.40	70.65	66.90	64.19	62.84
4	63.64	62.27	62.80	69.30	69.52	71.24	68.11	69.30	70.24	66.83	64.16	62.75
5	63.59	62.20	62.83	70.04	68.97	70.29	68.34	69.08	69.99	66.70	64.15	62.63
6	63.76	62.17	63.09	70.52	68.62	69.87	69.37	69.35	70.24	66.60	63.87	62.58
7	63.60	62.10	63.09	71.02	68.28	69.32	70.01	69.48	70.22	66.64	63.76	62.60
8	63.52	62.12	63.19	71.32	67.82	69.12	70.70	69.31	70.43	66.78	63.85	62.72
9	63.42	62.21	63.48	71.62	67.77	69.27	71.34	69.96	70.60	66.47	63.91	62.58
10	63.40	62.16	63.68	70.88	67.73	69.31	70.74	70.07	70.16	66.35	63.87	62.45
11	63.36	62.09	64.10	70.51	67.73	68.11	70.47	69.80	69.57	66.55	63.78	62.47
12	63.25	61.97	64.30	71.41	67.65	67.55	71.60	70.53	69.37	66.68	63.90	62.56
13	63.31	62.00	64.50	71.24	67.41	67.47	70.88	70.88	69.07	66.72	63.63	62.57
14	63.33	61.95	64.41	71.49	67.17	67.44	70.58	69.91	68.68	66.73	63.55	62.55
15	63.35	62.13	65.11	71.39	66.90	67.43	70.37	69.74	68.35	66.53	63.57	62.39
16	63.23	62.18	65.27	71.07	66.80	67.34	70.15	70.60	67.97	66.24	63.59	62.30
17	62.90	62.20	65.72	70.28	66.97	67.34	69.64	71.04	67.78	66.20	63.50	62.21
18	62.85	62.14	66.23	70.13	67.19	67.28	69.57	71.73	67.56	66.05	63.40	62.14
19	62.90	62.27	66.65	70.24	67.42	66.88	70.27	72.00	67.35	65.92	63.31	62.05
20	62.80	62.24	66.77	70.12	67.52	66.77	70.38	72.33	67.26	65.92	63.23	62.00
21	62.74	62.25	66.62	69.68	67.70	67.00	70.88	70.76	67.12	65.89	63.23	62.03
22	62.72	62.30	67.80	69.88	67.60	66.92	69.61	70.55	67.05	65.40	63.07	62.13
23	62.69	62.33	68.19	69.83	67.52	66.85	69.17	71.05	67.00	65.15	63.10	62.02
24	62.70	62.37	68.79	69.37	68.25	66.99	68.80	71.19	66.93	64.97	63.01	61.84
25	62.73	62.34	69.08	69.17	68.42	67.05	68.65	71.17	66.73	64.87	62.99	61.80
26	62.62	62.28	69.20	69.42	68.78	66.93	68.97	71.18	66.65	64.89	62.98	61.75
27	62.54	62.50	69.19	69.77	69.07	66.87	69.15	71.12	66.98	64.74	62.82	61.90
28	62.63	62.43	68.81	69.58	69.18	67.35	69.05	70.75	67.28	64.65	62.80	61.85
29	62.50		69.70	69.62	69.02	67.61	69.15	70.50	67.42	64.51	62.93	62.00
30	62.29		69.86	69.57	68.88	67.93	68.97	71.32	67.48	64.38	63.03	61.95
31	62.34		70.55		69.74		68.50	71.60		64.33		61.87

12.25.23.110. Orchard Park well. Maximum recorded daily fluctuation, 1949: July 13, 10.10 feet.

Highest daily water level, from recorder charts

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept	Oct.	Nov.	Dec.
1	14.37	7.92	22.10	60.18	41.50	46.43	31.17	24.10	48.07	28.57	12.43	8.46
2	12.15	8.47	.....	54.32	39.47	47.61	31.68	24.14	46.49	27.12	11.72	8.02
3	11.67	8.20	.....	51.70	41.25	51.09	33.03	25.80	45.34	26.95	11.65	8.73
4	11.81	9.44	.....	48.70	42.00	50.75	32.75	26.88	43.47	28.19	12.18	9.54
5	13.14	10.23	.....	55.69	36.87	44.49	34.68	26.00	41.40	28.37	12.68	9.40
6	12.84	10.10	.....	58.33	35.88	40.61	38.17	26.99	42.98	28.56	11.37	9.25
7	13.91	10.26	.....	61.89	32.22	.....	41.13	26.68	46.89	27.69	9.66	10.60
8	13.09	9.64	.....	61.63	29.62	.....	41.07	25.88	45.40	27.55	9.52	11.27
9	13.05	10.66	.....	59.20	28.90	.....	44.28	29.66	46.08	25.47	9.59	11.14
10	13.13	10.56	.....	54.50	28.22	.....	42.82	31.15	42.60	24.30	9.15	10.90
11	12.19	9.94	43.37	51.62	26.77	.....	43.42	32.08	39.31	26.69	9.09	10.55
12	11.54	11.51	46.68	53.69	26.34	.....	49.67	35.42	38.00	27.04	9.15	10.48
13	11.81	12.35	46.32	55.20	26.00	.....	42.82	36.85	35.87	26.66	9.40	11.23

12.25.23.110--Continued.

Highest daily water level, from recorder charts

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept	Oct.	Nov.	Dec.
14	12.77	12.02	46.37	54.42	26.65	.....	41.04	36.70	33.04	28.10	10.30	10.08
15	13.75	12.69	51.53	53.25	25.48	.....	40.98	35.55	29.67	26.18	9.55	9.07
16	11.99	13.37	50.00	52.54	24.69	22.64	41.92	41.00	28.97	24.23	9.27	8.55
17	10.42	14.16	g53.20	47.13	26.52	22.39	40.08	43.30	29.13	22.27	9.35	7.99
18	9.86	14.99	.....	45.15	26.70	22.16	39.58	45.47	27.40	21.12	8.47	7.56
19	9.57	14.89	.....	50.00	29.63	20.34	42.38	47.82	.....	20.38	8.98	7.87
20	9.71	14.92	.....	50.84	31.20	20.02	43.50	47.92	.....	20.13	9.69	7.30
21	9.10	14.39	.....	48.06	32.56	21.20	46.35	43.12	.....	20.08	8.76	7.71
22	10.39	17.32	.....	45.78	31.40	22.88	36.12	41.45	.....	18.91	8.78	7.25
23	10.89	19.51	.....	45.04	31.59	23.93	31.97	46.43	25.65	16.77	9.05	7.07
24	11.12	21.23	.....	42.20	37.58	24.67	29.81	49.00	26.15	16.03	9.06	6.57
25	10.59	21.50	.....	41.17	41.58	25.62	29.06	52.65	26.20	15.54	9.32	5.72
26	9.91	21.61	.....	44.14	45.37	28.42	29.80	50.60	25.40	15.65	9.46	5.52
27	9.94	22.40	.....	44.12	46.23	27.99	30.30	50.60	25.25	.....	8.83	5.85
28	8.85	21.75	.....	46.02	46.67	31.44	28.45	47.32	25.85	.....	9.22	5.95
29	7.63		63.90	45.91	42.45	29.65	26.90	43.95	27.02	.....	9.25	6.06
30	7.02		62.87	44.13	41.85	31.60	25.83	48.55	29.15	14.12	9.22	5.92
31	7.19		65.58		45.90		23.96	52.87		12.96		6.15

g Estimated.

13.25.27.211. Greenfield well. Maximum recorded daily fluctuation, 1949: Aug. 15, 12.56 feet.

Highest daily water level, from recorder charts

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept	Oct.	Nov.	Dec.
1	+1.55	.....	12.04	.....	.....	38.55	.....	10.71	37.38	13.80	+2.71	+7.89
2	+3.02	.....	17.74	.....	.....	39.61	.....	11.39	34.91	11.98	+3.47	+8.23
3	+3.53	g+8.35	20.13	.....	.....	40.41	.....	12.21	35.40	11.47	+4.17	+7.18
4	+1.85	+9.10	22.69	.....	.....	42.99	.....	13.10	32.58	12.56	+3.58	+7.19
5	+.52	+9.57	26.38	.....	.....	33.63	.....	12.34	30.86	12.19	+4.52	+7.65
6	.34	+10.00	27.02	56.55	.....	31.32	.....	13.38	31.85	11.89	+2.93	+6.60
7	+.12	+9.72	28.67	59.57	.....	27.20	39.25	13.99	34.46	10.84	+6.61	+6.63
8	+.57	+9.66	32.78	57.73	.....	23.78	36.38	13.24	33.54	11.32	+6.40	+6.30
9	+1.86	+8.70	36.48	55.00	.....	20.98	.....	14.87	33.65	8.67	+6.57	+5.96
10	+3.03	+7.68	39.42	.....	15.00	19.55	38.37	13.71	33.93	7.84	+6.96	+6.64
11	+4.18	+7.93	42.07	.....	14.00	12.95	.....	17.48	30.32	10.79	+6.88	+6.97
12	+4.74	+5.35	45.69	.....	12.54	11.37	.....	20.35	28.43	10.60	+7.12	+6.50
13	+4.77	+4.23	44.44	.....	12.15	10.82	.....	23.24	24.59	10.63	+6.41	+5.79
14	+4.45	+4.45	47.74	.....	12.32	10.59	37.83	22.09	22.48	10.21	+5.65	+6.01
15	+3.27	+.94	51.59	.....	10.98	9.57	39.69	22.57	18.88	8.68	+6.08	+5.76
16	+4.88	.00	50.00	.....	11.14	8.14	g42.20	30.34	18.20	5.91	+6.71	+6.02
17	g+6.60	1.94	50.29	.....	13.01	8.18	g41.35	31.83	15.87	4.63	+7.33	+7.05
18	+6.90	3.57	56.57	.....	14.56	7.89	.....	34.88	13.75	3.68	+7.55	+7.07
19	+7.90	3.48	57.56	.....	18.98	6.17	g40.75	35.88	10.73	3.37	+7.30	+7.12
20	+8.28	2.18	57.93	.....	.....	6.30	40.24	32.68	9.23	5.61	+7.22	+7.70
21	+8.27	1.78	57.85	.....	.....	7.92	35.47	26.92	8.67	4.57	+7.65	+6.80
22	+7.48	7.82	61.95	.....	28.30	9.49	27.93	26.42	8.18	3.11	+7.63	+7.71
23	+5.37	7.02	60.23	.....	28.43	.....	22.37	34.94	10.50	+.15	+7.28	+7.85
24	+5.35	9.16	62.53	.....	36.47	.....	20.43	38.35	10.25	+.86	+7.35	+8.50
25	+4.75	10.69	63.02	.....	37.83	.....	19.10	g42.50	10.58	+.10	+7.04	+9.70
26	+5.17	9.36	g64.65	.....	35.20	.....	22.50	40.83	9.42	+.72	+7.12	+9.93
27	+6.16	11.27	.....	.....	34.32	.....	23.00	39.38	9.35	1.17	+7.47	+9.65
28	g+8.50	10.23	h61.20	.....	33.83	.....	15.30	36.62	11.58	.45	+7.50	+9.49
29	g+8.70		59.78	.....	30.78	17.78	14.34	37.77	13.09	.58	+7.10	+9.65
30	.....		59.67	.....	30.05	.....	12.72	41.25	15.25	+1.76	+7.65	+10.34
31	.....		.....		37.20		11.69	.....		+2.57		+9.65

g Estimated.
h Tape measurement at odd hour.

18.26.5.330. Artesia well. Maximum recorded daily fluctuation, 1949: Apr. 3, 5.28 feet.

Highest daily water level, from recorder charts

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept	Oct.	Nov.	Dec.
1	26.12	19.59	29.51	58.62	42.98	47.72	39.59	58.16	.....	32.17	24.13	19.18
2	26.87	19.48	30.58	56.20	42.39	50.03	40.96	60.41	.....	31.89	24.01	19.00
3	25.70	19.35	31.53	50.92	42.35	49.32	41.61	62.32	.....	31.62	23.83	18.77
4	25.77	19.54	32.22	49.40	41.86	50.03	41.73	62.42	.....	31.19	23.63	18.87
5	26.49	20.25	32.50	49.37	40.74	44.94	43.66	60.43	.....	30.54	23.65	18.57
6	27.20	20.91	.....	52.67	40.13	41.49	46.84	61.73	.....	30.23	23.17	18.33
7	26.92	21.30	.....	54.88	40.01	40.61	50.56	61.42	.....	30.03	22.80	18.32
8	27.02	21.77	.....	55.31	38.35	40.40	53.61	59.47	59.14	30.01	22.42	18.34
9	26.74	22.26	.....	55.28	37.64	40.41	55.24	60.55	56.45	29.76	22.40	18.40
10	26.15	23.19	.....	52.69	37.86	40.34	52.04	60.60	52.31	.....	22.08	18.20
11	25.30	23.45	38.41	51.19	36.62	37.39	51.18	60.47	49.37	.....	21.94	18.20
12	24.67	23.64	40.15	51.93	35.75	35.28	53.97	59.83	48.39	29.37	21.98	18.34
13	24.35	23.42	40.62	50.89	35.21	34.19	51.28	60.51	45.54	.....	21.83	18.28
14	24.52	23.48	40.84	50.17	34.72	33.73	50.91	60.05	43.99	29.07	21.58	.....
15	24.39	23.99	43.87	49.18	33.70	33.56	49.65	59.07	41.68	28.72	21.41	.....
16	24.67	25.26	45.18	47.13	33.25	33.09	50.38	62.54	40.22	28.23	21.25	.....
17	23.67	26.03	47.76	44.85	34.37	33.33	49.23	.....	39.08	28.05	21.27	.....
18	23.46	25.97	50.74	44.12	36.30	34.42	48.47	.....	38.07	27.95	21.07	.....
19	22.94	26.20	51.47	45.29	37.91	32.84	50.70	.....	36.78	27.71	20.80	17.92
20	22.68	25.84	51.22	45.43	39.47	32.44	51.03	.....	36.38	27.67	20.58	18.06
21	22.63	26.15	51.20	45.42	39.61	32.48	.....	.....	36.02	27.60	20.29	17.88
22	22.13	27.68	54.63	45.36	39.91	31.82	50.23	.....	36.06	27.13	19.92	.....
23	21.77	28.94	55.60	45.69	39.94	31.65	52.09	.....	35.84	26.57	19.77	.....
24	21.63	29.24	.....	43.80	41.27	31.84	51.94	64.11	35.32	26.33	19.69	.....
25	21.13	29.55	.....	43.12	42.73	31.97	51.01	65.18	34.63	26.02	19.67	.....
26	20.64	29.62	.....	44.68	42.75	32.19	51.95	64.78	34.22	25.70	19.48	.....
27	20.28	29.93	.....	45.28	44.41	32.39	54.18	65.74	33.78	25.29	19.40	.....
28	20.36	29.53	.....	45.45	44.50	34.57	53.35	64.53	33.49	25.14	19.36	.....
29	19.80		57.40	46.68	43.43	35.97	55.55	.....	32.81	24.64	19.37	.....
30	19.43		57.56	44.95	42.65	37.90	57.60	.....	32.38	24.56	19.40	.....
31	19.36		57.93		45.45		57.17	.....		24.35		.....

g Estimated.

Wells in Intake Area of Roswell Artesian Basin

The water levels in the observation wells in the northern part of the intake area of the artesian basin, as based upon bimonthly measurements, generally were highest in March and lowest in September, the usual seasonal fluctuation which is mainly in response to the draft on the artesian aquifer by the artesian wells to the east. Water levels in the wells in the southern part generally began falling and rising earlier than in the northern part. Because of the reduction in pumping from the artesian aquifer and some additional recharge from the above-normal precipitation, the seasonal decline was generally less than usual and the water levels at the end of the year were either slightly higher or lower than at the beginning of the year. (See fig. 15.)

The average net annual decline for the Wood, Kincaid, Runyan, and Coffin wells in 1949 was about 0.1 foot, as compared with about 2.1

feet in 1948 and about 2.7 feet in 1947. Water levels in the wells in the intake area at the end of 1949 were still generally somewhat above, though approaching, the previous low levels observed in 1941 prior to the above-normal precipitation in late 1941 and early 1942.

Water levels in artesian-intake area, below land-surface datum, during 1949

Location No.	11.22. 1.312	12.23. 5.320	14.23. 8.340	16.23. 15.323	18.23. 5.333	19.23. 27.111
Owner	H. L. Wood	J. Herbst	M. D. Kincaid	D. W. Runyan	Joe Clements	C. R. Coffin
Jan. 7, 22	260.90	....	267.10	222.01	403.56	374.60
Mar. 12, 16	260.48	....	266.89	222.26	b406.68	b381.25
May 11, 16	263.17	....	268.37	b222.94	b407.72	380.19
July 13	b263.57	....	268.50	b223.39	417.54	380.40
Sept. 12, 16	264.04	....	268.92	b223.02	418.09	b378.48
Nov. 3, 8	262.10	....	267.83	b222.38	417.75	b380.18
Change:						
Jan. 1948-49	-2.00	....	-2.56	-3.24	k-4.32	-.50
Jan. 1949-50	+.51	....	+.36	-.44	-14.34	-.87

High and low January water levels

Well No.	High	Year	Low	Year	Record began	Year missing
11.22.1.312	253.75	45	260.90	49	45	....
12.23.5.320	228.74	43	243.33	41	41	49
14.23.8.340	258.00	45	270.01	41	41	....
16.23.15.323	211.92	45	225.70	41	41	....
18.23.5.333	387.46	47	403.56	49	47	....
19.23.27.111	368.83	46	379.30	41	41	45

b Pumping recently.
j Deepened from 420 to 480 feet during summer.
k Influenced by pumping.

Shallow Wells

Net annual declines in water level in shallow wells were generally confined to the Chaves County part of the basin and exceeded 2 feet in four small areas totaling only about 4 square miles, whereas, in 1948 the area of like decline occurred in about 121 square miles. In contrast, most of the rises occurred in the Eddy County part of the basin where the greatest declines occurred the preceding year. The water levels rose more than 2 feet in 78 square miles and 4 feet in 22 square miles. (See fig. 16.)

In Chaves County the net annual declines were generally less than 2 feet as contrasted with the previous year when the decline was more than 2 feet in about 48 square miles. The declines were generally in three acreas, southeast of Roswell, northwest of Dexter and from Dexter

to Hagerman, where pumping is comparatively concentrated. The maximum net decline observed was more than 6 feet in three wells southwest of Hagerman. In the center of the area of heavy pumping, southwest of Hagerman, a major decline of water level of as much as 35 feet has occurred since 1938 and as much as 55 feet since 1927, when records began. A net rise of water level of more than 4 feet occurred in about 1 square mile about 3 miles west of Dexter where there were declines of more than 2 feet in 1948.

In the Eddy County part of the Roswell basin the water levels rose more than 2 feet in an area of about 62 square miles as contrasted with a decline of more than 2 feet in 73 square miles in 1948. The rises occurred over the whole area of pumping except around Dayton where the water levels declines as much as 3 feet. Rises of more than 4 feet were observed in four small areas totaling 21 square miles, 6 and 3 miles northwest of Artesia, 3 miles south of Artesia and around Lakewood.

The rise of water level of more than 4 feet in the pumped area about 6 miles northeast of Artesia is opposed to a net decline of more than 5 feet in 1948 and more than 8 feet in 1947. The rises south of Artesia also did not erase the declines of more than 10 feet that have occurred in the last 2 years. Yearly declines of water level have averaged more than 3 feet a year during the part years in some of the areas where wells are pumped. Such large declines, if continued, will eventually result in uneconomic pumping lifts in certain areas and may cause abandonment of some wells if farm profits decline.

Part 2. Water levels in January or February 1949 and highest and lowest recorded levels in January or February, below land-surface datum, and change from January or February 1948 to January or February 1949, in feet

Location number	Owner	See also Part	Water levels: Jan. 1949 Level	Day	Change 1948-49	Highest Level	Year	Lowest Level	Year	Record: Began	Years missing
8.24.27.433	Poe Corn	5	65.4	13						49	
9.24.5.310	Lacy Shortridge	5	88.28	j9						49	
17.331	Oscar White	5	121.07	j9						49	
20.411	Oscar White	5	63.18	j9						49	
10.24.8.111	O. S. Stockton	.	52.32	j10	-14.06	38.26	48	52.32	49	38	42,44
8.333	Ira Lee	3	44.88	j8	-2.09	40.67	47	44.88	49	47	
15.342	W. C. Crawford	.	13.18	j8	-.54	8.82	38	13.18	49	38	39,42, 44,47
16.133	G. D. Perrine	.	27.17	j8	-1.38	22.85	43	28.70	41	38	
17.111	C. C. Henry & G. P. Mabry	3	43.37	j8	-2.04	38.92	46	43.37	49	46	
17.122	Mr. Howard	(Measurements discontinued)				24.58	42	33.67	41	38	48,49
18.424	L. T. Lewis	.	.....	..	.....	34.32	42	44.50	41	38	49
20.344	E. E. Crockett	(Measurements discontinued)				36.54	42	46.65	41	38	39,45, 47-49
22.322	A. B. Carpenter	.	16.14	j8	-1.65	11.19	42	19.70	41	38	
27.111	Jack Taylor	.	19.89	j8	-1.13	15.20	42	25.17	38	38	
32.111	F. W. Lewis	3	31.52	j8	-1.35	27.48	46	31.52	49	46	
33.244	J. L. Westover	.	4.52	j8	+2.00	4.52	49	6.52	48	41	47
34.333	Elmer Butler	.	5.16	j8	.....	2.67	42	5.16	49	41	48
36.222	State of New Mexico	.	2.96	j8	+.19	2.13	47	4.15	41	41	
10.25.17.344	P. E. Gannon	.	8.10	j8	-.47	4.16	42	8.10	49	41	
18.222	J. R. Pendergrass	.	9.68	j8	-.50	3.28	42	9.68	49	41	
19.331	F. C. Smith, Jr.	3	35.18	j8	-.98	30.76	42	35.18	49	41	46
29.222	U. S. Government	.	1.15	j8	-.20	0.95	48	3.15	41	41	
11.23.1.433	S. M. Wiggins	3	60.24	j7	-2.14	56.07	47	60.24	49	47	
12.221	S. P. Hannifin	.	60.15	j7	.....	51.57	43	61.14	40	38	41,42, 47,48
11.24.6.311	R. B. Wirtz	.	a52.80	j7	-5.35	37.61	39	51.87	41	39	40,47
6.433	Mr. Watkins	.	.....	..	.....	28.98	42	41.29	41	38	49
6.444	Morrie Huff	.	39.95	j7	-2.15	31.20	43	42.06	41	39	
9.122	Raymond McCutchen	(Measurements discontinued)				27.25	42	34.83	k41	38	48,49
10.114	E. M. Healy	.	.....	..	.....	16.85	42	26.60	41	40	49
10.224	C. E. Smith	3	b16.86	j7	-1.55	11.69	42	b19.61	39	38	
10.321	G. A. Oney	.	26.50	j7	- .21	21.13	42	28.64	40	38	39
13.144	Frank Peters	.	12.52	j7	-0.59	11.93	48	16.08	43	38	46
14.331	Leo Cowan	3	29.17	j7	-1.59	27.58	48	29.17	49	48	

* See footnotes at end of table.

Part 2--Continued

Location number	Owner	See also Part	Water levels: Jan. 1949 Level	Day	Change 1948-49	Highest Level	Year	Lowest Level	Year	Record: Began	Years missing
11.24.15.421	M. L. Barnett	.	37.81	j7	-1.90	30.09	42	41.49	41	38	
15.431	M. L. and S. Barnett	.	38.74	j7	-1.81	31.30	m42	42.80	41	38	
17.121a	D. H. Johnson	.	57.50	j7	-2.19	48.96	43	57.50	49	42	46
18.333	G. V. Coker	.	88.53	j8	-2.33	79.36	43	90.84	41	39	
22.333	John Tweedy	.	48.72	j4	-2.23	40.03	42	52.26	41	38	
23.312	T. T. Sanders	5	20.75	j7	.....	.....	..	.....	..	49	
23.411a	H. E. Babcock, Jr.	.	13.13	j7	- .59	10.35	42	17.34	41	38	45
23.433a	Tweedy Gin	.	.....	..	.....	16.43	46	20.40	47	46	49
28.113	Rocky Arroyo School	3,5	66.60	j4	-2.47	53.52	42	69.20	41	38	
29.144	Mr. Ferrell	.	83.84	j7	-1.71	69.82	42	85.65	41	38	
29.333	F. W. Clow	.	.....	..	.....	78.91	42	87.94	48	42	45,46,49
34.411b	Belle Hurst	.	48.42	j4	-2.22	40.40	43	51.63	41	39	
36.133	Wiley Grizzle	.	30.68	j4	-1.65	25.28	43	36.02	40	39	42
36.211	Harold Allison	.	.....	..	.....	15.44	42	24.88	40	38	45,48,49
36.333	Wiley Grizzle	.	33.29	j4	-1.17	28.45	42	35.55	39	39	40,41
11.25.6.123a	J. P. White & Co.	.	16.71	j8	.....	13.26	43	16.71	49	43	44,47,48
6.421a	J. P. White & Co.	3,5	8.53	j8	- .90	4.44	42	8.53	49	41	
22.333	Mrs. T. E. Whitney	.	7.77	j7	- .55	5.36	42	7.85	47	38	
28.234	E. Whitney	.	11.08	j7	-2.15	5.35	42	11.08	49	38	
28.244	R. O. Whitney	.	11.35	j7	-2.76	4.07	42	11.35	49	38	43
28.333	Unknown	.	12.53	j4	- .22	5.34	44	12.53	49	38	39-43
29.111	Farmers Incorporated	.	7.31	j7	+1.41	5.47	39	8.74	43	38	
29.343	Albert Hobson	.	10.90	j4	-1.36	4.38	40	10.90	49	39	
29.444	Glenn Wheeler	4	12.43	j4	-1.68	f4.59	42	f12.75	49	38	
30.333	J. P. White & Co.	.	15.96	j4	-1.17	9.24	42	17.07	40	38	
31.223	Ruby Brown	.	15.92	j4	-1.66	8.60	42	15.92	49	39	
31.433a	Albert Watson	(Measurements discontinued)				19.85	42	30.98	40	38	47-49
31.433b	Albert Watson	.	31.02	j4	-1.41	23.60	43	31.02	49	39	42
31.433c	Albert Watson	.	30.42	j4	-1.45	27.31	47	30.42	49	47	
32.333	George Bogart	.	e29.71	j4	.....	16.89	42	28.28	48	38	41,49
12.24.13.111	W. T. Weldy	3,5	70.52	j4	-1.93	62.36	43	70.52	49	42	
23.441a	Monte Goodin	.	83.99	j4	-3.20	75.53	43	83.99	49	38	41
12.25.2.Lot 3	B. F. Heine	.	a29.75	j3	-12.71	9.80	42	17.04	48	38	
2.Lot 4	V. H. Hodges	.	c18.48	j3	-3.43	7.27	42	c18.48	49	38	
3.334	J. W. Young	.	33.93	j3	-1.69	21.21	42	33.93	49	39	
7.144a	S. E. Hamill	5	143.48	j4	-1.33	37.08	43	45.00	38	38	

* See footnotes at end of table.

Part 2--Continued

Location number	Owner	See also Part	Water levels: Jan. 1949 Level	Jan. 1949 Day	Change 1948-49	Highest Level	Highest Year	Lowest Level	Lowest Year	Record: Began	Record: Years missing
12.25.9.422	Cumberland townsite	3	53.61	j3	-1.76	39.60	42	53.61	49	38	
13.111	M. E. Colclazier	.	18.43	j4	-1.03	11.23	43	18.43	49	39	
16.111	Ernest Nelson	.	35.93	j3	- .91	29.50	43	35.98	41	38	
16.222	State of New Mexico	.	61.92	j3	-2.15	42.25	38	61.92	49	38	
22.231	W. T. Clardy	.	89.92	j3	-4.11	51.84	39	89.92	49	39	
22.411	W. T. Clardy	3,5	89.87	j3	.....	.....	..	.....	..	49	
25.413	Ann E. Freeman	.	34.33	j3	- .84	17.90	42	36.25	47	38	40,41
26.311	J. K. Murphy	.	75.82	j2	-4.00	40.62	38	75.82	49	38	
27.211	W. T. Clardy	.	85.48	j3	-3.28	48.70	39	85.48	49	39	
30.222	Ivy Woodman	.	80.33	j4	- .06	78.24	43	81.50	41	38	
33.112	H. D. Wager	(Measurements discontinued)				67.07	39	92.73	48	39	41,49
33.122	McCloud Estate	5	90.83	j2	.....	.....	..	.....	..	49	
34.211	Donald Corn	.	73.19	j2	-2.15	39.09	38	73.19	49	38	39-41
34.431	Jack Mask	.	(a)	j3	.....	43.14	42	66.79	48	39	49
35.111	C. E. Smith	(Measurements discontinued)				34.00	42	61.81	48	40	49
35.111a	C. E. Smith	5	65.63	j2	.....	.....	..	.....	..	49	
35.131	C. E. Smith	.	67.40	j2	-3.82	47.14	44	67.40	49	44	
35.311b	H. G. Moberly	.	.....	..	.....	36.42	42	55.79	46	38	47-49
35.311c	Jack Mask	.	63.43	j2	-3.65	56.90	47	63.43	49	47	
35.411a	A. C. Stone	3	59.05	j2	-3.02	40.23	45	59.05	49	45	
36.112	O. B. Berry	5	35.92	j3	.....	.....	..	.....	..	49	
36.133	H. Kuykendall	.	41.89	j2	-1.30	23.91	42	41.89	49	38	45,47
36.142	O. B. Berry	.	27.88	j3	- .28	13.85	42	32.72	47	38	46
36.211	Unknown	.	.....	..	.....	24.55	44	27.01	45	44	46,48, 49
36.313	M. L. Kuykendall	.	37.10	j2	-1.04	22.84	38	44.06	47	38	42
12.26.7.421	Cecil Johnson	5	1.71	j4	- .45	(n)	(n)	5.60	38	38	42
18.221	Cecil Johnson	.	15.53	j4	+ .59	10.87	42	16.12	48	42	46
18.221a	Cecil Johnson	3	15.41	j4	+ .33	14.57	45	15.74	48	45	
29.333	T. S. Lawing	3	16.29	j1	+ .01	14.20	40	17.98	46	39	
30.213	Lowman Wiley	.	25.23	j3	- .77	13.32	42	25.23	49	38	
13.25.1.111	M. L. Kuykendall	.	26.15	j1	+ .47	12.78	42	26.62	48	38	40
1.111a	M. L. Kuykendall	.	28.30	j1	+ .13	28.30	49	28.43	48	48	
1.331	Will Schaaphok	.	24.97	j1	- .84	9.77	42	24.97	49	38	
3.111	Grace Stanley	.	77.66	j1	-4.85	45.40	38	77.66	49	38	
5.111	W. H. Belcher	.	a67.96	j1	-1.59	60.70	42	a67.96	49	38	44
6.333	R. L. Lowe	.	81.07	j1	- .20	78.22	38	82.16	44	38	

* See footnotes at end of table.

Part 2--Continued

Location number	Owner	See also Part	Water levels: Jan. 1949 Level	Day	Change 1948-49	Highest Level	Highest Year	Lowest Level	Lowest Year	Record: Began	Years Missing
13.25.8.133	W. H. Jeffries	.	67.63	j1	-1.07	59.61	42	70.33	41	39	
10.344	H. W. Reinicke	.	.....	..	.....	57.30	38	66.98	45	38	41,46-49
11.111	Kermit Southard	.	.....	..	.....	36.01	42	51.21	46	39	47-49
11.343	J. E. Brockman	.	64.20	j2	-2.63	42.21	42	64.20	49	38	
11.433	do (Measurements discontinued, well filled)					32.75	42	52.53	48	40	49
12.133	M. E. Colclazier	.	38.22	j1	.....	17.93	42	38.22	49	38	45,46,48
12.311	Mr. Boyle	.	36.32	j1	+2.54	16.23	42	138.86	48	39	46
13.113	W. F. Kerr	.	52.65	j1	-6.61	29.95	42	52.65	49	38	
13.131	Fletcher Bros. (Measurements discontinued)					29.05	42	46.58	48	38	49
13.133	do	.	a70.27	j1	-12.46	32.76	42	49.69	46	42	47
13.233a	W. F. Kerr	.	38.96	j1	-3.20	21.05	42	38.96	49	38	
13.233b	do	.	39.60	j1	-2.98	22.96	42	39.60	49	38	
13.311	Fletcher Bros.	.	a77.22	j1	-28.17	32.13	42	52.59	46	40	41,47
13.433	Mrs. J. W. Wier	.	42.33	j1	-2.66	25.54	42	42.33	49	38	
14.131	Fletcher Bros.	.	70.27	j2	-2.70	48.65	42	70.27	49	38	
14.231	William Zappe	3	62.97	j1	-3.79	40.12	42	62.97	49	40	
15.311	Rex Richmond	.	85.08	j2	-1.23	68.88	38	85.08	49	38	43,45
15.422	A. A. Gilland	.	71.00	j2	-2.65	49.63	42	71.00	49	38	40,41
17.411	R. Thaman	3	68.86	j1	+.19	55.08	42	73.26	47	39	40,44
23.111	I. F. Wortman	.	57.60	j2	-5.22	51.21	42	65.17	41	38	
24.333	Hal Bogle	.	57.90	j1	-0.47	41.34	42	57.90	49	38	
26.211	Belle Hurst	.	65.35	j2	-1.10	47.33	42	65.35	49	38	40,41
26.222	do	.	.....	..	.....	41.42	42	56.63	46	38	48,49
27.111	Hal Bogle	.	.....	..	.....	69.30	38	186.62	48	38	46,47,49
27.221b	do	.	78.14	j2	-1.48	61.95	42	78.14	49	39	40,41,44
34.323	L. D. & W. P. Kerr	3	87.32	j2	-.53	86.79	48	87.32	49	48	
35.311a	do	.	81.25	j2	-1.98	74.63	47	81.25	49	46	
35.322	W. F. Kerr	.	78.02	j2	-1.74	58.73	43	78.02	49	43	
36.421a	R. M. Ware	5	57.85	j2	-4.32	39.00	38	57.85	49	38	41,45
36.421c	do	.	61.63	j2	-1.38	39.79	42	61.63	49	38	
13.26.5.111	R. H. Aston	.	12.32	j1	+3.76	7.40	42	16.08	48	39	
5.231b	C. P. Sterrett	.	10.89	j1	+4.09	7.43	42	14.98	48	38	
5.231c	do	5	116.46	j7	+3.01	116.46	49	19.47	48	47	
5.331	W. W. Harris	.	13.80	j1	+4.07	13.27	42	18.27	47	38	
7.333	Howard Amason	4	17.13	10	-1.03	f6.28	42	f17.64	49	40	
8.332	G. M. Sterrett (Measurements discontinued, well filled)					5.77	46	10.29	38	38	40,49

* See footnotes at end of table.

Part 2--Continued

Location number	Owner	See also Part	Water levels: Jan. 1949 Level	Day	Change 1948-49	Highest Level	Year	Lowest Level	Year	Record: Began	Years missing
13.26.16.114a	U. S. Government (fish hatchery)	.	b12.74	31	-.15	8.01	43	12.59	48	38	--
16.114b	do	.	8.75	31	+.42	4.81	43	9.17	48	39	
16.114c	do	.	8.31	31	+1.10	5.19	43	9.41	48	39	40
17.321	Leo Nowak	3	12.15	j1	-1.67	8.90	39	14.24	44	38	47
17.443	H. Vandenbout	.	14.77	31	-.32	11.28	42	14.77	49	38	
17.444	do (Measurements discontinued, well filled)					11.56	42	14.41	48	38	49
18.311	W. F. Kerr	.	24.61	j1	-1.31	11.50	42	24.61	49	38	
19.222	A. T. Stone	.	20.11	31	+1.25	18.22	39	22.83	46	38	
19.333	Hal Bogle	.	19.14	31	-.19	18.20	47	33.32	46	38	44
19.432	Tom Bogle	.	.....	..	.....	6.19	42	14.94	46	38	49
20.113	A. T. Stone	.	.....	..	.....	17.25	42	23.20	46	38	47-49
20.333	Mrs. O. W. Lockhead	.	.....	..	.....	10.89	42	17.85	47	38	46,48,49
22.331	E. B. Clay	.	6.87	31	+.02	5.90	47	6.89	48	47	
23.111	do	3	i 6.13	j1	-.01	3.55	42	7.12	48	38	47
28.111	Joe Nowak (Measurements discontinued, well filled)					9.66	42	26.02	38	38	49
28.111a	do	5	20.47	31	.....	.....	..	.....	..	49	
28.121	Geo. Grassie	3	b21.71	31	-.55	14.82	39	b21.71	49	38	42
28.221b	Hal Bogle	.	10.80	31	+1.65	9.76	47	12.45	48	47	
28.311	Joe Giles and Anna Heinzel	.	.....	..	.....	10.42	39	17.38	48	38	49
29.111	J. H. Reid	.	.....	..	.....	9.67	39	15.72	40	39	42,45-49
29.113	do	5	121.78	31	.....	13.39	42	121.78	49	38	46-48
29.113a	K. O. Southard	.	22.09	31	-1.29	20.80	48	22.09	49	48	
29.211	J. H. Reid	.	14.61	31	-.61	7.22	39	14.61	49	38	41
29.333	M. Y. Monical	.	19.29	31	-1.03	11.04	42	19.29	49	38	
31.241	Hal Bogle	.	.....	..	.....	6.03	42	19.45	48	38	49
31.311	E. O. Moore	.	57.06	31	-.86	35.30	38	57.06	49	38	
33.421	K. O. Southard	.	18.10	28	+1.40	15.62	42	19.92	47	38	
34.313	Elton Lankford	.	11.39	28	+.67	8.28	39	12.27	47	38	
34.431	Mrs. Elizabeth Cole	.	22.66	28	-1.76	20.55	47	32.79	44	41	46
14.25.1.343	V. F. Flores	.	76.28	27	-3.86	43.20	38	76.28	49	38	40,47
1.344	do	3	72.64	27	-2.51	36.04	36	72.64	49	36	
2.233a	L. T. Lewis	3	79.63	27	.....	52.13	42	79.63	49	40	48
2.431	J. V. Thomas	.	94.16	28	-2.39	67.69	43	94.16	49	43	
2.444	do	.	.....	..	.....	48.50	38	71.17	46	38	41,45,47 49

* See footnotes at end of table.

Part 2--Continued

Location number	Owner	See also part	Water levels: Jan. 1949 Level	Day	Change 1948-49	Highest Level	Year	Lowest Level	Year	Record: Began	Years missing
14.25.8.411	Ray Mathes	.	96.59	28	-.37	93.24	42	96.59	49	39	
11.233	A. W. Langnegger	5	101.57	28	.....	.....	..	.....	..	49	
11.333	do	.	111.03	28	-4.74	78.83	42	111.03	49	42	46
11.433	do	5	106.50	28	.....	.....	..	.....	..	49	
12.133a	C. H. Whitman Estate	.	92.83	27	-3.78	60.82	42	92.83	49	42	
12.313	L. T. Lewis	.	.....	..	.....	60.75	38	192.54	48	38	41,49
12.314	do	.	94.23	28	-3.92	71.35	44	94.23	49	44	
13.213	Calvin Graham	.	91.32	27	-3.72	59.54	42	91.32	49	42	
13.311a	E. O. Moore	.	98.34	27	-4.28	80.38	45	98.34	49	45	
14.131	A. W. Langnegger	.	113.02	28	-4.52	84.52	39	113.02	49	39	46
20.443	Breeb Hurst	3	76.30	22	-.30	71.46	42	76.30	49	38	
24.133	E. O. Moore	.	88.41	24	-2.96	56.73	38	88.41	49	38	
24.421	Henry Johnson	.	75.82	24	-3.49	72.33	48	75.82	49	48	
25.111	J. M. Norris	.	85.88	24	-3.80	56.05	38	85.88	49	38	
25.111a	do	5	83.17	24	-4.24	59.92	43	83.17	49	43	
25.221	do	5	.....	..	.....	24.50	26	p59.93	47	26	27-37,48, 49
36.111	H. V. Parker	.	77.22	24	.....	55.69	43	77.22	49	42	48
36.133	do	5	71.55	24	.....	.....	..	.....	..	49	
36.211	do	.	80.90	24	-4.84	60.83	44	80.90	49	44	
14.26.3.111	Flora West	.	15.21	26	+.78	12.03	39	15.99	48	38	40,41
3.243	Mary Brown	.	12.08	26	+3.15	12.08	49	a16.80	47	45	
3.413	Howard Menefee	.	10.50	26	+1.35	8.35	39	11.85	48	38	
4.133a	W. E. Jacobson	.	21.99	27	+1.29	18.43	39	23.95	47	38	
4.141	Roy Lockhead	.	22.94	27	+1.02	18.47	39	24.66	47	38	
4.231	G. E. Wade	.	20.22	27	+1.02	15.82	39	21.66	47	38	
5.131	L. M. Harter	.	32.39	27	+.56	21.70	42	33.01	47	38	
5.211	M. D. Menoud	.	.....	..	.....	22.20	42	29.65	47	38	49
5.243	J. D. S. McKinistry	.	23.32	27	+1.49	20.00	39	25.76	47	38	
5.433a	J. D. Jones	.	35.34	27	+.19	34.62	47	35.53	48	47	
6.111	Wiley Grizzle	.	38.20	27	-1.00	16.30	38	38.20	49	38	
6.211	do	.	37.40	27	-.75	18.54	38	37.40	49	38	
6.232	Tom Andrews	.	42.55	27	-.54	26.82	42	42.55	49	40	
6.241	do	.	.....	..	.....	23.80	38	32.43	46	38	42,47-49
7.443	W. W. Adams	3	p47.16	27	+8.84	30.25	36	bp56.00	48	36	
8.112	G. L. Truitt	.	42.58	27	-.43	21.80	38	42.58	49	38	
8.243	P. Flores, Jr.	.	42.55	27	-.46	19.83	38	42.55	49	38	

* See footnotes at end of table.

Part 2--Continued

Location number	Owner	See also Part	Water levels							Record	
			Jan. 1949 Level	Day	Change 1948-49	Highest Level	Year	Lowest Level	Year	Began	Years missing
14.26.8.312	Oscar Kiper	.	70.36	27	-1.06	41.54	42	70.36	49	42	
8.433a	Tom Ferguson (Measurements discontinued)					35.32	36	67.15	47	36	44,48,49
8.433b	do	.	74.40	26	+1.09	74.40	49	75.49	48	48	
9.143	V. R. Barnett (Measurements discontinued, well filled)					26.06	39	31.89	48	38	49
9.143a	do	5	42.08	26	.....	.....	..	.....	..	49	
9.434	Cave Bros.	.	24.97	27	.....	8.35	38	24.97	49	38	45,48
9.442	Oscar Cave	.	19.59	26	+1.21	12.25	42	20.80	48	38	41
10.121	S. W. Smith	.	14.33	26	.....	12.22	39	14.91	43	38	47, 48
10.221	John Langnegger	.	11.20	26	+2.12	10.88	42	13.35	44	42	
10.244	do	.	13.38	26	+1.79	10.69	45	15.17	48	38	
11.111	do	.	16.76	26	+1.77	14.52	46	18.53	48	38	
11.121	H. A. Kiper	.	16.70	26	+1.51	15.13	39	18.21	48	38	43
11.231	Royce Langford	.	14.35	26	+1.01	14.35	49	15.36	48	48	
11.444	W. E. Utterback	.	9.10	26	-1.11	7.99	48	11.61	47	38	
12.433b	Mr. Commins	3	16.05	26	-.15	12.50	42	16.88	41	40	
13.121	L. M. Lang	.	17.22	26	-.78	14.30	42	17.50	41	38	
14.212	B. L. Barnett	.	12.52	26	+.86	11.36	42	13.40	41	40	46
14.421	Jim Michelet	.	13.35	26	+.98	10.49	43	14.33	48	43	
14.441	do	.	15.50	26	+.92	10.04	42	16.42	48	38	
14.443	Unknown	.	14.32	21	+1.04	11.22	44	15.36	48	44	
15.113	Hattie McCullough	5	121.86	24	.....	13.40	42	121.86	49	38	48
15.322	F. H. Evans.	3	12.82	24	+.58	5.55	42	13.40	48	42	
15.333	Dub Andrus	3	34.76	24	+.71	16.42	38	35.47	48	38	
17.122a	R. A. & T. A. Bledsoe	.	73.14	26	+.12	73.14	49	73.26	48	48	
17.211a	A. L. Hewitt	.	72.56	26	.....	55.10	45	72.56	49	45	48
17.444	Pearson Bros.	.	70.91	26	-.52	38.42	38	70.91	49	38	
18.113	R. G. Campbell	.	82.69	27	-3.27	50.57	39	82.69	49	39	
18.131	William Cooke	.	82.34	27	-3.22	50.83	42	82.34	49	42	47
18.131a	do	.	83.19	27	-3.17	74.92	47	83.19	49	47	
19.211	Pearson Bros.	.	75.22	24	-2.90	39.68	38	75.22	49	38	45
19.242	Oscar H. Pearson (Measurements discontinued, well filled)					48.05	38	84.33	48	38	49
19.311	Henry Johnson	.	.....	..	.....	36.12	38	p70.13	48	38	49
19.424	E. E. Lane	5	87.23	26	.....	.....	..	.....	..	49	
19.444	do	3	186.42	24	-2.13	49.10	38	186.42	49	38	
19.444a	do	3,5	86.79	26	.....	.....	..	.....	..	49	

* See footnotes at end of table.

Part 2--Continued

Location number	Owner	See also Part	Water levels: Jan. 1949 Level	Jan. 1949 Day	Change 1948-49	Highest Level	Highest Year	Lowest Level	Lowest Year	Record: Began	Record: Years missing
14.26.20.143	Pearson Bros.	.	87.59	24	-3.04	48.15	38	87.59	49	38	45
20.211	Ernest Langnegger	5	85.85	24	.....	.....	..	.....	..	49	
20.343	do	.	96.10	26	-2.94	56.26	38	96.10	49	38	41
21.311	G. E. Wade, Jr.	5	61.85	24	.....	.....	..	.....	..	49	
21.333	do	.	.....	..	.....	33.38	42	63.96	48	38	44,45,49
22.141	Wayne Adams	.	37.51	26	+0.13	21.66	42	37.64	48	38	
23.131	E. A. White	.	13.70	21	+2.87	6.89	42	16.57	48	38	
23.214a	F. E. Pilley	.	14.12	26	+2.44	13.96	45	16.56	48	45	
23.413	E. A. White	.	14.09	21	+2.44	8.99	42	16.53	48	42	
27.111	J. L. Ogle	.	21.12	24	-.46	8.43	42	21.12	49	38	
27.424a	M. C. Brown	.	28.25	21	-.35	25.40	47	28.25	49	46	
28.111	William Langnegger	.	62.76	24	-.05	32.32	42	62.76	49	42	
28.211	L. T. Lewis	.	47.39	26	-2.73	24.18	42	47.39	49	38	41
28.423	do	.	29.01	24	-.12	14.14	42	29.01	49	42	
29.112	P. E. Stoes	.	.....	..	.....	58.80	38	96.32	48	38	40,41,49
29.213	do	.	89.08	26	-1.62	49.52	38	89.08	49	38	
29.441a	J. W. Wiggins	.	63.32	24	-1.59	32.25	38	63.32	49	38	
29.441b	do	.	62.58	24	-.63	31.20	38	62.58	49	38	41
32.131a	B. M. Hopkins	.	81.45	24	.....	53.09	43	81.45	49	42	48
32.331	B. E. Spencer	3	58.01	20	-1.72	32.85	38	58.01	49	38	
35.212	J. H. King	5	28.35	21	.....	.....	..	.....	..	49	
35.344	J. Q. Mitchell	3	71.68	21	-.83	65.68	43	71.68	49	41	
15.24.23.344	Carroll Jackson	.	66.88	21	-.20	65.87	44	a67.35	46	38	
27.344	S. A. Lanning	.	58.48	21	+.21	58.48	49	61.75	38	38	
28.244	State of New Mexico	.	88.08	21	+.02	88.08	49	92.30	41	38	43,46
32.211	Carl Mangum	3	47.18	21	-2.60	37.63	45	50.72	41	40	
34.341	S. A. Lanning	.	25.68	21	+3.87	25.68	49	39.82	42	38	41
35.143	E. P. Malone	.	20.18	21	-2.36	16.81	44	27.70	38	38	
36.244	W. F. Waller	.	47.30	21	-1.68	45.62	48	47.30	49	48	
15.25.12.111a	E. H. Corzine	.	51.19	20	+2.79	35.64	42	51.19	49	38	47,48
12.212b	do	.	60.77	20	-6.42	41.92	44	60.77	49	44	
12.421	C. H. Foster (Measurements discontinued; well filled)					41.66	44	61.35	48	44	49
24.111	Hal Bogle	.	18.70	20	-3.44	12.06	42	18.70	49	38	
24.211	do	.	20.81	20	-1.22	7.65	42	20.81	49	38	41
26.423	R. T. Spence	.	5.95	20	+2.43	3.59	42	8.38	48	42	
27.321	Pearson Bros.	.	32.48	20	+3.77	17.50	42	36.25	48	38	
28.331	T. C. Sexton	.	34.92	19	+3.64	27.64	45	38.56	48	38	40,41,43

* See footnotes at end of table.

Part 2--Continued

Location number	Owner	See also Part	Water levels							Record	
			Jan. 1949 Level	Day	Change 1948-49	Highest Level	Year	Lowest Level	Year	Began	Years missing
15.25.28.331a	T. C. Sexton	.	43.86	19	-.96	26.48	45	43.86	49	44	
33.112	Carroll Jackson	.	22.47	19	+4.45	11.18	42	b26.92	48	38	39
35.111	M. M. Spence	3	28.46	19	-1.76	15.51	42	29.56	46	38	
35.311	Z. C. Robinson	.	41.42	19	-.72	28.85	42	41.42	49	38	40,46
35.311a	do	.	30.34	19	-.98	29.05	46	31.61	47	46	
36.333b	J. M. Norris	.	30.03	19	-.40	29.63	48	30.03	49	48	
15.26.4.444	Harry Cowan	3	42.51	20	-.25	33.14	42	42.51	49	40	
5.121	B. E. Spencer	.	52.78	20	-.24	34.80	38	52.78	49	38	
5.142	A. Russell Estate	.	46.28	20	+.23	25.55	43	46.51	48	38	
6.311	Calvin Graham	.	55.02	20	-3.36	28.66	38	55.02	49	38	
7.312	C. H. Foster	5	56.47	20	+2.42	36.25	44	58.89	48	44	
8.411	E. M. George	.	32.56	20	-.99	16.08	44	32.56	49	44	
8.413	do	.	31.84	20	-.80	15.53	44	31.84	49	44	
9.133	do	.	27.56	20	-3.41	16.68	42	27.56	49	40	
14.222	Breeb Hurst	.	7.90	21	+.03	2.38	42	7.93	48	41	
14.433	Peck Dority	.	12.18	21	-.02	12.16	48	12.18	49	48	
17.211	E. M. George	.	32.96	20	-3.03	12.06	44	32.96	49	44	
18.112	R. T. Spence	.	48.74	20	+3.82	31.29	44	52.56	48	44	
19.211	Lake Arthur Cemetery	3	37.84	20	+2.12	23.87	42	39.96	48	42	
19.442	Paul Robinson	.	.....	..	.....	5.47	42	12.44	46	38	47-49
20.144	J. W. Webb	.	31.03	20	-.30	18.30	42	31.03	49	38	
20.431a	Unknown (Measurements discontinued, well filled)					16.94	45	e21.00	48	45	48;49
29.111	E. C. Jackson	.	10.65	20	+.01	3.68	42	10.66	48	38	
30.131	Paul Robinson	.	7.91	20	+.01	2.10	40	7.92	48	39	42
30.224	Mrs. G. R. Pate	.	13.86	20	+.07	6.27	42	13.93	48	38	
30.411	C. R. Yoder	.	b17.05	20	-.42	13.35	43	b17.05	49	43	
31.111	E. J. Gromo	.	7.97	20	+2.65	7.97	49	13.73	41	38	
31.333	B. E. Spencer	.	18.93	19	+.09	15.12	42	19.02	48	42	
32.231	Mrs. H. C. Evans	.	9.92	20	-.33	7.70	42	9.92	49	38	

a Pumping.
b Pumping recently.
c Nearby well pumping.
e Dry at depth given.
f From recorder chart.
i Possible discrepancy of a few tenths of a foot between present and previous land-surface data.
j February.
k Also 1940.
m Also 1943.
n Flowing in 1939, 1940, 1941.
p Measurement uncertain.

Part 3

Water levels, in feet below land-surface datum, during 1949

Location number Owner	10.24. 8.333 Lee	10.24. 17.111 Henry & Mabry	10.24. 32.111 Lewis	10.25. 19.331 Smith	11.23. 1.433 Wiggins	11.24. 10.224 Smith	11.24. 14.331 Cowan	11.24. 28.113 School
Feb. 4,7,8	44.88	43.37	31.52	35.18	60.24	b16.86	29.17	66.60
Mar. 10,11	45.17	43.54	31.15	35.26	60.92	b19.27	35.03	65.87
May 10	48.37	46.90	32.69	35.23	65.30	b22.30	36.86	70.57
July 12	aj66.85	c52.46	33.27	35.34	67.84	30.75	48.48	.....
Sept. 8,9	50.06	48.57	33.89	35.36	66.86	25.57	43.31	72.25
Nov. 2-4	46.47	44.95	33.29	34.92	62.19	17.57	31.24	69.30

Location number Owner	11.25. 6.421a White	12.24. 13.111 Weldy	12.25. 9.422 Town-site	12.25. 22.411 Clardy	12.25. 35.411a Stone	12.26. 18.221a Johnson	12.26. 29.333 Lawing	13.25. 14.231 Zappe
Feb. 1-4,8	8.53	70.52	53.61	89.87	59.05	15.41	16.29	62.97
Mar. 10-12	9.54	70.48	52.97	90.60	72.24	15.37	17.27	c81.98
May 10-12	9.60	a75.31	57.13	95.10	69.76	15.22	16.43	74.34
July 12-14	18.72	75.35	55.84	94.23	68.09	15.06	15.78	c84.37
Sept. 8,9	c7.53	76.60	55.61	94.07	67.99	15.13	18.07	74.35
Nov. 3-5	8.42	72.95	54.08	91.98	61.43	16.34	16.21	b65.62

Location number Owner	13.25. 17.411 Thaman	13.25. 34,323 Kerr	13.26. 17.321 Nowak	13.26. 23.111 Clay	13.26. 28.121 Grassie	14.25. 1.344 Flores	14.25. 2.233a Lewis	14.25. 20.443 Hurst
Jan. 22,27,31	.....	.....	.....	.....	b21.71	72.64	79.63	76.30
Feb. 1, 2	68.86	87.32	12.15	16.13	.....	.....	.....	.....
Mar. 11,14	69.23	87.49	12.21	6.42	.....	72.49	a100.92	76.35
May 11,12	81.47	87.69	a26.21	6.45	b23.50	75.39	82.99	76.42
July 13,14	77.02	87.95	9.73	a33.06	19.44	77.28	a102.53	75.74
Sept. 9,12	79.72	88.02	10.84	6.89	21.87	78.25	a104.80	74.68
Nov. 4,5	71.88	88.13	10.82	5.86	18.39	75.46	81.15	74.41

Location number Owner	14.26. 7.433 Adams	14.26. 12.433b Commins	14.26. 15.322 Evans	14.26. 15.333 Andrus	14.26. 19.444a Lane	14.26. 19.444 Lane	14.26. 32.331 Spencer	14.26. 35.344 Mitchell
Jan. 20,21,24, 26,27	j47.16	16.05	12.82	34.76	86.79	i86.42	58.01	71.68
Mar. 14	47.48	a31.97	11.95	34.48	86.74	86.33	59.60	b72.17
May 12	37.32	15.44	12.24	35.86	90.46	89.58	62.47	a87.65
July 13,15	37.45	a28.64	.....	35.27	91.54	90.89	64.07	b73.60
Sept. 12,14	38.55	14.15	3.20	34.83	92.10	91.42	64.73	71.75
Nov. 5, 7	39.88	14.16	4.87	33.33	90.25	89.95	64.78	71.49

Location number Owner	15.24. 32.211 Mangum	15.25. 35.111 Spence	15.26. 4.444 Cowan	15.26. 19.211 Cemetery
Jan. 19-21	47.18	28.46	42.51	37.84
Mar. 14,15	49.07	b36.60	43.65	36.54
May 12,13	a49.57	.....	45.76	36.59
July 15	49.53	33.46	44.52	36.64
Sept. 14	a49.51	33.35	43.60	36.63
Nov. 7	47.55	28.75	41.83	36.44

a Pumping.
b Pumping recently.
c Nearby well pumping.
i Possible discrepancy of a few tenths of a foot between present and previous land-surface data.
j Measurement uncertain.

Part 4

11.25.29.444. Glenn Wheeler.

Highest daily water level, from recorder charts

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	12.73	12.41	12.11	11.56	9.88	13.89	13.34	10.97	13.61	13.33	13.12	11.55
2	12.70	12.40	12.13	10.74	10.25	14.14	12.66	10.76	13.42	12.98	13.42	11.34
3	12.75	12.40	12.13	10.28	10.51	14.36	12.37	10.67	13.43	13.05	13.65	11.11
4	12.74	12.41	12.15	10.26	10.30	14.55	12.89	10.59	13.43	13.44	13.90	10.90
5	12.73	12.40	12.16	10.08	10.16	14.56	13.44	10.55	13.41	13.53	13.66	10.59
6	12.69	12.42	12.18	9.54	10.44	14.28	13.67	10.47	13.62	13.23	13.31	10.53
7	12.66	12.41	12.18	10.11	10.79	14.33	13.79	10.11	13.83	12.58	13.40	11.08
8	.....	12.42	12.17	10.42	10.99	14.29	14.08	9.76	13.96	12.27	13.71	11.82
9	.....	12.46	12.23	10.13	11.06	14.16	14.34	9.62	14.02	12.43	13.94	12.33
10	12.66	12.44	12.21	9.88	10.80	14.02	14.43	9.61	14.01	12.12	14.13	12.40
11	12.64	12.39	12.27	9.93	10.78	12.54	14.10	10.31	13.56	11.95	14.12	12.03
12	12.61	12.39	12.27	9.85	10.82	11.92	14.47	10.97	13.00	12.03	13.63	11.91
13	12.58	12.41	12.77	9.61	10.91	11.50	14.49	10.92	12.49	12.45	13.23	12.43
14	12.55	12.41	13.37	9.42	10.85	11.32	14.49	11.46	12.21	12.82	13.09	12.91
15	12.55	12.41	13.31	9.20	10.72	11.24	14.56	11.86	12.00	12.84	13.08	12.51
16	12.56	12.43	12.81	9.18	10.61	11.66	14.60	12.39	11.83	12.31	13.61	12.13
17	12.53	12.41	12.65	9.57	10.69	12.32	14.60	12.63	11.74	12.13	13.82	11.83
18	12.52	12.39	12.89	9.52	11.29	12.90	13.87	12.85	11.66	12.05	13.61	11.51
19	12.54	12.41	13.04	9.41	11.70	13.37	13.19	13.03	11.53	12.04	13.80	11.21
20	12.50	12.31	13.05	9.26	12.22	13.72	12.43	12.89	11.44	12.05	14.01	10.94
21	12.48	12.07	12.85	9.45	12.56	14.03	12.16	12.46	11.41	12.40	14.08	10.90
22	12.43	11.87	12.83	9.15	12.56	14.02	11.29	12.47	12.21	12.68	14.13	10.90
23	12.41	11.80	12.72	9.11	12.75	13.34	11.11	12.83	12.72	12.21	13.86	10.90
24	12.43	11.81	12.82	9.58	12.94	12.75	11.54	13.12	12.93	11.90	13.27	10.88
25	12.43	11.88	13.17	10.11	13.12	12.50	11.94	13.38	13.11	11.80	12.83	10.91
26	12.40	11.94	13.24	10.41	12.83	12.94	12.20	13.54	13.33	12.20	12.48	10.98
27	12.39	12.02	13.31	10.27	13.13	13.25	12.43	13.62	13.41	12.57	12.25	11.01
28	12.43	12.09	12.93	9.93	13.37	13.69	12.39	13.44	13.43	12.82	12.07	11.05
29	12.43		12.72	9.60	13.53	13.41	12.50	13.17	13.47	12.62	11.90	11.07
30	12.37		12.48	9.53	13.72	13.44	11.86	13.44	13.18	12.46	11.69	11.08
31	12.40		12.59		13.89		11.32	13.68		12.75		11.10

13.26.7.333. Howard Amason.

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 10	h17.17	Feb. 17	17.70	Mar. 18	18.25	Apr. 21	16.17
11	17.22	18	17.76	19	18.29	22	16.13
12	17.32	19	17.83	20	18.32	23	16.08
13	17.40	20	17.90	21	18.33	24	16.01
14	17.48	21	17.93	22	18.33	25	15.93
15	17.55	22	17.93	23	18.33	26	15.86
16	17.60	23	17.88	24	18.34	May 3	g15.68
17	17.64	24	17.86	25	18.35	4	15.65
18	17.62	25	17.84	26	18.36	5	15.56
19	17.60	26	17.81	27	18.38	6	15.48
20	17.56	27	17.79	28	18.39	7	15.39
21	17.51	28	17.76	29	18.39	8	15.31
22	17.46	Mar. 1	17.70	30	18.39	9	15.21
23	17.42	2	17.69	31	18.39	10	g15.10
24	17.39	3	17.69	Apr. 1	18.36	11	g15.04
25	17.35	4	17.69	2	18.33	12	h15.01
26	17.31	5	17.69	3	g18.28	13	14.95
27	17.27	6	17.68	4	g18.26	14	14.89
28	17.24	7	17.67	5	18.23	15	14.84
29	17.22	8	17.66	6	18.18	16	14.79
30	17.19	9	17.71	7	18.10	17	14.76
31	17.17	10	17.73	8	17.99	18	14.75
Feb. 1	17.16	11	17.81	9	17.86	19	14.74
2	17.15	12	17.88	10	17.73	June 10	h15.07
3	17.14	13	17.95	11	17.57	22	h12.95
4	17.13	14	18.02	12	17.42	23	12.93
5	17.13	15	18.09	18	g16.44	24	12.92
6	17.13	16	18.15	19	16.36	25	12.92
16	h17.68	17	18.20	20	16.26	26	12.93

13.26.7.333--Continued.

Date	Water level	Date	Water level	Date	Water level	Date	Water level
June 27	12.99	Aug. 24	12.52	Oct. 10	13.40	Nov. 23	14.33
28	13.10	25	12.56	14	h13.51	24	14.36
29	13.17	26	12.62	15	13.53	25	14.39
July 14	h3.84	27	12.67	16	13.57	26	14.43
15	4.07	28	12.73	17	13.60	27	14.46
16	5.68	29	12.77	18	13.62	28	14.48
17	6.82	30	12.80	19	13.64	29	14.51
18	7.80	31	12.84	20	13.64	30	14.55
19	8.66	Sept. 7	13.57	21	13.65	Dec. 1	14.58
20	9.45	8	13.57	22	13.65	2	14.61
21	10.07	9	13.58	23	13.66	3	14.65
22	10.68	10	13.58	24	13.65	7	h14.95
23	11.22	11	13.58	25	13.64	8	14.96
24	11.36	12	13.58	26	13.64	9	14.98
25	11.44	13	13.57	Nov. 4	h13.68	10	15.00
26	11.44	14	13.54	5	13.68	11	15.01
27	11.44	23	13.24	6	13.70	12	15.03
28	11.51	24	13.22	7	13.73	13	15.06
29	11.62	25	13.20	8	13.74	14	15.09
Aug. 10	h11.75	26	13.18	9	13.76	15	15.11
11	11.75	27	13.17	10	13.78	19	h15.01
12	11.77	28	13.15	11	13.81	20	15.02
13	11.80	Oct. 3	h13.18	17	14.12	21	15.04
14	11.85	4	13.19	18	14.14	22	15.05
15	11.90	5	13.24	19	14.18	23	15.09
16	11.96	6	13.27	20	14.21	24	15.10
17	12.06	7	13.29	21	14.25	25	15.14
18	12.16	8	13.31	22	14.30	26	15.19
23	h12.52	9	13.33				

g Estimated. h Tape measurement.

Part 5

Miscellaneous Data Concerning Observation Wells

8.24.27.433. Corn. Drilled irrigation well, equipped with turbine pump, diameter 12 inches, depth 490 feet. Reference point, top of 4-by 4-foot concrete pump base, 0.80 foot above land-surface datum. Mar. 10, 64.60.

9.24.5.310. Shortridge. 150 feet southwest of rock house. Drilled irrigation well, equipped with turbine pump, diameter 10 inches, depth 300 feet. Reference point, top of 3- by 3-foot concrete pump base, 0.75 foot above land-surface datum. May 13, 1948, 89.15; Nov. 3, 90.60; May 10, 1949, 88.77; July 14, 92.51; Nov. 2, 90.51.

9.24.17.331. White. 30 feet southwest of exploration well for oil, and about 300 yards west of triangulation station. Unused drilled well, diameter 6 inches. Reference point, top edge of casing at chiseled mark, at high point on east side of casing, 1.01 feet above land-surface datum.

Date	Water level	Date	Water level	Date	Water level
Apr. 12, 1948	119.43	Nov. 3, 1948	122.20	July 14, 1949	121.04
May 13	119.51	Mar. 10, 1949	120.77	Sept. 8	116.08
July 14	119.99	May 9	122.36	Nov. 2	119.03
Sept.14	122.19				

9.24.20.411. White. About 0.5 mile west of U. S. Highway 285. Drilled irrigation well, equipped with turbine pump, diameter 10 inches, depth 150 feet. Reference point, top of 3- by 3-foot concrete base, 1 foot above land-surface datum.

Apr. 12, 1948	63.25	Nov. 3, 1948	64.99	July 14, 1949	66.64
May 13	63.26	Mar.10, 1949	63.05	Sept. 8	67.02
July 14	64.91	May 9	a86.35	Nov. 2	64.63
Sept.14	a94.98				

a Pumping.

11.24.23.312. Sanders. South side of south spring creek, about 900 feet southwest of large brick house, near two large concrete discharge boxes, 25 feet northwest of electric power pole supporting three transformers. Drilled irrigation well, equipped with turbine pump. Reference point, top of 3.3- by 3.3-foot concrete pump base, 0.80 foot above land-surface datum.

11.24.28.113. School. Well unused after July 1949, pump removed.

11.25.6.421a. White. Casing pulled, pump removed, after May 1949 measurement. Irrigation well drilled 40 feet southeast of observation well.

12.24.13.111. Weldy. Well cleaned out and repaired, 8-inch casing set in 1 1/2- by 1 3/4-foot concrete base. Reference point, established May 11, 1949, top of casing west side of well, 0.28 foot above concrete base, 1.20 feet above land-surface datum.

12.25.7.144a. Hamill. Pressure pump installed. Reference point, established February 3, 1949, top of 2.2- by 2.3-foot concrete pump base, 1.15 feet above land-surface datum.

12.25.22.411. Clardy. About 60 feet south of drilled irrigation well equipped with turbine pump. Drilled irrigation well, no equipment, diameter 18 inches. Reference point, top of casing east side of well, at land-surface datum. Sept. 9, 1947, 107.37, nearby well pumping; Mar. 11, 1948, 86.86; May 12, 1948, 97.50, nearby well pumping; July 14, 1948, 103.93, nearby well pumping; Sept. 15, 1948, 106.55, nearby well pumping; Nov. 4, 1948, 93.44.

12.25.33.122. McCloud. West side of earthen tank, about 100 feet southeast of house. Drilled irrigation well, equipped with turbine pump. Reference point, top of concrete pump base, 0.40 foot above land-surface datum.

12.25.35.111a. Smith. 30 feet southeast of observation well, 12.25.35.111. Drilled irrigation well, equipped with turbine pump, diameter 16 inches. Reference point, top of casing, 1 foot above land-surface datum.

12.25.36.112. Berry. About 50 feet northeast of railroad track, about 200 feet southeast of small house, at southwest side of earthen tank. Drilled irrigation well, equipped with turbine pump, diameter 15½ inches. Reference point, top of casing, north side of well, 0.5 foot above land-surface datum.

12.26.7.421. Johnson. Well abandoned, pump removed, near fence corner and 18 feet northeast of a 2.8- by 4.9-foot concrete engine block.

12.26.18.221a. Johnson. Old pit pump removed, new turbine pump installed. 6-inch casing set in old casing. Reference point, established September 16, 1948, top of 6-inch casing, 0.82 foot above land-surface datum.

13.25.36.421a. Ware. Well abandoned, pressure pump moved to new well 25 feet east.

13.26.5.231c. Sterrett. Windmill pump removed, pitcher pump installed on box over well.

13.26.28.111a. Nowak. Inside of rock and concrete shed, about 150 feet northwest of observation well, 13.26.28.111, and about 300 feet west of house. Drilled irrigation and domestic well, equipped with large pressure pump, diameter 6 inches. Reference point, top of casing, south side of well, 0.40 foot above land-surface datum.

13.26.28.121. Well abandoned, pressure pump removed.

13.26.29.113. Reid. Reference point, established January 31, 1949, top of concrete pump base, at land-surface datum.

14.25.11.233. Langnegger. Southwest corner of earthen tank. Drilled irrigation well, equipped with turbine pump, diameter 16 inches. Reference point, top of casing at high point, south side, 0.30 foot above land-surface datum.

14.25.11.433. Langnegger. West side of earthen tank, about 30 feet east of power pole supporting three electric transformers, east of four red houses, by side of road. Drilled irrigation well, equipped with turbine pump, diameter 16 inches. Reference point, top of casing, north side of well, at land-surface datum.

14.25.25.111a. Norris. Reference point, established January 24, 1949, top of casing, east side of well, 0.65 foot above land-surface datum.

14.25.25.221. Norris. Well redrilled. May 11, 72.18.

14.25.36.133. Parker. Northwest corner of earthen tank, 25 feet south of power pole supporting three electric transformers. Drilled irrigation well, equipped with turbine pump, diameter 16 inches. Reference point, top of casing, north side of well, 0.75 foot above land-surface datum.

14.26.9.143a. Barnett. About 200 feet north of well 14.26.9.143, about 150 feet south of red barn, on a high caliche ridge, at east edge of large gravel pit, southwest corner of earthen tank. Drilled irrigation well, equipped with turbine pump, diameter 16 inches. Reference point, top of 2 3/4- by 3-foot concrete base which is level with top of casing, 0.70 foot above land-surface datum.

14.26.15.113. McCullough. 7 feet northwest of small storage house. Well adandoned, windmill and pump removed. Reference point, established January 24, 1949, top of casing, at high point on south side of well, 0.25 foot below land-surface datum.

14.26.19.424. Lane. 40 feet west of power pole supporting three electric transformers. Drilled irrigation well, equipped with turbine pump, diameter 18 inches. Reference point, top of casing north side of well, 0.40 foot above land-surface datum.

14.26.19.444a. Lane. 6 feet south of electric power pole, about 75 feet northeast of house. Drilled well, equipped with pressure pump after March measurement, diameter 15⅝ inches. Reference point, top of casing south side of well, 1.00 foot above land-surface datum.

14.26.20.211. Langnegger. Northeast of earthen tank. Drilled irrigation well, equipped with turbine pump. Reference point, top of concrete pump base, east side of well, 0.40 foot above land-surface datum.

14.26.21.311. Wade. At northwest corner of earthen tank, 25 feet northeast of power pole supporting three electric transformers. Drilled irrigation well, equipped with turbine pump, diameter 15⅝ inches. Reference point, top of concrete pump base, 1.20 feet above land-surface datum.

14.26.35.212. King. East side of earthen tank. Drilled irrigation well, equipped with turbine pump, diameter 14 inches, depth 150 feet. Reference point, top of concrete base, 0.30 foot above land-surface datum.

15.26.7.312. Foster. Reference point, established January 20, 1949, top of casing, at land-surface datum.

EDDY COUNTY

Part 1. General Discussion

Roswell Basin

The general discussion of water-level changes in the Eddy County part of the Roswell basin has been included with part 1 for Chaves County as the areas are part of one continuous hydrologic area.

Carlsbad Area

The Carlsbad area lies in the southeastern part of New Mexico, principally west of the Pecos River. Results of a study of the ground-water conditions are given in a report completed in 1945 by W. E. Hale "Ground-water conditions in the vicinity of Carlsbad, N. Mex." The possibilities of obtaining ground water for the Carlsbad Army Air Base are covered in the report on ground-water conditions in the vicinity of the city airport southwest of Carlsbad, N. Mex., by W. E. Hale and C. V. Theis, 1942.

Water-level measurements were continued in 1949 in about 70 observation wells in the Carlsbad area. Bimonthly measurements of water levels were made in about 17 wells including well 22.26.24.224 which is equipped with a recording gage. A total of 148 measurements was made in the observation wells in 1949.

Most of the irrigation wells in the area are used for a supplemental ground-water supply on the land of the Carlsbad Irrigation District. Pumping of ground water onto these lands, therefore, varies from year to year depending upon the available supply of surface water and the precipitation. Irrigated land west of the Southern Canal receives water from wells and variations in the pumpage are the result of variations in the precipitation. Some recharge to the aquifer is received during times of flood in Dark Canyon Draw.

The precipitation in 1949 at Carlsbad was more than 18.3 inches, more than 5 inches above normal and about 4 inches above 1948. Most of the excess precipitation was in January, May, June, and September with 14.5 inches, 5.0 inches above normal, falling during the main part of the growing season April through September. The excess precipitation and adequate surface-water supplies resulted in only small amounts of ground water being used for supplemental irrigation on lands of the district. Pumping of ground water for lands west of the canal was undoubtedly considerably less than in 1948.

Pumpage from the airfield wells reportedly was 69 million gallons in 1949, essentially the same as in 1948. The pumping ranged from 4.8 million gallons in January, 4.4 million gallons in April, 8.5 million gallons in August, to 4.1 million gallons in December.

Changes of Water Levels

Because of the small amount of pumping caused by the nearly adequate supply of surface water and excess precipitation, the water levels showed favorable net annual rises in 1949 in all except three observation wells. East of the canal the water levels rose from less than 2 feet west of the Pecos River to a maximum of more than 7 feet near Otis.

A net rise of water level of as much as 6 feet was observed in a well about a mile south of Loving. The area of greatest rises practically paralleled the east side of the Southern Canal. Net rises of water level, in excess of 4 feet, also occurred east of the canal in 1948. However, because of the fairly large declines during 1947, the first year of concentrated pumping, the water levels east of the canal at the end of 1949 were, in general, about 2 feet lower than when records began in 1947.

The water levels also rose in 1949 under most of the area west of the canal. Rises of more than 7 feet were observed in the airport wells. However, in the area of heavy pumping west of the canal and east of the airport, declines in excess of 2 feet occurred. Declines in this area also occurred in 1947 and 1948 of about 12 and 7 feet respectively. Thus, in at least part of the area of heavy pumping west of the canal, the lowering of water level has been as much as 20 feet since records began in February 1947. (See fig. 17.)

The bimonthly measurements of water level show that when surface water is available the water level in the area east of the canal is generally lowest in the spring prior to irrigation and rises throughout the summer to its high level for the year in about September. The seepage to the ground-water body from applied irrigation water and from the canals is quite evident. When there is excessive pumping, and surface water is inadequate, the pattern of seasonal fluctuations changes in accordance with the change in conditions. In the area west of the canal where irrigation is exclusively by ground water, the low level for the year is in August or September, near the end of the pumping season.

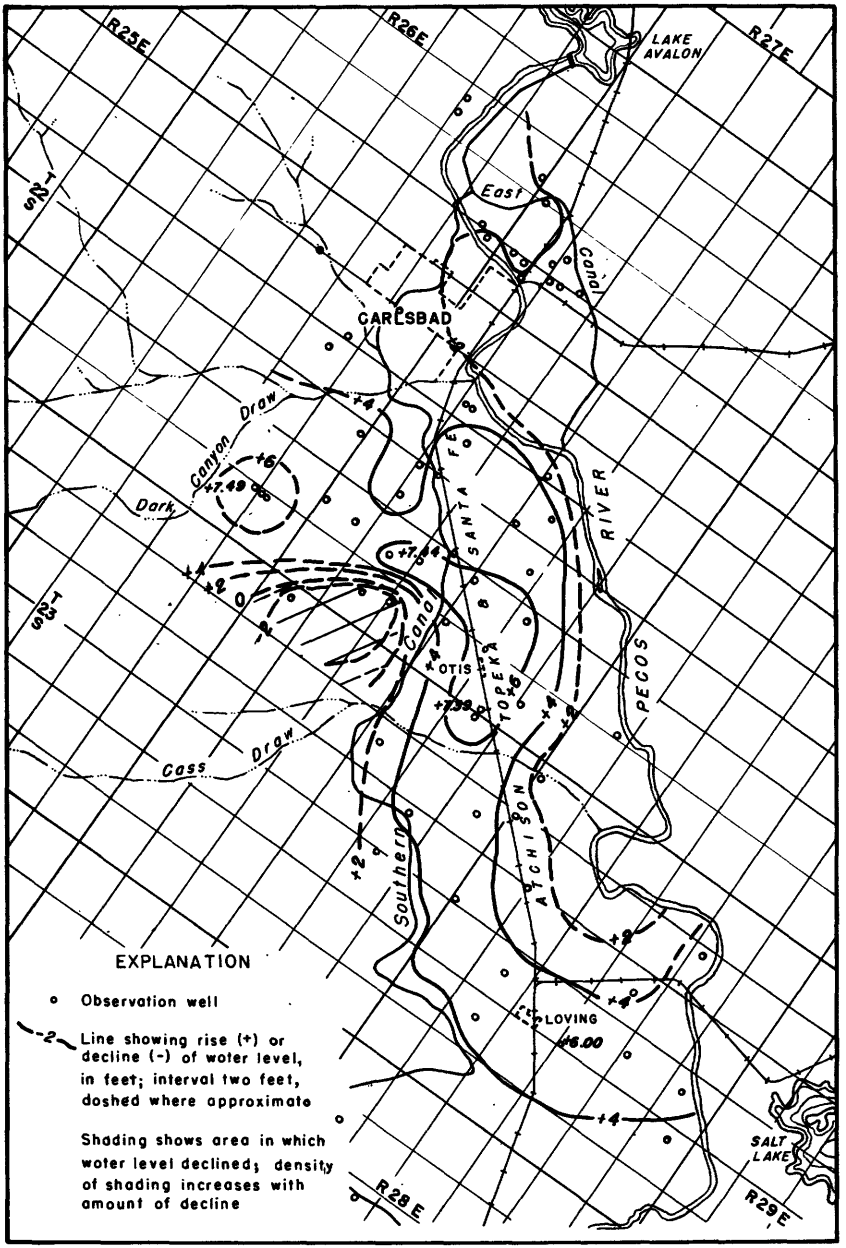


Figure 17.--Map of Carlsbad area, Eddy County, showing rise in water levels from January 1949 to January 1950.

As water is pumped for irrigation in the area east of the canal mainly as a supplement to the surface water, the water levels will, in general, show net annual rises or declines dependent upon the amount of surface water available. In the area west of the canal, irrigation is exclusively by ground water and as a consequence the water levels will, in general, show a year to year decline except when precipitation is excessive. As the natural gradient of the water table is small, and to the east, lowering of water levels in the area west of the canal may tend to draw the poorer quality of water from east of the canal toward the wells.

Part 2. Water levels in January 1949 and highest and lowest recorded levels in January or February, below land-surface datum, and change from January 1948 to January 1949, in feet

Location number	Owner	See also part	Water levels							Record	
			Jan. 1949 Level	Day	Change 1948-49	Highest Level	Year	Lowest Level	Year	Began	Years missing
16.25.1.Lot 3	Pearson Bros.	.	16.31	15	-1.47	10.61	44	19.40	38	38	
1.Lot 13a	Charles Buck	.	c18.90	14	-.64	14.66	44	c18.90	49	43	
1.344	Buck Bros.	3	b23.65	14	-5.75	9.50	42	b17.90	48	38	
2.Lot 9	Ralph Pearson	5	18.94	14	-1.87	14.07	44	a20.90	45	38	39
2.Lot13	Ralph Pearson	5	16.84	14	.....	.....	..	.....	..	49	
2.Lot15	Ralph Pearson	5	121.16	14	-2.31	17.35	44	121.16	49	40	
4.Lot12	J. E. Taylor	5	119.35	14	.....	10.58	42	119.35	49	38	48
5.Lot 4	E. P. Malone, Jr.	.	10.13	14	+2.65	9.22	42	13.35	45	38	
5.Lot 5	E. P. Malone, Jr.	.	11.35	14	-.42	9.48	42	14.17	45	42	
5.Lot13	Fred Croom	.	12.42	14	-6.56	3.12	47	15.72	38	38	
5.443	W. M. Ault	.	13.26	14	+4.70	8.27	42	18.66	46	38	
6.Lot 4	F. M. Nelson	3	12.03	14	+1.03	11.42	42	a15.40	38	38	
6.313	Frank Childress	4	27.94	14	+.28	f27.27	42	f30.30	41	38	
8.111	Pearson Bros.	.	30.59	21	+.04	24.27	45	a31.39	40	38	39
10.333	Orval Gray	.	a79.49	15	-22.33	56.55	44	60.48	46	44	47
10.334	Orval Gray	5	c160.84	15	-6.91	48.60	42	53.93	48	38	40,41
11.133	J. J. Terry	.	44.40	14	-4.78	34.46	44	44.40	49	44	
11.233	Noah Buck	.	40.75	14	-3.98	28.45	42	40.75	49	38	
12.124	Buck Bros.	.	bj32.93	14	-2.44	15.45	42	bj32.93	49	38	
12.412	T. J. Terry	5	bi34.63	14	.....	10.85	42	14.17	41	38	46,48
13.211	T. J. Terry	5	ic23.7	15	+12.4	19.64	42	36.14	48	39	
13.211a	T. J. Terry	5	a68.35	15	.....	.....	..	.....	..	49	
14.213	L. T. Lewis	.	46.19	15	-4.19	30.70	42	46.19	49	38	
15.233	J. H. Everest	.	(a)	15	.....	64.20	39	85.32	48	39	40,41,49
15.331	J. H. Everest	.	97.38	15	-1.25	82.78	38	97.38	49	38	40,41
24.212	Monroe Howard	.	52.88	19	-5.69	30.42	42	52.88	49	38	
25.211	James Buck	.	69.90	13	-2.07	67.83	48	69.90	49	48	
16.26.5.Lot 3	Ed. Taylor	.	j15.09	15	.....	22.73	42	29.12	47	38	48
5.Lot 4	H. V. Parker	.	34.05	15	-.23	27.35	42	34.05	49	38	45
5.331	J. L. Taylor	.	20.95	15	-.21	16.21	38	20.95	49	38	
6.Lot 2	H. V. Parker	.	33.07	15	-1.27	24.07	42	33.07	49	38	41,43
6.Lot 4	H. V. Parker	.	34.96	15	-1.01	27.15	42	34.96	49	38	40,41
6.Lot 4a	H. V. Parker	.	22.92	15	-1.92	19.99	46	29.06	45	44	
7.121	L. T. Lewis	.	29.23	14	+2.76	7.20	42	31.99	48	38	
7.321	T. J. Frink	.	24.08	15	-.86	3.09	42	24.08	49	38	
8.111	Ira S. Reser	.	17.32	15	+1.98	12.45	42	19.30	48	38	

* See footnotes at end of table.

Part 2 --Continued

Location number	Owner	See also part	Water levels: Jan. 1949 Level	Day	Change 1948-49	Highest Level	Year	Lowest Level	Year	Record: Began	Years missing
16.26.15.333	Carl Manda	.	13.71	19	+.10	9.66	42	13.81	48	42	
16.313	V. L. Gates	5	111.56	19	-1.92	3.80	42	111.56	49	38	
17.311	W. R. Roberts	.	33.02	15	-1.36	16.68	42	33.02	49	38	
17.331	Elzie Swift	.	23.54	15	.....	6.12	43	23.54	49	38	42,48
18.331	Monroe Howard	.	36.93	19	.....	14.32	42	36.93	49	38	46,48
18.411	Ira S. Reser	.	a39.59	15	-9.88	13.29	42	29.71	48	38	41
19.113	H. E. Hall	.	39.71	19	-3.79	16.19	42	39.71	49	39	
19.133	E. Jeffers	.	j44.97	13	-10.34	16.54	42	34.63	48	38	
19.211	H. V. Parker	.	31.24	19	-4.32	9.34	42	31.24	49	38	
19.411	E. Jeffers	3	30.20	13	+2.61	27.84	42	37.18	46	38	
21.333	J. H. Everest	..	17.05	15	-3.08	2.09	42	17.05	49	38	
28.333	H. L. Williams	3	29.62	13	-2.95	9.57	42	29.62	49	38	
28.431	R. E. Coleman	.	21.92	13	-1.63	8.72	42	21.92	49	38	
30.431	Alvin Bowman	5	66.13	14	.....	.....	..	.....	..	49	
31.311	F. R. Zumwalt	5	84.76	19	.....	.....	..	.....	..	49	
31.413	T. F. Wilson	.	63.47	14	.....	35.33	38	63.47	49	38	48
32.231	B. E. Green	.	47.05	13	-5.30	20.41	43	47.05	49	43	
32.411	B. E. Green	.	42.24	13	-3.68	15.20	42	42.24	49	38	41
32.421	Smith Bros.	.	38.04	13	-4.57	13.78	42	38.04	49	38	45
35.113	J. T. Fulton	.	14.45	13	-.98	7.86	43	14.45	49	43	
17.25.1.143	Fred Savoie	5	119.00	8	.....	.....	..	.....	..	49	
12.211	Artesia Country Club	.	94.02	7	-3.93	90.09	48	94.02	49	48	
13.131	O. L. Latham	.	113.43	8	-4.17	85.20	42	113.43	49	38	41
22.224	J. M. Jackson	.	164.61	8	-4.02	135.66	42	164.61	49	38	40
24.433	J. M. Jackson	.	b112.38	8	-2.40	82.40	42	b112.38	49	38	46
26.221	Sam Sanders	5	126.41	8	.....	.....	..	.....	..	49	
26.222	Sam Sanders (Measurements discontinued, well filled)					91.56	42	116.10	48	38	46,49.
35.411	Ed Kissinger Estate	3	131.66	6	-3.76	107.95	43	131.66	49	38	
17.26.2.133	Fred Savoie	.	11.73	13	-.37	5.62	42	11.73	49	38	
3.231	H. R. Rogers	.	12.53	13	-.29	4.61	42	12.53	49	38	
3.333	A. T. Woelk	.	.....	..	.....	7.04	42	12.63	46	42	47-49
3.433	Mrs. R. W. Box	.	113.62	13	+2.66	5.23	42	113.62	49	38	43,48
4.121a	State of New Mexico	.	20.87	13	-.91	16.60	47	20.87	49	47	
4.331a	Joe Nunn	5	27.48	13	.....	.10	38	27.48	49	38	46-48
4.331b	Joe Nunn	.	12.7	13	+1.8	.55	42	14.5	48	39	
4.331c	Joe Nunn	5	22.92	13	.....	.....	..	.....	..	49	

* See footnotes at end of table.

Part 2 --Continued

Location number	Owner	See also part	Water levels							Record	
			Jan. 1949 Level	Day	Change 1948-49	Highest Level	Year	Lowest Level	Year	Began	Years missing
17.26.4.413	R. R. McCorkle	5	122.78	13	-.22	9.48	41	122.78	49	38	40,42,44,45
5.422	J. L. McCabe	.	18.76	13	-1.22	9.83	42	18.76	49	38	
6.213	Martin Yates, Jr.	.	a80.97	8	-20.19	42.73	46	60.78	48	46	
6.413	Fred and B. A. Savoie	.	.....	..	.....	34.75	42	42.24	45	38	46-49
7.131	J. W. Collins	.	71.79	7	+3.92	42.87	42	71.79	49	38	40,48
7.221	Buck Jernigan	.	57.50	7	-1.82	32.74	44	57.50	49	44	
7.344	W. F. Culbertson	3	62.66	7	-3.99	31.53	42	62.66	49	40	
7.421	Ivan Rogers	.	48.68	8	-3.18	19.24	42	48.68	49	38	41
7.423	C. A. Houghton	.	46.99	8	-3.55	15.87	42	46.99	49	40	46
7.433	Ed. Stone	.	c60.37	7	-7.14	26.90	42	53.23	48	38	41
7.444	Albert Blake	.	50.07	7	-3.77	20.98	42	50.07	49	38	
10.333	V. L. Gates	3,5	14.32	6	-5.60	4.60	42	14.32	49	39	
10.433	D. D. Sullivan	.	23.36	6	-3.51	14.41	42	23.36	49	38	46
11.313	W. T. Haldeman	5	5.80	6	.....	.....	..	.....	..	49	
15.113	R. L. Vogel	.	17.69	6	-6.32	1.48	42	17.69	49	38	41,43
15.121	R. L. Vogel	.	a26.88	6	-7.43	5.00	42	a19.45	48	38	41
15.211	J. M. Vogel	.	21.12	6	-3.61	11.57	42	21.12	49	38	
15.411	W. M. Jackson	.	21.13	6	-3.20	11.25	42	22.90	46	38	
16.333	Artesia Cemetery	3	27.84	6	-2.16	6.14	42	27.84	49	38	
16.411	G. G. Armstrong & Son	.	25.69	6	-2.57	11.34	42	25.69	49	39	
17.423	H. A. Denton	.	a31.04	6	.....	17.93	45	21.58	47	38	40,42,48
18.433	A. C. Baca	.	69.17	6	-2.26	38.61	42	69.17	49	38	
18.442	Mrs. Murphy	5	56.08	6	-.58	26.30	42	56.08	49	38	41
20.133	J. W. Sharp & H. J. Whitaker	.	54.68	6	+.83	25.48	42	55.51	48	38	43
21.112	Roger Durand	.	28.90	6	-2.17	8.63	42	28.90	49	38	46
21.341	W. S. Hogsett	.	16.80	6	-2.53	.53	43	16.80	49	38	42
22.233	R. L. Paris	.	25.92	6	-.56	18.34	42	25.92	49	38	
24.333	Mary E. Yates	3	3.07	6	+.75	2.13	42	3.82	48	41	
27.413	W. L. Martin	.	(a)	6	.....	11.16	42	15.45	48	38	40,41,49
27.423	W. L. Martin	.	14.81	6	.....	10.38	42	15.90	41	38	48
28.331	C. E. Martin	.	31.70	6	-4.62	8.78	42	31.70	49	38	
29.131a	C. E. Martin	.	53.48	6	-.03	26.04	42	53.48	49	38	
31.133	Dale & Massey	.	81.92	6	-3.19	56.57	43	81.92	49	38	
18.25.23.111	Mrs. G. M. Phelps	3	123.24	5	-7.98	90.67	42	123.24	49	42	
18.26.2.333	S. O. Higgins	.	14.30	6	+.25	10.75	46	14.55	48	38	41

See footnotes at end of table.

Part 2 --Continued

Location number	Owner	See also part	Water levels: Jan. Level	1949 Day	Change 1948-49	Highest Level	Highest Year	Lowest Level	Lowest Year	Record: Began	Years missing
18.26.4.111b	Frank Watkins	3	33.19	6	-1.20	18.19	43	33.19	49	k38	
4.433	Chas. Rogers	.	27.72	6	-1.18	16.82	43	27.72	49	38	46
7.234a	C. H. Hutsonpiller	4	59.77	5	+.95	f43.62	43	f61.21	48	39	
7.234c	C. H. Hutsonpiller	.	61.88	5	-2.56	53.73	44	61.88	49	39	42
9.133	Martin Yates, Jr.	.	39.83	5	+.51	26.01	43	40.34	48	43	
9.311	C. T. McCauley	.	38.53	5	+.90	26.62	43	39.43	48	39	40
10.311a	Charles Rogers	.	17.93	6	+.37	17.93	49	18.30	48	48	
15.133	J. D. Terry Estate	.	24.51	5	-2.05	15.78	42	24.51	49	38	41
15.311	Charles Martin	.	.....	.	.....	14.16	42	22.02	40	38	49
18.241	Ralph Thorp	.	58.10	5	-2.19	37.50	43	58.10	49	38	40
18.323	F. F. Thorp	5	j62.81	5	-4.35	38.49	43	j62.81	49	38	40
21.344	Town of Dayton	4	52.55	4	-2.79	f32.97	43	f52.56	49	39	
22.314	Mrs. W. D. Eads	5	118.37	5	-1.09	8.16	43	118.37	49	38	40,41
23.131	Charles Martin	5	31.38	5	.....	.....	..	.....	..	49	
23.213	R. G. Goodwin	5	127.43	5	.....	17.55	42	27.80	41	38	47,48
.24.131	R. G. Goodwin	.	20.36	5	+1.30	14.16	43	22.77	47	43	
24.223a	R. G. Goodwin	3,5	6.44	5	+1.95	6.44	49	8.39	48	48	
28.143	Town of Dayton	.	60.92	4	-2.72	52.87	47	60.92	49	47	
33.111	L. T. Lewis	.	77.92	4	-3.21	64.22	45	77.92	49	38	47
19.26.12.323	Forrest Lee (Measurements discontinued, well dry)					15.74	42	27.57	46	39	48,49
12.323b	Forrest Lee	5	34.07	4	+.31	34.07	49	34.38	48	48	
12.333	Ollie Banks (Measurements discontinued, well dry)					22.21	43	32.76	47	41	42,48,49
13.211a	R. L. House	.	24.17	4	+.95	19.10	47	25.12	48	47	
13.344	R. W. Rankin	3	13.33	4	.....	2.70	42	e16.08	48	42	45,48
14.431a	Albert Lee	3	c37.17	4	.....	11.75	45	15.88	46	45	47,48
14.431b	Albert Lee	3	a44.11	4	-17.25	16.43	47	26.86	48	47	
27.233	Lakewood School	3	60.88	4	-1.80	40.73	43	60.88	49	38	40
28.334	L. T. Lewis	.	70.38	4	-2.89	46.20	42	70.38	49	38	40
28.441	L. T. Lewis	.	76.41	4	-2.93	53.11	42	76.41	49	38	47
33.412	J. H. Everest	.	55.15	4	+1.02	39.63	42	56.17	48	38	
20.26.6.431	J. G. Moutry & Sons	5	159.59	4	-.52	35.67	42	159.59	49	38	
7.122	P. S. Campbell	3	157.83	4	+.05	36.57	42	57.88	48	38	
7.421	E. Manthei	.	(a)	4	.....	30.99	42	50.03	48	38	39,46,47,49
8.112	J. G. Moutry & Sons	.	45.66	4	-.47	24.15	42	45.66	49	38	
17.231	J. E. Howell	.	61.29	4	-.86	55.50	47	61.29	49	47	
17.411	J. H. Angell	.	51.05	9	-1.17	43.00	42	51.05	49	38	46
21.112	Manuel Hernandez *	5	22.63	4	-.93	17.31	47	22.63	49	46	

* See footnotes at end of table.

Part 2.--Continued

Location number	Owner	See also part	Water levels							Record	
			Jan. 1949 Level	Day	Change 1948-49	Highest Level	Year	Lowest Level	Year	Began	Years missing
			Carlsbad Area								
21.26.23.131	Judson Boyd	.	35.48	30	+2.24	34.0	47	37.72	48	47	
23.133	Judson Boyd	5	36.55	30	.....	.....	..	.....	..	49	
24.424	L. F. Rayroux	.	48.26	27	+2.08	50.0	47	150.34	48	47	
25.344	Unknown	.	17.28	27	+2.27	17.28	49	19.55	48	48	
36.212	Unknown	.	24.35	27	-1.36	22.99	48	24.35	49	48	
21.27.19.334	F. R. Dickson	3	28.22	27	+2.03	26.8	47	130.25	48	47	
29.311	T. Ives	.	9.37	27	+2.13	9.37	49	11.50	48	48	
29.434	Fred O'Chesky	.	17.62	27	+1.29	17.62	49	19.91	48	48	
30.442	T. Ives	3	10.14	27	+.49	10.14	49	10.63	48	48	
31.112	Jim Stagner	.	9.29	27	+2.18	9.29	49	11.47	48	48	
31.211	G. A. Blitz	.	8.90	27	+2.20	8.90	49	11.10	48	48	
31.214	Unknown	.	18.79	27	-2.37	16.42	48	18.79	49	48	
32.111	L. E. Loman	.	16.18	27	-1.53	14.65	48	16.18	49	48	
32.112	L. E. Loman	.	5.43	27	+2.23	5.43	49	7.66	48	48	
22.26.3.344	O. G. Willis	3	75.05	29	+2.86	75.05	49	77.91	48	48	
11.443	Unknown	.	48.35	29	+1.84	48.35	49	50.19	48	48	
12.112	Joe Boyd	.	26.88	29	+1.82	22.7	47	28.70	48	47	
12.311	A. J. Bradley	.	38.84	29	+.91	38.84	49	39.75	48	48	
14.213	H. E. Stevenson	3	66.82	29	+.88	66.82	49	68.70	48	48	
24.224	D. N. Vest	4	84.67	29	+.65	84.67	49	85.32	48	48	
25.432	R. V. Barfield (Measurements discontinued, well dry)					111.41	45	125.21	48	45	49
35.222	Carlsbad Airfield No. 3	3	156.80	30	-3.65	135.70	43	156.80	49	43	
36.111	Carlsbad Airfield No. 1	3	155.69	30	-3.00	135.09	43	155.69	49	43	45
36.111a	Carlsbad Airfield No. 2	3	155.48	30	-3.27	134.75	43	155.48	49	43	
22.27.8.313	George Mashaw	.	23.12	27	+.11	23.12	49	23.23	48	48	
8.314	George Mashaw	.	19.26	27	+.19	19.26	49	19.45	48	48	
10.333	Mrs. M. Knifer	3	10.64	27	+.94	10.64	49	11.58	48	48	
15.333	Fred Forni	.	41.74	28	+.65	35.9	47	142.39	48	47	
15.411	Fred Forni	.	14.04	28	+1.05	14.04	49	15.09	48	48	
17.124	W. W. Glaze	.	29.76	28	+.93	29.76	49	30.69	48	48	
20.111a	E. C. Walterscheid	5	46.78	28	.....	.....	..	.....	..	49	
20.122	Mr. Calvanis	.	145.68	28	+3.19	36.9	47	48.87	48	47	
20.313	Frank Zugary	.	76.61	28	-1.50	62.35	47	76.61	49	47	
21.344	Dr. Pate	.	51.65	28	+3.28	51.65	49	54.93	48	48	
22.421	Enea Grandi	3	32.99	28	+1.80	32.99	49	34.79	48	48	
26.114	Caesar Grandi	.	32.17	28	+1.32	25.3	47	33.49	48	47	

* See footnotes at end of table.

Part 2 --Continued

Location number	Owner	See also part	Water levels							Record	
			Jan. Level	1949 Day	Change 1948-49	Highest Level	Highest Year	Lowest Level	Lowest Year	Began	Years missing
22.27.27.113	Caesar Grandi	.	42.80	28	+2.48	35.0	47	145.28	48	47	
28.133	I. L. Skeen.	3	64.49	28	-2.13	62.36	48	64.49	49	48	
29.133	Frank Gentry	.	94.01	28	-2.01	92.00	48	94.01	49	48	
29.413	Mr. Rogers	.	79.97	28	-2.50	77.47	48	79.97	49	48	
30.133	W. H. Merchant	3	113.80	12	-1.43	98.94	45	113.80	49	45	
30.243	Mr. Yarbro	5	100.65	28	-2.19	98.46	48	100.65	49	48	
32.233	Mr. Brenningstool	.	93.55	29	-6.86	86.69	48	93.55	49	48	
33.131	Unknown	.	69.12	29	+1.87	69.12	49	72.97	48	48	
34.111	L. T. Lewis	5	150.12	28	+5.40	41.5	47	155.52	48	47	
35.111	W. Craft	.	36.04	28	+2.55	26.7	47	138.59	48	47	
35.433	Munoz Methola	3	34.44	28	+2.10	34.44	49	36.54	48	48	
36.133	Brantley & Williams	.	25.52	28	+1.47	18.7	47	26.99	48	47	
22.28.30.443	Calvani Bros.	.	11.63	28	+.30	11.63	49	11.93	48	48	
23.27.2.122	Jim Derrick	.	37.77	28	+1.71	28.1	47	39.48	48	47	
4.333	Jones & Turner	5	98.30	29	.....	.....	..	.....	..	49	
6.213	J. A. & W. A. Ashbacker	.	131.16	29	-7.93	123.23	48	131.16	49	48	
10.143	A. A. Crabb	.	7.83	29	+4.12	7.83	49	11.95	48	48	
12.233	Bird Bros.	.	35.48	29	+.52	35.48	49	36.00	48	48	
14.124	A. M. House	.	71.32	29	+2.73	69.8	47	74.05	48	47	
23.211	W. H. Sweavingen	3	23.78	29	-.34	23.44	48	23.78	49	48	
23.28.6.131	Julius Roberson	.	15.49	29	+.74	12.4	47	16.23	48	47	
7.113	G. Brantly	.	24.18	28	+.78	18.5	47	24.96	48	47	
8.421	E. D. Rosson	.	.....	..	.....	27.2	47	33.36	48	47	49
11.114	Bonney Yarbro	.	16.05	29	.....	15.7	47	16.05	49	47	48
15.411	Joe Yarbro	.	11.39	29	+3.14	9.5	47	14.53	48	47	
18.222	Mr. Carter	.	25.00	28	+1.38	25.00	49	26.38	48	48	
18.333	L. T. Lewis	.	62.33	29	+.52	56.5	47	62.85	48	47	
20.144	Mr. Carter	.	53.05	29	+1.85	53.05	49	54.90	48	48	
22.333	J. L. Seal	.	41.03	29	+5.09	41.03	49	46.12	48	48	
23.133	A. R. Donaldson	3	47.92	29	+3.37	47.92	49	51.29	48	48	
24.134	Buford Yarbro	.	41.78	29	+1.86	39.5	47	143.64	48	47	
25.213	Ray Howard	.	37.32	29	+3.30	35.7	47	140.62	48	47	
29.411	Unknown	.	20.85	29	-.19	20.66	48	20.85	49	48	
24.28.7.231	L. T. Lewis	.	16.52	29	+3.70	16.52	49	20.22	49	48	
17.231	Carleton & Kraft	.	24.54	29	-1.36	23.18	48	25.1	47	47	
25.123	J. E. Montgomery	.	4.86	29	+.98	4.86	49	5.84	48	48	

a Pumping.
b Pumping recently.
c Nearby well pumping.
e Dry at depth given.
f From recorder chart.
i Possible discrepancy of a few tenths of a foot between present and previous land-surface data.
j Measurement uncertain.
k March.
m February.

Part 3

Water levels, in feet below land-surface datum, during 1949

Roswell Basin

Location number	16.25. 1.344	16.25. 6.Lot 4	16.26. 19.411	16.26. 28.333	17.25. 35.411	17.26. 7.344	17.26. 10.333	17.26. 16.333
Owner	Buck Bros.	Nelson	Jeffers	Williams	Kiss-inger	Gulbert-son	Gates	Cemetery
Jan.6,7,13,14	b23.65	12.03	30.20	29.62	131.66	62.66	14.32	27.84
Mar.15,16	b26.67	11.88	31.74	31.50	132.67	65.80	b33.30	42.69
May 13,16	24.05	11.56	29.10	33.64	135.75	(a)	21.16	42.25
July 15,16,20	b28.00	11.96	24.66	35.51	136.10	68.64	23.15	47.03
Sept.14,17	b22.90	12.30	21.63	37.63	138.01	71.17	18.79	36.25
Nov. 7	16.10	12.92	27.37	32.44	134.98	64.53	13.68	a28.28

Location number	17.26. 24.333	18.25. 23.111	18.26. 4.111b	18.26. 24.223a	19.26. 13.344	19.26. 14.431a	19.26. 14.431b	20.26. 7.122	19.26 27.233
Owner	Yates	Phelps	Watkins	Goodwin	Rankin	Lee	Lee	Cambell	School
Jan.4-6	3.07	123.24	33.19	6.44	13.33	c37.17	a44.11	157.83	60.88
Mar.15,16	2.74	134.87	34.25	10.69	12.68	c37.15	a45.69	b59.53	a71.23
May 13,16	2.72	131.83	37.02	5.01	13.54	27.83	27.08	61.09	62.36
July 20,21	3.58	140.64	b39.82	5.70	14.73	c38.92	a46.86	b62.17	60.20
Sept.15,17	2.64	136.75	38.66	5.92	14.18	27.27	26.74	66.19	a59.58
Nov. 7,8	3.08	125.11	34.05	5.22	11.49	21.22	20.66	60.04	a57.76

Carlsbad Area

Location number	21.27. 19.334	21.27. 30.442	22.26. 3.344	22.26. 14.213	22.26. 35.222	22.26. 36.111	22.26. 36.111a
Owner	Dickson	Ives	Willis	Steven-son	Air-field	Air-field	Air-field
Jan.27,29,30	28.22	10.14	75.05	66.82	156.80	155.69	155.48
Mar.18,19	27.48	9.39	c74.70	a71.78	155.34	154.29	154.13
May 17-19	(a)	9.16	c76.06	66.46	166.49	165.42	165.27
July 23-25	28.28	b8.58	c75.87	66.41	164.81	163.76	163.61
Sept. 21	27.11	7.80	c74.11	65.37	j165.71	166.27	165.95
Nov. 9	27.13	9.32	73.25	65.12	155.07	b154.05	153.88

Location number	22.27. 10.333	22.27. 22.421	22.27. 28.133	22.27. 30.133	22.27. 35.433	23.27. 23.211	23.28. 23.133
Owner	Enifer	Grandi	Skeen	Mer-chant	Methola	Swea-vingen	Donald-son
Jan.27-29	10.64	32.99	64.49	.....	34.44	23.78	47.92
Feb. 12	.....	.....	.....	113.80	.....	.....	.....
Mar. 17-19	14.25	35.10	63.00	114.96	34.71	23.50	47.51
May 17,18	10.84	34.30	74.34	125.20	37.02	23.61	48.16
July 22,23,25	6.10	28.70	74.41	123.98	27.15	23.00	44.77
Sept.19-21	4.23	23.71	75.13	126.31	23.29	22.05	39.89
Nov. 9,14	5.11	23.82	62.56	112.62	24.32	20.83	40.49

a Pumping.
b Pumping recently.
c Nearby well pumping.
i Possible discrepancy of a few tenths of a foot between present and previous land-surface data.
j Measurement uncertain.

Part 4

16.25.6.313. Frank Childress.

Highest daily water level, from recorder charts

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 14	27.88	Mar. 16	27.72	Apr. 12	27.74	July 22	28.37
15	27.88	17	27.72	May 12	27.88	Sept. 14	h28.66
16	27.96	18	27.90	13	27.79	15	28.63
17	27.96	19	27.78	14	27.77	16	28.53
21	27.97	20	27.61	15	27.74	17	28.51
22	27.91	21	27.63	16	27.71	18	28.51
23	27.89	22	27.74	17	27.73	19	28.68
24	27.91	23	27.63	18	27.80	20	28.59
25	28.07	24	27.69	19	27.85	21	28.57
26	27.92	25	27.67	20	27.90	Nov. 7	28.11
27	27.84	26	27.76	July 15	h28.32	8	28.05
28	27.89	Apr. 5	27.95	16	28.30	9	28.05
Mar. 10	27.77	6	27.90	17	28.22	10	28.04
11	27.73	7	27.87	18	28.24	11	28.04
12	27.73	8	27.77	19	28.30	12	28.22
13	27.79	9	27.79	20	28.28	13	28.28
14	27.89	10	27.93	21	28.28	14	28.19
15	27.87	11	27.91				

h Tape measurement at odd hour.

18.26.7.234a. C. H. Hutsompiller.

Highest daily water level, from recorder charts

Day	Jan.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	59.87	.....	62.37	.....	64.27	63.89	66.85	.....	.....	.....	60.84
2	59.76	.....	62.52	.....	64.37	63.95	66.97	.....	.....	.....	60.73
3	59.76	.....	62.68	.....	64.46	64.02	67.11	.....	.....	.....	.....
4	59.79	.....	62.83	64.44	.....	64.09	67.27	.....	.....	.....	.....
5	h59.77	.....	62.90	64.45	.....	64.17	67.38	.....	.....	.....	.....
6	59.76	.....	62.98	64.45	64.82	64.21	.....	.....	.....	.....	.....
7	59.69	.....	63.11	64.44	64.81	.....	.....	h70.20	.....	h62.95	60.18
8	59.68	.....	63.21	64.43	64.79	.....	.....	70.22	.....	62.84	60.19
9	59.67	.....	63.32	64.41	64.79	.....	.....	70.29	.....	62.75	60.06
10	59.72	59.30	63.47	64.37	64.80	.....	h68.08	70.34	.....	62.62	59.95
11	59.69	59.35	63.56	64.34	64.76	.....	68.13	70.37	.....	62.57	59.95
12	59.61	59.48	63.63	64.21	64.72	.....	68.26	70.29	.....	62.50	59.96
13	59.55	59.65	63.71	h64.16	64.66	.....	68.39	70.23	.....	62.39	59.88
14	59.47	59.77	.....	64.15	.....	.....	68.51	70.11	.....	62.30	59.84
15	59.45	59.91	.....	64.12	.....	.....	68.62	70.31	.....	.....	.....
16	59.47	60.02	.....	64.09	64.39	h65.12	68.74	70.11	.....	.....	.....
17	59.38	60.14	.....	64.08	64.36	65.13	68.86	69.93	.....	62.04	.....
18	59.37	60.32	.....	64.07	64.33	65.14	68.97	69.75	.....	61.92	.....
19	59.38	60.44	h61.84	64.06	64.28	65.19	.....	69.56	.....	61.80	59.66
20	59.30	60.55	61.86	64.02	64.21	65.30	.....	69.37	65.80	61.77	59.57
21	59.27	60.66	61.90	.....	64.15	65.43	.....	69.18	65.73	61.66	59.58
22	59.21	60.86	61.94	.....	64.06	65.55	.....	69.00	65.58	61.54	59.58
23	59.17	60.97	61.97	.....	63.98	65.67	h69.55	68.83	65.49	61.44	59.51
24	59.16	61.13	62.00	.....	.....	65.81	69.59	68.72	65.37	61.38	59.41
25	59.15	61.33	61.99	.....	.....	65.93	69.67	68.60	65.26	61.26	59.40
26	59.07	61.46	61.99	64.08	.....	66.04	69.75	68.49	65.13	61.17	59.33
27	.....	61.63	.....	64.09	.....	66.17	69.84	68.35	64.93	61.09	.....
28	.....	61.74	.....	64.11	63.79	66.29	69.92	68.18	.....	61.03	.....
29	.....	61.87	.....	64.13	63.78	66.46	69.99	68.02	.....	60.98	.....
30	.....	62.06	.....	64.16	63.80	66.60	70.06	.....	.....	60.86	.....
31	.....	62.21		64.19		66.73	70.13		.....		.....

18.26.21.344. Town of Dayton.

Highest daily water level, from recorder charts

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	52.56	51.99	51.70	52.75	.....	.....	54.52	55.21	56.29	56.26	55.29	54.35
2	52.52	51.93	51.73	52.78	.....	.....	54.53	55.23	56.32	56.23	55.29	54.28
3	52.56	51.92	51.75	52.85	.....	54.42	54.54	55.26	56.36	56.21	55.22	54.22
4	52.54	51.91	51.77	52.86	.....	54.46	54.56	55.32	56.39	56.17	55.19	54.23
5	52.52	51.87	51.78	52.91	53.96	54.47	54.58	55.35	56.44	56.11	55.18	54.14
6	52.49	51.88	51.83	52.94	54.04	54.49	54.61	55.38	56.45	56.10	55.13	54.14
7	52.42	51.83	51.81	52.95	54.02	54.50	54.64	55.41	56.49	.....	55.05	54.11
8	52.43	51.83	51.84	53.06	54.04	54.51	54.66	55.44	56.49	.....	55.01	54.10
9	52.42	51.82	51.91	53.12	54.05	54.53	54.70	55.48	56.52	.....	54.99	54.06
10	52.41	51.79	51.90	53.19	54.04	54.52	54.70	55.54	56.54	.....	54.95	54.05
11	52.39	51.75	51.92	53.22	54.08	54.51	54.73	55.58	56.57	.....	54.93	54.05
12	52.36	51.74	51.96	53.25	54.04	54.51	54.75	55.61	56.59	.....	54.91	54.05
13	52.33	51.72	52.01	53.27	54.04	54.51	54.77	55.65	56.61	.....	54.90	53.98
14	52.30	51.72	52.05	53.36	54.05	54.51	54.80	55.67	56.61	55.87	54.85	53.98
15	52.30	51.69	52.07	53.43	54.07	54.50	54.81	55.71	56.62	55.81	54.83	53.91
16	52.31	51.71	52.07	53.44	54.05	54.50	54.82	55.75	56.60	55.78	54.83	53.85
17	52.25	51.66	52.13	53.47	54.08	54.51	54.83	55.79	56.63	55.76	54.75	53.87
18	52.24	51.64	52.16	53.49	54.09	54.50	54.86	55.83	56.65	55.77	54.72	53.85
19	52.23	51.64	52.18	53.61	54.09	54.51	54.87	55.86	56.62	55.69	54.66	53.79
20	52.19	51.65	52.16	53.64	54.09	54.54	54.88	55.90	56.59	55.67	54.67	53.76
21	52.19	51.66	52.23	53.64	54.08	54.54	54.90	55.92	56.59	55.66	54.65	53.77
22	52.16	51.63	52.26	.....	54.10	54.55	54.93	55.93	56.57	55.62	54.56	53.75
23	52.15	51.62	52.29	.....	54.13	54.58	54.96	55.94	56.53	55.59	54.55	53.71
24	52.15	51.65	52.37	.....	54.15	54.57	54.98	56.02	56.48	55.57	54.54	53.66
25	52.12	51.66	52.38	.....	54.17	54.58	55.00	56.03	56.45	55.55	54.47	53.68
26	52.08	51.65	52.45	.....	54.19	54.58	55.03	56.10	56.44	55.53	54.46	53.63
27	52.06	51.70	52.49	.....	54.21	54.56	55.08	56.13	56.40	55.46	54.45	53.63
28	52.09	51.70	52.50	.....	54.25	54.53	55.11	56.16	56.37	55.43	54.38	53.59
29	52.04		52.51	.....	.....	54.50	55.14	56.19	56.33	55.37	54.37	53.57
30	51.99		52.64	.....	.....	54.50	55.17	56.22	56.29	55.37	54.36	53.54
31	52.00		52.69		.....		55.19	56.27		55.32		53.51

22.26.24.224. D. N. Vest.

Highest daily water level, from recorder charts, 1948

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Nov. 12	84.36	Nov. 29	84.90	Dec. 10	85.25	Dec. 21	85.57
13	84.41	30	84.95	11	85.21	22	85.69
14	84.42	Dec. 1	84.78	12	85.32	23	85.67
15	84.32	2	85.05	13	85.43	24	85.76
16	84.38	3	84.97	14	85.37	25	86.02
17	84.22	4	84.84	15	85.42	26	85.91
18	84.70	5	85.10	16	85.53	27	85.76
19	85.20	6	85.02	17	85.54	28	85.73
26	84.62	7	85.18	18	85.55	29	86.09
Nov. 27	84.70	8	85.08	19	85.55	30	86.02
28	85.03	9	85.47	20	85.48	31	85.97

22.26.24.224. D. N. Vest.

Highest daily water level, from recorder charts, 1949

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Nov.	Dec.
1	85.72	84.45	85.19	88.41	.....	86.26	81.94	79.66	79.02	.....	76.68
2	85.57	84.30	85.31	88.66	.....	86.22	81.81	79.68	78.75	.....	76.82
3	85.71	84.32	85.29	88.95	87.95	86.16	81.61	79.72	78.60	.....	76.79
4	86.01	84.40	85.27	89.17	87.86	86.08	81.49	79.87	78.67	.....	77.05
5	86.11	84.34	85.24	89.23	87.81	85.85	81.36	79.87	78.80	.....	.....
6	86.16	.....	85.36	89.24	87.67	.....	81.36	79.79	78.81	.....	76.88
7	85.90	.....	85.31	89.35	87.54	85.87	81.36	79.68	78.83	.....	76.96
8	85.90	.....	85.28	.....	87.44	85.16	81.42	79.49	78.78	.....	77.11
9	85.87	.....	85.48	.....	87.42	84.98	g82.46	79.47	78.79	.....	76.96
10	86.04	.....	85.41	.....	87.30	84.74	g82.36	79.56	78.60	.....	76.87
11	85.95	.....	85.41	89.35	87.23	g84.32	82.26	79.56	78.56	.....	76.99
12	85.77	.....	85.48	89.19	87.09	84.06	82.19	79.43	78.54	(m)	77.52
13	85.59	.....	85.59	89.12	86.97	83.86	82.15	79.33	78.54	.....	77.50

22.26.24.224--Continued.

Highest daily water level, from recorder charts, 1949

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Nov.	Dec.
14	85.39	84.74	85.66	89.19	86.91	g83.76	82.07	79.29	78.36	h75.59	77.62
15	85.36	84.75	85.58	89.29	86.86	g83.38	81.02	79.28	78.30	75.60	77.49
16	85.43	84.89	85.48	89.09	86.90	g83.37	80.87	79.10	78.11	75.90	77.32
17	85.23	84.86	85.56	89.02	86.96	g83.50	80.70	79.01	78.04	75.93	77.42
18	85.10	84.78	85.85	88.88	87.00	83.73	80.70	78.93	78.09	75.93	77.60
19	85.19	84.86	85.86	88.90	87.10	83.46	80.60	78.96	(k)	75.82	77.47
20	84.90	84.98	85.74	88.91	h86.97	83.23	80.39	79.07	.....	75.88	77.32
21	84.87	85.09	85.91	88.93	.....	g83.00	80.37	79.15	h78.42	76.30	77.51
22	84.70	.....	86.12	88.89	.....	g82.72	g80.30	79.08	.....	76.05	77.64
23	84.63	.....	86.25	88.90	.....	82.46	80.09	79.11	.....	76.13	77.50
24	84.66	.....	86.52	88.85	86.63	82.38	79.91	79.20	.....	76.12	77.25
25	84.63	.....	86.72	.....	86.59	82.34	79.70	79.22	.....	76.34	77.27
26	84.46	.....	87.02	.....	86.62	82.27	79.59	79.22	.....	76.24	77.32
27	84.32	.....	87.39	.....	86.62	82.25	79.65	79.31	.....	76.30	77.49
28	84.40	.....	87.50	.....	86.58	82.16	79.70	79.25	.....	76.43	77.38
29	84.68		87.66	.....	.....	82.08	79.69	79.08	.....	76.61	77.38
30	84.26		88.02	.....	.....	82.01	79.75	79.06	.....	76.68	77.36
31	84.34		88.20		86.38		79.72	78.97			77.39

g Estimated.
h Tape measurement at odd hour.
k Recorder removed Sept. 18, 1949.
m Recorder reinstalled.

Part 5

Miscellaneous Data Concerning Observation Wells

16.25.2.Lot 9. Pearson. Casing apparently cut off. Reference point, beginning Jan. 14, 1949, top of casing, 0.50 foot above land-surface datum.

16.25.2.Lot 13. Pearson. About 200 feet east of a north-south section line road, and about 150 feet southeast of red top house. Drilled irrigation well, equipped with a turbine pump, diameter 15½ inches. Reference point, top of casing, south side of well, at land-surface datum.

16.25.2.Lot 9. Pearson. Casing apparently cut off. Reference point, beginning Jan. 14, 1949, top of casing, 0.50 foot above land-surface datum.

16.25.2.Lot 15. Pearson. Reference point, beginning Jan. 14, 1949, top of casing, 1 foot below land-surface datum.

16.25.4.Lot 12. Taylor. Well cleaned out, casing cut off, equipped with hand pump. Reference point, beginning Jan. 14, 1949, top of casing, 0.55 foot above land-surface datum.

16.25.10.334. Gray. Well abandoned, pump removed, casing pulled.

16.25.12.412. Terry. Reference point, beginning Jan. 14, 1949, top of casing, 0.77 foot below land-surface datum.

16.25.13.211. Terry. Well abandoned, casing pulled, pump and concrete base removed. Water probably seeping into well from earthen tank about 15 feet south of well.

16.25.13.211a. Terry. About 175 feet south of well, 16.25.13.211, 20 feet southeast of power pole supporting three electric transformers, at southwest corner of earthen tank. Drilled irrigation well, equipped with turbine pump, diameter 15½ inches. Reference point, top of casing, 0.80 foot above land-surface datum.

16.26.16.313. Gates. Old pump removed, new turbine pump installed. Reference point, beginning January 19, 1949, top of galvanized casing, south side of well, 0.50 foot below land-surface datum.

16.26.30.431. Bowman. About 150 feet north of house, west side of earthen tank. Drilled irrigation well, equipped with turbine pump. Reference point, top of concrete pump base, west side, 0.30 foot above land-surface datum.

16.26.31.311. Zumwalt. Drilled irrigation well, equipped with turbine pump, diameter 12½ inches, depth 150 feet. Reference point, established January 19, 1949, top of casing, north side, 0.60 foot above land-surface datum. Jan. 16, 1948, 95.03, pumping.

17.25.1.143. Savoie. About 150 feet north of white stucco house, and about 300 feet northeast of artesian windmill well. Drilled irrigation well for garden, equipped with a pump jack, diameter 8 inches, depth 245 feet. Reference point, top of steel casing, east side of well, 0.50 foot above land-surface datum.

17.25.26.221. Sanders. About 150 feet southwest of small shed, 10 feet east of steel storage tank. Drilled stock well, equipped with windmill and pump, diameter 6 inches, depth 140 feet. Reference point, top of steel casing, south side of well, 0.55 foot above land-surface datum.

17.26.3.433. Box. Turbine pump removed, pitcher pump installed, 2.45- by 2.65-foot concrete base around 14-inch casing, top of casing, 0.32 foot below concrete base. Reference point, established January 13, 1949, top of concrete base, east side of well, 0.72 foot above land-surface datum.

17.26.4.331a. Nunn. Well cleaned out December 1948, tried to remove 8-inch liner, inside 12-inch casing, depth 330 feet.

17.26.4.331c. Nunn. About 25 feet east of north-south fence line, north of well 17.26.4.331a. Drilled irrigation well, equipped with turbine pump, diameter 12½ inches, depth 185 feet. Well cleaned out and gravel packed. Reference point, top of steel casing, west side of well, 0.55 foot above land-surface datum.

17.26.4.413. McCorkle. Reference point, established January 13, 1949, top of concrete pump base, 0.75 foot above land-surface datum.

17.26.11.313. Haldeman. In stock pen about 30 feet east of road, and about 75 feet southwest of white house. Drilled irrigation well, equipped with turbine pump, diameter 12 inches, depth 140 feet. Reference point, top of casing, 0.30 foot below land-surface datum.

17.26.17.423. Denton. Depth 217 feet.

17.26.18.442. Murphy. Reference point, established January 6, 1949, top of concrete base, level with top of casing, 0.25 foot above land-surface datum.

17.26.10.333. Gates. Corrected water levels for 1948: July 19, 18.72; Sept. 18, 24.84, pumping; Nov. 8, 13.57.

18.26.18.323. Thorp. Reference point, established January 5, 1949, top of concrete pump base, 1.12 feet above land-surface datum.

18.26.22.314. Eads. Reference point, beginning January 5, 1949, top of casing, 0.50 foot above land-surface datum.

18.26.23.131. Martin. About 150 feet southwest of white house, west side of earthen tank, 20 feet east of north-south road, in metal corrugated shed. Drilled irrigation well, equipped with turbine pump, diameter 10 inches. Reference point, top north edge of south 6- by 8-inch timber at land-surface datum.

18.26.23.213. Goodwin. About 50 feet east of house, an artesian well 18 feet northwest of observation well. well cleaned out, turbine pump installed, diameter 15 inches, depth 44 feet. Reference point, established January 5, 1949, top of casing, north side of well, 1.25 feet about land-surface datum.

18.26.24.223a. Goodwin. Top of casing extended 1 foot. Reference point, established March 15, 1949, top of casing, 0.50 foot above land-surface datum.

19.26.12.323b. Lee. Mar. 15, 32.81.

20.26.6.431. Moutry. Pump removed, pressure pump installed in concrete block shed. Reference point, established January 4, 1949, top of concrete floor, at land-surface datum.

20.26.21.112. Hernandez. Centrifugal pump removed, turbine pump, steel culvert casing, diameter 1.3 feet installed on well.

21.26.23.133. Boyd. Drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 418 feet. Reference point, surface of $4\frac{1}{2}$- by $4\frac{1}{2}$-foot concrete base, 1 foot above land-surface datum.

22.27.20.111a. Walterscheid. About 50 feet southeast of house, about 100 feet northwest of well 22.27.20.111. Drilled well, no equipment, diameter 8 inches, depth 227 feet. Reference point, surface of 3- by 3-foot concrete slab around casing, 0.30 foot above land-surface datum.

22.27.30.243. Yarbro. Jan. 3, 102.22.

22.27.34.111. Lewis. Reference point, established January 28, 1949, surface of 4- by 4-foot concrete pump base, 0.70 foot above land-surface datum.

23.27.4.333. Jones and Turner. 60 feet northwest of irrigation well, which is equipped with turbine pump, about 300 feet northeast of frame house, east side of earthen storage tank, 40 feet north of elevated galvanized storage tank. Drilled irrigation well, no equipment, diameter $12\frac{1}{2}$ inches. Reference point, top of casing, south side of well, 0.50 foot above land-surface datum. July 23, 1948, 103.47; Sept. 23, 1948, 99.88; Nov. 10, 1948, 97.02.

HIDALGO COUNTY (ANIMAS, PLAYAS, AND VIRDEN VALLEYS)

Part 1. General Discussion

A study of ground-water conditions and a program of measuring water levels in observation wells primarily in the Lower Animas Valley in Hidalgo County and in the Playas Valley begun in 1948 was continued in 1949. Water-Supply Paper 422 "Ground Water in the Animas, Playas, Hachita, and San Luis Basins, New Mexico" by A. T. Schwennesen was published in 1918. A report by H. O. Reeder covering the general phases of the ground-water conditions in Animas Valley will be published in a forthcoming biennial report of the State Engineer.

Lower Animas Valley

Lower Animas Valley was developed greatly for irrigation during 1948. By the end of that year about 60 wells intended for irrigation were drilled; approximately 40 were completed in time to irrigate 4,000 acres. By the end of 1949 about 65 wells were being pumped to irrigate 6,800 acres. In addition to the irrigation wells a number of windmill wells are used for domestic and stock purposes. The water occurs in the gravelly and sandy beds of the valley fill and comes mainly from precipitation which falls on the more porous soils of Upper Animas Valley and from precipitation on the mountains and stream-built slopes that border the lower valley. Water-level measurements and study of the basin were begun in March 1948. During 1949, 220 measurements were made in 55 observation wells with an average of 33 bi-monthly measurements and 55 yearly measurements made in February. A recording gage was installed in November 1948 on well 25.20.34.241 and was operated throughout the remaining part of that year and all of 1949. Six tape measurements were made on this well.

Playas Valley

Development of Playas Valley for irrigation began in 1948 at about the same time as in Animas Valley but the development is not so extensive. During 1948 about eight wells intended for irrigation were drilled of which four were used that year. During 1949 three additional wells were drilled and about eight wells were used to irrigate about 1,000 acres. Almost all of this development is concentrated in T. 30 S., R. 16 W. about 20 miles southwest of Hachita. In addition to these irrigation wells a number of windmill wells are used for domestic and stock purposes.

As in the Animas Valley, the water is obtained mainly in the gravelly beds in the valley fill. The recharge is mainly from precipitation which falls on the mountains and stream-built slopes which border the valley.

Water-level measurements were begun in July 1948. During the remainder of that year 14 measurements were made in 8 observation wells. During 1949 there were 32 measurements of water levels made in 7 observation wells.

Virden Valley

The Virden Valley is the New Mexico portion of the Duncan-Virden Valley, which lies along the upper Gila River in Hidalgo County, New Mexico and Greenlee County, Arizona. In this area ground water is pumped mainly as a supplement to a generally deficient surface-water supply. More surface water was available in 1949 for irrigation and less ground water was pumped.

In the Greenlee County, Arizona section of this paper are graphs of water levels in wells 232 and 201 in the Virden Valley. In general, the water levels were higher in 1949 than in any year since 1946.

Records of water levels in part 2 and part 3 for 1949 have been arranged to conform to the style used in the sections on other areas in New Mexico. Water levels were measured in five of six observation wells in March, July, and October. There were 15 water-level measurements made in 1949.

Precipitation and Pumpage

Precipitation within the Animas and Playas Valleys is the ultimate source of the ground water, however, apparently the main source for Lower Animas Valley is the precipitation which falls on Upper Animas Valley to the south. Precipitation also furnishes part of the water requirement of the crops and consequently at such times pumping is reduced.

Animas is nearest the irrigated area of Lower Animas Valley and more nearly indicates the amount of precipitation of direct benefit to crops. Precipitation during the main part of the growing season, April to September, was below normal in 1948 and 1949 except in September when it was 1.0 inch and 1.3 inches above normal, respectively. The precipitation at Lordsburg and Rodeo was below normal throughout the growing season of 1948 and most of the remainder of that year. In 1949 the precipitation was well above normal in January and February because of the blizzards, and it wae also above normal in July. The precipitation at Eicks Ranch in the recharge area of Animas Valley was above normal throughout most of 1948 and 1949.

Hachita, the only precipitation station in Playas Valley, is about 20 miles northeast of the irrigated area. However, Animas and Hicks Ranch are about 27 miles northwest and 30 miles southwest, respectively, from the irrigated area of Playas Valley.

In 1948 the discharges of a number of pumps in the Animas Valley were measured and estimates made of water pumped. Apparently about 1.6 acre-feet of water was pumped per acre of land irrigated and as about 4,000 acres were irrigated, about 6,400 acre-feet of water was pumped. It is estimated that in 1949, 6,800 acres were irrigated and about 11,000 acre-feet of water pumped.

Changes of Water Levels

Animas Valley

From April 1948, the beginning of records of water level, to February 1949 the ground-water levels declined more than 1 foot under about 31 square miles which included all of the irrigated area. The ground-water levels declined more than 2 feet under about 14 square miles and more than 3 feet under about 4 square miles. In the center of greatest concentration of pumpage, about sec. 35, T. 25 S., R. 20 W., the ground-water levels declined more than 4 feet under about 0.6 square mile. (See fig.18.)

The area in which ground-water levels declined increased considerably from February 1949 to January 1950. The ground-water levels declined more than 1 foot under about 60 square miles which includes all of the irrigated area except the few scattered farms in the northern end of the valley in T. 24 S., R. 20 W. The ground-water levels declined more than 2 feet under about 22 square miles and more than 3 feet under about 6 square miles. The area of greatest pumpage shifted about a mile southward in 1949 where the ground-water levels declined more than 4 feet over an area of about 1.4 square miles. (See fig.19.) Since the beginning of record in April 1948, water levels in the center of the area of concentrated pumping have declined as much as 9 feet while in the outlying areas they have declined only fractions of a foot.

As the water pumped in the Animas Valley is being taken from ground-water storage the water levels will generally continue to decline from year to year and gradually result in increased pumping lifts. Declines in future

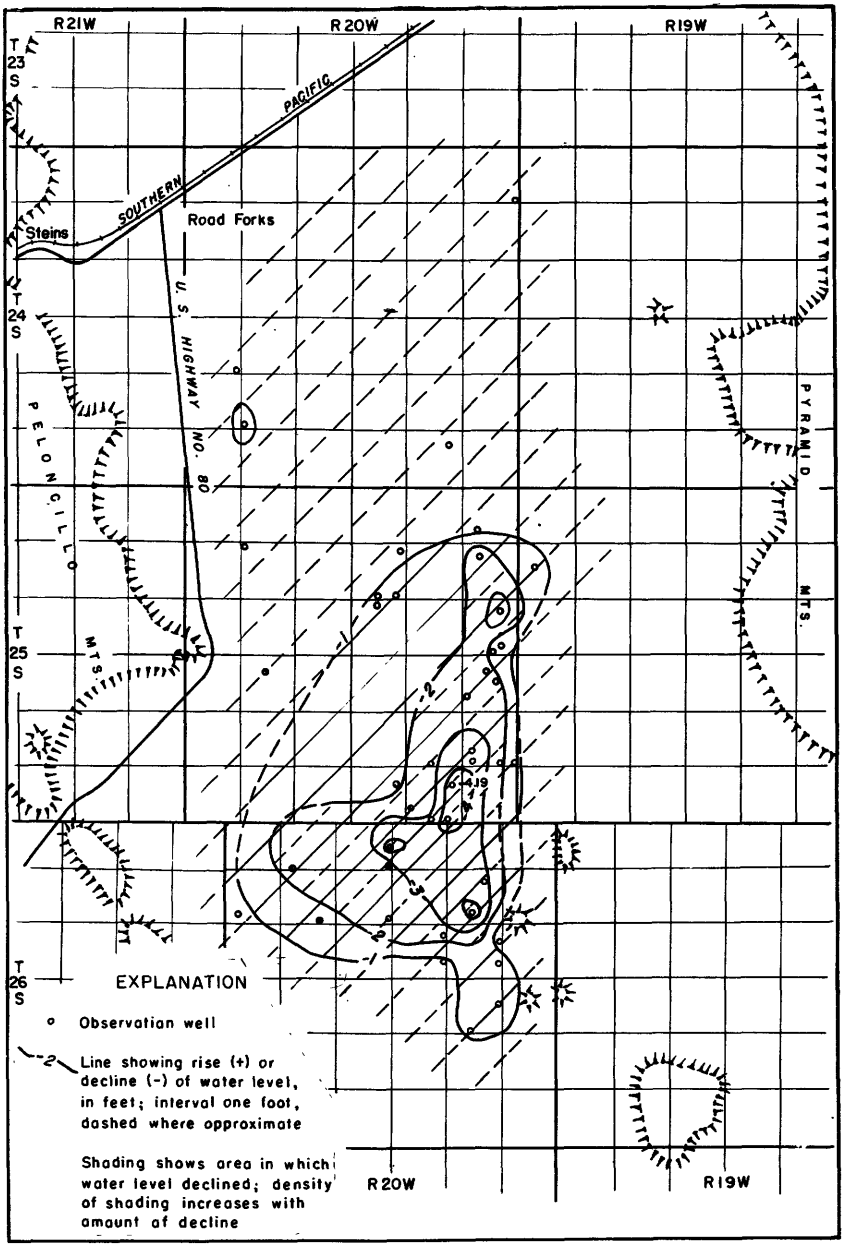


Figure 18.--Map of lower Animas Valley, Hidalgo County, showing decline of water levels from April 1948 to February 1949.

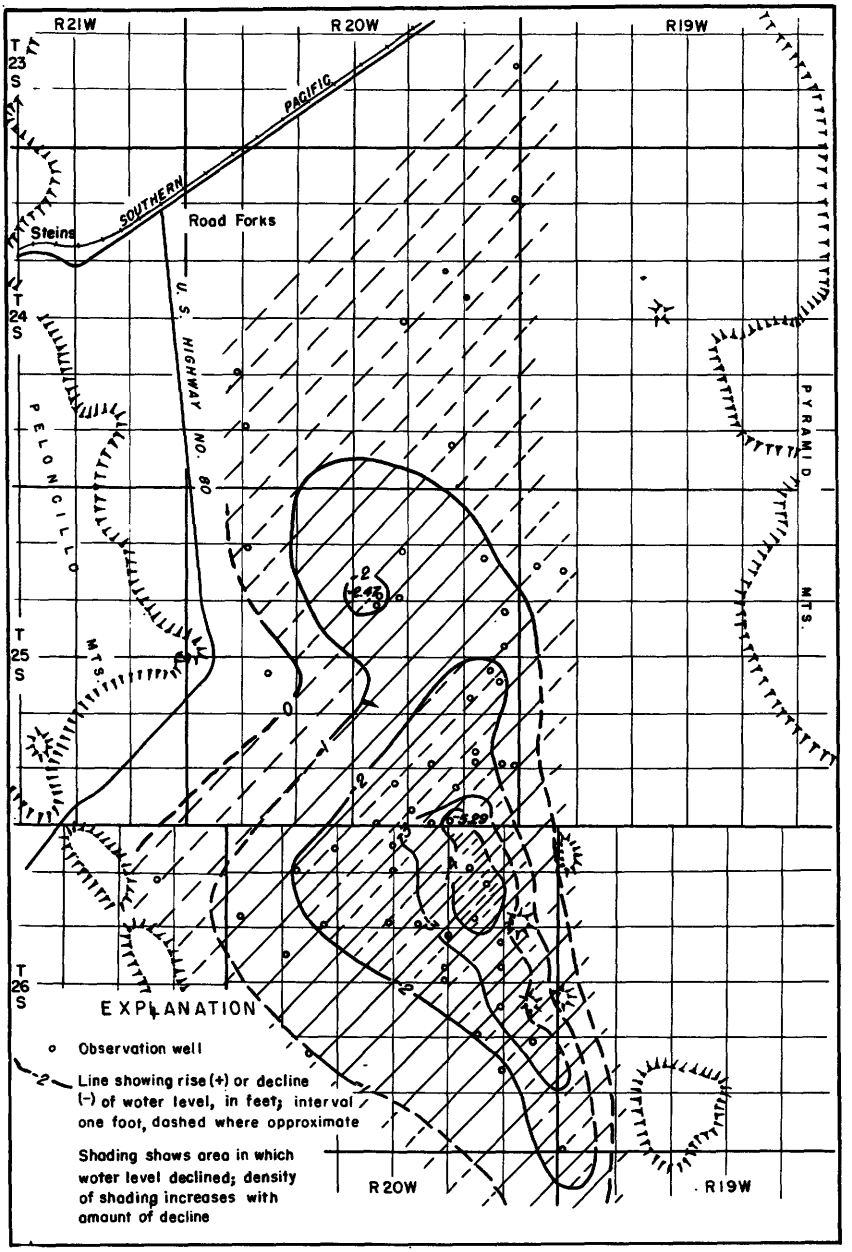


Figure 19.--Map of Animas Valley, Hidalgo County, showing decline of water levels from February 1949 to January 1950.

years are expected to be smaller unless an increase in irrigated acreage occurs. A reduction in pumpage brought about such as by above normal rainfall or unfavorable economic conditions may cause some rises in water level in particular years.

Playas Valley

As water-level measurements were started in July of 1948 in the Playas Valley, changes for that year are not given. The ground-water levels declined more than 1 foot from February 1949 to January 1950, under all the irrigated area. The declines were greatest where the concentration of pumped wells is greatest. The decline of water level in the irrigation well 30.16.16.344 was 1.7 feet. Three non-pumped observation wells in this vicinity for which changes in water level were determined are near wells which were pumped throughout the year. The maximum change in these wells was a decline of 4.75 feet in well 30.16.29.422 which is half a mile from a pumped well. Two observation wells 32.17.13.240 and 32.17.23.434 which are 10 and 12 miles respectively from the nearest wells used for irrigation show net declines of 0.1 foot and 0.2 foot respectively.

Part 2

Water levels in February 1949 in observation wells having records beginning February 1949 below land-surface datum

Location number	Owner	See also part	Water level	Day
	Animas Valley			
24.20.1.444	Fred Kerr	3,5	29.98	3
19.444	W. O. Bogart	3,5	34.05	3
29.333	Mrs. May Smith	3,5	38.49	3
35.214	E. L. Kerr	3,5	18.06	3
25.19.7.134	D. A. Vannoy	3,5	26.14	1
7.234	do	3,5	31.69	1
25.20.8.111	T. H. McCants	3,5	58.20	3
10.222	Valley View Church	3,5	28.28	3
10.344	Bishop Bros.	3,5	34.23	3
10.443	do	5	34.70	2
12.123	T. H. McCants	5	23.66	3
13.213	G. Wright	3,5	28.18	1
13.432	E. L. Kerr	3,5	32.35	1
15.122	Herf Wood	3,5	35.54	3
20.142	Mr. Standsberry	3,5	a62.32	2
24.124	E. L. Kerr	3,5	36.96	1
24.233	Jundt & Rudiger	5	37.45	1
24.313	do	3,5	45.30	1
25.314	Richin Bros.	5	53.54	1
25.334	do	3,5	58.75	1
25.434	R. H. Wamel	5	64.95	1

Part 2--Continued

Location number	Owner	See also part	Water level	Day
25.20.25.444	Richin Bros.	3,5	70.07	1
26.344	W. Veck	5	50.87	1
34.241	H. H. Hatch	4,5	53.20	1
34.241a	do	5	53.20	1
34.344	W. A. Tyler	3,5	55.27	2
35.241	W. Veck	3,5	57.44	1
35.313	do	5	58.43	1
35.344	do	5	61.57	1
35.434	do	3,5	54.44	1
26.19.31.333	Luther Edwards	3,5	84.23	2
26.20.2.344	R. H. Wamel	3,5	66.48	2
4.422	W. W. Roark	5	61.26	2
4.444	do	3,5	63.79	2
5.334	D. A. Lee	3,5	56.33	2
5.422	do	3,5	54.98	2
8.434	J. E. Weatherby	3,5	62.37	2
9.444	Mrs. H. K. Wood	5	73.27	2
9.444a	do	3,5	72.84	2
10.344	S. O. Wright	3,5	63.18	2
11.232	R. H. Wamel	5	68.84	2
11.342	do	5	c68.69	2
14.242	do	3,5	80.10	2
14.424	do	5	70.98	2
15.224	Mr. Crabtree	5	65.33	1
15.424	W. Veck	5	61.86	1
15.444	Mr. Crabtree	3,5	63.00	1
17.133	J. E. Weatherby	3,5	54.21	2
23.244	W. Veck	5	73.30	1
23.433	V. E. Davis	5	69.69	1
25.211	Unknown	3,5	93.74	1
29.142	Kate Washburn	3,5	49.53	2
26.21.11.200	Mr. Baker	3,5	a77.99	2
27.19.19.433	Felix Gauthier	3,5	133.41	2
28.19.20.244	Unknown	3,5	256.74	1
	Playas Valley			
30.16.14.211	M. T. Everhart, Jr.	3,5	32.12	4
16.344	Myers Bros.	3,5	35.06	4
27.340	Unknown	3,5	44.24	4
28.444	Myers Bros.	3,5	44.03	4
29.422	do	3,5	43.85	4
32.17.13.240	Unknown	3,5	58.13	4
23.434	Mr. Timberlake	3,5	96.70	4

a Pumping.
c Nearby well pumping.

Part 2. Water levels in March 1949 and highest and lowest recorded levels, j/above and below land-surface datum, and change from February 1948 to March 1949, in feet

Location number	Previous number	Owner	See also part	Water levels							Record	
				Mar. 1949 Level	Day	Change 1948-49	Highest Level	Year	Lowest Level	Year	Began	Years missing
				Virden Valley								
18.21.32.130	181	P. Lunt	3	.....	..	.....	38.90	44	55.35	42	40	43,49
32.440	185	J. Pierce	.	30.30	1	+2.20	29.12	41	32.50	48	40	42
19.20.18.120	232	Floyd Johns	3	23.69	1	+4.63	20.05	45	29.29	43	40	47
19.21.2.410	201	J. E. Payne	3	44.72	1	+1.93	41.35	41	46.65	48	40	
2.330a	202A	Byron Echols	3	14.58	1	+2.94	14.58	49	17.52	48	48	
12.420	217	Nancy O. Pace	3	21.36	1	-1.86	16.98	40	21.36	49	40	

j Jan. 1940-41, Mar. 1942, Feb. 1943, Mar. 1944, Feb. 1945, Jan. 1946, Mar. 1947, Feb. 1948.

Part 3. Water levels, below land-surface datum, during 1949

Virden Valley

Location number / Owner	18.21. 32.130 Lunt	19.20. 18.120 Johns	19.21. 2.410 Payne	19.21. 2.330a Echols	19.21. 12.420 Pace
Mar. 1	.....	23.69	44.72	14.58	21.36
July 14	41.78	26.26	44.33	15.02	16.09
Oct. 27	41.98	26.57	44.23	14.98	e23.90

e Dry at depth given.

Part 3

Water levels below land-surface datum during 1948 and 1949

Animas Valley

Location number / Owner	24.20. 1.444 Kerr	24.20. 19.444 Bogart	24.20. 29.333 Smith	24.20. 35.214 Kerr	25.19. 7.134 Vannoy	25.19. 7.234 Vannoy	25.20 8.111 McCants	25.20. 10.222 Church
1948								
Apr. 1,4,6	29.75	33.16	37.39	17.40	24.66	.....	57.50	27.44
May 21,22	30.25	33.35	a48.47	17.45	24.66	.....	57.46	27.59
July 23,24,27	30.53	34.38	39.23	18.43	25.05	.....	a58.70	a28.74
Sept. 22,23	a36.90	34.78	(a)	19.50	25.32	.....	a73.82	28.51
Nov. 19,21,23	30.25	34.55	39.09	18.61	25.38	31.65	58.52	28.50
1949								
Feb. 1,3	29.98	34.05	38.49	18.06	26.14	31.69	58.20	28.28
Mar. 21-23	29.90	33.91	38.17	17.86	25.06	31.71	a58.56	28.20
May 21,23	30.86	a49.58	38.78	17.84	25.39	31.31	57.77	29.14
July 27,28	30.69	35.90	a47.30	20.78	25.80	31.83	59.19	30.22
Sept. 4,5	31.82	36.48	(a)	19.30	.....	31.70	59.02	31.20
Nov. 22,25	30.55	35.52	39.58	18.79	25.94	31.84	58.90	30.12

Location number / Owner	25.20. 10.344 Bishop Bros.	25.20. 13.213 Wright	25.20. 13.432 Kerr	25.20. 15.122 Wood	25.20. 20.142 Standsberry	25.20. 24.124 Kerr	25.20. 24.313 Jundt & Rudiger	25.20. 25.334 Richin Bros.
1948								
Apr. 1,6	33.14	.....	30.68	34.41	60.09	34.60	42.43	54.94
May 22,24	(a)	.....	31.42	c36.57	60.14	35.50	142.99	a165.07
July 23-25	34.10	.....	32.17	35.74	a61.52	36.79	44.43	b62.37
Sept. 22,23	34.41	28.55	32.88	c35.76	b62.12	37.46	45.63	(a)
Nov. 19,21,22	34.33	28.52	32.66	35.67	61.09	37.27	45.81	60.63
1949								
Feb. 1-3	34.23	28.18	32.35	35.54	a62.32	36.96	45.30	58.75
Mar. 21,22	34.12	28.05	32.19	c35.46	b60.95	36.74	45.40	58.86
May 21,23	36.15	29.21	33.17	36.44	60.84	37.95	47.17	a81.08
July 27	(a)	ac57.87	34.92	c37.42	a61.30	39.64	48.83	c70.03
Sept. 4,5	38.68	(a)	35.58	37.54	61.51	40.23	50.02	70.96
Nov. 22,25	36.51	30.33	34.76	37.59	161.79	39.67	48.39	62.70

Location number / Owner	25.20. 25.444 Richin Bros.	25.20. 34.344 Tyler	25.20. 35.241 Veck	25.20. 35.434 Veck	26.19. 31.333 Edwards	26.20. 2.344 Wamel	26.20. 4.444 Roark	26.20. 5.334 Lee
1948								
Apr. 1-3	69.00	.....	53.25	50.27	.....	.....	60.99	54.05
May 23,24	69.10	54.35	b159.00	54.67	.....	.....	63.08	54.47
July 25,26,31	69.36	56.28	60.78	55.13	b85.27	.....	a72.99	156.88
Sept. 23,24,27	69.62	57.69	b64.00	55.73	84.21	.....	a74.96	56.42
Oct. 13	.....	.....	.....	.....	.....	66.69	.....	.....
Nov. 21,22	.....	55.95	58.93	59.21	84.21	66.74	64.36	56.49
1949								
Feb. 1,2	70.07	55.27	57.44	54.44	84.23	66.48	63.79	56.33
Mar. 21,22	70.40	55.11	57.48	54.33	84.13	66.33	63.58	56.23
May 23,24	70.42	bc60.10	(a)	(a)	b89.26	(a)	a74.82	a73.96
July 27,28	71.09	(a)	(a)	(a)	89.33	a101.95	70.69	58.40
Sept. 4,5	c71.35	62.18	(a)	(a)	91.36	bc82.35	67.18	59.43
Nov. 22,23,25	173.08	58.81	61.25	60.43	87.35	7.142	67.18	58.61

* See footnotes at end of Part 3.

Part 3--Continued

Location number Owner	26.20. 5.422 Lee	26.20. 8.434 Weatherby	26.20. 9.444a Wood	26.20. 10.344 Wright	26.20. 14.242 Wamel	26.20. 15.444 Crabtree	26.20. 17.133 Weatherby	26.20. 25.211 Unknown
1948								
Apr. 3,5	.....	60.54	.....	.....	79.44	.....	a57.22	.....
May 23,25	a62.17	a72.70	72.52	a75.00	81.45	72.01	53.20	.....
July 23,25,26	54.72	61.80	74.22	.....	180.17	66.42	53.52	.....
Sept.24,25,27,29	55.82	62.61	74.64	.....	181.40	66.78	a54.72	93.42
Nov. 21,22	55.33	62.67	73.35	163.54	80.92	64.92	a54.62	93.75
1949								
Feb. 1,2	54.98	62.37	72.84	63.18	80.10	63.00	54.21	93.74
Mar. 22	54.82	62.32	72.74	63.08	79.77	62.91	54.13	93.63
May 23,24	56.66	a75.39	75.81	a79.91	81.42	69.02	54.21	94.30
July 28	.....	64.33	a83.41	66.45	83.37	a92.58	a58.78	95.71
Sept. 4,5	59.12	65.02	(a)	67.62	84.39	(a)	54.92	96.54
Nov. 23,25	57.56	(a)	76.00	66.10	84.52	66.69	55.48	97.62

Location number Owner	26.20. 29.142 Washburn	26.21. 11.200 Baker	27.19. 19.433 Gauthier	28.19. 20.244 Unknown
1948				
Apr. 3	b62.16	.....	.....	.....
May 23,26	48.86	j21.29	a147.70	.....
July 23,29	b50.29	a77.71	137.31	a259.84
Sept. 25,27	49.47	a78.43	137.75	a256.76
Nov. 22	49.59	.....	133.70	255.76
1949				
Feb. 1, 2	49.53	a77.99	133.41	256.74
Mar. 22	49.61	a78.54	133.31	(a)
May 23,24	a81.03	78.01	136.48	255.54
July 28,29	(a)	a78.22	(a)	a259.43
Sept. 3-5	(a)	a78.53	(a)	255.64
Nov. 23,25	50.42	a78.85	135.00	259.27

Playas Valley

Location number Owner	30.16. 14.211 Everhart	30.16. 16.344 Myers Bros.	30.16. 27.340 Unknown	30.16. 28.444 Myers Bros.	30.16. 29.422 Myers Bros.	32.17. 13.240 Unknown	32.17. 23.434 Timberlake
1948							
July 30	.....	b36.60	.....	.....	43.97	.....	.....
Sept.28	.....	44.97	.....	.....	44.33	.....	.....
Nov. 23	32.48	35.37	.....	.....	44.25	.....	99.35
1949							
Feb. 4	32.12	35.06	44.24	44.03	43.85	58.13	96.70
Mar. 23	31.97	35.09	.....	144.03	.....	57.94	96.09
May 20	31.69	a71.04	(a)	(a)	.....	57.92	96.24
July 26	32.77	35.67	.....	53.92	.....	58.10	96.47
Sept. 3	33.16	(a)	c52.28	(a)	c47.94	58.21	96.63
Nov. 21	33.32	137.00	a50.29	.....	49.15	58.26	96.87

a Pumping.
b Pumping recently.
c Nearby well pumping.
i Possible discrepancy of a few tenths of a foot between present and previous land-surface data.
j Measurement uncertain.

Part 4

25.20.34.241. H. H. Hatch.

Highest daily water level, from recorder charts

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	53.39	h53.20	53.06	53.16	56.51	57.09	.....	59.13	59.71	58.22	57.21	56.57
2	53.35	53.17	53.06	53.16	.....	57.05	.....	59.15	59.63	58.16	57.19	56.55
3	53.37	53.19	53.05	.....	g56.43	57.01	.....	59.25	59.59	58.15	57.15	56.53
4	53.41	53.18	53.04	53.19	56.39	57.01	.....	59.26	59.62	58.14	57.14	56.51
5	53.41	53.17	53.07	53.19	56.39	g57.04	.....	59.21	59.55	58.10	57.16	56.48
6	53.39	53.19	53.06	53.17	56.44	.....	.....	59.13	59.49	58.05	57.15	56.46
7	53.36	53.15	53.04	53.17	56.57	g57.19	58.35	59.07	59.51	58.00	57.12	56.46
8	53.32	53.17	53.03	53.42	56.57	57.17	58.32	59.02	59.57	57.98	57.11	56.43
9	53.33	53.21	53.08	53.58	56.60	57.19	58.36	58.95	59.53	57.97	57.11	56.39
10	53.34	53.16	53.17	53.58	56.59	57.25	58.31	58.87	59.41	57.88	57.11	56.42
11	53.34	53.12	53.18	53.57	56.56	57.28	58.28	58.79	59.34	57.84	57.09	.....
12	53.33	53.11	53.16	53.58	56.67	57.35	.....	58.72	59.29	57.81	57.05	56.41
13	53.30	53.14	53.16	53.61	56.79	.....	.....	58.66	59.23	57.82	57.01	56.39
14	53.31	53.14	53.11	53.89	56.91	.....	.....	58.60	59.16	57.78	56.95	56.38
15	53.31	53.16	53.07	54.05	57.01	g57.60	.....	58.59	59.12	57.73	56.93	56.34
16	53.30	53.14	53.07	54.05	57.12	57.70	58.53	58.85	59.05	57.68	56.92	56.32
17	53.32	53.11	53.07	54.06	57.22	57.76	58.63	59.02	58.99	57.65	56.88	56.32
18	53.31	53.10	53.04	54.09	57.25	57.72	58.67	59.07	58.93	57.59	56.84	56.30
19	53.29	53.10	53.05	54.34	57.29	57.80	58.70	59.06	58.89	57.57	56.80	56.28
20	53.28	53.12	53.14	54.61	57.21	57.87	58.81	59.17	58.86	57.53	56.77	.....
21	53.27	53.11	53.15	54.89	57.10	57.91	58.87	59.18	58.81	57.51	56.75	.....
22	53.25	53.09	53.10	55.12	57.00	.....	58.92	59.17	58.75	57.46	56.72	.....
23	53.26	53.07	53.05	55.33	56.93	.....	.....	59.21	58.69	57.43	56.67	.....
24	53.25	53.06	53.02	55.52	56.91	.....	.....	59.24	58.62	57.38	56.67	.....
25	53.23	53.05	53.01	55.62	56.88	.....	.....	59.24	58.55	57.33	56.69	.....
26	53.25	53.05	53.02	55.79	56.93	.....	.....	.....	58.49	57.29	56.67	.....
27	53.25	53.05	53.01	55.99	57.06	.....	h59.01	59.41	58.43	57.28	56.65	.....
28	53.23	53.04	52.99	56.15	57.19	.....	59.07	59.40	58.39	57.29	56.61	.....
29	53.25		53.00	56.26	57.15	.....	59.15	59.41	58.34	.....	56.60	.....
30	53.22		53.15	56.41	57.12	.....	59.16	59.52	58.28	.....	56.60	.....
31	53.21		53.14		57.14		59.16	59.60		.....		.....

g Estimated.
h Tape measurement at odd hour.

Part 5

Miscellaneous Data Concerning Observation Wells

24.20.1.444. Kerr. About 100 feet northwest of dwelling. Bored irrigation well, equipped with turbine pump, diameter 18 inches, depth 92 feet.

24.20.19.444. Bogart. About 0.1 mile northeast of poultry yard and house. Drilled irrigation well, equipped with turbine pump March 22, 1949, diameter 16 inches, depth 88 feet. Reference point, top of casing, south side of well, 0.91 foot above land-surface datum.

24.20.29.333. Smith. 1.0 mile south of poultry yard and house. Drilled irrigation well, equipped with turbine pump after April 6, 1948, diameter 14 inches. Reference point, No. 1, top of casing, 0.90 foot above land-surface datum. Reference point, No. 2, top of nail in Geological Survey washer on 2- by 2-inch wood hub, 40 feet south of well on fence line, 0.07 foot above land-surface datum.

24.20.35.214. Kerr. About 250 yards south of dwelling, on west side of earthen tank. Drilled irrigation well, equipped with turbine pump, diameter 12 inches. Reference point, top of casing, south side of well, 0.50 foot above land-surface datum. Mar. 25, 1948, 17.49.

25.19.7.134. Vannoy. Southwest side of earthen tank. Bored irrigation well, diameter 32 inches, depth 74 feet. Reference point, No. 1, top edge of concrete casing, south side of well, 0.60 foot below land-surface datum. Reference point, No. 2, top of nail in Geological Survey washer on 2- by 2-inch hub southwest of well on fence line, 0.25 foot above land-surface datum which is 4,188.33 feet above mean sea level.

25.19.7.234. Vannoy. Drilled well, equipped with turbine pump, diameter 18 inches, depth 95 feet. Reference point, top of casing, south side of well, 1.04 feet above land-surface datum.

25.20.8.111. McCants. 20 yards southwest of dwelling, northeast side of elevated tank. Domestic and stock well, equipped with windmill and small pump, diameter 36 inches. Reference point, top of southwest windmill tower support post, 3.75 feet above land-surface datum, which is 4,220.39 feet above mean sea level.

25.20.10.222. Church. About 100 years south of church. Domestic well, equipped with windmill, diameter 4 inches. Reference point, No. 1, top of casing, south side of well, 0.50 foot above land-surface datum. Reference point, No. 2, chisel mark in concrete foundation of circular steel tank, 6 feet south of well, 0.01 foot above land-surface datum which is 4,189.88 feet above mean sea level.

25.20.10.344. Bishop Bros. In pump house, about 175 yards north of dwelling. Irrigation well, equipped with pump, diameter 36 inches, depth 96 feet. Reference point, top surface of concrete well curb, west side of well, 0.50 foot above land-surface datum which is 4,200.09 feet above mean sea level.

25.20.10.443. Bishop Bros. Bored and drilled irrigation well, depth 105 feet. Reference point, No. 1, top surface of concrete, north side of well, 0.10 foot above land-surface datum. Reference point, No. 2, top of nail in Geological Survey washer, on 2- by 2-inch wood hub, about 175 feet south of well on fence line, 0.38 foot above land-surface datum which is 4,201.50 feet above mean sea level. Apr. 1, 1948, 33.46; July 24, 1948, 34.30; Sept. 22, 1948, 34.66; Nov. 19, 1948, 34.79.

25.20.12.123. McCants. West side of earthen tank. Drilled irrigation well, equipped with turbine pump after April 1, 1948, diameter 16 inches. Reference point, top of casing, north side of well, 1.00 foot above land-surface datum which is 4187.13 feet above mean sea level. Apr. 1, 1948, 22.20; May 21, 23.16, possible discrepancy of a few tenths of a foot between present and previous land-surface data; July 24, 1948, 24.18; Sept. 22, 24.15; Nov. 23, 1948, 24.02.

25.20.13.213. Wright. About 500 feet west of dwelling and 700 feet west of well 25.20.13.214. Drilled irrigation well, equipped with turbine pump May 21, 1949, diameter 18 inches, depth 123 feet. Reference point, No. 1, top of casing, 1.40 feet above land-surface datum. Reference point, No. 2, top of 20-inch outer casing, 1.21 feet above land-surface datum which is 4,195.64 feet above mean sea level.

25.20.13.432. Kerr. North of dwelling and about 200 yards north of another irrigation well. Dug and drilled irrigation well, diameter 45 inches, depth 74 feet. Reference point, No. 1, top edge of concrete curb, south side of well, at land-surface datum. Reference point, No. 2, top of northeast corner of 10- by 20-foot concrete box at chiseled "X", 1.89 feet above land-surface datum, which is 4,204.72 feet above mean sea level.

25.20.15.122. Wood. Northeast of dwelling, about 40 feet northeast of a pumped well, and 80 feet east of a windmill. Abandoned well, diameter 14 inches. Reference point, No. 1, top of casing, 5.75 feet above land-surface datum. Reference point, No. 2, chisel mark on 3- by 3-foot square concrete foundation for rocker arm, west of well, 0.25 foot above land-surface datum which is 4,202.62 feet above mean sea level.

25.20.20.142. Standsberry. East of house. Stock well, equipped with windmill prior to November 1949, depth 68 feet. Reference point, chisel mark "X" in concrete foundation of small circular tank, 16 feet south of well, 0.88 foot below land-surface datum.

25.20.24.124. Kerr. Bored irrigation well, diameter 36 inches, depth 107 feet. Reference point, top of nail in Geological Survey washer on wooden 2- by 2-inch hub, 53 feet north of well, 0.40 foot below land-surface datum which is 4,210.61 feet above mean sea level.

25.20.24.233. Jundt & Rudiger. Bored irrigation well, diameter 20 inches, depth 123 feet. Reference point, No. 1, top of casing, west side of well, 0.20 foot above land-surface datum. Reference point, No. 2, top of concrete butane tank support, southwest corner, west of well, 1.78 feet above land-surface datum which is 4,212.44 feet above mean sea level. Apr. 1, 1948, 35.12; May 22, 37.34, possible discrepancy of a few tenths of a foot between present and previous land-surface data. July 25, 1948, 38.56, pumping recently; Sept. 23, 38.69; Nov. 21, 37.86.

25.20.24.313. Jundt & Rudiger. Bored irrigation well, equipped with turbine pump May 23, 1949, diameter 16 inches, depth 97 feet. Reference point, No. 1, top of ½-inch iron pin, about 50 feet south of well, on fence line, 0.65 foot above land-surface datum, which is 4,221.43 feet above mean sea level. Reference point, No. 2, established May 23, 1949, top of casing, 0.43 foot above land-surface datum.

25.20.25.314. Richin Bros. Northeast of dwelling. Drilled irrigation well, equipped with turbine pump, diameter 18 inches, depth 107 feet. Reference point, No. 1, top of corrugated metal casing, 0.50 foot above land-surface datum. Reference point, No. 2, top of nail in Geological Survey washer on 2- by 2-inch wood hub, 5 feet south of well, 0.54 foot above land-surface datum which is 4,233.44 feet above mean sea level. Apr. 1, 1948, 50.07; May 24, 1948, 72.38, pumping; July 25, 1948, 56.61, pumping recently; Nov. 21, 1948, 55.49, pumping recently.

25.20.25.334. Richin Bros. 0.25 mile south of dwelling. Drilled irrigation well, equipped with turbine pump after April 1, 1948, diameter 18 inches, depth 115 feet. Reference point, No. 1, top of casing, north side of well, 0.60 foot above land-surface datum. Reference point, No. 2, top of nail in Geological Survey washer on 2- by 2-inch wood hub, 8 3/4 feet south, and 3 feet east of well, 0.21 foot below land-surface datum which is 4,239.18 feet above mean sea level.

25.20.25.434. Wamel. Northwest of fence corner. Drilled well, equipped with turbine pump Feb. 1, 1949, diameter 16 inches, depth 150 feet. Reference point, No. 1, top of nail in Geological Survey washer on 2- by 2-inch hub, 45 feet southeast of well in fence corner, 0.20 foot above land-surface datum, 4,249.19 feet above mean sea level. Reference point, No. 2, established Feb. 1, 1949, top of casing, 0.42 foot above land-surface datum. Apr. 3, 1948, 62.95; May 25, 63.40; July 25, 64.34; Sept. 23, 65.05; Nov. 21, 65.25; Mar. 21, 1949, 65.55.

25.20.25.444. Richin Bros. Drilled well, diameter 16 inches, depth 204 feet. Reference point, No. 1, top of nail in Geological Survey washer on 2- by 2-inch hub, 118 feet south of well, on fence line, 0.62 foot above land-surface datum, altitude 4,261.29 feet above mean sea level. Reference point, No. 2, top of General Land Office Survey marker, southeast of well, 2.54 feet above land-surface datum.

25.20.26.344. Veck. Southwest of small house. Drilled irrigation well, equipped with turbine pump after Apr. 2, 1948, diameter 16 inches, depth 120 feet. Reference point, No. 1, top of casing, north side of well, 0.60 foot above land-surface datum. Reference point, No. 2, top of 2- by 2-inch wooden hub, ½ foot east of well, 0.09 foot below land-surface datum which is 4231.39 feet above mean sea level. Apr. 2, 1948, 48.00; May 24, 61.38, pumping, possible discrepancy of a few tenths of a foot between present and previous land-surface data; July 25, 60.29, pumping; Sept. 23, 54.30; Nov. 21, 51.58.

25.20.34.241. Hatch. Drilled irrigation well, equipped with turbine pump for irrigation prior to Sept. 24, 1948. Water-stage recorder installed Nov. 21, 1948. Diameter 36 inches, depth 120 feet. Reference point, No. 1, top edge of concrete well curb, west side of well, at land-surface datum. Reference point, No. 2, northwest corner of old concrete engine-foundation, about 17 feet south of well, 2.14 feet above land-surface datum which is 4,233.23 feet above mean sea level. Apr. 2, 1948, 51.44; May 25, 53.59; July 25, 55.33; Sept. 24, 55.78; Nov. 21, 53.80.

25.20.34.241a. Hatch. 35 feet east of well 25.20.34.214. Drilled irrigation well, equipped with turbine pump, diameter 36 inches, depth 80 feet. Reference point, No. 1, top of concrete well curb, east side of well, 0.42 foot above land-surface datum. Reference point, No. 2, northeast corner (ledge) of concrete engine base, 20 feet south of well, 2.15 feet above land-surface datum, altitude 4,235.38 feet above mean sea level. Reference point, No. 3, top surface of east wall of 10- by 6-foot concrete box at center, 4 feet west of well, 1.68 feet above land-surface datum, which is 4,233.23 feet above mean sea level. Sept. 24, 1948, 55.72; Nov. 21, 53.77.

25.20.34.344. Tyler. About 25 yards east of dwelling. Drilled irrigation well, equipped with turbine pump, diameter 36 inches, depth 110 feet. Reference point, top edge of concrete well curb, east side of well, at land-surface datum.

25.20.35.241. Veck. 50 yards south of house. Drilled irrigation well, equipped with turbine pump after Apr. 2, 1948, diameter 16 inches, depth 120 feet. Reference point, No. 1, top of casing, north side of well, 0.79 foot below land-surface datum. Reference point, No. 2, top of ¼- by 1½-inch steel strap, 30 feet south of well, 0.09 foot below land-surface datum which is 4,238.81 feet above mean sea level.

25.20.35.313. Veck. 25 yards north-northeast of house. Drilled irrigation well, equipped with turbine pump after Apr. 2, 1948, diameter 16 inches. Reference point, No. 1, top of 16-inch casing, northwest side of well, 0.95 foot above land-surface datum. Reference point, No. 2, top edge of 20-inch outer casing, north side of well, at land-surface datum, altitude 4,240.90 feet above mean sea level. Apr. 2, 1948, 55.77; May 24, 58.08; July 25, 60.04; Sept. 23, 70.28, pumping; Nov. 21, 59.16; Mar. 21, 1949, 58.87.

25.20.35.344. Veck. Drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 120 feet. Reference point, top of nail in Geological Survey washer on 2- by 2-inch wood hub, 37 feet south of well on fence line, 0.41 foot below land-surface datum which is 4,245.79 feet above mean sea level. Apr. 2, 1948, 58.49; May 24, 61.60; Sept. 23, 65.04; Nov. 21, 62.31.

25.20.35.434. Veck. Drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 120 feet. Reference point, No. 1, top of casing, north side of well, 0.30 foot above land-surface datum. Reference point, No. 2, top of General Land Office Survey marker* correction corner section 2 and 3, T. 26 S., R. 20 W., 36 feet southeast of well, 1.48 feet above land-surface datum which is 4,245.96 feet above mean sea level.

26.19.31.333. Edwards. Drilled irrigation well, equipped with turbine pump, diameter 15 inches, depth 200 feet. Reference point, No. 1, top of casing, southwest side of well, 0.65 foot above land-surface datum. Reference point, No. 2, top of township marker stamped General Land Office Survey*, 69 feet southwest of well, 1.02 feet above land-surface datum which is 4,340.62 feet above mean sea level.

26.20.2.344. Wamel. Drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 157 feet. Reference point, top of casing, west side of well, 1.05 feet above land-surface datum.

* Now Bureau of Land Management.

26.20.4.422. Roark. Drilled irrigation well, equipped with turbine pump, diameter 24 inches at surface and 14 inches at water level, depth 98 feet. Reference point, No. 1, top edge of 2- by 5½-foot iron engine base, 3 feet west of well, 1.45 feet above land-surface datum. Reference point, No. 2, top edge of 2-inch pipe driven in ground, 4 feet east of well, 0.59 foot above land-surface datum which is 4,245.04 feet above mean sea level. Apr. 2, 1948, 57.08; July 25, 1948, 62.60, possible discrepancy of a few tenths of a foot between present and previous land-surface data; Sept. 24, 1948, 75.05, pumping; Nov. 22, 61.90.

26.20.4.444. Roark. Drilled irrigation well, equipped with turbine pump, diameter 24 inches at surface and 14 inches at water level, depth 103 feet. Reference point, No. 1, upper surface of concrete well curb, east side of well, at land-surface datum. Reference point, No. 2, upper surface of 2- by 4-foot concrete engine block, 4 feet south of well, 1.79 feet above land-surface datum which is 4,248.07 feet above mean sea level.

26.20.5.334. Lee. Bored irrigation well, equipped with turbine pump after May 23, 1948, diameter 40 inches, depth 100 feet. Reference point, No. 1, top of 2½- by 3-foot concrete curb, west side of well, 0.70 foot above land-surface datum. Reference point, No. 2, top of nail in Geological Survey washer on 2- by 2-inch wood hub, 48 feet south of well on fence line, 0.14 foot above land-surface datum which is 4,240.81 feet above mean sea level.

26.20.5.422. Lee. West of dwelling on southwest corner of earthen tank. Dug and drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 106 feet. Reference point, point on west side of concrete box 18 feet north of well, 3.0 feet from south end of box, 2.62 feet above land-surface datum which is 4,237.93 feet above mean sea level.

26.20.8.434. Weatherby. East of dwelling. Drilled irrigation well, equipped with turbine pump, diameter 18 inches, depth 125 feet. Reference point, top of casing at lowest point, north side of well, 0.87 foot above land-surface datum which is 4,250.28 feet above mean sea level.

26.20.9.444. Wood. About 40 feet east of another well, 200 feet south of house. Drilled irrigation well, equipped with turbine pump prior to May 1948, diameter 36 inches at surface and 18 inches at water level, depth 117 feet. Reference point, top edge of concrete well curb, west side of well, at land-surface datum. Apr. 3, 1948, 70.90; Nov. 22, 73.79.

26.20.9.444a. Wood. About 40 feet west of another drilled well, 225 feet southwest of house. Drilled irrigation well, equipped with turbine pump, diameter 18 inches, depth 140 feet. Reference point, No. 1, top of casing, north side of well, 0.86 foot above land-surface datum. Reference point, No. 2, upper surface of 3- by 4-foot concrete engine block, 5 feet west of well, 1.60 feet above land-surface datum which is 4,259.56 feet above mean sea level.

26.20.10.344. Wright. West side of small house and 200 feet east of dwelling. Drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 144 feet. Reference point, established Nov. 21, 1948, top of casing, 0.90 foot above land-surface datum which is 4,266.12 feet above mean sea level.

26.20.11.232. Wamel. West side of earthen tank. Drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 167 feet. Reference point, top of casing at lowest point, south side of well, 0.83 foot above land-surface datum. Apr. 3, 1948, 65.69; May 25, 67.95; July 26, 69.28; Nov. 21, 69.46.

26.20.11.342. Wamel. North side of earthen tank. Drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 160 feet. Reference point, No. 1, top of casing, west side of well, 1.28 feet above land-surface datum. Reference point, No. 2, top edge of Geological Survey washer on north side of northwest 7- by 9-inch leg of gasoline tank support 15 feet east of well, at land-surface datum. Reference point, No. 3, top of nail in Geological Survey washer on 2- by 2-inch wood hub, 64 feet north of well, 0.08 foot below land-surface datum which is 4,273.24 feet above mean sea level. Apr. 3, 1948, 64.63; May 25, 91.86, pumping; July 26, 71.43; Sept. 27, 72.37; Nov. 21, 69.86.

26.20.14.242. Wamel. West side of earthen tank. Drilled well, diameter 16 inches, depth 150 feet. Reference point, top of nail in Geological Survey washer on 2- by 2-inch wood hub, 21 feet west of well, 0.65 foot below land-surface datum which is 4,293.30 feet above mean sea level.

26.20.14.424. Wamel. West side of earthen tank. Drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 150 feet. Reference point, No. 1, top of casing, at high point, south side of well, 0.70 foot above land-surface datum. Reference point, No. 2, top of nail in Geological Survey washer on 2- by 2-inch wood hub, 9 feet southeast of well, 1.51 feet above land-surface datum. Reference point, No. 3, top of nail in Geological Survey washer on 2- by 2-inch wood hub, 5 feet west of well, 0.19 foot above land-surface datum which is 4,290.51 feet above mean sea level. Apr. 3, 1948, 69.30; May 25, 69.86; July 26, 71.62; Sept. 29, 72.48; Nov. 21, 71.60; Mar. 22, 1949, 71.10.

26.20.15.224. Crabtree. South side of earthen tank. Drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 130 feet. Reference point, No. 1, top of casing, northeast side of well, 0.20 foot above land-surface datum. Reference point, No. 2, top of nail in Geological Survey washer on 6- by 8-inch cross tie northeast side of well, 0.51 foot above land-surface datum which is 4,274.67 feet above mean sea level. Apr. 3, 1948, 63.08; July 26, 68.13; Sept. 25, 68.90; Nov. 22, 66.10.

26.20.15.424. Veck. Drilled irrigation well, equipped with turbine pump after March 25, 1948, diameter 16 inches, depth 130 feet. Reference point, top of casing, 0.50 foot below land-surface datum which is 4,281.06 feet above mean sea level. Mar. 25, 1948, 61.10; May 25, 63.04, possible discrepancy of a few tenths of a foot between present and previous land-surface data; July 26, 66.45; Sept. 25, 64.14; Nov. 22, 62.51.

26.20.15.444. Crabtree. Drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 148 feet. Reference point, No. 1, top of casing, 0.65 foot below land-surface datum. Reference point, No. 2, top of nail in Geological Survey washer on 2- by 2-inch wood hub, 45 feet southeast of well, 0.01 foot above land-surface datum which is 4,284.18 feet above mean sea level.

26.20.17.133. Weatherby. West side of earthen tank. Stock well, equipped with windmill, diameter 6 inches, depth 63 feet. Reference point, No. 1, top edge of General Land Office Survey marker, about 50 feet west of well, 0.58 foot above land-surface datum. Reference point, No. 2, top of concrete well curb, north side of well, 1.39 feet above land-surface datum.

26.20.23.244. Veck. Drilled irrigation well, equipped with turbine pump after February 1, 1949, diameter 16 inches, depth 130 feet. Reference point, No. 1, top of casing, south side of well, 0.70 foot above land-surface datum. Reference point, No. 2, top of nail in Geological Survey washer on 2- by 2-inch wood hub, 83 feet south of well on fence line, 0.68 foot above land-surface datum which is 4,299.01 feet above mean sea level. Apr. 5, 1948, 71.77; May 25, 72.36; July 26, 73.24; Sept. 27, 73.96; Nov. 22, 73.66; Nov. 23, 1949, 77.86.

26.20.23.433. Davis. Drilled irrigation well, equipped with turbine pump, diameter 20 inches, depth 142 feet. Reference point, No. 1, top of casing at low point, south side of well, 0.70 foot above land-surface datum. Reference point, No. 2, top of 8-inch post, 67 feet west of well, 2.43 feet above land-surface datum. Reference point, No. 3, top of nail in Geological Survey washer on 2- by 2-inch wood hub, 72 feet east of well, on fence line, 0.48 foot below land-surface datum which is 4,299.37 feet above mean sea level. Apr. 5, 1948, 68.67; July 26, 69.92, possible discrepancy of a few tenths of a foot between present and previous land-surface datum; Sept. 27, 70.66; Nov. 22, 70.02; Mar. 22, 1949, 69.27, possible discrepancy of a few tenths of a foot between present and previous land-surface data.

26.20.25.211. Unknown. Abandoned windmill well, equipped with windmill tower, diameter 36 inches, depth 112 feet. Reference point, top of concrete well curb, 0.10 foot above land-surface datum.

26.20.29.142. Washburn. North of house at foot of hill on east side of earthen tank. Drilled irrigation well, equipped with turbine pump, diameter 14 inches, depth 132 feet. Reference point, top of casing, north side of well, 1.20 feet above land-surface datum.

26.21.11.200. Baker. Seventy-five yards south of shack, 30 yards southwest of dry windmill well, west side of earthen tank. Stock well, equipped with windmill, diameter 6 inches. Reference point, No. 1, chisel mark in concrete foundation of 2.5-foot circular corrugated metal tank, 10 feet north of well, 0.63 foot above land-surface datum. Reference point, No. 2, established February 1949, top of casing, 1.09 feet above land-surface datum.

27.19.19.433. Strange. Drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 210 feet. Reference point, top of casing, above slot in casing, 0.60 foot above land-surface datum which is 4,415.13 feet above mean sea level.

28.19.20.244. Owner unknown. 20 feet north of circular steel tank. Stock well, equipped with windmill and 4-foot circular concrete slab around casing, diameter 6 inches. Reference point, top edge of collar, south side of well, on top of casing, 1.86 feet above land-surface datum.

30.16.14.211. Everhart. Drilled irrigation well, equipped with turbine pump prior to May 20, 1949, diameter 12 inches, depth 180 feet. Reference point, top of casing, north side of well, 0.50 foot above land-surface datum.

30.16.16.344. Myers Bros. Drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 150 feet. Reference point, No. 1, top of casing, 0.73 foot above land-surface datum. Reference point, No. 2, established November 1949, top of concrete pump base, 0.73 foot above land-surface datum.

30.16.27.340. Owner unknown. West side of earthen tank and 150 feet south of circular metal tank. Stock well, equipped with windmill, diameter 6 inches. Reference point, top surface of concrete slab over well, at land-surface datum.

30.16.28.444. Myers Bros. Drilled irrigation well, equipped with turbine pump, diameter 16 inches. Reference point, top of casing, north side of well, 0.90 foot above land-surface datum.

30.16.29.422. Myers Bros. North side of earthen tank. Drilled irrigation well, diameter 16 inches, depth 160 feet. Reference point, top of casing, east side of well, 0.50 foot above land-surface datum.

32.17.13.240. Owner unknown. On south side of earthen tank, 0.2 mile west of road, 0.1 mile west of corral. Abandoned stock well, windmill tower removed, diameter 6 inches. Reference point, top of casing, north side of well, 1.00 foot above land-surface datum.

32.17.23.434. Timberlake. Drilled irrigation well, equipped with turbine pump, diameter 12 inches. Reference point, top of casing, west side of well, at land-surface datum.

LEA COUNTY (TATUM-LOVINGTON-HOBBS AREA)

Part 1. General Discussion

Water levels were measured in 162 wells in January 1949 (see part 2) and in about 29 of them in March, May, July, September, and November (see part 3). Two recording gages were in operation during the year (see part 4). A total of 314 measurements of water levels was made during the year including 12 tape measurements made in the recorder wells.

Precipitation and Pumpage

Precipitation causes changes in the water levels by changing the amount of recharge to the ground-water body and the amount of ground water pumped for irrigation. At times of near-normal or above-normal precipitation, the amount of ground water pumped for irrigation is reduced and the amount of recharge directly from precipitation to the ground-water body is increased. The net effect at such times is generally a rise in water levels.

The precipitation for 1949, as reported by the U. S. Weather Bureau, was above normal and amounted to 22.27 inches at Tatum--6.16 inches above normal, 26.4 inches at Lovington including an estimate of 3.8 inches for May--about 11.5 inches above normal, and 23.3 inches at Hobbs including an estimate of 3 inches for January--7.7 inches above normal. Incomplete records at Pearl also indicate corresponding above-normal precipitation. In general the precipitation was above normal in January, when conditions for recharge were good, and in the growing period from April through September when 8.28 inches was recorded at Lovington, 6.03 inches above normal. Precipitation during 1946 was above normal also, but during 1947 and 1948 was below normal.

The acreage of land served by pumps in Lea County increased greatly during 1949, more so than in 1948. The acreage of land irrigated in 1949 is roughly estimated by T. C. Perkins, County Agricultural Extension Agent, at 80,000 acres, an increase of 55,000 acres over 1948, which in turn showed an increase of 15,700 acres over 1947. The greater part of the increased acreage was planted to cotton of which, it is estimated, about 55,000 acres were irrigated in 1949. Acreage of grasses for permanent pasture and alfalfa, which in 1948 amounted to about 2,500 acres, probably increased to about 8,000 acres in 1949. The greater part of the remaining acreage was planted to row feed crops.

The excess precipitation in 1949 drastically reduced irrigation requirements. On the basis of metered electric power consumed in 1949 by 55 irrigation pumps for which there were comparable records in 1948, it is estimated that about half as much water was pumped per acre in 1949 as in 1948. It is estimated that 66,000 acre-feet of water was pumped for irrigation in 1949, an increase of about 27,000 acre-feet over that pumped in 1948. Public-supply pumpage for Lovington increased from about 190 acre-feet in 1948 to about 200 acre-feet in 1949 whereas, presumably because of the excess precipitation in 1949, the pumpage for Hobbs decreased from 2,330 acre-feet in 1948 to 1,830 acre-feet in 1949. Pumpage of ground water for drilling of oil wells has probably decreased. Pumpage of ground water for stock, municipal, and industrial use is estimated as 8,000 acre-feet in 1949.

Changes of Water Levels

The distances between observation wells in Lea County are so great that the relationship of the changes of water levels in different observation wells is not always readily apparent. The water levels in observation wells that are some distance away from pumping wells mainly show the effects of precipitation. Those in observation wells in lightly and sporadically pumped areas show varying fluctuations. Those in the more heavily pumped areas, show mainly the effects of pumping.

Water levels in January 1949 were low as compared with January 1948 because of the increase in pumping in 1948. The additional increase in pumping in 1949 caused a further decline in water levels so that by January 1950 significant net declines were observed for the year in most of the observation wells in areas of pumping. The declines were greater in the areas where pumps are concentrated than in outlying areas where pumps are scattered. The net yearly declines in general were smaller than for 1948 because of the excess precipitation which reduced the pumpage per acre. The accompanying map shows the areal changes in water levels from January 1949 to January 1950. (See fig. 20.) Water levels showed a net decline of more than 1 foot under about 23 square miles and more than 2 feet under 2 square miles or so, as compared with like declines under 94 and 24 square miles respectively in 1948. Water levels in areas remote from pumping showed net rises for the year as did many in 1948 also.

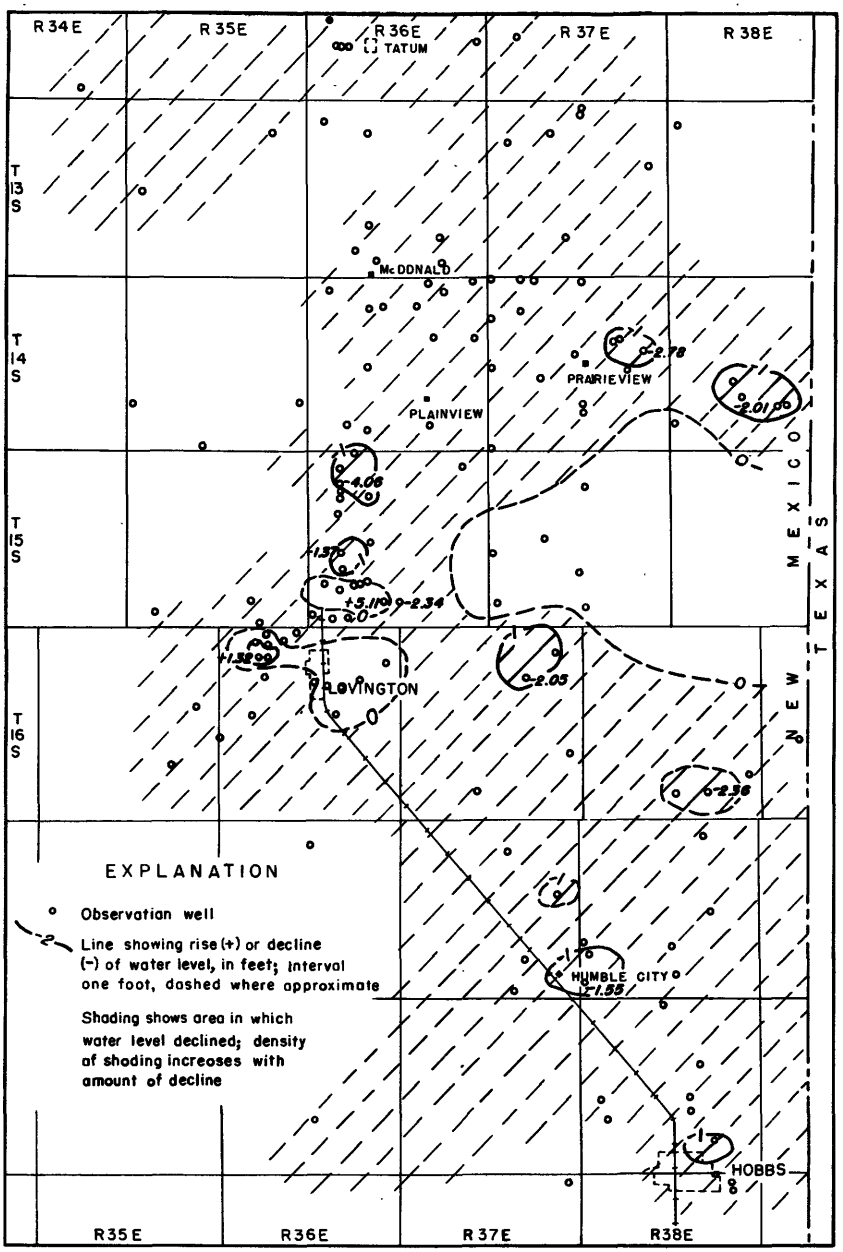


Figure 20.--Map of Tatum-Lovington-Hobbs area of High Plains, Lea County, showing change in water levels from January 1949 to January 1950.

The water levels declined more than 1 foot in areas, in general, where pumps are relatively concentrated and new. Each of these areas of decline generally covered only a few square miles and were about 2 and 6 miles east of Prairieview, 3 and 8 miles north of Lovington, 7 miles east of Lovington, 12 miles north of Hobbs, at Humble City, and the northeast part of Hobbs. The maximum observed decline, 4.0 feet, occurred in an irrigation well about 6 miles north of Lovington.

Rises of water level occurred in the two older developed areas, west and east, and northeast of Lovington. A maximum rise of water level of 1.3 feet was observed west of Lovington while a rise of 5.1 feet was observed in an irrigation well about 2 miles northeast of Lovington where declines of 5.2 and 6.6 feet were observed in the past 2 years. Rises of water level also occurred over most of T. 15 S., Ranges 37 and 38 E. where there are few pumps.

The water level in the outlying area, generally west of the middle of R. 35 E. (see fig. 20) showed a net rise in the period January 1949 to January 1950. As this area is distant from the area of irrigation wells, the water levels exhibit mainly the changes in the recharge derived from precipitation. The water level in an unused well, 14.35.33.433, has shown a continuous rise since mid-1941. This rise, which was rapid after the heavy rains of late 1941 and early 1942, continued at a slackening rate until essentially a static water level was reached in 1945 and 1946. Beginning in 1947 the water level again began rising as a result of the excess precipitation in 1946 and continued to rise to the end of 1949. It appears from the record of this well and others in areas remote from the effects of pumping, that water levels uninfluenced by pumping were higher at the end of 1949 than in 1941.

The seasonal fluctuations of water level in 1949 in the areas of pumping were, in general, slightly less than in 1948 because of the reduction in pumping per well caused by the excess precipitation in 1949. Water levels, as measured in unused wells that prior to 1948 had shown practically no seasonal fluctuations, showed seasonal lowerings in 1948 and 1949, the amount of lowering being dependent upon the distance from pumped wells and the amount of pumping. The seasonal lowering, from the highest level to the lowest level, in an unused well 14.37.27.131, about 1½ miles south of

Prairieview, was 1.4 feet in 1949, 1.8 feet in 1948 and somewhat less than 0.7 foot in 1947, whereas no seasonal lowering occurred in the preceding years. The seasonal lowering in 1949 in an unused well 18.38.30.200 was about 1.4 feet, whereas in prior years no significant seasonal lowering was observed. The declines of water level during the pumping season in 1948 and 1949 reflect the effects of increased pumping.

Water levels at the end of 1949 in areas distant from the heavy pumping were generally above the previous low levels reached in early 1941, but in the pumped areas they, in general, were at their lowest recorded level. Thus, in the areas of pumping around McDonald, Prairieview, Lovington, Humble City, and Hobbs, the gains in ground-water storage brought about by excess precipitation, particularly in 1941, have been more than offset by the relatively small amount of pumping since that time. Of 70 wells having records beginning in 1941 or earlier, the lowest level on record for 34 of them was in January 1941 or earlier, for 11 it was January 1949, and for 25 it was January 1950. Because of the increased number of pumps, the general tendency in succeeding years in the pumped areas will be a gradual net annual lowering of water levels except in years of above-normal precipitation. The magnitude of the annual declines in water level in particular areas will depend mainly upon the spacing of the wells and the amount of water pumped. Close spacing and large pumpage will result in large declines of water levels in some areas.

Part 2. Water levels in January 1949 and highest and lowest recorded levels in January or February, below land-surface datum, and change from January 1948 to January 1949, in feet

Location number	Owner	See also part	Water levels							Record	
			Jan. 1949 Level	Day	Change 1948-49	Highest Level	Year	Lowest Level	Year	Began	Years Missing
12.34.13.112	A. D. Jones Estate	3	30.74	20	-1.06	29.68	48	30.74	49	48	
35.411	A. D. Jones Estate	•	35.62	20	+1.10	35.62	49	36.72	48	48	
12.36.19.223	O. V. Fisher	•	27.93	20	-1.14	22.13	43	a32.05	41	39	
24.434	Jerry Clay	•	.....	..	.....	+1.32	42	a11.05	46	41	49
24.434a	Jerry Clay	3	a23.08	20	-.23	22.85	48	a23.08	49	48	
24.434b	Jerry Clay	•	22.48	20	-.23	22.25	48	22.48	49	48	
27.212	State of New Mexico	5	e35.55	20	.....	32.04	42	37.21	41	36	49
29.111	E. D. Holt	3	31.62	20	-.82	30.72	47	31.62	49	47	
29.112	E. D. Holt	•	30.92	20	-.89	f27.69	44	f34.25	41	30	
29.122	E. D. Holt	4	29.22	20	-.82	27.88	47	f29.23	49	47	
12.37.20.331	W. O. Dunlap, Jr.	5	.....	..	.....	+15.24	43	+0.09	48	41	49
12.38.4.312	G. C. Copeland	•	40.85	20	-.50	39.15	43	43.35	41	41	
13.35.11.222	Ashley Green	•	35.62	20	-4.03	29.14	43	35.62	49	30	32-38
19.211	Clara Elkins	•	45.65	20	-.79	44.75	46	49.07	41	41	
13.36.6.231	R. W. Duncan	3	37.33	20	-.79	36.54	48	37.33	49	48	
6.413	R. W. Duncan	•	b48.27	20	-3.33	44.94	48	b48.27	49	48	
9.111	W. B. Baum	•	41.01	20	-.99	38.18	47	41.01	49	47	
26.324	Iona McClish	5	42.24	19	.....	.....	..	.....	..	49	
28.113	M. R. Anderson	5	44.77	20	.....	.....	..	.....	..	49	
32.211	H. N. McDaniels	5	42.93	20	.....	.....	..	.....	..	49	
33.321	L. V. Beaman	•	45.14	19	-1.74	40.16	47	45.14	49	39	
35.323	(Incorrect designation used previously for well 13.36.35.413, which see)										
35.413	M. J. McClish	5	40.22	19	-.73	36.07	45	40.22	49	39	
13.37.3.131	J. H. Simpson	•	39.08	21	-.01	37.74	47	39.86	41	39	
3.133	J. H. Simpson	•	36.00	21	.....	33.83	43	36.00	49	40	42,48
7.234	W. D. Patton	3	29.87	21	-.30	29.57	48	29.87	49	47	
9.111	A. P. Breckon	•	36.79	21	-.46	36.33	48	36.79	49	48	
13.132	A. M. Brownfield	3	28.70	21	-.18	26.46	42	30.09	41	30	
28.230	A. F. Hight	(Measurements discontinued)				33.76	46	33.76	46	46	47-49
28.413	Mr. Dorn	•	35.32	21	-1.00	31.70	45	35.32	49	45	
13.38.6.341	Opal Fulton	•	44.05	21	-.22	43.02	45	45.62	41	40	
14.35.25.241	M. J. Wiggins	5	44.88	19	.....	.....	..	.....	..	49	
14.35.30.134	W. A. Anderson	•	46.00	19	+.50	45.46	45	48.93	41	39	
33.433	W. A. Anderson	3	39.76	19	+.13	39.76	49	42.37	30	30	
14.36.1.211	H. L. Wade	•	39.74	19	-5.94	33.80	48	39.74	49	48	
2.113	C. E. Renshaw	5	50.61	19	.....	.....	..	.....	..	49	

* See footnotes at end of table.

Part 2--Continued

Location number	Owner	See also part	Water Levels							Record	
			Jan. 1949		Change	Highest		Lowest		Be-	Years
			Level	Day	1948-49	Level	Year	Level	Year	gan	missing
14.36.2.410	C. E. Renshaw	.	40.50	19	+0.05	39.02	45	40.88	41	39	
6.421	S. A. and W. B. Richardson	.	40.09	20	-.39	39.03	44	40.96	41	40	45
9.111	A. C. Drake	.	40.65	19	-.73	38.36	44	40.77	41	39	
9.211	O. M. Woodward	.	44.70	19	-1.72	40.46	43	44.70	49	39	
10.212	Unknown	5	47.98	19	.....	.....	..	.....	..	49	
13.211	Mattie Chambers	3	36.80	21	-1.03	35.74	46	37.18	41	30	
14.112	V. M. Chamber	5	41.28	21	-.46	40.75	46	42.09	41	39	
14.121	(Incorrect designation used previously for well 14.36.14.112, which see)										
21.111	Curtiss Patterson	5	42.69	19	.....	.....	..	.....	..	49	
32.121	Unknown	5	53.58	19	.....	.....	..	.....	..	49	
33.131	H. H. Caldwell	5	57.45	19	.....	.....	..	.....	..	49	
35.111	Bert Wright	5	48.36	22	.....	.....	..	.....	..	49	
14.37.3.113	Lois C. Hobbs	.	34.10	21	-1.73	31.40	45	34.72	40	39	42
5.111	S. G. Knoll	5	35.52	19	.....	.....	..	.....	..	49	
5.211	Unknown	5	31.76	19	.....	.....	..	.....	..	49	
6.111	E. L. Harbison	5	37.38	19	.....	.....	..	.....	..	49	
7.311	E. L. Harbison	5	42.82	21	.....	.....	..	.....	..	49	
8.113	E. L. Harbison	5	38.10	21	.....	.....	..	.....	..	49	
13.311	C. H. Spears	5	35.57	21	.....	.....	..	.....	..	49	
14.111	M. E. Powell	5	36.12	21	.....	.....	..	.....	..	49	
14.112	M. E. Powell	3	37.59	21	-2.23	34.53	45	37.59	49	39	
16.421	School Land	.	31.18	21	-.68	28.86	43	31.42	39	39	
19.111	Unknown	5	41.86	21	.....	.....	..	.....	..	49	
20.412	G. O. Durham	.	36.92	21	-1.19	33.30	45	36.92	49	40	
23.213	Lee Whitman	.	38.07	21	-2.82	33.90	47	38.07	49	46	*
27.134	J. R. Fort	3	37.90	21	-1.25	36.14	47	37.90	49	30	
27.311	J. R. Fort	.	36.02	21	-.89	35.13	48	36.02	49	48	
14.38.18.111	Annie Miller	5	33.26	21	.....	.....	..	.....	..	49	
21.313	Claude Cox	5	32.48	21	.....	.....	..	.....	..	49	
27.233	M. M. Gaines	.	37.11	21	-.13	34.57	43	37.11	49	43	
27.240	M. M. Gaines	.	39.55	21	-.73	36.80	46	40.14	41	39	43-45
28.121	Ila Cox	3	27.03	21	-.50	24.28	42	27.03	49	30	
31.111	W. J. and D. O. Aldridge	5	37.54	21	.....	.....	..	.....	..	49	
15.35.31.422	Joe Price	5	54.50	18	.....	.....	..	.....	..	49	
35.112	Louis Chapman	.	40.93	18	-.40	39.60	43	41.51	41	40	
35.344	Louis Chapman	5	44.57	18	.....	.....	..	.....	..	49	

* See footnotes at end of table.

Part 2--Continued

Location number	Owner	See also part	Jan. 1949 Level	Day	Change 1948-49	Highest Level	Year	Lowest Level	Year	Began	Years missing
15.36.1.311	Ida F. Allen	5	43.60	22	.....	.....	..	.....	..	49	
5.311	J. P. Caudill	5	40.02	19	.....	.....	..	.....	..	49	
8.111	Gordon Gann	5	39.95	19	.....	.....	..	.....	..	49	
8.131	Orren Beatty	.	43.23	19	-2.92	39.93	47	43.23	49	30	
8.311	M. G. Adams	3	43.58	19	-3.45	40.13	48	43.58	49	48	
9.311	E. L. and S. L. Sibley	5	44.30	20	.....	.....	..	.....	..	49	
17.111	M. G. Adams	5	44.53	19	.....	.....	..	.....	..	49	
20.133	E. B. Parsons	5	45.25	19	.....	.....	..	.....	..	49	
21.111	D. H. Crockett	5	42.55	20	.....	.....	..	.....	..	49	
28.133	J. R. and Boss Hale	.	49.69	20	-1.07	44.53	47	49.69	49	47	
29.112	G. A. Fisher	.	47.06	19	-2.16	44.90	48	47.06	49	48	
29.331	D. A. Hudgens	5	48.72	19	.....	.....	..	.....	..	49	
29.410	D. A. Hudgens	.	50.65	20	-3.70	41.89	42	50.65	49	39	46
29.421	H. R. Fleming	.	49.45	20	-1.76	47.69	48	49.45	49	48	
30.411	Ray Short	5	47.43	19	.....	.....	..	.....	..	49	
31.311	O. A. Payton	.	47.47	18	-.12	47.35	48	47.47	49	48	
31.423	J. and R. Burns	5	51.05	19	.....	.....	..	.....	..	49	
32.323	Hobdy Gann	5	53.60	20	.....	.....	..	.....	..	49	
33.211	Spencer Nymeyer	.	61.00	21	-5.22	49.14	47	61.00	49	47	
34.111	Fred Nymeyer	.	45.70	21	-1.58	44.12	48	45.70	49	48	
15.37.5.442	Unknown	5	33.98	22	.....	.....	..	.....	..	49	
10.113	W. A. Simpson	.	35.24	21	-.31	34.66	45	36.63	39	38	40-42,44
19.311	Otto Dean	.	41.51	21	+3.23	41.51	49	44.74	48	48	
20.221	J. E. Steele	5	35.87	21	.....	.....	..	.....	..	49	
15.37.21.334	R. W. Dean	3	.....	..	.....	29.20	45	a39.46	41	31	49
27.111	C. L. Naul	.	34.67	21	-1.84	29.38	43	34.67	49	42	45
31.132	W. R. Dean	5	35.07	21	.....	.....	..	.....	..	49	
34.133	O. S. Bigham	5	30.95	21	.....	.....	..	.....	..	49	
15.38.22.441	J. W. Motsenbocker	.	31.67	23	+.56	28.72	42	32.50	41	40	
16.35.13.112	W. T. Zuber	3,5	43.38	22	.....	.....	..	.....	..	49	
26.211	Homer Youngblood	5	35.37	22	.....	.....	..	.....	..	49	
16.36.1.431	Lorene Easley	.	41.68	23	-.46	39.65	45	43.84	41	39	
4.Lot 2	W. L. Barbee	.	48.32	18	-.68	46.59	47	48.32	49	47	
4.Lot12	E. H. Byers	4	47.37	17	-1.31	f43.50	43	f47.40	49	35	
4.433	City of Lovington	.	.....	..	.....	52.66	40	53.89	48	40	42-47,49
5.Lot10	Mrs. Mary Coxey	5	49.86	22	.....	44.53	42	49.86	49	40	48

* See footnotes at end of table.

Part 2--Continued

Location number	Owner	See also part	Water levels: Jan. 1949 Level	Day	Change 1948-49	Highest Level	Year	Lowest Level	Year	Record: Began	Years missing
16.36.5.Lot14	W. B. Phillips	5	53.49	22	-1.14	45.23	42	53.49	49	39	
5.Lot15	I. D. Phillips	.	51.99	22	-1.90	50.09	48	51.99	49	48	
5.321	J. T. Gwinn	.	53.16	22	-1.60	44.81	42	53.16	49	39	
5.411	Mrs. E. J. Robinson	.	55.21	22	-1.81	45.72	42	55.21	49	49	
8.111	C. C. Chambers	.	53.01	22	-3.12	49.89	48	53.01	49	48	
8.211	H. W. Gillette	.	55.83	22	-2.16	53.67	48	55.83	49	48	
8.424	E. B. Yarbo	(Measurements discontinued)				50.76	44	52.48	41	38	48
10.123	E. Carr	5	57.89	23	.....	.....	..	.....	..	49	
10.233	J. E. Simmons	.	56.31	23	-2.29	50.22	42	56.31	49	40	
11.133	C. G. Hudgens	.	53.95	23	-3.24	50.71	48	53.95	49	48	
11.232	Lorene Easley	.	57.66	23	-3.69	53.97	48	57.66	49	48	
15.240	I. E. Collier	.	52.74	23	-2.32	46.72	43	52.74	49	39	
17.133	B. L. Hobbs	5	53.15	22	.....	.....	..	.....	..	49	
19.111	George Spires	5	46.58	22	.....	.....	..	.....	..	49	
16.37.11.111	Mitsu Harada	5	31.93	23	.....	.....	..	.....	..	49	
19.200	H. T. Montieth	.	30.62	23	+.13	28.60	42	30.90	41	38	
24.431	R. L. Robinson	.	35.90	23	+.30	35.90	49	36.20	48	48	
33.110	(Incorrect designation used previously for well 16.37.33.122, which see)										
33.122	Elbert Shipp	.	29.23	23	.....	27.48	42	30.63	41	39	47,48
16.38.25.144	J. S. and Rose Eaves	.	33.71	23	-.59	31.90	42	34.61	41	41	
34.131	Ralph Moe	3	36.60	23	-.07	35.39	47	36.60	49	47	
35.110	Mrs. P. S. Bennett	.	36.52	23	+.71	34.02	44	37.23	48	40	
16.39.20.131	O. D. Ferguson	.	33.61	23	-1.14	32.47	48	33.61	49	48	
17.33.13.433	American Potash Co.	3,5	c144.24	22	.....	.....	..	.....	..	49	
17.34.35.130	Phillips Petroleum Co.	3	89.92	22	+.14	89.92	49	*91.98	41	41	
17.35.35.213	Phillips Petroleum Co.	3	38.93	22	-.33	38.60	48	41.45	41	41	
17.36.3.333	State of New Mexico	3	42.47	22	-.25	42.02	44	44.29	41	39	
27.131	Wallace Mitchell	3	33.05	22	+.09	33.05	49	33.14	48	48	
17.37.10.211	Unknown	5	32.87	23	.....	.....	..	.....	..	49	
13.312	John Catchings	.	28.61	23	-1.66	26.05	44	28.84	41	39	
26.333	David Newby	.	30.77	24	-1.89	28.21	43	30.77	49	38	
34.441	M. J. Waltman	.	27.25	24	-1.22	24.60	43	27.25	49	41	
17.38.2.311	O. and G. W. Hickerson	5	43.89	24	.....	.....	..	.....	..	49	
23.111	Unknown	5	36.01	24	.....	.....	..	.....	..	49	
27.133	W. E. Manning	.	27.16	24	-.52	25.55	47	27.16	49	46	
30.113	W. H. Martin	.	29.15	24	-1.33	23.97	42	29.15	49	38	

* See footnotes at end of table.

Part 2--Continued

Location number	Owner	See also part	Water levels							Record	
			Jan. 1949 Level	Jan. 1949 Day	Change 1948-49	Highest Level	Highest Year	Lowest Level	Lowest Year	Began	Years missing
17.38.30.312	Mrs. W. L. Goedeke	3	30.22	24	-1.00	26.47	42	30.44	41	30	
31.311	G. L. Beene	5	26.71	24	.....	.....	..	.....	..	49	
34.113	W. E. Busby	.	26.90	24	-.59	24.78	44	26.90	49	44	
18.36.27.111	State of New Mexico	3	40.06	18	-.20	38.13	43	41.66	41	39	
18.38.2.131	Sam Dalmont	.	29.69	24	-.92	27.20	43	30.64	40	39	
4.323	J. R. Isaacs	3	24.35	24	-.68	22.17	43	25.59	40	30	
15.241	Mr. Harris	3	30.25	25	-2.08	26.77	43	30.25	49	40	
19.413	Carl Dennison	5	24.37	18	.....	.....	..	.....	..	49	
22.411	S. C. Albertson	.	36.95	24	-1.58	34.43	43	36.95	49	40	
22.412	M. C. Younger	(Measurements discontinued)				37.09	43	38.69	41	40	47-49
22.433	Glenn Staley	5	41.23	18	.....	.....	..	.....	..	49	
26.343	L. V. Pribble	.	47.68	18	-3.86	k40.30	43	47.68	49	40	
30.200	Mrs. Sadie Davis	3	23.92	18	-.73	23.19	48	27.56	31	31	
19.35.13.211	Clara Fowler	5	21.55	18	-.72	18.38	42	a26.67	30	30	
24.222	F. K. Turner	.	19.34	18	-.58	17.78	47	20.38	41	39	
19.36.19.113	L. S. Evans	.	16.26	18	-.44	15.06	47	17.93	41	39	
19.411	C. R. Jordan	.	16.59	18	-.07	16.35	47	16.59	49	42	
32.111	S. P. Jordan	.	16.77	18	-.30	15.15	42	18.60	40	39	
32.321	E. T. Childers	(Measurements discontinued)				23.80	42	26.77	46	42	48,49
32.323	E. T. Childers	(Measurements discontinued)				23.17	42	26.18	46	42	48,49
19.37.1.231	Hobbs Country Club	.	25.67	18	+.20	24.75	47	25.87	48	45	
32.241	Mrs. E. A. Anderson	3	12.34	18	-.04	11.50	33	12.34	49	30	
32.241a	Mrs. E. A. Anderson	.	12.27	18	+.03	12.27	49	12.30	48	48	
19.38.2.122	Perry Lamar	.	52.30	24	-3.80	43.59	42	52.30	49	40	
2.242	Bert Dodson	.	46.88	24	-1.14	44.38	42	46.97	41	41	
2.424	A. C. Cheser	.	42.33	24	.....	42.33	49	46.54	41	41	42,48
34.222	Collins Walker	5	42.27	25	.....	.....	..	.....	..	49	
20.35.1.222	J. L. Wood	3	e21.25	18	-.61	19.70	44	25.63	41	30	
20.37.9.110	W. H. Laughlin	3	31.13	18	-.73	27.18	43	42.40	38	30	36,37
9.110a	W. H. Laughlin	3	30.30	18	-.75	26.36	43	37.12	41	41	

a Pumping.
b Pumping recently.
e Dry at depth given.
f From recorder charts.
j Also 1937.
k March 30.

Part 3

Water levels, below land-surface datum, during 1949

Location number	12.34. 13.112	12.36. 24.434a	12.36. 29.111	13.36. 6.231	13.37. 7.234	13.37. 13.132	14.35. 33.433	14.36. 13.211
Owner	Jones	Clay	Holt	Duncan	Patton	Brown-field	Ander-son	Cham-bers
Jan.19-21	30.74	a23.08	31.62	37.33	29.87	28.70	39.76	36.80
Mar.21,23	(a)	23.08	31.83	37.54	29.95	28.74	39.76	36.88
May 23,24	32.20	23.20	31.84	37.68	29.99	28.77	39.77	36.98
July 27,28	a54.70	a23.42	32.02	37.84	30.02	28.82	39.75	37.13
Sept.23.24	34.25	23.47	32.10	(e)	30.10	28.83	39.73	37.34
Nov.17,18	33.95	23.27	c32.04	.....	30.15	28.87	39.73	37.46

Location number	14.37. 14.112	14.37. 27.134	14.38. 28.121	15.36. 8.311	15.37. 21.334	16.35. 13.112	16.38. 34.131	17.33. 13.433
Owner	Powell	Fort	Cox	Adams	Dean	Zuber	Moe	American Potash
Jan.19,21-23	37.59	37.90	27.03	43.58	.....	43.38	36.60	b144.24
Mar. 21-23	37.45	37.76	26.76	(a)	31.59	43.03	36.37	145.02
May 21,23,24	38.19	38.31	27.61	46.29	33.03	46.52	36.87	145.31
July 26-28	39.17	38.85	27.92	50.65	35.22	44.57	48.66	151.91
Sept. 22-24	40.86	39.20	28.30	46.29	33.19	45.63	41.84	153.14
Nov. 16,17	d40.73	38.52	28.29	44.79	32.36	43.91	39.10	a177.84

Location number	17.34. 35.130	17.35. 35.213	17.36. 3.333	17.36. 27.131	17.38. 30.312	18.36. 27.111	18.38. 4.232	18.38. 15.241
Owner	Petro-leum	Petro-leum	State of N.M.	Mitchell	Goedeke	State of N.M.	Isaacs	Harris
Jan.18,22,24,25	89.92	38.93	42.47	33.05	30.22	40.06	24.35	30.25
Mar. 22	89.99	38.92	42.49	33.06	30.43	40.10	24.43	29.97
May 21,23	90.00	39.01	42.57	33.08	30.33	40.15	d25.28	31.07
July 26,27	90.01	39.03	42.68	b36.18	30.82	40.20	25.07	31.19
Sept. 22,23	90.00	39.10	42.72	33.00	31.18	40.20	24.69	32.41
Nov. 16, 17	90.00	39.11	42.60	33.48	31.42	40.23	24.69	30.00

Location number	18.38. 30.200	19.37. 32.241	20.35. 1.222	20.37. 9.110	20.37. 9.110a
Owner	Davis	Anderson	Wood	Laughlin	Laughlin
Jan. 18	23.92	12.34	c21.25	31.13	30.30
Mar. 22	c25.89	12.34	21.34	30.93	30.15
May 21	24.70	12.23	c21.48	30.90	30.13
July 26	c25.30	12.17	21.58	31.66	30.84
Sept.22	25.38	11.22	21.50	31.78	30.96
Nov. 16	23.96	12.06	21.75	31.34	30.53

a Pumping.
b Pumping recently.
c Nearby well pumping.
d Nearby well pumping recently.
e Dry.

Part 4

12.36.29.122. E. D. Holt.

Highest daily water level, from recorder charts

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	29.20	29.23	29.23	29.35	29.37	29.45	29.51	29.59	.....	29.67	29.66	29.71
2	29.18	29.22	29.23	29.35	29.38	29.46	29.52	29.59	.....	29.66	29.66	29.71
3	29.19	29.21	29.23	29.35	29.37	29.45	29.52	29.59	.....	29.66	29.67	29.70
4	29.22	29.22	29.23	29.35	29.38	29.46	29.52	29.60	.....	29.65	29.67	29.71
5	29.22	29.21	29.22	29.35	29.38	29.46	29.52	29.60	.....	29.64	29.67	29.69
6	29.23	29.22	29.22	29.34	29.37	29.45	29.53	29.59	.....	29.63	29.67	29.69
7	29.22	29.21	29.23	29.34	29.38	29.42	29.53	29.59	.....	29.63	29.66	29.69

12.36.29.122.--Continued.

Highest daily water level, from recorder charts

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
8	29.21	29.21	29.23	29.33	29.39	29.44	29.54	29.59	.....	29.63	29.66	29.69
9	29.22	29.22	29.24	29.33	29.39	29.44	29.56	29.60	.....	29.65	29.65	29.70
10	29.23	29.23	29.25	29.34	29.40	29.44	29.57	29.61	.....	29.67	29.65	29.68
11	29.23	29.22	29.25	29.34	29.39	29.43	29.56	29.62	.....	29.67	29.65	29.68
12	29.23	29.21	29.26	29.33	29.39	29.42	29.56	29.61	.....	29.67	29.65	29.71
13	29.22	29.22	29.28	29.33	29.37	29.42	29.56	29.62	.....	29.67	29.66	29.71
14	29.19	29.23	29.30	29.34	29.39	29.42	29.56	29.62	.....	29.67	29.66	29.71
15	29.20	29.23	29.30	29.36	29.39	29.42	29.55	29.62	.....	29.67	29.66	29.70
16	29.22	29.24	29.29	29.35	29.36	29.41	29.55	29.62	.....	29.67	29.66	29.69
17	29.22	29.24	29.29	29.35	29.40	29.41	29.55	.....	.....	29.66	29.66	29.69
18	29.22	29.23	29.32	29.33	29.40	29.42	29.56	.....	.....	29.66	29.65	29.69
19	29.23	29.23	29.34	29.35	29.40	29.46	29.58	.....	.....	29.66	29.65	29.69
20	29.22	29.23	29.32	29.35	29.39	29.45	29.59	.....	.....	29.66	29.65	29.69
21	29.21	29.24	29.33	29.35	29.39	29.45	29.59	.....	.....	29.66	29.66	29.69
22	29.22	29.24	29.33	29.36	29.39	29.45	29.61	.....	.....	29.66	29.67	29.71
23	29.22	29.23	29.32	29.36	29.39	29.44	29.62	.....	.....	29.66	29.67	29.71
24	29.23	29.23	29.32	29.36	29.39	29.44	29.61	.....	.....	29.66	29.68	29.71
25	29.24	29.23	29.34	29.37	29.38	29.47	29.61	.....	29.65	29.66	29.70	29.71
26	29.23	29.23	29.35	29.37	29.38	29.49	29.61	.....	29.65	29.65	29.71	29.72
27	29.22	29.24	29.36	29.38	29.37	29.50	29.59	.....	29.65	29.65	29.71	29.72
28	29.23	29.24	29.35	29.38	29.38	29.51	29.59	.....	29.65	29.65	29.71	29.72
29	29.25		29.34	29.37	29.39	29.51	29.60	.....	29.66	29.65	29.71	29.72
30	29.23		29.35	29.37	29.42	29.51	29.60	.....	29.66	29.65	29.71	29.72
31	29.23		29.35		29.45		29.59	.....		29.66		29.72

16.36.4.Lot 12. E. H. Byers.

Highest daily water level, from recorder charts

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	47.40	.....	.....	47.97	48.02	49.03	49.64	49.63	50.27	48.87	48.28	47.92
2	47.39	.....	.....	47.92	48.03	49.11	49.63	49.69	50.29	48.84	48.27	47.92
3	47.39	.....	.....	47.90	48.13	49.19	49.65	49.84	50.28	48.80	48.25	47.90
4	47.40	.....	.....	47.87	48.34	49.27	49.61	50.00	50.22	48.77	48.23	47.90
5	47.40	.....	47.31	47.85	48.53	49.36	49.65	50.11	50.16	48.73	48.22	47.90
6	47.39	.....	47.32	47.83	48.65	49.40	49.69	50.04	50.09	48.69	48.20	47.91
7	47.40	.....	47.31	47.82	48.76	49.45	49.73	49.97	50.02	48.67	48.19	47.91
8	47.40	.....	47.31	47.82	48.82	49.50	49.77	49.91	49.99	48.66	48.17	47.91
9	47.40	.....	47.38	47.89	48.83	49.45	49.80	49.90	.....	48.61	48.16	47.89
10	47.40	.....	47.51	48.13	48.80	49.37	49.81	49.96	.....	48.59	48.14	47.87
11	47.40	.....	47.67	48.19	48.78	49.28	49.79	50.02	49.97	48.56	48.13	47.87
12	47.39	.....	47.75	48.31	48.73	49.21	49.83	49.96	49.90	48.53	48.12	47.87
13	47.39	.....	47.78	48.39	48.72	49.13	49.87	49.89	49.83	48.51	48.10	47.87
14	47.39	.....	47.79	48.45	48.72	49.08	49.91	49.83	49.77	48.51	48.09	47.88
15	47.39	.....	47.85	48.46	48.61	49.00	49.93	49.77	49.70	48.53	48.07	47.88
16	47.39	.....	48.00	48.42	48.58	48.95	49.95	49.72	49.65	48.56	48.06	47.89
17	47.37	.....	48.10	48.37	48.54	48.90	49.98	49.67	49.58	48.57	48.04	47.89
18	47.37	.....	48.19	48.33	48.51	48.85	49.99	49.61	49.53	48.60	48.03	47.87
19	47.38	.....	48.28	48.29	48.47	48.80	50.03	49.57	49.46	48.62	48.01	47.87
20	47.37	47.35	48.28	48.24	48.45	48.75	50.06	49.54	49.40	48.61	48.00	47.77
21	47.37	47.34	48.27	48.20	48.42	48.74	50.06	49.51	49.33	48.52	47.99	47.77
22	47.37	47.35	48.22	48.16	48.48	48.87	50.09	49.52	49.27	48.50	47.99	47.77
23	47.37	47.34	48.17	48.12	48.67	48.98	50.02	49.52	49.23	48.48	47.99	47.77
24	47.37	.....	48.15	48.09	48.75	49.14	49.95	49.52	49.18	48.44	47.99	47.76
25	47.36	.....	48.11	48.07	48.85	49.26	49.92	49.51	49.14	48.42	47.99	47.76
26	47.36	.....	48.10	48.06	48.83	49.38	49.97	49.58	49.09	48.39	47.96	47.75
27	47.36	.....	48.06	48.05	48.79	49.39	49.91	49.83	49.05	48.37	47.97	47.75
28	47.37	.....	48.03	48.05	48.82	49.50	49.85	50.05	49.01	.....	47.93	47.75
29	47.37		47.98	48.04	48.90	49.55	49.78	50.09	48.97	48.33	47.92	47.75
30	47.35		47.98	48.01	48.91	49.60	49.73	50.16	48.92	48.32	47.92	47.75
31	47.36		47.98		48.95		49.68	50.23		48.29		47.74

Part 5

Miscellaneous Data Concerning Observation Wells

12.36.27.212. State of New Mexico. Mar. 21, dry at 35.13.

12.37.20.331. Dunlap. Mar. 21, 2.66, pumping recently.

13.36.26.324. McClish. Drilled irrigation well equipped with turbine pump, depth 120 feet. Reference point, top of 3- by 3-foot concrete pump base, 0.52 foot above land-surface datum.

13.36.28.113. Anderson. Drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 100 feet. Reference point, top of 3- by 3-foot concrete pump base, 0.30 foot above land-surface datum.

13.36.32.211. McDaniels. Drilled irrigation well, equipped with turbine pump. Reference point, top of 2- by 2-foot concrete pump base, 0.40 foot above land-surface datum.

13.36.35.413. McClish. Previously designated incorrectly as 13.36.35.323.

14.35.25.241. Wiggins. Drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 110 feet. Reference point, top of 3- by 3-foot concrete pump base, 1.00 foot above land-surface datum.

14.36.2.113. Renshaw. Drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 125 feet. Reference point, top of 3.2- by 3.2-foot concrete pump base, 0.75 foot above land-surface datum.

14.36.10.212. Owner unknown. Drilled irrigation well, equipped with turbine pump. Reference point, top of 3- by 3-foot concrete pump base, 0.50 foot above land-surface datum.

14.36.14.112. Chamber. Previously designated incorrectly as 14.36.14.121.

14.36.21.111. Patterson. Drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 95 feet. Reference point, top of 2½- by 2½-foot concrete pump base, 0.50 foot above land-surface datum.

14.36.32.121. Owner unknown. Drilled irrigation well, equipped with turbine pump. Reference point, top of 4- by 4-foot concrete pump base, 0.50 foot above land-surface datum.

14.36.33.131. Caldwell. Drilled irrigation well, equipped with turbine pump. Reference point, top of 4- by 4-foot concrete pump base, 1.00 foot above land-surface datum.

14.36.35.111. Wright. Drilled irrigation well, equipped with turbine pump, diameter 14 inches, depth 100 feet. Reference point, top of 4- by 4-foot concrete pump base, 2.00 feet above land-surface datum.

14.37.5.111. Knoll. Drilled irrigation well, equipped with turbine pump. Reference point, top of 3- by 3-foot concrete pump base, 0.70 foot above land-surface datum.

14.37.5.211. Owner unknown. Drilled irrigation well, equipped with turbine pump. Reference point, top of 3- by 3-foot concrete pump base, 0.70 foot above land-surface datum.

14.37.6.111. Harbison. Drilled irrigation well, equipped with turbine pump. Reference point, top of 3- by 3-foot concrete pump base, 1.00 foot above land-surface datum.

14.37.7.311. Harbison. Drilled irrigation well, equipped with turbine pump. Reference point, top of 3½- by 3½-foot concrete pump base, at land-surface datum.

14.37.8.113. Harbison. Drilled irrigation well, equipped with turbine pump. Reference point, top of 4- by 4-foot concrete pump base, 0.60 foot above land-surface datum.

14.37.13.311. Spears. Drilled irrigation well, equipped with turbine pump. Reference point, top of 4- by 4-foot concrete pump base, 0.50 foot above land-surface datum.

14.37.14.111. Powell. Drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 140 feet. Reference point, top of concrete pump base, 0.40 foot above land-surface datum. May 25, 1948, 59.63, pumping.

14.37.19.111. Owner unknown. Drilled irrigation well, equipped with turbine pump. Reference point, top of 3- by 3-foot concrete pump base, 0.50 foot above land-surface datum.

14.38.18.111. Miller. Drilled irrigation well, no equipment, diameter 20 inches, depth 140 feet. Reference point, top of concrete pump base, 0.20 foot above land-surface datum.

14.38.21.313. Cox. Drilled irrigation well, equipped with turbine pump. Reference point, top of 3- by 3-foot concrete pump base, 0.50 foot above land-surface datum.

14.38.31.111. Aldridge. Drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 135 feet. Reference point, top of 3- by 3-foot concrete pump base, 0.70 foot above land-surface datum. July 26, 1948, 41.30.

15.35.31.422. Price. Drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 127 feet. Reference point, surface of concrete pump base, 0.50 foot above land-surface datum.

15.35.35.344. Chapman. About 30 feet north of elevated metal storage tank, center of east side of earthen storage tank, and northeast of house. Drilled well, diameter 12 inches. Reference point, top edge of casing, 1.50 feet above land-surface datum.

15.36.1.311. Allen. Drilled irrigation well, equipped with turbine pump, depth 120 feet. Reference point, top of 3- by 3-foot concrete pump base, 0.40 foot above land-surface datum.

15.36.5.311. Caudill. Drilled irrigation well, no equipment, diameter 16 inches, depth 100 feet. Reference point, top of concrete pump base, 0.75 foot above land-surface datum.

15.36.8.111. Gann. Drilled irrigation well, equipped with turbine pump. Reference point, surface of 3- by 3-foot concrete pump base, 0.25 foot above land-surface datum.

15.36.9.311. Sibley. Drilled irrigation well, equipped with turbine pump, diameter 12 (?) inches, depth 120 feet.

15.36.17.111. Adams. Drilled irrigation well, equipped with turbine pump, diameter 18 inches, depth 115 feet. Reference point, surface of 3½- by 3½-foot concrete pump base, 0.50 foot above land-surface datum.

15.36.20.133. Parsons. Drilled irrigation well, equipped with turbine pump, diameter 15 inches, depth 94 feet. Reference point, surface of concrete pump base, 0.85 foot above land-surface datum.

15.36.21.111. Crockett. Drilled irrigation well, equipped with turbine pump, depth 97 feet. Reference point, top of 4- by 4-foot concrete pump base, 0.80 foot above land-surface datum.

15.36.29.331. Hudgens. Drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 100 feet. Reference point, surface of 2½- by 2½-foot concrete pump base, 0.25 foot above land-surface datum.

15.36.30.411. Short. Drilled irrigation well, equipped with turbine pump, diameter 12 inches, depth 85 feet. Reference point, surface of 2½- by 2½-foot concrete pump base, 0.25 foot above land-surface datum.

15.36.31.423. Burns. Drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 110 feet. Reference point, surface of 2½- by 2½-foot concrete pump base, 1.00 foot above land-surface datum.

15.36.32.323. Gann. Drilled irrigation well, equipped with turbine pump. Reference point, top of 2½- by 2½-foot concrete pump base, 0.25 foot above land-surface datum. July 22, 1946, 58.12.

15.37.5.442. Owner unknown. Drilled stock well, no equipment, diameter 8 inches, depth 52 feet. Reference point, top of 1.5- by 1.5-foot pyramidalshaped concrete block around casing, 0.70 foot above land-surface datum.

15.37.20.221. Steele. Drilled irrigation well, equipped with turbine pump, depth 120 feet. Reference point, top of 4- by 4-foot concrete pump base, 0.20 foot above land-surface datum.

15.37.31.132. Dean. Drilled irrigation well, equipped with turbine pump. Reference point, top of 4- by 4-foot concrete pump base, 1.00 foot above land-surface datum.

15.37.34.133. Bigham. Drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 116 feet. Reference point, top of 2½- by 2½-foot concrete pump base, 0.80 foot above land-surface datum.

16.35.13.112. Zuber. Drilled irrigation well, equipped with turbine pump, diameter 12½ inches, depth 82 (?) feet. Irrigation well about 600 feet northwest of this well. Reference point, top of casing, 1.00 foot above land-surface datum. Mar. 26, 1948, 42.36, nearby well pumping; May 24, 48.00; July 23, 50.53; Sept. 25, 46.91; Nov. 17, 44.37.

16.35.26.211. Youngblood. Drilled irrigation well, equipped with turbine pump. Reference point, top of 2½- by 2½-foot concrete pump base, 0.30 foot above land-surface datum.

16.36.5.Lot 10. Coxey. Well redrilled in 1948. Reference point, established Jan. 22, 1949, surface of 4- by 4-foot concrete pump base, 0.86 foot above land-surface datum.

16.36.5.Lot 14. Phillips. Correction to water level published in Water-Supply Paper 1101; Jan. 15, 1947, 49.04.

16.36.10.123. Carr. About 80 feet southeast of City of Lovington water well and tank. Drilled irrigation well, equipped with turbine pump. Reference point, top of 2½- by 2½-foot concrete pump base, 0.30 foot above land-surface datum.

16.36.17.133. Hobbs. Drilled irrigation well, equipped with turbine pump. Reference point, top of concrete pump base, 0.20 foot above land-surface datum.

16.36.19.111. Spires. Drilled irrigation well, equipped with turbine pump. Reference point, top of 2½- by 2½-foot concrete pump base, at land-surface datum.

16.37.11.111. Harada. Drilled irrigation well, equipped with turbine pump. Reference point, top of 3½- by 3½-foot concrete pump base, 1.00 foot above land-surface datum.

16.37.33.122. Shipp. Previously designated incorrectly as 16.37.33.110.

17.33.13.433. American Potash Co. Drilled industrial well, for potash refinery east of Carlsbad. Well is farthest well east of three wells in an east-west line. Reference point, top of 3- by 3-foot concrete pump base, 0.80 foot above 15- by 15-foot concrete slab, 1.25 feet above land-surface datum. Nov. 17, 1948, 144.18.

17.37.10.211. Owner unknown. Drilled irrigation well, equipped with turbine pump. Reference point, top of 3- by 3-foot concrete pump base, 0.80 foot above land-surface datum.

17.38.2.311. Hickerson. Drilled irrigation well, equipped with turbine pump. Reference point, top of 4- by 4-foot concrete pump base, 0.40 foot above land-surface datum.

17.38.23.111. Owner unknown. Drilled irrigation well, equipped with turbine pump. Reference point, top of 3- by 3-foot concrete pump base, 0.90 foot above land-surface datum.

17.38.31.311. Beene. Drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 110 feet. Reference point, top of 3- by 3-foot concrete pump base, 0.70 foot above land-surface datum. Aug. 14, 1948, 29.77.

18.38.19.413. Dennison. Drilled irrigation well, equipped with turbine pump, diameter 18 inches, depth 103 feet.

18.38.22.433. Staley. Drilled irrigation well, equipped with turbine pump. Reference point, surface of concrete pump base, 0.25 foot above land-surface datum.

19.35.13.211. Fowler. Mar. 22, 21.19.

19.38.34.222. Walker. Drilled irrigation well, equipped with turbine pump. Reference point, top of 3- by 3-foot concrete pump base, at land-surface datum.

LUNA COUNTY (MIMBRES VALLEY)

Part 1. General Discussion

The water levels in the Mimbres Valley generally continue to decline every year as a result of the continued pumping of ground water from storage. Careful study of the changes in water level of ground-water use is essential as the major decline that has occurred over a period of years makes the recovery of water for irrigation costly.

Water levels were measured in January 1949 in 129 wells distributed throughout the area. Water levels were also measured in about 56 of these wells in March, May, July, September, and November. Water-stage recorders were operated throughout the year on the same four wells as in preceding years. 400 water-level measurements were made in the observation wells during the year, including 26 tape measurements made on the recorder wells.

Precipitation and Pumpage

Precipitation falling on the Mimbres Valley, particularly on the head-waters of the Mimbres River, is the ultimate source of the water stored in the aquifer. Precipitation also furnishes part of the water requirement of the crops and consequently at such times reduces the amount of pumping necessary. The precipitation in 1949 was, in general, well above normal throughout the valley, except at the Mimbres Ranger Station in the area of the head-waters of the Mimbres River where the U. S. Weather Bureau reported 17.63 inches, 0.74 inch below normal. Precipitation at Deming was 10.62 inches, 0.91 inch above normal and 5.36 inches more than in 1948. The precipitation at Gage was 11.11 inches, 1.06 inches above normal, and that at Columbus, near the Mexican border, was 13.52 inches, 3.83 inches above normal. Precipitation at Deming during the main part of the growing season, April to September, amounted to 6.52 inches, 0.13 inch above normal, which resulted in the smallest ground-water requirements for irrigation since 1941.

The irrigated acreage continued to increase in Mimbres Valley, with an estimated 25,800 acres being irrigated in 1949, an increase of about 1,800 acres over 1948. Even though the acreage increased the precipitation was sufficient to cause a decrease in the total amount of water pumped. On the basis of the power records for 229 comparable pumps, it is estimated that about 14 percent less water was required for crops in 1949 than in 1948

and that about 54,000 acre-feet of water was pumped for irrigation in 1949. An additional 2,000 acre-feet is estimated to have been used for domestic and industrial purposes, a decrease of about 200 acre-feet from 1948 as a result, mainly, of decreased use by the railroads and smaller amount required for lawns. The city of Deming used less water for domestic purposes in 1949 than in 1948.

Changes of Water Levels

The area in which ground-water levels showed net declines for 1949 was less than for the previous year. The ground-water levels declined more than 1 foot under about 148 square miles, and more than 2 feet under about 53 square miles. The area under which water levels declined more than 3 feet was about 9 square miles, all of which was south of Deming. The maximum observed decline, shown on the accompanying map, was 3.72 feet and occurred in a well 5 miles south of Deming.

East of Deming, along the Mimbres River, three small areas, totalling about 5 square miles, show a rise in water level. (See figure 21.)

These areas of rise in water levels are the result of decreased pumpage of ground water, and additional recharge from flood flows in the Mimbres River during the early part of 1949. The rise of 1.24 feet in shallow well 24.7.9.111 is the result of decreased pumping of this well and of water leaking into the shallow aquifer from the deeper aquifer through the medium of the nearby deep well 24.7.9.111a. The water level in the latter well declined 43 feet as a result, in part, of heavy pumpage from this well but mainly because the casing was perforated at the upper aquifers which allowed the water under high pressure in the lower aquifers to flow into the upper aquifers.

In this same area, northeast of Little Florida Mountains, the other wells which showed a rise in water levels in 1949 showed large declines the preceding year. Conversely, in the same vicinity the two areas which show declines in excess of 2 feet from January 1949 to January 1950 showed large rises for the preceding year.

Water levels in observation wells near the Mimbres River about 13 miles northwest of Deming showed rises of from 3.5 to more than 11 feet from January 1949 to January 1950. These rises, which are greatest near the river channel and decrease farther away, indicate recharge was contributed from the flood flow in the river that occurred during the early part of 1949.

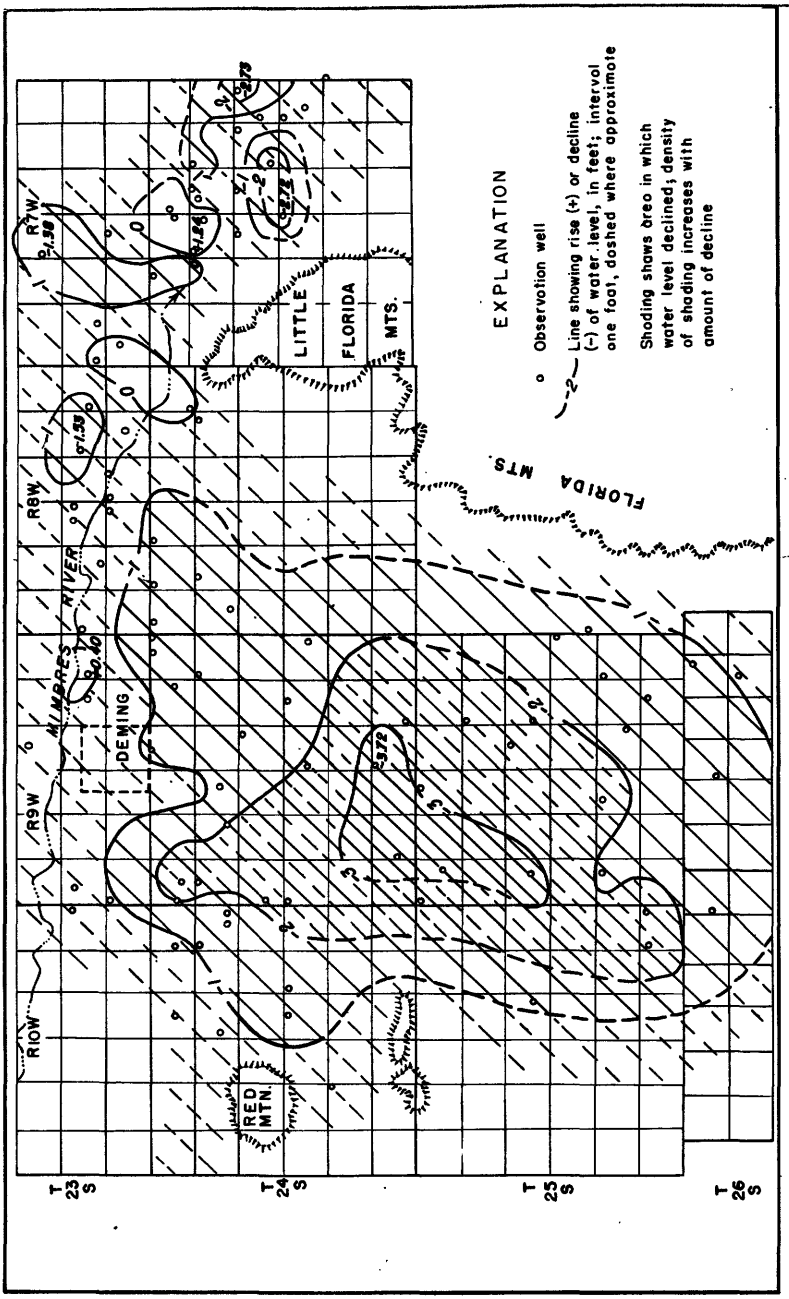


Figure 21.--Map of Mimbres Valley, Luna County, showing decline of water levels from January 1949 to January 1950.

The decreased area of decline of water levels in 1949 which resulted from the decreased pumpage and increased recharge is shown by the following table which gives the comparative areas for preceding years:

Area in square miles in which water levels showed a net decline during the year

Year	1 foot	2 feet	3 feet
1941	36	5	1
1942	41	4	0
1943	100	10	1
1944	23	4	1
1945	133	9	1
1946	147	29	1
1947	157	63	19
1948	177	69	19
1949	148	53	9

As the water pumped in the Mimbres Valley is being taken from groundwater storage the water levels will continue to decline from year to year and result in increased pumping lifts. If the amount of pumping is not increased, the rate of decline will gradually decrease as a result of the effects of pumping reaching greater areas.

Part 2. Water levels in January 1949 and highest and lowest recorded levels in January or February in feet below land-surface datum, and change from January 1948 to January 1949, in feet

Location number	Owner	See also part	Water levels							Record	
			Jan. 1949 Level	Day	Change 1948-49	Highest Level	Year	Lowest Level	Year	Began	Years missing
21.10.6.112	Tom Tigner	3	9.34	10	+0.01	6.57	33	9.76	47	29	
21.11.13.411c	Claude Irwin	3	52.07	10	-1.22	38.77	46	52.07	49	45	
35.310	State of New Mexico	3	34.73	10	+.12	18.76	32	34.85	48	30	
22.10.18.121	State of New Mexico	3	78.07	30	-.96	68.51	30	78.07	49	29	
20.210	State of New Mexico	.	94.37	30	-1.11	88.72	40	94.37	49	40	42
22.11.2.210	State of New Mexico	3	35.84	10	-.66	21.11	30	35.84	49	30	
13.122	State of New Mexico	3	69.49	30	-.55	59.07	30	69.49	49	29	
13.221	State of New Mexico	3	76.25	30	-.67	66.06	30	76.25	49	29	
13.411	State of New Mexico	.	77.67	30	-.62	76.30	47	77.67	49	47	
23.222	State of New Mexico	3	56.49	30	-.71	47.43	42	60.30	37	29	31,33-35
24.211	State of New Mexico	.	78.68	30	-.81	77.05	47	78.68	49	47	
23.7.17.242	Jack Smyer	.	96.58	30	-1.69	92.90	42	96.58	49	42	44,47
21.311	Unknown	3	70.98	30	+.55	69.56	45	71.53	48	45	
30.433	John Kelly	.	67.29	20	-1.11	58.42	40	67.29	49	40	
30.Lot 16	H. T. Foster	3	29.62	20	-.05	22.62	32	29.62	49	32	33,38
31.111	William Haas	.	67.61	20	-6.56	39.49	40	67.61	49	40	46
31.111a	William Haas	.	165.78	20	-5.58	55.95	47	65.78	49	47	
31.132	William Haas	.	68.59	20	-5.11	40.60	40	68.59	49	40	46
31.133	William Haas	3	51.56	20	-.39	48.86	47	51.56	49	47	
33.211	Lewis and R. S. Smyer	.	67.89	30	-.89	59.99	40	67.89	49	40	47
23.8.3.322	U. S. Government	3	133.64	28	-.56	131.14	42	133.64	49	42	43
13.411	E. P. Peoples	.	40.70	30	-.56	34.67	30	40.70	49	30	31-36,44,47
25.311	Ed Remondini	.	27.64	20	-1.34	20.75	40	27.64	49	40	
26.131	W. L. Bankston	3	43.41	20	-2.23	28.26	28	43.41	49	28	31,33,47
28.231	C. R. Lewis, Jr.	.	52.99	31	+.31	43.50	42	53.30	48	42	
28.241	C. R. Lewis, Jr.	(Measurements discontinued)				40.23	40	49.93	47	40	48,49
28.241a	C. R. Lewis, Jr.	5	50.69	30	.....	.....	..	.....	..	49	
29.433	E. Krenek	.	55.38	20	-1.88	42.56	39	55.38	49	39	
30.133	H. A. Norvell	.	52.97	20	-.98	44.96	39	52.97	49	39	
33.221	Geo. Dowdle	.	47.19	20	-.79	35.66	40	47.19	49	40	
34.111	Geo. Dowdle	3	44.22	20	-.73	33.52	40	44.22	49	40	
34.211	E. B. Law	3	42.98	20	-1.33	27.50	29	42.98	49	29	
35.233	Joe Remondini	.	33.97	20	.....	29.14	44	33.97	49	44	48

* See footnotes at end of table.

Part 2 --Continued

Location number	Owner	See also part	Water levels							Record	
			Jan. 1949 Level	Day	Change 1948-49	Highest Level	Year	Lowest Level	Year	Be-gan	Years missing
23.9.7.240	P. D. Torres	.	101.52	10	-.77	97.06	40	101.52	49	40	
22.213	Roy Perkins	3	66.44	10	-1.19	58.77	32	66.44	49	29	30,31,33-36
25.311	Albert Ernst	3	60.78	10	-1.15	50.40	28	60.78	49	28	31,33
26.410	H. H. Ruebush	.	60.42	10	-1.14	53.64	39	60.42	49	39	
27.142	H. J. Thomas (Measurements discontinued, well caving)					54.75	32	64.10	48	j29	30-1,33-4,49
27.221	J. D. McDaniels	3	a62.45	10	-1.81	52.18	30	60.64	48	j29	31,33
30.142	J. M. Mazac	.	82.11	10	+2.69	82.11	49	84.80	48	47	
31.110	Glen Neighbors	.	82.89	10	-2.07	75.38	40	82.89	49	40	
23.10.25.242	J. M. Mazac	.	85.36	10	-1.19	82.84	47	85.36	49	47	
24.6.29.300	Bill Birchfield	.	.....	..	.....	66.89	j41	a68.26	44	j41	42,49
30.111	Bill Birchfield	.	70.07	21	-.55	66.16	j41	70.07	49	j41	
24.7.3.311	G. D. Hatfield	3	19.90	21	-3.16	7.36	46	19.90	49	45	
3.321	Lewis Smyer	.	89.47	21	-.57	88.90	48	89.47	49	48	
4.424	G. D. Hatfield	3	90.44	21	-.72	65.36	29	90.44	49	29	30,33
5.211	R. M. Williamson	3	a90.26	30	-2.37	66.90	32	87.89	48	32	33,38
8.212	J. M. McDougall	.	87.88	20	.....	78.47	40	87.88	49	40	44,48
9.111	Smyer Bros.	3	87.73	20	-1.06	77.25	39	87.73	49	39	
9.111a	Smyer Bros.	3	42.91	20	-.67	38.22	47	42.91	49	47	
9.241	G. D. Hatfield	3	91.79	21	-1.45	84.60	40	91.80	44	40	
9.241a	G. D. Hatfield	.	.....	..	.....	21.49	45	33.51	48	45	49
10.111	G. D. Hatfield	.	72.40	20	-5.31	20.73	47	91.67	44	40	46
10.211	Fred Hassman	3	93.92	21	-1.60	82.47	40	93.92	49	40	
11.111	Edith E. Pollard	.	88.92	20	+.33	74.69	39	90.49	46	39	42
13.212	F. S. Dale	5	61.96	21	+11.88	61.96	49	73.84	48	40	
13.311	Mr. Miramontes	.	83.53	29	-2.32	69.97	39	83.53	49	39	
14.221	J. H. Winslow	4	85.47	21	-.40	f72.11	39	f85.71	49	39	
14.331	Cecil and Roger Miller	5	76.08	21	+8.63	76.08	49	84.71	48	40	
15.122	J. L. Caudill	.	91.72	21	-.80	79.36	39	91.72	49	39	
16.211b	Geo. Snyder	3	90.35	21	-1.72	81.08	42	90.35	49	42	
21.222	Hiram Jeter	5	79.20	29	+.17	70.19	40	79.37	48	40	
21.222a	C. W. Geurin	5	18.76	29	.....	.....	..	.....	..	49	
24.111	Jasper Wilson	3	79.60	29	-1.29	69.79	40	79.60	49	40	
24.312	Bill Birchfield	3	74.94	29	-.86	68.60	41	74.94	49	41	
26.113	Bill Birchfield	(Measurements discontinued)				69.59	43	72.86	48	43	49
24.8.1.333b	F. K. Kretek	3	22.88	30	-1.86	15.86	45	22.88	49	40	

* See footnotes at end of table.

Part 2 --Continued

Location number *	Owner	See also part	Water levels: Jan. 1949 Level	Jan. 1949 Day	Change 1948-49	Highest Level	Highest Year	Lowest Level	Lowest Year	Record: Began	Record: Years missing
24.8.4.111	Foy Riley	4	44.05	30	-1.75	35.59	41	f44.04	49	41	
5.111	R. A. Hackebeil	.	50.13	21	-1.76	34.52	29	50.13	49	29	31-33,35-37
6.112	Deming Air Base	3	56.51	11	-1.84	49.22	43	56.51	49	43	
7.431	Paul Hrna	.	.....	..	.....	39.06	42	45.69	48	42	43,49
8.121	Mrs. J. F. Holiday	.	48.75	30	-1.35	40.21	39	48.75	49	39	
11.221	F. K. Kretek	3	21.87	30	-1.57	12.60	34	21.87	49	32	33,35
24.9.1.211	Deming Air Base	3	62.20	11	-2.01	55.64	43	62.20	49	43	
1.222	Deming Air Base	3	b61.37	11	-4.05	54.69	44	57.32	48	44	
2.421	Roscendo Trujillo	3	61.14	11	-1.64	48.10	33	61.14	49	32	34,35
3.122	Unknown	.	65.40	11	-1.51	62.42	47	65.40	49	47	
6.311	J. B. Wells	.	83.11	12	-1.58	61.35	28	83.11	49	28	31,33
6.431	State of New Mexico	3	75.76	12	-1.47	f57.45	42	75.76	49	42	
7.211	Emanuel Vocale	.	82.60	12	-1.65	67.49	42	82.60	49	39	
7.331	S. R. Moir	.	87.80	12	-5.62	66.10	30	87.80	49	30	31,33
8.441	F. A. Bredecko	.	79.60	19	-1.77	68.60	40	79.60	49	40	
9.411	Joe Clary	3	72.86	12	-1.51	65.16	39	72.86	49	39	
12.111	E. H. Hatcher	.	62.33	11	-2.00	47.68	28	62.33	49	28	31,32
13.111	Mary E. Barrett	.	58.61	11	-2.59	14.92	28	58.61	49	28	31,33
15.221	Joe Lutonsky	.	.....	..	.....	61.60	40	67.40	47	40	49
15.221a	Joe Lutonsky	.	65.99	11	-1.34	64.65	48	65.99	49	48	
18.311	Chas. Peter	.	82.27	12	-2.01	72.38	40	82.27	49	40	
19.111	Francis Ligocky	3	83.58	12	-2.18	72.82	40	83.58	49	40	
21.131	L. L. Gaskill	5	81.95	12	-3.15	59.33	29	81.95	49	28	33
22.311	Joe Hrna	.	78.61	12	-2.47	69.50	45	78.61	49	45	
23.211	Emanuel Vocale	5	77.98	11	-2.42	58.12	30	77.98	49	30	33
24.421	W. F. Roberts	.	66.99	31	-1.94	57.99	41	66.99	49	40	
26.211	Unknown		(Measurements discontinued)			.....	..	.....	..	47	48,49
32.311	D. D. Roderick	.	83.50	19	-2.62	69.00	40	83.50	49	40	
34.111a	V. V. Norwood	.	76.25	12	-3.40	65.94	46	76.25	49	46	
35.331	J. E. Howell	3	75.64	11	-4.52	71.12	48	75.64	49	48	
24.10.1.311	R. V. Griggs	3	85.91	12	-1.22	78.45	42	85.91	49	41	
3.411	A. M. & B. L. Speir	3	93.91	12	-1.50	79.17	30	93.91	49	30	31,33,34
3.411b	A. M. & B. L. Speir	3	86.08	12	-1.53	75.34	42	86.08	49	41	
10.311	Jim Hurt	3	88.60	12	-1.86	76.53	30	88.60	49	30	33,34,36
12.111	Morgan Garrett	.	88.47	12	-2.74	79.69	39	88.47	49	39	46

* See footnotes at end of table.

Part 2--Continued

Location number	Owner	See also part	Water levels: Jan. 1949 Level	Day	Change 1948-49	Highest Level	Year	Lowest Level	Year	Record: Began	Years missing
24.10.12.431	Steve Hrna	4	86.95	12	-2.87	f78.08	40	f87.19	49	40	
12.432a	Steve Hrna	.	85.52	12	-.96	77.29	40	85.52	49	40	
12.432b	Steve Hrna	.	86.53	12	-1.43	78.05	40	86.53	49	40	
22.211	E. F. Hurt	3	76.57	12	-2.15	69.61	42	76.57	49	42	
23.111	E. F. Hurt	3,5	76.51	12	.....	.....	..	.....	..	49	
29.222	State of New Mexico	3	67.29	12	-.82	63.87	41	67.29	49	41	
24.11.1.333	J. D. Smith	.	101.45	12	-.48	99.78	44	101.45	49	44	
25.8.18.111	Spencer McCann (Measurements discontinued, well dry)					50.00	40	57.47	48	40	49
19.331	Unknown	3	66.36	11	-1.95	59.01	42	66.36	49	42	44
25.9.4.211	Val Miller	4	79.63	12	-3.35	63.70	41	f79.69	49	41	
6.111	P. M. Yates	.	76.05	19	-2.63	65.14	41	76.05	49	41	
6.421	Bernabe Alba	3	81.79	19	-3.03	66.41	39	81.79	49	39	
11.111	R. J. Bishop	3	75.25	11	-3.38	60.01	39	75.25	49	39	
12.311	Jo Willa Cheek	.	67.33	11	-1.99	56.69	40	67.33	49	40	
14.311	C. W. Gaines	.	67.18	11	-2.09	57.10	40	67.18	49	40	
15.211	C. H. Paulk	.	74.19	19	-3.64	59.78	39	74.19	49	39	
18.211	S. P. Walker	.	79.13	19	-1.18	74.30	47	79.13	49	47	
18.412	Tom Marcak	.	80.30	31	-2.39	73.37	47	80.30	49	47	
19.111	Tom Marcak	.	.....	..	.....	62.41	40	69.81	47	40	48,49
21.311	A. W. Speir (Measurements discontinued, well filled)					63.48	39	74.16	48	39	46,47,49
24.222a	D. J. Schmelzla	.	56.91	11	-2.09	52.15	46	56.91	49	46	
25.111	Alan Crotchett	.	54.96	11	-1.67	47.54	40	54.96	49	40	
27.422	Ted Zacaz	.	62.85	11	-1.98	53.42	40	62.85	49	40	
28.121	Leonard Zumwalt	3	77.10	19	-2.32	66.03	42	77.10	49	42	
30.111	M. M. Robertson (Measurements discontinued, well caving)					55.78	40	69.49	48	40	42,49
30.212	Ernest Marsh	.	75.80	19	-4.07	71.73	48	75.80	49	48	
35.211	Joe Marcak	3	56.29	11	-1.84	47.21	39	56.29	49	39	
25.10.15.422	C. H. Graves	.	.....	..	.....	57.18	40	61.29	48	40	49
36.111	A. M. Seale, Jr.	3	69.69	29	-2.19	58.84	40	69.69	49	40	45
36.222	A. M. Seale, Jr.	.	73.09	19	-3.71	56.94	39	73.09	49	39	
26.9.2.221	T. R. Taylor	3	45.35	11	-1.08	39.69	41	45.35	49	41	42
4.331	R. E. Smyer	.	59.14	11	-2.12	52.28	41	59.14	49	41	47
11.211	State of New Mexico	3	42.19	11	-.98	37.30	40	42.19	49	40	
26.10.1.310	Fred Chambers	.	66.79	19	-2.44	55.42	28	66.79	49	28	33,36-39
27.8.8.411	Bill Birchfield	3	22.62	29	+1.53	22.62	49	24.29	40	40	

* See footnotes at end of table.

Part 2--Continued

Location number	Owner	See also part	Water levels							Record	
			Jan. 1949 Level	Day	Change 1948-49	Highest Level	Year	Lowest Level	Year	Began	Years missing
27.9.12.111	Waterloo School	3	28.28	29	-.61	27.12	46	28.28	49	45	
28.8.34.444	Mrs. Hoover	.	38.58	31	+.06	38.58	49	38.64	48	48	
29.7.4.111	Francis S. Connatt	.	1.38	31	+.07	1.38	49	1.45	48	48	
18.211	R. M. Marshall	.	.....	..	....	0.50	41	14.53	44	j40	43,49
29.8.12.244	A. G. Anderson	.	7.49	31	+.11	7.07	j40	7.60	48	j40	
13.111	Jack Missal	.	6.73	31	+.09	6.44	jk40	6.82	48	j40	

a Pumping.
b Pumping recently.
f From recorder charts.
i Possible discrepancy of a few tenths of a foot between present and previous land-surface data.
j March.
k Also 1942.

Part 3

Water levels, in feet below land-surface datum, during 1949

Location number	21.10. 6.112	21.11. 13.411c	21.11. 35.310	22.10. 18.121	22.11. 2.210	22.11. 13.122	22.11. 13.221	22.11. 23.222
Owner	Tigner	Irwin	State of N.M.	State of N.M.	State of N.M.	State of N.M.	State of N.M.	State of N.M.
Jan.10,30	9.34	52.07	34.73	78.07	35.84	69.49	76.25	56.49
Mar. 15	7.41	49.08	13.50	77.39	26.73	68.18	75.19	54.69
May 17	7.08	a71.10	13.76	76.01	22.40	66.14	73.41	51.98
July 19	9.74	a78.82	18.64	75.54	22.72	65.60	72.93	51.90
Sept. 1	10.12	43.90	18.72	75.31	23.17	65.40	72.71	51.79
Nov. 16	9.38	42.49	20.08	74.66	24.38	65.13	72.43	51.45

Location number	23.7. 21.311	23.7. 30.L.16	23.7. 31.133	23.8. 3.322	23.8. 26.131	23.8. 34.111	23.8. 34.211	23.9. 22.213
Owner	Unknown	Foster	Haas	U.S. Govt.	Bank-ston	Dowdle	Law	Perkins
Jan.10,20,28,30	70.98	29.62	51.56	133.64	43.41	44.22	42.98	66.44
Mar.15,17	71.96	29.52	47.17	133.65	44.34	43.26	41.73	66.11
May 17,19	71.83	30.03	41.08	133.76	52.40	(a)	47.97	66.97
July 19,21	72.02	30.72	40.35	.....	(a)	(a)	a81.18	68.54
Sept. 1	71.80	c30.97	41.14	.....	(a)	(a)	b73.23	69.00
Nov.16,18	72.16	29.29	38.15	.....	47.57	46.81	44.62	67.15

Location number	23.9. 25.311	23.9. 27.221	24.7. 3.311	24.7. 4.424	24.7 5.211	24.7. 9.111	24.7. 9.111a	24.7. 9.241
Owner	Ernst	Mc-Daniels	Hat-field	Hat-field	Wil-liamson	Smyer Bros.	Smyer Bros.	Hat-field
Jan.10,20,21,30	60.78	a62.45	19.90	90.44	a90.26	87.73	42.91	91.79
Mar.15,17	60.35	59.26	18.16	89.19	a90.51	c87.22	(a)	91.11
May 19	60.94	a61.86	35.05	91.38	a90.48	c87.34	(a)	j87.59
July 19,21,22	61.26	61.20	71.38	92.72	a91.56	c96.29	(a)	c89.95
Sept. 1	61.67	a63.19	(a)	94.96	a91.56	(a)	(a)	c93.33
Nov. 16,18	60.64	62.08	.....	90.96	90.99	84.36	83.68	92.00

Location number	24.7. 10.211	24.7. 16.211b	24.7. 24.111	24.7. 24.312	24.8. 1.333b	24.8. 6.112	24.8. 11.221	24.9. 1.211
Owner	Hass-man	Snyder	Wilson	Birch-field	Kretek	Air Base	Kretek	Air Base
Jan.11,21,29,30	93.92	90.35	79.60	74.94	22.88	56.51	21.87	62.20
Mar.17,18	92.43	89.98	79.46	75.07	22.37	56.70	21.54	62.52
May 19	d101.75	a104.76	79.31	75.14	23.85	57.01	22.44	62.75
July 21,22	c104.77	a103.94	79.45	75.20	24.38	57.41	23.10	63.16
Sept. 1	106.60	(a)	79.87	75.27	a31.81	57.68	23.39	(b)
Nov. 16,18	95.67	91.20	80.27	75.46	23.27	58.13	22.75	63.89

Location number	24.9. 1.222	24.9. 2.421	24.9. 6.431	24.9. 9.411	24.9. 19.111	24.9. 35.331	24.10. 1.311	24.10. 3.411
Owner	Air Base	Tru-jillo	State of N.M.	Clary	Li-gocky	Howell	Griggs	Speir Bros.
Jan. 11,12	b61.37	61.14	75.76	72.86	83.58	75.64	85.91	93.91
Mar. 16,17	b60.36	61.01	74.61	71.70	82.90	75.41	85.45	c94.66
May 18,19	59.99	ac70.72	b90.36	81.66	85.19	c97.63	91.62	c95.19
July 20,22	60.25	68.85	(ac)	83.75	87.58	(c)	c104.08	c95.48
Sept. 1,2	(a)	c71.84	(a)	87.65	e88.56	c98.94	c104.09	c96.79
Nov. 16,17	60.95	62.70	80.40	76.24	87.08	79.82	88.28	94.06

Location number	24.10. 3.411b	24.10. 10.311	24.10. 22.211	24.10. 23.111	24.10. 29.222	25.8. 19.331	25.9. 6.421	25.9. 11.111
Owner	Speir Bros.	Hurt	Hurt	Hurt	State of N.M.	Unknown	Alba	Bishop
Jan. 11,12,19	86.08	88.60	76.57	76.51	67.29	66.36	81.79	75.25
Mar. 16	a107.58	88.46	76.39	76.27	67.40	66.00	81.36	b82.40
May 18,19	a111.22	c93.78	a97.18	80.14	67.50	a68.90	a112.0	(a)
July 20,22	a112.30	c94.40	79.17	79.61	67.64	a69.79	a117.18	82.37
Sept. 2	(a)	c94.76	(a)	(a)	67.77	68.94	(a)	(a)
Nov. 17	86.44	89.59	78.03	78.13	67.99	68.00	87.28	78.43

Location number Owner	25.9. 28.121 Zumwalt	25.9. 35.211 Marcak	25.10. 36.111 Seale	26.9. 2.221 Taylor	26.9. 11.211 State of N.M.	27.8. 8.411 Birch-field	27.9. 12.111 School
Jan.11,19,29	77.10	56.29	69.69	45.35	42.19	22.62	28.28
Mar.16	76.13	55.99	69.09	45.37	42.30	23.44	28.16
May 18	a78.83	57.51	(c)	b46.51	42.42	24.24	28.40
July 20	a103.50	a68.01	(c)	a56.20	42.57	22.80	28.91
Sept. 2	(a)	59.56	(c)	(a)	42.75	e22.5	29.12
Nov. 17	81.22	58.25	73.26	a56.68	43.04	e22.5	28.68

a Pumping.
b Pumping recently.
c Nearby well pumping.
d Nearby well pumping recently.
e Dry at depth given.
j Measurement uncertain.

Part 4

24.7.14.221. J. H. Winslow.

Highest daily water level, from recorder charts

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	85.71	85.35	84.99	84.62	85.35	85.44	86.03	86.20	86.54	86.82	86.62	86.33
2	85.68	85.32	84.98	84.60	85.39	85.45	86.04	86.21	86.56	86.82	86.62	86.30
3	85.69	85.31	84.97	84.61	85.41	85.45	86.05	86.22	86.57	86.82	86.63	86.29
4	85.69	85.31	84.95	84.60	85.45	85.47	86.06	79.91	86.59	86.82	86.63	86.27
5	85.68	85.30	84.95	84.61	85.48	85.48	86.09	81.46	86.60	86.83	86.65	86.23
6	85.65	85.30	84.94	84.62	85.51	85.50	86.10	84.59	86.61	86.84	86.67	86.20
7	85.63	85.26	84.91	84.63	85.54	85.52	86.10	85.55	86.62	86.85	86.68	86.17
8	85.62	85.27	84.90	84.65	85.57	85.55	86.11	85.97	86.64	86.87	86.69	86.15
9	85.61	85.27	84.90	84.67	85.59	85.59	86.13	86.14	86.66	86.87	86.71	86.11
10	85.60	85.23	84.88	84.71	85.62	85.62	86.14	86.23	86.67	86.88	86.73	86.09
11	85.59	85.22	84.87	84.74	85.64	85.64	86.14	86.29	86.69	86.89	86.72	86.10
12	85.57	85.21	84.87	84.75	85.66	85.66	86.14	86.32	86.70	86.89	86.71	86.07
13	85.55	85.19	84.85	84.77	85.66	85.69	86.15	86.33	86.71	86.88	86.68	86.04
14	85.54	85.19	84.84	84.81	85.65	85.71	86.16	86.35	86.71	86.87	86.66	86.02
15	85.54	85.18	84.82	84.85	85.65	85.73	86.17	86.36	86.72	86.85	86.65	85.98
16	85.53	85.17	84.81	84.89	85.64	85.75	86.17	86.37	86.73	86.84	.....	85.96
17	85.52	85.15	84.80	84.91	85.65	85.77	86.18	86.39	86.73	86.83	.....	85.98
18	85.51	85.13	84.79	84.94	85.66	85.80	86.19	86.39	86.75	86.82	86.61	85.98
19	85.49	85.13	84.77	84.98	85.66	85.82	86.21	86.39	86.76	86.81	86.60	85.97
20	85.48	85.12	84.76	85.00	85.65	85.83	86.21	86.40	86.77	86.81	86.58	85.96
21	85.47	85.11	84.76	85.03	85.65	85.85	86.20	86.41	86.77	86.81	86.56	85.96
22	85.45	85.09	84.74	85.08	85.64	85.88	86.21	86.41	86.79	86.79	86.53	85.95
23	85.45	85.07	84.72	85.11	85.63	85.89	86.20	86.43	86.80	86.77	86.51	85.93
24	85.43	85.06	84.71	85.14	85.61	85.90	86.19	86.44	86.81	86.75	86.49	85.90
25	85.42	85.03	84.71	85.17	85.58	85.93	86.17	86.45	86.81	86.73	86.47	85.90
26	85.41	85.02	84.70	85.20	85.55	85.94	86.16	86.47	86.82	86.72	86.44	85.88
27	85.40	85.02	84.68	85.24	85.53	85.96	86.15	86.47	86.82	86.70	86.42	85.88
28	85.39	85.00	84.65	85.27	85.51	85.98	86.16	86.49	86.82	86.68	86.40	85.87
29	85.39		84.66	85.29	85.49	86.00	86.17	86.50	86.81	86.67	86.37	85.88
30	85.36		84.65	85.31	85.46	86.01	86.18	86.51	86.82	86.63	86.34	85.88
31	85.35		84.61		85.46		86.19	86.52		86.62		85.88

24.8.4.111. Foy Riley.

Highest daily water level, from recorder charts

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	44.03	43.78	43.75	44.37	44.76	45.13	45.50	45.95	46.25	46.10	45.79
2	.....	44.01	43.77	43.77	44.39	44.77	45.15	45.52	45.96	46.26	46.09	45.78
3	.....	44.01	43.76	43.80	44.42	44.78	45.16	45.53	45.97	46.26	46.08	45.77
4	.....	44.00	43.74	43.83	44.45	44.79	45.18	45.55	45.99	46.26	46.07	45.77
5	.....	43.99	43.74	43.86	44.47	44.79	45.19	45.57	46.01	46.27	46.06	45.75
6	.....	43.98	43.73	43.88	44.48	44.79	45.20	45.58	46.03	46.27	46.04	45.73

24.84.111--Continued.

Highest daily water level, from recorder charts

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
7	.....	43.96	43.72	43.89	44.50	44.80	45.21	45.59	46.04	46.27	46.04	45.73
8	.....	43.96	43.71	43.91	44.51	44.81	45.21	45.61	46.05	46.27	46.01	45.72
9	.....	43.96	43.71	43.94	44.52	44.82	45.22	45.62	46.07	46.27	46.01	45.70
10	.....	43.94	43.69	43.97	44.53	44.83	45.23	45.63	46.08	46.27	46.00	45.68
11	.....	43.92	43.68	44.01	44.54	44.84	45.25	45.63	46.10	46.27	45.99	45.68
12	.....	43.91	43.68	44.03	44.55	44.84	45.26	45.65	46.12	46.27	45.99	45.68
13	.....	43.91	43.68	44.04	44.56	44.85	45.28	45.66	46.13	46.26	45.98	45.68
14	.....	43.91	43.67	44.07	44.56	44.86	45.29	45.67	46.15	46.26	45.96	45.68
15	.....	43.91	43.66	44.08	44.57	44.87	45.30	45.68	46.16	46.25	45.95	45.66
16	.....	43.90	43.65	44.11	44.58	44.87	45.31	45.69	46.17	46.24	45.94	45.64
17	.....	43.89	43.66	44.12	44.58	44.88	45.31	45.70	46.18	46.23	45.93	45.64
18	.....	43.87	43.66	44.14	44.59	44.90	45.32	45.73	46.18	46.23	45.92	45.63
19	.....	43.87	43.65	44.16	44.60	44.94	45.33	45.75	46.18	46.22	45.90	.....
20	.....	43.86	43.63	44.18	44.62	44.95	45.34	45.77	46.18	46.22	45.89	.....
21	.....	43.85	43.64	44.21	44.62	44.95	45.34	45.79	46.19	46.21	45.89	.....
22	.....	43.84	43.64	44.22	44.63	44.98	45.39	45.81	46.20	46.20	45.88	.....
23	.....	43.82	43.63	44.25	44.64	45.00	45.40	45.81	46.21	46.20	45.87	.....
24	.....	43.82	43.64	44.27	44.65	45.01	45.40	45.82	46.22	46.19	45.85	.....
25	.....	43.80	43.65	44.29	44.67	45.03	45.41	45.84	46.22	46.17	45.84	.....
26	.....	43.80	43.68	44.31	44.68	45.05	45.42	45.87	46.22	46.16	45.83	.....
27	.....	43.79	43.69	44.32	44.70	45.07	45.43	45.88	46.23	46.15	45.82	.....
28	.....	43.78	43.68	44.32	44.71	45.09	45.45	45.91	46.24	46.14	45.81	.....
29	.....		43.69	44.33	44.72	45.10	45.46	45.92	46.24	46.13	45.80	.....
30	44.04		43.72	44.34	44.73	45.12	45.47	45.94	46.25	46.12	45.79	.....
31	44.03		43.74		44.74		45.49	45.94		46.11		.....

24.10.12.431. Steve Hrna.

Highest daily water level, from recorder charts

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	87.19	86.45	85.84	85.57	87.60	88.37	90.03	91.11	91.98	91.99	90.94	89.82
2	87.14	86.43	85.83	85.60	87.64	88.44	90.08	91.14	92.01	91.96	90.90	89.80
3	87.14	86.41	85.81	85.64	87.68	88.49	90.12	91.17	92.04	91.93	90.85	89.77
4	87.13	86.39	85.77	85.74	87.72	88.54	90.17	91.21	92.07	91.89	90.82	89.74
5	87.11	86.36	85.75	85.80	87.70	88.61	90.22	91.22	92.10	91.86	90.78	89.70
6	87.08	86.35	85.74	85.84	87.73	88.67	90.27	91.24	92.12	91.83	90.73	89.66
7	87.05	86.31	85.70	85.89	87.75	88.73	90.33	91.25	92.14	91.80	90.69	89.62
8	87.01	86.30	85.68	85.93	87.78	88.80	90.37	91.27	92.16	91.77	90.66	89.58
9	87.00	86.29	85.66	86.03	87.80	88.86	90.41	91.28	92.19	91.74	90.62	89.53
10	86.97	86.26	.....	86.14	87.82	88.94	90.45	91.30	92.21	91.71	90.58	89.50
11	86.93	86.22	.....	86.24	87.85	89.00	90.48	91.33	92.23	91.67	90.56	89.50
12	86.93	86.20	.....	86.31	87.88	89.05	90.52	91.36	92.25	91.64	90.52	89.48
13	86.90	86.18	.....	86.37	87.90	89.11	90.56	91.43	92.27	91.61	90.48	89.45
14	86.88	86.17	.....	86.48	87.90	89.16	90.59	91.45	92.29	91.58	90.44	89.42
15	86.86	86.15	.....	86.58	87.92	89.22	90.62	91.48	92.31	91.54	90.41	89.36
16	86.84	86.14	85.56	86.67	87.93	89.27	90.65	91.51	92.32	91.51	90.37	89.34
17	86.82	86.10	85.56	86.75	87.95	89.31	90.68	91.54	92.32	91.48	90.33	89.32
18	86.80	86.07	85.55	86.83	87.97	89.39	90.72	91.56	92.32	91.45	90.30	89.28
19	86.77	86.05	85.53	86.92	87.98	89.45	90.74	91.59	92.30	91.42	90.25	89.24
20	86.74	86.04	85.51	87.00	88.00	89.50	90.79	91.62	92.28	91.38	90.23	89.20
21	86.72	86.02	85.49	87.07	88.01	89.55	90.84	91.65	92.27	91.35	90.20	89.19
22	86.69	85.99	85.50	87.15	88.03	89.60	90.88	91.68	92.24	91.31	90.15	89.16
23	86.67	85.96	85.50	87.20	88.05	89.66	90.91	91.71	92.22	91.29	90.11	89.13
24	86.64	85.94	85.51	87.27	88.07	89.71	90.93	91.74	92.19	91.24	90.07	89.09
25	86.61	85.91	85.51	87.32	88.09	89.76	90.96	91.78	92.16	91.20	90.03	89.07
26	86.59	85.90	85.54	87.37	88.13	89.81	90.98	91.80	92.14	91.16	89.99	89.04
27	86.57	85.87	85.51	87.43	88.15	89.86	90.99	91.83	92.10	91.12	89.97	89.01
28	86.55	85.85	85.54	87.48	88.20	89.89	91.02	91.86	92.08	91.08	89.94	88.99
29	86.53		85.53	87.51	88.25	89.93	91.04	91.89	92.05	91.04	89.91	88.96
30	86.50		85.53	87.57	88.28	89.98	91.06	91.92	92.02	91.02	89.85	88.94
31	86.48		85.56		88.32		91.08	91.94		90.98		88.91

25.9.4.211. Val Miller.

Highest daily water level, from recorder charts

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept	Oct.	Nov.	Dec.
1	79.58	79.69	79.76	79.84	80.14	80.48	80.88	81.30	81.74	82.12	82.29	82.45
2	79.57	79.68	79.76	79.85	.....	80.49	80.89	81.33	81.75	82.13	82.29	82.46
3	79.59	79.70	79.76	79.85	.....	80.50	80.91	81.33	81.77	82.13	82.29	82.46
4	79.60	79.70	79.76	79.87	.....	80.52	80.92	81.37	81.78	82.14	82.30	82.47
5	79.60	79.70	79.77	79.87	.....	80.52	80.93	81.37	81.81	82.15	82.31	82.47
6	79.61	79.71	79.77	79.88	.....	80.55	80.94	81.38	81.82	82.16	82.32	82.47
7	79.61	79.70	79.75	79.88	.....	80.56	80.95	81.39	81.85	82.16	82.32	82.48
8	79.63	79.72	79.77	79.89	.....	80.58	80.97	81.40	81.85	82.17	82.32	82.48
9	79.63	79.72	79.77	79.91	.....	80.59	80.98	81.41	81.86	82.18	82.33	82.49
10	79.62	79.71	79.77	79.90	.....	80.61	80.99	81.42	81.87	82.20	82.33	82.49
11	79.63	79.72	79.77	79.92	.....	80.62	81.01	81.43	81.89	82.20	82.33	82.51
12	79.62	79.72	79.77	79.93	.....	80.63	81.03	81.44	81.90	82.21	82.34	82.52
13	79.61	79.72	79.78	79.92	.....	80.64	81.04	81.45	81.93	82.21	82.34	82.52
14	79.62	79.73	79.78	79.96	.....	80.65	81.05	81.47	81.93	82.21	82.34	82.52
15	79.63	79.73	79.77	79.97	.....	80.66	81.07	81.48	81.95	82.22	82.35	82.52
16	79.64	79.73	79.78	79.98	.....	80.68	81.08	81.49	81.96	82.22	82.35	82.52
17	79.64	79.73	79.81	79.99	.....	80.69	81.10	81.52	81.96	82.23	82.35	82.52
18	79.65	79.73	79.81	80.00	80.33	80.71	81.11	81.52	81.99	82.23	.....	82.53
19	79.64	79.74	79.80	80.01	80.35	80.72	81.13	81.53	82.00	82.27	.....	82.53
20	79.65	79.74	79.80	80.02	80.36	80.73	.....	81.55	82.00	82.28	82.40	82.53
21	79.66	79.74	79.81	80.03	80.37	80.75	.....	81.56	82.01	82.28	82.40	82.54
22	79.65	79.74	79.81	80.04	80.37	80.77	.....	81.58	82.01	82.28	82.42	82.55
23	79.66	79.74	79.81	80.06	80.39	80.78	81.20	81.61	82.05	82.28	82.42	82.55
24	79.67	79.74	79.81	80.06	80.40	80.78	81.21	81.61	82.05	82.28	82.42	82.55
25	79.65	79.74	79.82	80.07	80.41	80.81	81.22	81.64	82.06	82.28	82.43	82.55
26	79.67	79.75	79.82	80.08	80.42	80.81	81.22	81.64	82.07	82.28	82.43	82.56
27	79.67	79.75	79.81	80.10	80.42	80.83	81.23	81.66	82.12	82.29	82.43	82.56
28	79.68	79.75	79.82	80.10	80.45	80.84	81.25	81.68	82.12	82.29	82.43	82.56
29	79.69		79.83	80.11	80.45	80.85	81.26	81.69	82.12	82.29	82.44	82.56
30	79.67		79.83	80.12	80.46	80.88	81.27	81.70	82.12	82.29	82.44	82.56
31	79.68		79.82		80.47		81.30	81.73		82.29		82.57

Part 5

Miscellaneous Data Concerning Observation Wells

23.8.28.241a. Lewis. West of shed and north of earthen tank. Drilled irrigation well, equipped with turbine pump, diameter 14 inches. Reference point, top of casing, east side of well, 0.20 foot above land-surface datum.

24.7.13.212. Dale. New deep well drilled 100± feet south.

24.7.14.331. Miller. New deep well 30± feet south.

24.7.21.222. Jeter. New well 20 feet south.

24.7.21.222a. Geurin. Southeast of earthen tank and about 20 feet south of abondoned well 24.7.21.222. Drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 335 feet. Reference point, top of casing and 4- by 4-foot concrete pump base, 1.00 foot above land-surface datum.

24.9.21.131. Gaskill. Mar. 16, 81.06.

24.9.23.211. Vocale. Mar. 17, 78.16.

24.10.23.111. Hurt. 175 feet south of another pumped well. Sept. 18, 1948, 84.29, nearby well pumping; Nov. 16, 1948, 76.90.

QUAY COUNTY (HOUSE AREA)

Part 1. General Discussion

Water levels were measured in 64 wells in January 1949, of which about 23 were measured at bimonthly intervals. Recording gages were operated on two of these wells in order to obtain a continuous record of the water level. A total of 187 measurements of water level was made during the year, including 12 tape measurements made on the recorder wells.

Precipitation and Pumpage

Fluctuations of the water levels in the House area are the result mainly of pumping of ground water for irrigation. The precipitation in 1949 at House was 23.7 inches, including an estimated 0.5 inch for March, and at Hassell, about 8 miles northwest of House, 19.2 inches--3.4 inches above normal. The precipitation during the growing season, April to September, was 20.54 inches at House and 17.77 inches at Ragland--5.44 inches above normal. The precipitation during the summer months was particularly favorable for crops, more than 3 inches falling each month from May through September at House.

Because of the excess summer precipitation, the pumpage per acre in 1949 undoubtedly was less than in 1948 when there was also favorable precipitation. It is estimated that the irrigated acreage in 1949 was substantially the same as in 1948, about 3,800 acres, and that about 2,300 acre-feet of water was pumped for irrigation in 1949, a reduction from 1948 of about 2,000 acre-feet. The amount of land irrigated has increased gradually since 1939 and in general there has been an increase each year in the amount of water used. However, the amount of water used per acre varies from year to year, depending upon the amount and distribution of precipitation in a particular year and the type of crops grown.

Changes of Water Levels

The seasonal change of water level in the main part of the irrigated area, about 3 miles north of House, followed the general pattern of former years, declines through the summer pumping season and rises during the winter nonpumping season, but with a net decline for the year. However, near House the water level, after beginning the normal summer decline in early May, began to rise in mid-June so that by the end of the year it was about 1.6 feet higher than at the start of the year.

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Because of the reduced pumpage and additional recharge in 1949, the decline in water levels was less than in any year since 1943, and in areas where pumping is scattered small rises occurred. The water levels declined more than 1 foot under an area of about 0.5 square mile as compared with a like decline in 1948 and 1947 under about 5 and 18 square miles respectively. The area under which water levels declined encompassed most of the region in which ground water was pumped for irrigation and extended north of House about 1⅛ miles to about 5 miles and had a maximum width of more than 2 miles. The maximum observed net decline was 1.3 feet and occurred in a well 2.5 miles north of House.

Net annual rises in water levels occurred in outlying wells and in the two minor areas of irrigation, half a mile north and from 4 to 5 miles east of House. Maxium net observed rises in these areas were 1.5 and 1.7 feet respectively. (See fig.22.)

By the end of 1949 the water levels were below the previous low levels observed in early 1941, prior to the heavy rains in late 1941 and early 1942, by more than 5 feet in the irrigated area 3 miles north of House.

There has been a general lowering in water levels in the House area since 1942 with the area of greatest decline being centered where the concentration of pumps is greatest. The amount of decline in an individual year depends upon the amount of pumping which in turn is dependent upon economic factors as well as precipitation. An increase in irrigated area will result in an increase in the rate of decline. Slight rises occur in some years because of reductions in pumping and occasionally because of some increase in recharge from above-normal precipitation, such as occurred in 1941. However, most of the water is being taken from ground-water storage, and the long-term trend will be a decline of water levels so long as ground water is pumped.

Part 3

Water levels, below land-surface datum, during 1949*

Location number Owner	5.28. 1.221 Wyatt	5.29. 6.222 Poe	5.29. 7.141 Birch	5.29. 8.232 Turner	5.29. 9.400 Head	5.29. 13.121 Barron	5.29. 15.311b Tullis	5.29. 18.434 Willis
Jan. 14,15	48.35	55.31	36.58	41.48	(a)	78.26	21.43	54.47
Mar. 28	48.47	54.78	36.67	40.97	(a)	a77.96	21.52	55.22
June 2,3	48.69	(a)	36.73	42.25	25.05	a78.21	21.33	58.10
Aug. 1-3	48.57	57.50	36.24	43.41	a31.00	77.93	20.79	57.68
Sept. 28,29	48.70	58.15	36.65	45.24	a27.83	78.08	21.00	56.29
Nov. 22,23	48.74	47.01	36.82	41.70	25.34	77.81	21.16	54.39

*Table continued on p. 257.

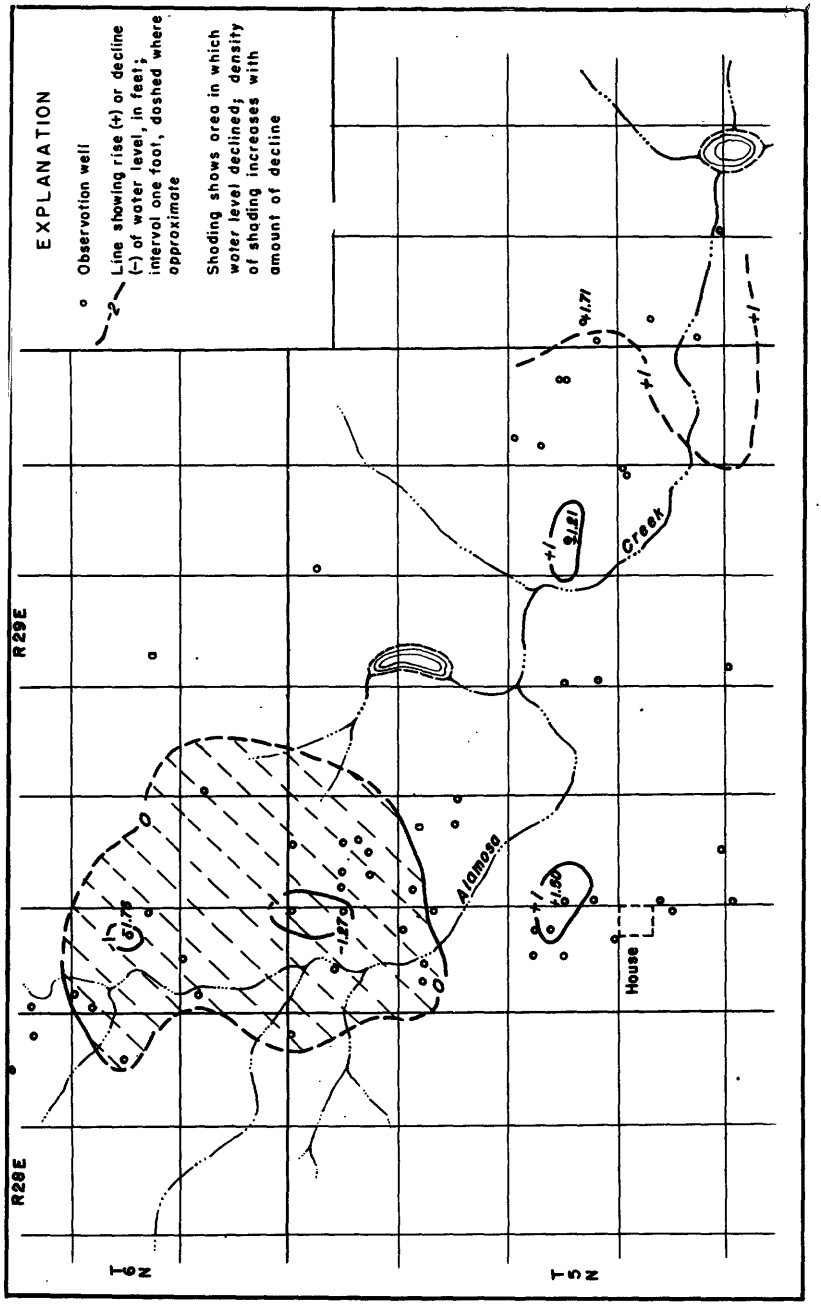

Figure 22.--Map of House area, Quay County, showing change of water levels from January 1949 to January 1950.

Part 2. Water levels in January 1949 and highest and lowest recorded levels in January or February, below land-surface datum, and change from January 1948 to January 1949, in feet

Location number	Owner	See also part	Water levels							Record	
			Jan. 1949		Change	Highest		Lowest		Be-	Years
			Level	Day	1948-49	Level	Year	Level	Year	gan	missing
5.28.1.221	D. C. Wyatt	3	48.35	15	-0.73	46.93	47	48.35	49	47	
5.29.2.131	O. G. Miller	.	b24.87	15	-.65	24.22	48	b24.87	49	48	
5.211	R. H. Currence	.	53.07	15	-1.21	48.68	44	53.08	49	44	
5.231	do	.	47.90	15	-1.52	42.35	45	47.90	49	44	
5.312	Troy Pendergrass	.	46.05	15	-1.89	42.76	47	46.05	49	47	
5.321	J. F. Wallace	.	45.67	15	-1.87	40.70	46	45.67	49	46	
5.341	William Martin	.	38.37	15	-1.64	29.73	43	38.37	49	42	
5.342	do	4	38.17	15	-1.50	30.15	43	f38.30	49	41	
5.411	A. R. Wallace	.	44.99	15	-1.52	37.95	43	44.99	49	43	
5.413	do	.	38.59	15	-1.12	f30.96	43	38.59	49	42	
6.144	F. I. Austin	.	28.94	15	-1.56	23.45	44	28.94	49	44	
6.222	L. L. Poe	3	55.31	15	-1.98	52.37	47	55.31	49	46	
6.422	do	.	42.33	15	-1.91	36.24	45	42.33	49	45	
7.141	D. L. Birch	3	36.58	14	-1.44	29.26	43	36.58	49	43	
7.142	do	.	22.14	14	-1.34	14.31	42	22.14	49	41	
7.221	J. W. Bolling	.	33.21	14	-1.41	25.49	42	33.21	49	42	
7.242	C. P. McBride	.	24.08	14	-1.38	18.44	44	24.08	49	44	
8.114	J. C. Davenport	.	30.82	14	-1.38	22.75	42	30.82	49	41	
8.232	G. W. Turner	3	41.48	15	-1.21	34.19	43	41.48	49	42	
8.412	W. W. Kuykendall	.	35.26	15	-1.20	27.94	43	35.26	49	42	
8.422a	Bill Dwight	.	36.16	15	-1.00	32.03	45	36.16	49	45	
9.400	W. Y. Head	3	(a)	15	.....	21.33	42	23.97	46	42	48,49
13.121	J. C. Barron	3	78.26	14	.....	a76.94	46	79.13	41	41	48
13.131	do	.	59.24	14	-1.25	56.80	45	59.24	49	41	
13.243	H. S. Crosby	.	50.33	14	- .11	50.22	48	50.33	49	45	
13.421	W. F. & Wylie Hudman	.	47.76	14	- .14	46.61	43	47.97	42	41	
14.321	R. A. Tullis	.	37.94	14	.....	35.55	45	37.94	49	45	48
15.311b	do	3	21.43	14	- .43	17.91	43	21.43	49	43	
15.331	do	.	35.49	14	- .22	34.48	45	35.49	49	43	47
17.133	W. W. Kuykendall	4	39.33	14	-1.00	f29.68	42	f39.46	49	41	
17.331	M. M. McEndree	.	42.53	14	- .85	32.92	42	42.53	49	41	
18.213	Dayton Harris	.	41.27	15	- .79	35.07	43	41.27	49	41	
18.223	Carl Johnson	.	36.84	14	- .99	31.89	45	36.84	49	45	
18.233	M. R. Wallace	.	51.53	14	- .61	45.74	42	51.53	49	41	
18.243	L. M. Bright	.	40.22	14	- .94	34.83	45	40.22	49	45	

* See footnotes at end of table.

Part 2--Continued

Location number	Owner	See also part	Water Levels							Record	
			Jan. 1949 Level	Day	Change 1948-49	Highest Level	Year	Lowest Level	Year	Began	Years Missing
5.29.18.433	Frank Davis	(Measurements discontinued)				51.42	44	57.6	48	44	49
18.434	Charles Willis	3	54.47	14	- .65	53.82	48	54.47	49	48	
19.244	Lester McCasland	.	54.18	14	-1.20	46.66	42	54.18	49	41	
20.131b	J. M. Thompson	.	55.76	14	-1.05	48.79	43	55.76	49	43	
20.133	Welton Henry	(Measurements discontinued)				48.32	44	50.54	47	44	48,49
20.314	Stanley Elliott	.	155.03	14	-1.06	52.20	45	155.03	49	45	
20.433b	D. J. Speed	.	50.89	14	- .25	f46.99	43	50.89	49	41	
23.222	E. C. Harris	5	30.90	14	- .63	30.27	48	30.90	49	48	
23.222a	do	3,5	30.90	14	.....	.....	..	.....	..	49	
27.112	E. D. Gallehon	3	70.90	14	+ .15	70.88	47	71.05	48	47	
29.111	C. A. Morrow	3	67.96	14	- .22	65.91	43	67.96	49	41	
36.242	State of New Mexico	.	.....	..	.....	94.86	48	96.28	42	42	43,46, 49
5.30.18.314	Jerry Thompson	5	41.80	14	- .50	39.73	46	41.80	49	46	
18.323	(Incorrect designation used previously for well 5.30.18.314, which see)										
18.331	Jerry Thompson	3	36.70	14	+ .03	34.80	46	36.73	48	45	
19.132a	Ralph Hendrix	5	29.11	14	- .34	26.17	44	29.11	49	44	
19.313	do	.	19.58	14	+ .21	15.94	42	19.79	48	42	
20.333	W. F. & Wylie Hudman	3	25.07	14	-1.08	16.82	42	25.07	49	42	
31.442	T. W. Coleman	3	99.29	14	- .19	98.95	47	99.77	44	44	
6.28.1.232	C. M. Brown	3	66.84	15	- .02	66.82	48	66.84	49	48	
13.232	Irwin Estate	(Measurements discontinued)				60.86	48	61.84	45	45	49
13.333	Ollie Dameron	.	1101.71	15	-1.24	100.47	48	1101.71	49	48	
23.112	William Upton	3	73.76	15	+ .46	73.76	49	74.35	47	47	
24.233	Byers Irwin	3	80.68	15	+ .13	78.12	45	80.81	48	45	
24.423	W. W. Addison	.	65.58	15	- .15	62.83	45	65.58	49	42	
25.411	R. A. Davenport	3	54.01	15	- .40	52.20	45	54.01	49	44	
6.29.19.313	R. W. Dean	.	55.03	15	- .39	53.50	47	55.03	49	46	
27.332	J. D. Green	3	43.67	15	+ .09	43.67	49	44.20	45	45	
30.112	L. M. McDaniels	3	51.30	15	- .50	48.08	43	51.30	49	41	
30.113	do	.	54.43	15	- .29	51.29	45	54.43	49	41	
30.412	R. W. Dean	3	75.26	15	- .63	73.83	47	75.26	49	47	
30.424	do	.	85.48	15	-3.11	78.23	46	85.48	49	46	
31.114	Clyde Kuykendall	.	41.78	15	- .34	36.40	42	41.78	49	41	
31.122	G. H. Griggs	.	58.18	15	- .84	53.57	44	58.18	49	44	
32.111	Sam Morrow	.	.....	..	.....	70.99	46	75.21	48	46	49

* See footnotes at end of table.

Part 2--Continued

Location number	Owner	See also Part	Water Levels							Record	
			Jan. 1949 Level	Day	Change 1948-49	Highest Level	Year	Lowest Level	Year	Began	Years missing
6.29.33.131	Frank Morrow	3	55.08	15	- .10	54.26	44	55.08	49	43	
35.314	P. R. Gates	3	.....	..	.....	38.36	46	39.14	48	46	49
7.28.35.333	W. B. Giles	(Measurements discontinued)				129.32	46	129.62	45	45	49

a Pumping.
b Pumping recently.
f From recorder chart.
i Possible discrepancy of a few tenths of a foot between present and previous land-surface data.

Part 3--Continued *

Location number Owner	5.29. 23.222a Harris	5.29. 27.112 Galle-hon	5.29. 29.111 Morrow	5.30. 18.331 Thomp-son	5.30. 20.333 Hudman	5.30. 31.442 Coleman	6.28. 1.232 Brown	6.28. 23.112 Upton
Jan. 14,15	30.90	70.90	67.96	36.70	25.07	99.29	66.84	73.76
Mar. 28	30.78	70.86	68.06	36.42	a25.46	99.20	c67.16	73.88
June 2,3	30.72	70.82	68.11	36.27	b24.71	99.32	c67.26	74.08
Aug. 1,2	30.51	70.79	68.14	39.61	a24.48	99.18	66.94	74.15
Sept. 28,29	30.18	70.74	68.09	36.75	b24.03	99.17	66.80	74.30
Nov. 22,23	30.04	70.67	68.08	35.89	24.22	98.92	66.63	74.20

Location number Owner	6.28. 24.233 Irwin	6.28. 25.411 Daven-port	6.29. 27.332 Green	6.29. 30.112 McDaniels	6.29. 30.412 Dean	6.29. 33.131 Morrow	6.29. 35.314 Gates
Jan. 15	80.68	54.01	43.67	51.30	75.26	55.08	.....
Mar. 28	80.24	53.86	43.64	51.21	75.53	55.10	38.99
June 2,3	81.19	55.17	43.63	51.69	76.08	55.23	44.85
Aug. 2,3	81.28	54.27	43.60	51.36	77.44	55.22	44.10
Sept. 29	81.85	54.42	43.58	51.12	77.83	55.66	39.91
Nov. 23	80.47	54.12	43.56	51.08	77.26	55.41	39.00

* Table begins on p. 252.
a Pumping.
b Pumping recently.
c Nearby well pumping.

Part 4

5.29.5.342. William Martin.

Highest daily water level, from recorder charts

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	38.30	.....	37.77	37.52	37.99	38.62	38.95	39.32	39.84	39.82	39.40	38.95
2	38.29	.....	37.77	37.53	38.03	38.65	39.00	39.34	39.87	39.83	39.40	38.95
3	38.30	.....	37.77	37.54	38.07	38.66	39.01	39.40	39.89	39.83	39.37	38.96
4	38.29	.....	37.74	37.52	38.12	38.71	39.01	39.43	39.90	39.81	39.37	38.96
5	38.29	.....	37.73	37.51	38.17	38.66	39.02	39.44	39.98	39.80	39.37	38.96
6	38.27	.....	37.75	37.51	38.25	38.72	39.07	39.45	39.98	39.80	39.37	38.94
7	38.24	.....	37.72	37.50	38.29	38.71	39.09	39.48	40.05	39.79	39.30	38.94
8	38.25	.....	37.70	37.47	.....	38.72	39.12	39.50	40.07	39.79	39.29	38.92
9	38.25	.....	37.72	37.49	.....	38.76	39.13	39.50	40.09	39.73	39.28	38.91
10	38.23	.....	37.70	37.50	.....	38.80	39.15	39.52	40.09	39.72	39.28	38.83
11	38.22	.....	37.69	37.47	.....	38.78	39.16	39.52	40.09	39.72	39.24	38.90
12	38.21	.....	37.68	37.45	.....	38.84	39.16	39.52	40.09	39.71	39.26	38.89
13	38.19	.....	37.68	37.45	.....	38.85	39.18	39.49	40.05	39.71	39.25	38.87
14	38.17	.....	37.67	37.48	.....	38.88	39.19	39.49	40.06	39.70	39.20	38.87
15	38.17	.....	37.66	37.48	.....	38.92	39.18	39.49	40.03	39.67	39.20	38.85
16	38.17	.....	37.63	37.43	.....	38.92	39.18	39.49	40.03	39.67	39.20	38.83
17	38.13	.....	37.64	37.44	.....	38.92	39.18	39.50	40.00	39.59	39.18	38.83
18	38.13	.....	37.63	37.41	.....	38.92	39.18	39.55	39.99	39.61	39.17	38.82
19	38.17	37.85	37.62	37.44	.....	38.94	39.18	39.57	39.98	39.58	39.13	38.80
20	38.16	37.85	37.58	37.44	.....	38.94	39.13	39.60	39.96	39.58	39.14	38.77
21	38.15	37.85	37.62	37.45	38.64	38.87	39.09	39.63	39.97	39.58	39.13	38.77
22	38.11	37.83	37.59	37.46	38.64	38.88	39.09	39.63	39.94	39.53	39.09	38.78
23	38.11	37.83	37.57	37.48	38.64	38.85	39.10	39.63	39.94	39.53	39.08	38.77
24	38.07	37.83	37.60	37.51	38.64	38.85	39.07	39.64	39.91	39.52	39.09	38.74
25	38.07	37.80	37.54	37.54	38.64	38.85	39.06	39.65	39.91	39.51	39.10	38.76
26	38.08	37.79	37.56	37.61	38.64	38.85	39.02	39.69	39.91	39.49	39.08	38.73
27	.....	37.80	37.56	37.71	38.64	38.86	39.03	39.71	39.85	39.48	39.07	38.73
28	.....	37.78	37.55	37.77	38.62	38.85	39.09	39.75	39.84	39.47	39.06	38.72
29	.....		37.54	37.80	38.63	38.86	39.12	39.75	39.83	39.43	39.04	38.71
30	.....		37.55	37.89	38.64	38.93	39.21	39.76	39.82	39.45	39.02	38.71
31	.....		37.54		38.65		39.22	39.80		39.43		38.70

5.29.17.133. W. W. Kuykendall.

Highest daily water level, from recorder charts

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept	Oct.	Nov.	Dec.
1	39.46	.....	38.82	38.69	38.84	39.56	39.53	39.26	38.89	38.65	38.40	38.10
2	39.46	.....	38.82	38.69	38.84	39.55	39.51	38.97	38.88	38.65	38.39	38.09
3	39.46	.....	38.85	38.69	38.85	39.57	39.50	38.96	38.87	38.64	.....	38.08
4	39.46	.....	38.86	38.74	38.85	39.58	39.50	38.95	38.87	38.62	.....	38.08
5	39.45	.....	38.82	38.74h	39.07	39.59	39.49	38.93	38.86	38.61	.....	38.06
6	39.45	.....	38.81	38.74	39.08	39.62	39.49	38.93	38.86	38.61	.....	38.05
7	39.44	.....	38.80	38.74	39.13	39.64	39.51	38.92	38.83	38.60	.....	38.05
8	39.44	.....	38.78	38.74	39.17	39.65	39.53	.....	.....	.....	38.32	38.04
9	39.44	.....	h38.79	38.74	39.20	39.66	39.55	38.88	.....	.....	38.32	38.02
10	39.44	.....	38.78	38.72	39.24	39.67	39.56	38.88	.....	.....	38.32	38.00
11	39.43	.....	38.78	38.72	39.27	39.67	39.56	38.87	.....	38.56	38.31	38.00
12	39.43	.....	38.78	38.72	39.30	39.68	39.56	38.86	.....	.....	38.31	38.01
13	.....	.....	38.79	38.72	39.36	39.68	39.58	38.84	38.86	.....	.....	38.00
14	39.33	.....	38.79	38.72	39.37	39.69	39.57	38.84	38.85	.....	.....	38.00
15	39.32	.....	38.79	38.72	39.39	39.68	39.57	38.85	38.84	.....	38.25	38.00
16	39.32	.....	38.79	38.71	39.40	39.67	39.55	38.85	38.81	.....	.....	37.98
17	.....	.....	38.79	38.71	39.41	39.67	39.54	38.86	38.81	.....	.....	37.98
18	.....	.....	38.79	38.72	39.42	39.67	39.52	38.88	38.81	38.50	.....	37.98
19	.....	.....	.....	38.72	39.42	39.66	39.50	38.88	38.79	38.48	.....	37.97
20	.....	38.89	.....	38.72	39.42	39.66	39.49	38.90	38.78	38.48	.....	37.94
21	.....	38.90	.....	38.72	.....	39.65	39.47	38.91	38.78	38.48	.....	37.94
22	.....	38.90	.....	38.72	39.47	39.66	39.45	38.91	38.78	.....	38.17	37.94
23	.....	38.90	.....	38.72	39.48	39.64	39.43	38.91	38.77	.....	38.16	37.94
24	.....	38.90	.....	38.73	39.47	39.63	39.41	38.91	38.75	.....	38.16	37.91
25	.....	38.90	.....	38.73	39.48	39.61	39.39	38.92	38.73	38.45	38.14	37.91
26	.....	38.90	.....	38.73	39.49	39.60	39.37	38.91	38.72	38.45	38.13	37.90
27	.....	38.89	.....	38.73	39.49	39.59	39.34	38.91	38.70	38.44	38.12	37.90
28	.....	38.87h	38.69	38.73	39.51	39.57	39.32	38.91	38.69	38.43	38.12	37.89
29	.....		38.69	38.73	39.53	39.56	39.30	38.91	38.67	38.42	38.11	37.88
30	.....		38.69	38.73	39.53	39.54	39.29	38.90	38.66	38.42	38.10	37.88
31	.....		38.69		39.55		39.27	38.90		.....		37.87

h Tape measurement at odd hour.

Part 5

Miscellaneous Data Concerning Observation Wells

5.29.23.222. Harris. Mar. 28, 30.80.

5.29.23.222a. Harris. About 33 feet west of well 5.29.23.222. Drilled irrigation well, no equipment (pump off well June 2, 1949), diameter 16 inches. Reference point, surface of circular concrete pump base with steel rim, 0.38 foot above land-surface datum.

5.30.18.314. Thompson. Previously designated incorrectly as 5.30.18. 323.

5.30.19.132a. Hendrix. Pump on new well 10 feet south.

ROOSEVELT COUNTY (PORTALES VALLEY)

Part 1. General Discussion

In January 1949, 183 wells were measured; of these about 53 were measured also every other month. Recording gages were operated on four wells during 1949. A total of 461 measurements of water levels was made during the year, including about 24 tape measurements made on recorder wells.

Precipitation and Pumpage

The fluctuations in water levels in Portales Valley are the result primarily of variation in the amount and time of pumping which in turn is affected by the amount and time of precipitation that occurs throughout the year. Fluctuations in water levels also result from recharge to the water table in periods of excessive precipitation such as occurred in late 1941. The precipitation in the Portales Valley in 1949 averaged approximately 11 percent above normal, 22 and 54 percent more than in 1948 and 1947, respectively. The precipitation at Floyd was 15.85 inches, 0.28 inch below normal; at Portales Evaporation Station, 21.7 inches including an estimate of 0.5 inch for February, 2.9 inches above normal; at Portales, 22.08 inches, 4.16 inches above normal; and at Arch, 18.8 inches, including an estimate of 0.4 inch for December, 1.3 inches above normal. The excess precipitation occurred mainly in January, May through July, and October. The precipitation during the growing season, April through September, was more than three inches above normal except at Floyd and apparently was greatest near the center of the valley, as it was in 1948 also, and amounted to 17.50 inches at Portales, 3.84 inches above normal.

Because of the excess precipitation the amount of ground water pumped per acre for irrigation in Portales Valley in 1949 was somewhat less than in the preceding year. The decreased pumping per acre was offset, in part, by an increase in irrigated acreage. On the basis of electric power records for 290 comparable wells, it is estimated that about 0.76 as much water was pumped per acre from these wells in 1949 as in 1948. Pumps powered other than by electricity probably were not used much, as many of these pumps are used mainly to supplement the precipitation on row crops. The acreage served by all pumps in 1949 is estimated as about 32,000 acres, an increase of 2,000 acres over 1948. Some of this land, though served by pumps, was probably not irrigated because of the excess precipitation. The pumpage in 1949 is estimated as 32,000 acre-feet, a decrease of 3,000 acre-feet from 1948.

A large part of the increase in irrigated acreage in the later years has been planted to row crops that require less water than truck crops. The over-all average water pumped per acre irrigated has, therefore, shown a tendency to decrease in the later years. As row crops are grown successfully in years of normally distributed precipitation without the aid of irrigation, the actual acreage irrigated and amount of water pumped vary from year to year.

Changes of Water Levels

The ground-water levels in Portales Valley showed small net declines in the irrigated area northwest of Portales and small net rises in the area southeast of Portales, in the period from January 1949 to January 1950 as shown by the accompanying map. The declines northwest of town, generally less than 1 foot, apparently were the result of a smaller reduction in pumpage, as compared with the area southeast of town and an increase in irrigated acreage. The excess precipitation probably resulted in more than normal recharge. The water levels declined more than 1 foot in an area of about 2 square miles as compared with a like decline in 1948, also a year of above-normal precipitation, in about 61 square miles. The maximum recorded decline was 1.4 feet in a well about 5 miles northwest of town. The water levels rose more than 1 foot in an area of more than 55 square miles that extended from Portales to beyond Arch with the greatest rises of more than 2 feet in about 4 square miles occurring in a nearly circular area centered about 3 miles southeast of Portales.

The rises in water level in 1949 are the first since 1941 when, because of 44 inches of precipitation at Portales, the water levels rose more than 8 feet under nearly 120 square miles. In spite of the excess precipitation in 1941, 1948, and 1949 during which years there was considerable recharge to the ground-water body, the water levels in the areas of concentrated pumping northwest of Portales were in general at their lowest level at the end of 1949 and those southeast of Portales had reached their lowest level the year before. (See fig. 23.)

In the period from January 1940, when water levels were at comparatively low levels, to the end of 1949 the water levels show a net decline of more than 10 feet in an elliptical area of about 10 square miles that extends from about 5 miles northwest to 2 miles southeast of Portales.

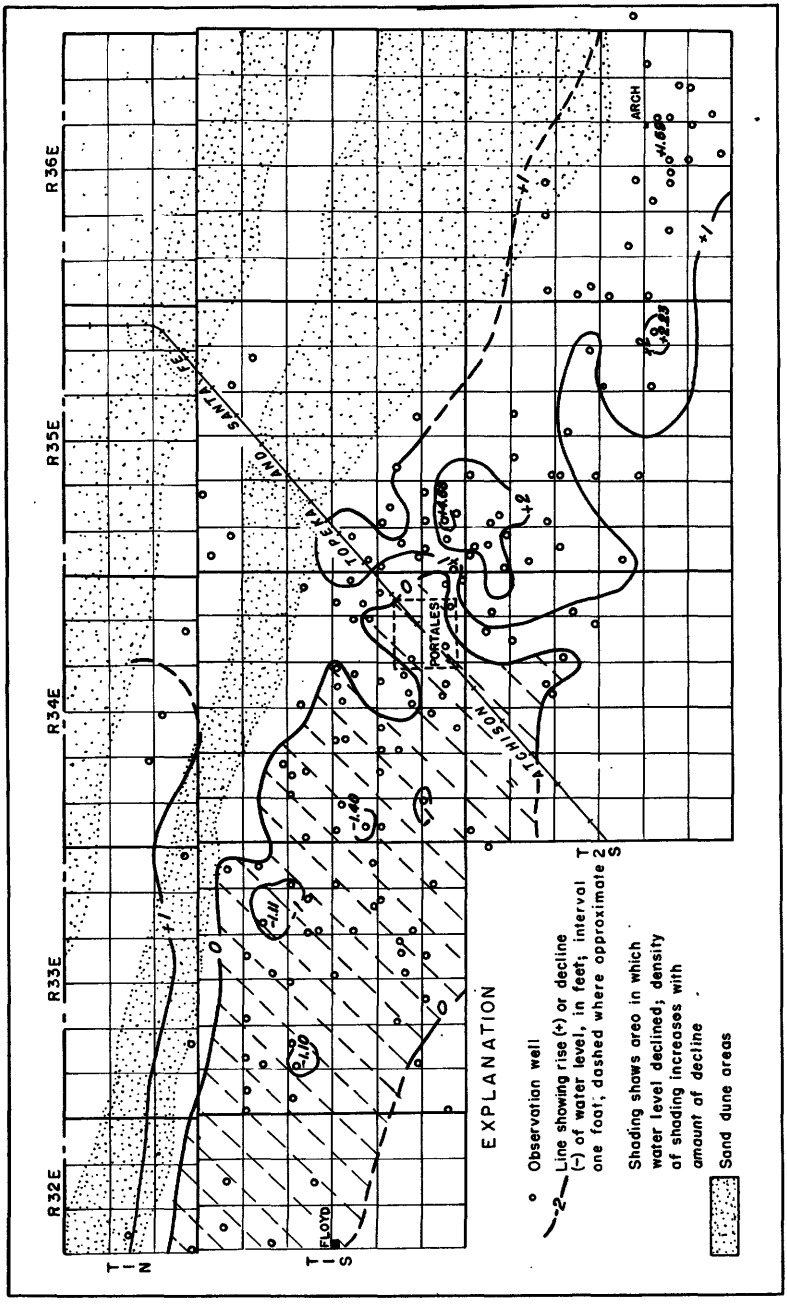

Figure 23.--Map of Portales Valley, Roosevelt County, showing decline of water levels from January 1949 to January 1950.

Part 2. Water levels in January 1949 and highest and lowest recorded levels in January or February, below land-surface datum, and change from January 1948 to January 1949, in feet

Location number	Owner	See also part	Water levels							Record	
			Jan. 1949		Change	Highest		Lowest		Be-	Years
			Level	Day	1948-49	Level	Year	Level	Year	gan	missing
1N.32.7.300	W. J. Crenshaw	3	16.35	5	-0.33	14.93	43	18.78	41	32	
27.321	Carl Essary	3	45.98	7	- .57	45.41	48	45.98	49	48	
30.421	W. J. Morris	.	61.02	5	- .56	57.95	47	61.02	49	47	
32.133	Virgie Hawkins	.	66.43	5	- .51	65.41	47	66.43	49	47	
34.333	Robert Newman	.	142.97	7	- .09	42.88	48	142.97	49	48	
1N.33.16.112	W. F. Hardwick	.	24.33	8	- .62	20.00	42	24.68	47	42	
16.131	do	.	b25.13	8	+ .70	b25.13	49	25.83	48	48	
26.120	Mary E. Miller	.	8.70	8	+2.20	3.54	42	12.06	39	39	43
32.443	Unknown	5	31.36	7	.....	.....	..	.....	..	49	
36.400a	A. C. Woodburn	4	5.63	8	- .85	f+1.57	42	f8.23	41	32	
36.400b	do	3	9.12	8	+4.08	1.98	42	13.97	41	32	37,38
1N.34.29.444	J. N. Tefertiller	.	17.91	10	- .76	10.78	42	20.62	41	39	
33.224	Mrs. Lee Garrett	.	20.12	10	+ .06	10.96	42	23.15	41	39	
35.432	Earl McCollum	(Measurements discontinued)				18.97	47	22.88	44	39	
35.432a	do	5	20.16	10	.....	.....	..	.....	..	49	
1.31.1.222	Bennett & Griffith	3	75.79	5	- .45	75.20	46	75.79	49	45	
1.32.2.431	Ira Brown	5	27.88	7	.....	.....	..	.....	..	49	
3.431	M. Nall	3,5	36.32	7	.....	.....	..	.....	..	49	
3.440	do	(Measurements discontinued)				24.35	42	39.68	32	32	49
10.331	J. R. Meadows	3	46.15	7	+ .22	45.23	47	46.37	48	47	
14.432	Robert Morrison	3	49.00	7	-1.86	43.63	45	49.00	49	45	
1.33.1.331	A. C. Woodburn	5	142.9	8	-1.8	41.13	48	142.9	49	48	
1.342	do	5	38.95	8	....	.....	..	.....	..	49	
5.432	Clay Jones	.	21.28	7	- .52	13.10	43	23.51	37	35	
7.111	E. L. Sisk	3	19.89	7	+ .60	12.17	42	22.02	41	40	
7.211	A. Q. Smith	.	c20.33	7	+ .11	15.29	45	20.44	48	45	
8.121	do	.	20.97	7	- .33	11.69	43	22.30	37	35	
8.311	E. E. Marcus	5	122.03	7	- .41	12.28	43	23.00	41	39	
9.111	Earl Plank	.	23.14	7	- .88	13.36	43	23.14	49	39	
10.211	O. B. Sherman	.	27.09	7	-1.01	18.63	43	27.09	49	39	
10.313a	Jim Allen	3	27.93	7	-2.37	22.49	47	27.93	49	47	
11.312	C. F. Williams	.	27.75	7	- .97	18.17	43	27.75	49	35	39
12.144	A. C. Woodburn	3	39.39	8	-3.44	28.61	32	39.39	49	32	34,37
13.111	L. R. King	.	31.92	7	-2.66	17.83	43	31.92	49	35	
14.131	J. V. Miller	.	31.28	7	-2.60	13.89	42	31.28	49	35	44
14.311	Claude Elder	(Measurements discontinued)				11.81	42	27.55	48	36	40,41, 49

*See footnotes at end of table.

Part 2--Continued

Location number	Owner	See also part	Water Levels: Jan. 1949 Level	Jan. 1949 Day	Change 1948-49	Highest Level	Highest Year	Lowest Level	Lowest Year	Record: Began	Record: Years missing
1.33.14.331c	J. E. Stacey	3	30.33	7	-2.32	19.37	45	30.33	49	45	
14.412	A. D. Pinkert	.	b34.47	8	-3.22	31.25	48	b34.47	49	48	
15.212	O. D. Minick		(Measurements discontinued)			13.44	42	23.20	41	35	47-49
16.222	Bethel Church	3	25.95	7	-2.72	11.13	43	25.95	49	42	
17.131	Marvin Wormington	.	22.63	7	- .71	21.92	48	22.63	49	48	
17.211	Bertha Campbell	3	23.68	7	-.95	20.66	47	23.68	49	47	
18.112	Mr. Walker	5	30.10	7	.....	.....	..	.....	..	49	
22.111	Mrs. E. J. Smith	.	26.61	7	-1.49	22.49	47	26.61	49	47	
23.311a	D. H. Smith	.	32.75	7	-1.93	25.61	46	32.75	49	46	
23.433	H. A. Miller	.	32.01	7	-2.13	15.73	42	32.01	49	36	
24.111	J. E. Dictson	.	38.15	7	-2.90	18.40	42	38.15	49	35	
24.433	J. E. Jones	.	34.51	7	-2.32	15.82	42	34.51	49	36	
26.221	C. J. & M. Bennett	5	32.19	8	-2.50	15.54	42	32.19	49	36	
26.331	C. G. Norton	.	35.97	7	-2.04	22.56	43	35.97	49	37	
27.311	M. R. Washington	.	47.80	7	-2.04	36.55	43	47.80	49	41	42,46
27.411	W. W. McClary	.	39.77	7	-2.12	27.20	43	39.77	49	41	
27.421	Luther Cooper	.	36.50	7	-2.10	23.31	43	36.50	49	42	
28.311	C. C. Ramey	3	47.11	7	-.84	39.39	43	47.30	41	39	
29.333	M. H. Rea	3	34.33	7	-.29	29.73	43	37.03	41	41	
31.244	Luther Cox	.	.....	.	.....	44.61	47	45.25	48	47	49
31.313	Webbie Starr	.	57.98	7	+.04	57.98	49	58.07	47	47	
33.211	W. R. McAffee	.	43.05	7	-1.37	39.11	47	43.05	49	47	
34.211	R. T. Bilberry	3	31.87	7	-2.07	19.72	43	31.87	49	40	
36.131	Edwin Johnson	.	43.59	7	-2.30	31.89	43	43.59	49	39	
1.34.8.434	Bob Ledbetter	.	34.99	11	-.74	28.33	43	36.64	41	37	
13.412	Ben Donathan	3	54.07	11	-.61	51.50	44	56.44	41	39	
15.131	A. M. Bradley	3	52.54	11	-.44	49.25	46	52.54	49	46	
17.111	W. D. Ware	.	38.14	11	-1.64	28.16	43	38.14	49	36	38
1.34.17.122	W. T. Duke	.	36.01	11	-1.02	27.59	43	36.34	41	37	
17.411a	O. L. Spencer	3	36.50	11	-2.10	34.40	48	36.50	49	48	
18.133	J. E. Tucker	.	40.05	11	-2.90	25.64	42	40.05	49	42	43
19.121a	Unknown	5	41.82	11	.....	.....	..	.....	..	49	
19.223	Mr. Mathis	.	38.85	11	-2.39	19.03	42	38.85	49	35	
19.341a	Wayne Welch	.	35.58	8	-2.09	33.49	48	35.58	49	48	

* See footnotes at end of table.

Part 2 --Continued

Location number	Owner	See also part	Water levels							Record	
			Jan.1949 Level	Day	Change 1948-49	Highest Level	Year	Lowest Level	Year	Began	Years missing
1.34.21.121	L. H. Lee	.	44.57	11	-1.44	26.36	42	44.57	49	35	43
21.141	R. L. Ledbetter	.	45.57	11	-1.32	25.82	42	45.57	49	35	43
22.131	Mrs. W. E. Jergins	.	43.87	11	-1.16	27.47	42	43.87	49	35	
22.211	Mrs. A. J. Goodwin	.	43.55	11	-1.18	35.66	35	43.55	49	35	41,47
22.222	Mrs. A. J. Goodwin	3	43.30	11	-.82	38.17	43	43.52	41	32	
22.421a	R. C. Grunig	3,5	42.98	11	.....	.....	..	.....	..	49	
23.211	Pope Long	.	42.09	11	-.73	36.89	42	42.09	49	37	46
23.422	E. L. Yandell	.	35.04	11	-.56	27.73	43	35.04	49	35	
23.442a	S. B. Fletcher	.	39.12	11	-1.11	28.34	43	39.12	49	41	
24.112a	J. A. Pinson	.	39.05	11	-.58	37.41	47	39.05	49	47	
24.243	J. T. Gorrell	.	48.56	11	-.16	42.45	43	48.56	49	37	
24.312a	W. A. Cummings	.	36.50	11	-.40	29.40	43	36.50	49	42	
25.211	J. B. H. Young	4	44.64	13	-1.86	32.54	32	f44.84	49	32	
26.313	Unknown	.	41.44	8	-1.53	28.53	35	41.44	49	35	39-47
27.211	A. L. Tiffin	.	41.71	11	-1.24	20.95	42	41.71	49	32	
27.331a	G. A. Whitmire	.	40.63	8	-1.53	39.10	48	40.63	49	48	
27.341	B. F. Smith	.	40.49	8	-1.56	17.24	42	40.49	49	35	
27.412	J. E. Plummer	.	40.82	8	-1.10	20.17	42	40.82	49	35	45
28.111	G. C. Morris	.	38.99	8	-1.22	18.84	42	38.99	49	42	
28.133a	Lee Daniels	.	41.30	8	-1.60	20.49	42	41.30	49	39	
28.211	W. B. McGuinness	.	40.45	8	-1.48	19.74	42	40.45	49	35	38,39
28.211b	W. B. McGuinness	5	40.45	8	.....	.....	..	.....	..	49	
29.211	J. W. King	.	38.36	8	-1.88	17.98	42	38.36	49	35	
30.121	M. A. Pember	.	35.12	7	-1.81	16.55	42	35.12	49	35	
31.222	Unknown	5	34.55	11	.....	.....	..	.....	..	49	
33.223a	Portales Municipal Airport.		37.21	8	-1.95	28.84	46	37.21	49	46	
33.431	W. A. Moore	3	24.47	7	-1.77	7.24	42	24.47	49	32	
34.143	Arvel Branscomb	5	k41.82	6	-1.36	24.00	43	141.82	49	33	42
34.232	J. W. Owens	(Measurements discontinued)				19.90	42	39.67	48	35	36,49
34.234	J. W. Owens	.	41.03	6	-1.70	39.33	48	41.03	49	48	
34.411	W. L. Patton	(Measurements discontinued)				20.70	42	35.35	47	35	48,49
35.312	Eastern N. Mex. College	.	41.27	6	-1.49	20.06	42	41.27	49	35	
36.331	Jim Landiss	.	41.22	6	-1.24	18.84	42	41.22	49	41	
36.421	Earl McCollum	.	41.38	13	-2.37	26.64	44	41.38	49	35	42,43,46
36.443	Foy Williams	.	42.04	13	-1.39	19.37	42	42.04	49	35	
1.35.2.300	Eastern New Mex. State Park	3	44.88	10	-.25	43.52	44	48.07	40	36	

* See footnotes at end of table.

Part 2 --Continued

Location number	Owner	See also part	Water levels							Record	
			Jan. 1949 Level	Day	Change 1948-49	Highest Level	Year	Lowest Level	Year	Began	Years missing
1.35.5.212	J. R. Carver	5	27.13	10	.....	.....	..	.....	..	49	
6.141	F. K. Montague	3	8.03	10	-.45	.54	42	10.70	41	39	
6.400	J. C. Brown	3	12.49	10	-.72	5.24	42	15.46	41	32	
11.241	Eunice McPherson	3	16.33	10	-.36	14.03	43	19.02	41	41	
19.241	Royce Pember	5	41.87	11	.....	.....	..	.....	..	49	
19.332	H. E. Frazier	.	46.98	11	-1.50	37.80	43	46.98	49	35	44,45
19.411	E. T. Hensley	(Measurements discontinued)				47.30	47	48.95	48	47	49
27.344a	H. J. McCroary	3	31.19	12	-.10	30.42	47	31.19	49	47	
28.143	C. A. Kerby	3	47.39	11	-.02	44.24	43	51.49	41	35	
29.111	Clara Nullmeyer	.	42.64	11	+.37	35.26	43	43.01	48	40	
29.142	R. E. Lee	.	41.42	11	-.52	33.15	43	41.42	49	35	
30.111	E. F. Foreman	.	44.26	11	-1.73	33.65	43	44.26	49	35	
30.343	T. E. Livingston (Measurements discontinued, well filled)					22.67	43	36.98	48	35	49
30.343a	T. E. Livingston	5	38.82	11	.....	.....	..	.....	..	49	
30.441	J. H. Breshears	.	39.22	11	-1.10	26.85	35	39.22	49	35	39-46
31.122	Mary M. Kenyon	.	40.47	11	-2.69	22.00	43	40.47	49	35	
31.331a	R. A. Young	.	39.72	12	-1.23	34.31	47	39.72	49	47	
31.342	E. F. Moore	(Measurements discontinued)				19.37	43	138.80	48	35	46,49
31.412	Henry Beebe	.	39.48	12	-2.04	30.40	46	39.48	49	46	
32.111	Alvin George	.	34.82	11	-1.23	19.65	43	34.82	49	35	37
32.212	R. H. Green	.	30.81	11	-1.25	18.45	43	30.81	49	40	
32.311	O. W. Doak	.	b38.13	12	-2.98	17.41	42	b38.13	49	35	
32.332	C. E. Lane	.	36.82	12	-.86	17.12	42	36.82	49	36	37
33.331	L. C. Green	.	.....	..	.....	13.03	42	24.03	41	35	48,49
1.36.5.300	W. H. McDaniel	3	(a)	10	.....	32.84	43	36.01	41	40	49
16.100	State of New Mexico	3	a27.75	10	-8.29	b18.40	45	a30.20	40	40	46
2.33.1.422	W. B. & H. R. Skeen	.	27.75	7	-.14	26.58	46	27.75	49	46	
5.113	Kenneth Nunn	.	53.56	7	-.23	53.04	47	53.56	49	47	
7.241	John Morgan	.	49.12	7	+.18	49.12	49	49.94	46	46	
2.34.1.114	Jack Clark	.	41.23	6	-1.21	18.24	42	41.23	49	35	36,37
1.133	W. F. Clifton	.	39.57	6	-1.31	18.18	42	39.57	49	35	
1.221	Foy Williams	(Measurements discontinued)				18.98	42	35.46	47	35	48,49
2.233	Louisa Trout	4	54.97	13	-1.19	f33.04	42	f55.37	49	32	
4.441	Maud Wallace	3	e8.77	6	.....	+4.17	42	8.25	48	39	49
6.112	Clyde Collis	.	33.13	7	-2.64	28.56	47	33.13	49	47	

* See footnotes at end of table.

Part 2 --Continued

Location number	Owner	See also part	Water levels							Record	
			Jan.1949 Level	Day	Change 1948-49	Highest Level	Year	Lowest Level	Year	Began	Years missing
2.34.10.324	Henry Walker	3	28.26	6	-1.40	23.45	46	28.26	49	46	
10.343	C. R. Jones	.	34.92	6	-.29	32.25	43	36.03	41	35	
11.122	D. W. Bedinger	.	37.53	6	-1.73	19.20	42	37.53	49	41	
13.133	L. J. Sanders	3	24.99	12	-1.01	19.09	45	24.99	49	45	
14.113	J. P. Tarlton (Measurements discontinued, well filled)					20.56	42	31.46	48	35	49
14.113a	J. P. Tarlton	.	32.62	6	-1.52	31.10	48	32.62	49	48	
14.443	W. A. Schaffer	.	37.97	12	-.85	29.22	42	37.97	49	35	
2.35.4.111	E. S. Weber	3	28.33	12	-.28	12.94	42	28.33	49	35	36,37
5.311	R. C. Dale	.	34.03	12	-1.14	12.87	42	34.03	49	35	
5.341	H. R. Sadler	.	33.63	12	-1.20	13.45	42	33.63	49	35	
6.121	Dallas Clark	3	38.75	12	-.71	16.73	42	38.75	49	32	
6.213	Beulah Ownby	.	39.21	12	-.82	16.87	42	39.21	49	35	37,46
6.312a	O. L. Spencer	.	37.11	12	-.30	24.37	45	37.11	49	45	46
6.331	J. A. Akens	.	31.10	12	+.04	12.96	42	31.14	48	35	36-38
6.411	F. A. Jewell	.	36.53	12	-.70	14.25	42	36.53	49	39	
6.443a	Ora Johnson	3	33.15	12	-.95	32.20	48	33.15	49	48	
7.134	A. L. Kelly	.	40.61	12	-1.86	24.01	42	40.61	49	37	
8.332	D. L. Ray	.	33.37	12	-1.09	18.28	42	33.37	49	35	
9.122	L. D. Griffith	3	23.48	12	-.63	20.57	47	23.48	49	47	
9.333	C. E. Clark	.	31.13	12	-.33	23.60	45	31.13	49	45	
10.211	S. H. Hare	.	20.02	12	-.53	10.30	42	20.02	49	40	
14.313	1st Nat'l Bank, Portales	(Measurements discontinued, well dry)				6.79	42	12.07	48	39	49
14.414	1st Nat'l Bank, Portales	3	3.43	12	+.20	+.07	43	3.63	48	40	
15.131	1st Nat'l Bank, Portales	3	4.36	12	-.09	+.02	42	4.36	49	39	
16.111	Robert Stokes	.	27.42	12	-.22	24.52	47	27.42	49	47	
16.333	A. J. Cline	3	9.00	12	+.46	4.12	42	9.46	48	39	
18.211	State of New Mexico	3	8.35	12	-.21	(j)	42	8.35	49	39	
19.134	Roy Fairoloth	3	28.16	12	.....	27.55	47	28.16	k48	47	
21.333	L. V. Campbell	.	42.52	12	-1.20	41.32	48	42.52	49	48	
23.111	Jack McCarty	3,5	24.12	12	.....	.....	..	.....	..	49	
25.114	R. C. Watkins	(Measurements discontinued)				24.53	47	25.25	48	47,49	
25.114a	Joe Carraway	3,5	27.00	12	.....	.....	..	.....	..	49	
26.111	T. M. McCrary	.	31.42	12	+.08	28.07	42	32.98	41	41	
2.36.7.332	Loren Johnson	3	20.19	13	+.02	16.60	45	20.21	48	45	

* See footnotes at end of table.

Part 2 --Continued

Location number	Owner	See also part	Water levels: Jan.1949 Level	Jan.1949 Day	Change 1948-49	Highest Level	Highest Year	Lowest Level	Lowest Year	Record: Began	Years missing
2.36.8.432	S. W. Davis	(Measurements	discontinued)			13.26	42	20.94	41	39,49	
8.432a	S. W. Davis	3,5	20.31	13	.....	.....	..	.....	..	49	
9.431	H. C. Cosby	.	21.31	13	-.89	15.67	43	21.63	41	39	
18.311	H. H. McLain	.	15.23	13	-.14	15.09	48	15.23	49	48	
18.341	Robert Stokes	3	16.27	13	-.14	9.42	42	18.26	33	32	
19.115	R. C. Marchbank	.	23.13	13	-.10	16.93	42	23.13	49	41	
20.321	W. O. Davis	3	16.32	13	-.47	8.12	42	16.50	32	32	
21.432	Mr. Ledbetter	.	18.52	13	-.88	10.39	43	18.52	49	39	42
25.112	W. D. Pate	.	16.55	13	-1:11	8.13	42	16.55	49	39	
26.131	J. N. McGinnis	3	15.46	13	-.89	5.29	42	15.46	49	32	
26.311	J. S. Riley	.	15.13	13	-1.00	5.09	42	15.13	49	36	
26.423	W. B. Cox	.	17.48	13	-1.41	8.15	42	17.48	49	35	33,39
27.111	B. L. Kennedy	.	.....	..	.....	6.27	42	16.41	48	39	49
27.311	J. M. Riley	(Measurements	discontinued)			7.04	42	16.88	48	32	49
27.311a	J. M. Riley	3	17.43	13	-.76	16.67	48	17.43	49	48	
28.114b	Morgan Trammell	4	18.30	13	-1.02	f7.37	42	f18.38	49	33	
28.411	C. A. Tevis	.	18.03	13	-.93	7.06	42	18.03	49	36	
28.421	C. A. Tevis	.	19.05	13	-1.00	8.26	42	19.05	49	35	
28.441	E. C. Sanders	(Measurements	discontinued)			11.60	43	18.78	48	35	42,49
29.411	Unknown	.	19.75	13	-.93	18.82	48	19.75	49	48	
30.111	L. B. Thornton	3	5.95	13	-.54	.70	42	5.95	49	42	
34.111	D. J. Patton	.	18.65	13	-.95	8.18	42	18.65	49	36	
34.111a	D. J. Patton	.	18.62	13	-.92	17.70	48	18.62	49	48	
34.222	W. H. Davenport	.	13.17	13	-.84	4.01	42	13.17	49	35	
34.312	L. W. Walker	3	18.98	13	-.85	18.13	48	18.98	49	48	
34.341	W. J. Murrill	(Measurements	discontinued)			12.39	42	20.89	48	36	49
34.421	F. F. Dacus	(Measurements	discontinued)			4.24	42	10.64	41	39	48,49
35.212a	Mrs. Eunice Harrison	3	12.25	13	-1.32	10.93	48	12.25	49	48	
35.311	Mr. Stokes	.	12.41	13	-1.17	11.24	48	12.41	49	48	
2.37.19.331	W. H. McDougal	.	19.30	13	-.98	12.74	42	20.19	41	39	
19.341	C. R. Anderson	.	18.89	13	-.90	12.97	42	19.84	41	39	
21.312	O. E. Pattison	.	14.61	13	-.46	12.86	46	14.61	49	46	

a Pumping.
b Pumping recently.
c Nearby well pumping.
e Dry at depth given.
f From recorder chart.
i Possible discrepancy of a few tenths of a foot between present and previous land-surface data.
j Water above land-surface datum, well inaccessible.
k Also 1949.

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Declines of more than 4 feet have occurred under most of the area where pumping is comparatively concentrated.

It is expected that water levels generally will decline from year to year in Portales Valley as long as pumping continues. The magnitude of the yearly declines will depend upon the amount of pumping which is influenced by the precipitation, economic conditions, and the types of crops grown. Rises may occur in a particular year because of reduced pumping and increased recharge from excess precipitation. However, as the pumpage of ground water is mainly from ground-water storage, the long-term trend will be a decline in water levels.

Part 3

Water levels, in feet below land-surface datum, during 1949

Location number Owner	IN.32. 7.300 Crenshaw	IN.32. 27.321 Essary	IN.33. 36.400b Woodburn	1.31. 1.222 Bennett & Griffith	1.32. 3.431 Nall	1.32. 10.331 Meadows	1.32. 14.432 Morrison	1.33. 7.111 Sisk
Jan. 5,7,8	16.35	45.98	9.12	75.79	36.32	46.15	49.00	19.89
Mar. 25	a17.09	45.48	9.02	75.35	35.98	45.97	48.40	b22.39
May 31	16.10	45.73	a10.44	75.47	37.36	46.41	50.99	b22.62
July 30	16.38	45.40	a10.85	(a)	37.33	46.45	49.21	b27.12
Sept. 27,28	b16.79	45.37	8.71	78.13	39.14	47.25	52.59	24.57
Nov. 21,22	16.74	45.04	a11.20	76.47	36.88	46.89	50.66	20.66

Location number Owner	1.33. 10.313a Allen	1.33. 12.144 Woodburn	1.33. 14.331c Stacey	1.33. 16.222 Bethel Church	1.33. 17.211 Campbell	1.33. 28.311 Ramey	1.33. 29.333 Rea	1.33. 34.211 Bilberry
Jan. 7,8	27.93	39.39	30.33	25.95	23.68	47.11	34.33	31.87
Mar. 25	27.31	38.60	a48.27	c29.24	23.45	(a)	33.87	31.19
May 31	29.62	41.73	32.00	28.37	25.04	48.32	34.16	a58.10
July 30	(a)	(a)	b39.11	29.12	24.35	48.70	34.30	33.58
Sept. 27,28	29.61	b49.89	b33.92	28.57	25.84	48.91	34.11	34.27
Nov. 21, 22	27.93	40.01	31.41	27.42	24.77	48.33	a34.65	32.87

Location number Owner	1.34. 13.412 Donathan	1.34. 15.131 Bradley	1.34. 17.411a Spencer	1.34. 22.222 Goodwin	1.34. 22.421a Grunig	1.34. 33.431 Moore	1.35. 2.300 State Park	1.35. 6.141 Montague
Jan. 7,10,11	54.07	52.54	36.50	43.30	42.98	24.47	44.88	8.03
Mar. 23,25,26	54.04	52.19	35.96	43.46	44.39	24.37	45.18	7.85
May 25	54.22	.....	.....	.....	.....	.....	45.10	7.60
June 1,2	.....	52.16	37.18	43.33	43.39	24.96	.....	....
July 29,30	54.29	52.02	39.63	43.07	42.27	24.71	45.04	7.12
Sept. 26,27	54.21	53.89	40.81	43.16	44.02	25.38	.....	7.48
Nov. 19,21	54.13	52.80	37.52	43.26	43.69	25.50	.....	7.54

Part 3--Continued

Location number Owner	1.35. 6.400 Brown	1.35. 11.241 Mc-Pherson	1.35. 27.344a Mc-Creary	1.35. 28.143 Kerby	1.36. 5.300 Mc-Daniel	1.36. 16.100 State of N.M.	2.34. 4.441 Wallace	2.34. 10.324 Walker
Jan. 6,10-12	12.49	16.33	31.19	47.39	(a)	a27.75	e8.77	28.26
Mar. 23-26	12.55	16.28	a37.85	47.45	(a)	a29.69	10.37	28.42
May 24,25	12.62	16.35	.....	.....	a34.46	a21.64	9.11	29.00
June 1	.....	.....	31.39	47.76	.....	.....	.....	.....
July 29	12.20	16.20	30.46	47.43	a33.74	a28.37	8.67	28.37
Sept. 26,27	12.18	16.32	30.23	46.99	a33.95	a27.40	9.71	28.15
Nov. 19,21	12.29	16.28	30.21	46.55	a34.39	a30.07	10.21	28.08

Location number Owner	2.34. 13.133 Sanders	2.35. 4.111 Weber	2.35. 6.121 Clark	2.35. 6.443a Johnson	2.35. 9.122 Griffith	2.35. 14.414 Bank	2.35. 15.131 Bank	2.35. 16.333 Cline
Jan. 12	24.99	28.33	38.75	33.15	23.48	3.43	4.36	9.00
Mar. 24,25	25.52	27.91	37.79	32.03	23.63	3.08	4.06	8.89
May 24	c28.40	.....	.....	.....	.....	....	....	....
June 1	.....	28.66	a51.15	35.51	a31.79	2.51	2.94	7.24
July 29,30	24.99	26.45	37.84	31.83	20.50	2.67	3.40	6.87
Sept. 26,27	b27.07	29.69	40.11	35.19	23.14	3.33	4.32	8.12
Nov. 19,21	25.00	26.68	38.10	31.86	22.01	2.91	3.97	8.38

Location number Owner	2.35. 18.211 State of N.M.	2.35. 19.134 Faircloth	2.35. 23.111 McCarty	2.35. 25.114a Caraway	2.36. 7.332 Johnson	2.36. 8.432a Davis	2.36. 18.341 Stokes	2.36. 20.321 Davis
Jan. 12,13	8.35	28.16	24.12	27.00	20.19	20.31	16.27	16.32
Mar. 24	8.21	28.30	24.05	27.51	20.52	21.87	16.43	16.17
June 1	5.84	28.79	23.51	b32.16	19.77	19.72	14.74	15.50
July 30,31	4.73	27.28	22.08	27.26	17.45	20.79	10.94	14.28
Sept. 26,27	6.93	28.56	23.61	26.17	18.69	19.83	13.84	14.83
Nov. 19,21	7.36	27.20	23.37	25.03	18.55	18.70	14.52	15.98

Location number Owner	2.36. 26.131 Mc-Ginnis	2.36. 27.311a Riley	2.36. 30.111 Thornton	2.36. 34.312 Walker	2.36. 35.212a Harrison
Jan. 13	15.46	17.43	5.95	18.98	12.25
Mar. 24	15.52	17.12	5.57	18.82	11.88
June 1	13.98	16.38	3.61	17.24	10.46
July 30,31	11.61	a36.72	3.96	16.03	9.80
Sept. 26,27	13.97	17.35	4.93	17.63	12.00
Nov. 21	14.08	16.10	4.66	17.76	11.49

a Pumping.
b Pumping recently.
c Nearby well pumping.
e Dry at depth given.

Part 4

IN.33.36.400a. A. C. Woodburn.

Highest daily water level, from recorder charts

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.70	5.62	5.56	5.54	5.63	4.67	3.57	4.30	4.76	5.16	5.24	5.24
2	5.69	....	5.56	5.53	5.65	4.70	3.62	4.33	4.77	5.15	5.23	5.24
3	....	5.60	5.56	5.53	5.67	4.74	3.67	4.35	4.77	5.15	5.23	5.24
4	....	5.59	5.55	5.53	5.69	4.78	3.71	4.39	4.78	5.15	5.23	5.24
5	....	5.58	5.55	5.53	5.71	4.81	3.75	4.41	4.80	5.16	5.24	5.24
6	....	5.58	5.55	5.53	5.73	4.85	3.79	4.43	4.82	5.16	5.24	5.24
7	....	5.57	5.55	5.53	5.71	4.85	3.83	4.45	4.84	5.17	5.24	5.24
8	5.63	5.57	5.54	5.54	5.68	4.83	3.89	4.47	4.87	5.18	5.23	5.23
9	5.63	5.58	5.54	5.54	5.67	4.21	3.95	4.49	4.89	5.19	5.23	5.23
10	5.64	5.59	5.55	5.55	5.67	3.78	3.98	4.52	4.91	5.19	5.23	5.23
11	5.65	5.59	5.55	5.55	5.67	3.35	....	4.54	4.92	5.20	5.23	5.22
12	5.65	5.58	5.56	5.56	5.53	3.32	....	4.55	4.94	5.21	5.23	5.22
13	5.63	5.58	5.56	5.56	4.67	3.32	....	4.56	4.95	5.22	5.24	5.22
14	5.62	5.58	5.57	5.56	4.55	3.35	....	4.58	4.97	5.23	5.24	5.22
15	5.62	5.57	5.57	5.57	4.55	3.38	....	4.60	4.97	5.23	5.23	5.22
16	5.62	5.57	5.56	5.58	4.58	3.41	....	4.62	4.98	5.23	5.23	5.23
17	5.62	5.58	5.55	5.58	4.65	3.45	....	4.65	4.99	5.23	5.23	5.23
18	5.62	5.58	5.57	5.59	4.69	3.50	....	4.67	5.00	5.22	5.23	5.23
19	5.63	5.57	5.56	5.59	4.73	3.37	....	4.69	5.01	5.22	5.23	5.22
20	5.63	5.58	5.55	5.59	4.75	3.35	....	4.71	5.02	5.22	5.23	5.22
21	5.63	5.58	5.54	....	4.76	3.35	4.00	....	5.03	5.23	5.23	5.22
22	5.62	5.57	5.53	....	4.79	3.27	4.04	....	5.05	5.23	5.25	5.22
23	5.62	5.57	5.53	....	4.82	3.25	....	....	5.06	5.23	5.24	5.23
24	5.61	5.57	5.53	....	4.86	3.25	....	....	5.07	5.23	5.24	5.23
25	5.61	5.57	5.53	....	4.83	3.27	....	4.89	5.08	5.24	5.24	5.23
26	5.62	5.56	5.53	....	4.60	3.31	....	4.94	5.09	5.24	5.24	5.23
27	5.61	5.56	5.53	....	4.57	3.35	....	4.97	5.11	5.25	5.24	5.24
28	5.61	5.56	5.53	5.63	4.57	3.41	....	4.78	5.13	5.25	5.24	5.24
29	5.61		5.53	5.63	4.59	3.47	....	4.75	5.15	5.25	5.24	5.24
30	5.62		5.53	5.63	4.61	3.52	h4.26	4.75	5.16	5.26	5.24	5.24
31	5.61		5.53		4.64		4.27	4.75		5.25		5.24

h Tape measurement at odd hour.

1.34.25.211. Young and Hatch.

Highest daily water level, from recorder charts

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	44.84	44.44	44.12	44.00	.....	.....	.....	44.47	.....	47.15	45.48	44.84
2	44.81	44.41	44.15	.....	.....	44.56	.....	44.49	.....	47.05	45.48	44.79
3	.....	44.41	44.12	.....	.....	44.55	.....	44.48	.....	46.95	45.43	44.78
4	.....	44.40	44.11	.....	.....	44.62	.....	44.48	.....	46.85	45.39	44.79
5	.....	44.39	44.10	.....	.....	44.68	.....	44.45	.....	46.74	45.38	44.70
6	.....	44.39	44.12	.....	.....	.....	45.01	44.57	.....	46.67	45.33	44.71
7	.....	44.34	44.10	.....	.....	.....	44.96	44.53	.....	46.59	45.29	44.72
8	44.72	44.36	44.09	.....	.....	.....	44.95	44.50	.....	46.53	45.26	44.70
9	44.72	44.36	44.09	.....	.....	.....	44.93	44.78	.....	46.61	45.23	44.67
10	44.77	44.33	44.04	.....	.....	.....	44.89	44.95	.....	46.49	45.21	44.61
11	44.70	44.31	44.02	.....	.....	.....	44.85	45.43	.....	46.48	45.18	44.66
12	44.68	44.29	44.04	.....	.....	.....	44.84	.....	.....	46.51	45.20	44.69
13h	44.65	44.31	44.06	.....	.....	.....	44.80	.....	.....	46.41	45.16	44.66
14	44.61	44.29	44.03	.....	.....	.....	44.77	.....	.....	46.35	45.13	44.66
15	44.62	44.27	44.02	.....	.....	.....	44.75	.....	.....	46.25	45.10	44.60
16	44.63	44.31	44.00	.....	.....	.....	44.69	.....	.....	46.18	45.11	44.55
17	44.59	44.26	44.02	.....	.....	.....	44.67	.....	.....	46.12	45.07	44.58
18	44.59	44.25	44.01	.....	.....	.....	44.67	.....	.....	46.08	45.02	44.68
19	44.58	44.25	44.00	.....	.....	.....	44.65	.....	.....	45.97	44.95	44.59
20	44.55	44.25	43.95	.....	.....	.....	44.57	.....	.....	45.94	44.97	44.54
21	44.56	44.24	43.98	.....	.....	.....	44.57	.....	.....	45.93	44.94	44.52

1.34.25.211--Continued.

Highest daily water level, from recorder charts

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
22	44.54	44.24	43.98	.....	44.47	.....	44.53	.....	.....	45.87	44.89	44.56
23	44.52	44.18	43.95	.....	44.50	.....	44.51	.....	.....	45.84	44.86	44.53
24	44.55	44.21	44.01	.....	44.49	.....	44.49	.....	.....	45.78	44.86	44.50
25	44.50	44.17	43.96	.....	44.47	.....	44.45	.....	.....	45.75	44.85	44.51
26	44.46	44.17	44.00	.....	44.46	.....	44.45	.....	47.58	45.71	44.97	44.49
27	44.46	44.19	43.99	.....	44.45	.....	44.67	.....	47.56	45.65	44.89	44.49
28	44.53	44.15	44.00	.....	44.46	.....	44.63	.....	47.47	45.63	44.87	44.50
29	44.49		43.99	.....	.....	.....	44.58	.....	47.35	45.56	44.88	44.45
30	44.41		44.00	.....	.....	.....	44.56	.....	47.24	45.56	44.84	44.43
31	44.43		44.01		.....		44.51	.....		45.52		44.43

h Tape measurement at odd hour.

2.34.2.233. Louisa Trout.

Highest daily water level, from recorder charts

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	55.37	54.38	53.60	54.43	55.59	55.68	56.92	55.81	57.40	57.01	55.38	55.02
2	55.30	54.32	53.60	54.33	55.57	55.81	57.13	55.78	57.39	56.85	55.40	55.00
3	55.36	54.31	53.58	54.28	56.11	55.84	57.59	55.71	57.32	56.80	55.46	55.00
4	55.30	54.28	53.55	54.20	57.07	55.95	57.89	55.70	57.60	56.69	55.43	55.00
5	55.29	54.23	53.52	54.18	56.57	55.90	58.20	55.71	57.52	56.53	55.42	54.89
6	55.23	54.23	53.50	54.19	56.57	55.86	57.94	55.79	57.47	56.47	55.31	54.87
7	55.19	54.18	53.47	54.43	56.17	55.80	57.82	55.70	57.28	56.40	55.22	54.88
8	55.18	54.19	53.45	54.50	55.94	55.74	57.64	55.68	57.12	56.35	55.19	54.87
9	55.16	54.17	53.48	54.49	55.80	55.70	57.53	56.01	57.02	56.25	55.18	54.80
10	55.10	54.13	53.48	54.56	55.70	55.62	57.22	55.82	56.98	56.20	55.18	54.70
11	55.08	54.08	53.44	54.47	55.60	55.53	57.13	55.70	56.92	56.19	55.15	54.74
12	54.98	54.04	53.45	54.83	55.54	55.47	57.57	55.65	56.85	56.14	55.17	54.72
13	54.97	54.03	53.44	55.00	55.45	55.40	57.29	55.61	56.79	56.24	55.10	54.70
14	54.88	54.00	53.42	55.11	55.40	55.38	57.01	55.57	56.73	56.20	55.06	54.69
15	54.88	53.96	53.40	55.22	55.30	55.30	56.81	55.53	56.68	56.13	55.04	54.59
16	54.92	53.99	53.39	55.37	55.26	55.22	56.63	56.31	56.60	56.08	55.07	54.58
17	54.80	53.91	53.43	55.23	55.22	55.28	56.48	56.57	56.58	56.02	55.10	54.60
18	54.80	53.89	53.58	55.18	55.19	55.31	56.40	56.84	56.59	55.99	55.20	54.58
19	54.78	53.88	53.66	55.17	55.16	55.22	56.38	57.08	56.56	55.94	55.22	54.53
20	54.72	53.89	53.59	55.06	55.10	55.20	56.33	56.97	56.71	55.99	55.24	54.48
21	54.73	53.83	53.60	55.02	55.70	55.22	56.38	56.81	57.10	56.00	55.13	54.46
22	54.65	53.80	53.65	55.30	56.15	55.17	56.33	56.79	56.94	56.03	55.19	54.46
23	54.63	53.74	53.62	55.21	56.18	55.13	56.27	56.94	56.85	55.95	55.27	54.43
24	54.65	53.76	53.70	55.29	56.40	55.10	56.14	57.05	56.79	55.82	55.14	54.36
25	54.57	53.70	53.93	55.22	56.46	55.19	56.10	57.64	56.63	55.79	55.12	54.39
26	54.50	53.69	54.25	55.37	56.03	56.13	56.59	57.64	56.59	55.70	55.30	54.33
27	54.49	53.73	54.11	55.54	55.82	55.95	56.81	57.75	57.11	55.63	55.15	54.33
28	54.54	53.64	54.08	55.50	55.70	56.02	56.60	57.56	57.02	55.59	55.12	54.32
29	54.43		54.40	55.52	55.65	56.58	56.20	57.50	57.11	55.52	55.18	54.63
30	54.37		54.38	55.60	55.62	56.88	56.03	57.50	57.05	55.53	55.00	54.57
31	54.40		54.59		55.63		55.92	57.45		55.43		54.50

2.36.28.114b. Morgan Trammel.

Highest daily water level, from recorder charts

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	18.38	18.18	18.04	18.12	18.12	17.33	16.50	16.38	17.74	17.44	17.15	16.90
2	18.37	18.16	18.04	18.11	18.13	17.34	16.48	16.44	17.74	17.44	17.14	16.90
3	18.37	18.16	18.03	18.11	18.12	17.32	16.44	16.47	17.76	17.45	17.12	16.89
4	18.36	18.16	18.03	18.11	18.12	17.31	16.41	16.49	17.78	17.45	17.11	16.89
5	18.36	18.15	18.02	18.10	18.14	17.30	16.40	16.49	17.80	17.43	17.10	16.85
6	18.36	18.15	18.02	18.11	18.18	17.30	16.41	16.53	17.80	17.43	17.08	16.84
7	18.34	18.15	18.01	18.13	18.16	17.29	16.42	16.53	17.80	17.43	17.06	16.84
8	18.34	18.15	18.01	18.11	18.13	17.28	16.48	16.53	17.78	17.43	17.04	16.82

2.36.28.114b--Continued.

Highest daily water level, from recorder charts

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
9	18.34	18.15	18.02	18.10	18.09	17.26	16.49	16.60	17.75	17.41	17.03	16.80
10	18.33	18.15	18.00	18.11	18.04	17.20	16.45	16.66	17.73	17.42	17.01	16.79
11	18.32	18.14	18.00	18.14	18.00	17.11	16.43	16.68	17.72	17.42	16.98	16.79
12	18.32	18.13	18.00	18.16	17.95	17.04	16.42	16.71	17.70	17.41	16.98	16.82
13	18.30	18.13	18.00	18.16	17.91	16.97	16.39	16.78	17.68	17.40	16.99	16.81
14	18.29	18.12	18.00	18.17	17.86	16.94	16.37	16.83	17.67	17.39	16.99	16.81
15	18.28	18.11	17.99	18.18	17.80	16.87	16.35	16.90	17.64	17.37	16.98	.....
16	18.28	18.13	17.98	18.19	17.77	16.81	16.32	16.96	17.61	17.36	16.98	.....
17	18.27	18.11	17.99	18.20	17.72	16.77	16.29	17.01	17.60	17.35	16.97	.....
18	18.26	18.11	17.99	18.20	17.68	16.72	16.28	17.06	17.59	17.33	16.95	16.76
19	18.27	18.11	17.98	18.21	17.64	16.67	16.27	17.12	17.58	17.32	16.93	16.75
20	18.26	18.10	17.97	18.21	17.61	16.63	16.27	17.20	17.57	17.31	16.93	16.73
21	18.25	18.10	17.96	18.21	17.58	16.61	16.28	17.23	17.56	17.31	16.94	16.73
22	18.25	18.09	17.98	18.20	17.54	16.59	16.34	17.32	17.55	17.32	16.92	16.75
23	18.24	18.08	18.00	18.19	17.51	16.57	16.37	17.39	17.54	17.31	16.90	16.74
24	18.24	18.08	18.02	18.16	17.49	16.55	16.38	17.46	17.52	17.29	16.90	16.72
25	18.23	18.07	18.02	18.15	17.46	16.54	16.38	17.54	17.49	17.27	16.89	16.72
26	18.21	18.07	18.03	18.14	17.43	16.53	16.38	17.59	17.48	17.25	16.88	16.73
27	18.20	18.06	18.05	18.12	17.40	16.52	16.39	17.63	17.47	17.23	16.88	16.74
28	18.21	18.05	18.06	18.12	17.37	16.51	16.39	17.68	17.46	17.21	16.88	16.73
29	18.20		18.08	18.11	17.34	16.50	16.39	17.68	17.45	17.19	16.90	16.73
30	18.18		18.10	18.11	17.32	16.51	16.39	17.69	17.44	17.19	16.90	16.72
31	18.18		18.11		17.31		16.39	17.71		17.17		16.72

Part 5

Miscellaneous Data Concerning Observation Wells

IN.33.32.443. Owner unknown. Drilled irrigation well, equipped with turbine pump. Reference point, surface of 3-by 3-foot concrete pump base, 0.75 foot above land-surface datum.

IN.34.35.432a. McCollum. About 50 feet southeast of well IN.34.35.432. Drilled stock well, equipped with windmill, diameter 6 inches. Reference point, top edge of casing, east side of well, 2.00 feet above land-surface datum.

1.32.2.431. Brown. Drilled irrigation well, equipped with turbine pump. Reference point, surface of circular concrete pump base, 0.34 foot above land-surface datum.

1.32.3.431. Nall. About 1,200 feet northwest of farm house near power poles supporting electric transformers. Drilled irrigation well, equipped with turbine pump. Reference point, top of concrete pump base, 0.33 foot above land-surface datum. Nov. 22, 1948, 36.68.

1.33.1.331. Woodburn. Casing removed. Possible discrepancy of a few tenths of a foot between present and previous land-surface data.

1.33.1.342. Woodburn. Drilled irrigation well, equipped with turbine pump, diameter 12 inches, depth 121 feet. Reference point, top edge of corrugated 18-inch surface pipe, 2.25 feet above land-surface datum.

1.33.8.311. Marcus. New reference point, established January 7, 1949, top of concrete well curb, center of south side of well, at land-surface datum.

1.33.18.112. Walker. Drilled irrigation well, equipped with turbine pump, diameter 14 inches, depth 113 feet. Reference point, surface of 3-by 3-foot concrete pump base, 0.50 foot above land-surface datum.

1.33.26.221. Bennett. Reference point, established Jan. 8, 1949, top of circular concrete pump base, 4.13 feet below land-surface datum.

1.34.19.121a. Unknown. Drilled irrigation well, equipped with turbine pump. Reference point, surface of concrete pump base, 2.50 feet above land-surface datum.

1.34.22.421a. Grunig. Drilled irrigation well, equipped with turbine pump, diameter 15 inches. Reference point, top of concrete base, 1.25 feet above land-surface datum.

1.34.28.211b. McGuinness. Drilled irrigation well, equipped with turbine pump, diameter 12 inches, depth 107 feet. Reference point, surface of 3-by 3-foot concrete base, 1.23 feet above land-surface datum of well 1.34.28.211.

1.34.31.222. Unknown. Drilled irrigation well, equipped with turbine pump. Reference point, surface of 2½- by 2½-foot concrete pump base, 0.20 foot above land-surface datum.

1.34.34.143. Branscomb. Pit filled. Reference point destroyed.

1.35.5.212. Carver. Drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 60 feet. Reference point, top of casing, 0.06 foot above circular concrete pump base, 0.56 foot above land-surface datum. May 27, 1948, 27.31, pumping recently.

1.35.19.241. Pember. Drilled irrigation well, equipped with turbine pump. Reference point, surface of 6- by 6-foot concrete pump base, 0.50 foot above land-surface datum.

1.35.30.343a. Livingston. About 3 feet south of well 1.35.30.343. Drilled irrigation well, equipped with turbine pump. Reference point, surface of concrete base around casing, at land-surface datum.

2.35.23.111. McCarty. Drilled irrigation well, equipped with turbine pump. Reference point, top surface of a 2½- by 2½-foot concrete pump base, 1.50 feet above land-surface datum.

2.35.25.114a. Caraway. Drilled irrigation well, equipped with turbine pump, diameter 12 inches, depth 96 feet. Reference point, top of concrete base level with top of casing, 0.50 foot above land-surface datum. May 29, 1948, 27.33; July 28, 1948, 28.35; Sept. 29, 1948, 29.38; Nov. 20, 1948, 27.12.

2.36.8.432a. Davis. Drilled irrigation well, equipped with turbine pump. 10 feet northwest of well 2.36.8.432. Reference point, top of concrete pump base, 0.5 foot above land-surface datum. Mar. 31, 1948, 19.91; May 29, 22.19; July 28, 1948, 22.18; Sept. 29, 21.43; Nov. 20, 1948, 19.81.

SIERRA COUNTY (HOT SPRINGS AREA)

Part 1. General Discussion

Water levels were measured in 11 thermal wells at Hot Springs in January and alternate months thereafter. Recording gages were operated throughout the year on the same three wells as in preceding years. Of these wells No. 6 is an artesian well, No. 6a is a shallow well dug into the alluvium, and No. 25 is a well dug into limestone of the Magdalena group near the upper edge of the spring area. (See part 4.) A total of 81 measurements of water levels was made in the thermal area during the year including about 34 made upon the recorder wells.

Water levels were measured in four nonthermal wells in the area west of Hot Springs in February. Of these, two are flowing artesian wells, 14.4.6.441 and 14.4.6.442, one is a shallow well, 14.4.5.310, and one is a deep well which failed to produce pressure, 14.4.6.110a. The water level in the latter well was also measured in March, May, July, and September.

Changes of water levels and artesian heads

Thermal water area

Artesian pressures at Hot Springs increased an average of 0.25 foot during 1949 as compared with a decline of 0.50 foot in the preceding year.

The lowest observed levels on record as well as for the year were reached in the thermal wells in January. The highest observed levels for the year were reached in May and a secondary, or seasonal, low in September as compared to a high in March and low in November for the preceding year.

Nonthermal water area

The wells considered here are in Mud Springs Draw about a mile southwest of Hot Springs and within a mile of the Rio Grande. The artesian wells in this vicinity furnish the municipal water supply for the city of Hot Springs, but most of the wells in the area are used for combined domestic and irrigation purposes.

The water level in the deep well 14.4.6.110a showed a rise of 0.24 foot from February 1949 to January 1950 as compared with a decline of 2.51 feet for the preceding year. The lowest observed level in this well for the year was in February and the highest in March with a secondary low

in May. The range of fluctuation was 1.5 feet. The water levels in the artesian wells 14.4.6.441 and 14.4.6.442 showed large net annual declines for 1949 of 11.8 and 6.8 feet, respectively, as a result of continued use of the artesian water and because the wells were flowing prior to the measurements made in January 1950. The water levels in these wells at the end of 1949 were 27 and 16 feet lower than when records began in 1947.

Part 3

Water levels, above and below land surface datum, in 1949

Field no. Owner	2 Lock-hart	3 Lock-hart	5 Malone	12 Mathis	18 White-head	19 Green	27 Graham	30 Mills	33 James
Jan. 4	-0.35	-0.30	-1.29	+3.10	-2.29	-1.54	....	-2.07	-0.94
Mar. 14	-.09	-.04	-1.15	+3.30	-2.05	-1.24	....	-1.73	-.78
May 16	+.06	+.10	-1.06	+3.45	-1.98	-1.14	....	.....	-.67
July 19	-.25	-.22	-1.43	+3.43	-1.96	.....	+.90	-1.70	-.64
Sept. 6	-.29	-.29	-1.52	+3.21	-2.23	-1.41	+.95	b-2.00	-.96
Nov. 29	....	-.06	-1.07	+3.30	-2.11	-1.29	....	-1.88	-.82

Location number Owner	14.4.6.110a Gray
Feb. 9	100.66
Mar. 14	99.15
May 16	101.51
July 19	100.38
Sept. 6	99.36
Nov. 30	.....

b Pumping recently.

Part 4

6 Lot 4, block 8. C. E. James.

Highest daily water level, from recorder charts

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	+0.17	....	+0.42	+0.53	+0.56	+0.53	....	+0.19	+0.24	+0.29	+0.35
2	....	.18	....	.41	.54	.56	.53	+0.33	.19	.22	.29	.33
3	....	.17	....	.40	.53	.58	.51	.34	.17	.23	.26	.35
4	+0.11	.17	+0.33	.40	.51	.57	.52	.30	.33	.23	.28	.30
5	.11	.18	.33	.39	.52	.54	.51	.30	.29	.24	.27	.33
6	.15	.18	.30	.40	.50	.54	.51	.29	.23	.23	.28	.34
7	.18	.20	.33	.41	.50	.57	.52	.26	.17	.24	.31	.34
8	.19	.20	.34	.43	.51	.57	.53	.28	.19	.23	.31	.35
9	.18	.15	.33	.41	.50	.57	.51	.28	.19	.21	.29	.40
10	.15	.13	.35	.38	.51	.57	.50	.26	.20	.21	.30	.41
11	.17	.17	.36	.38	.50	.58	.50	.24	.42	.21	.31	.34
12	.17	.20	.38	.41	.48	.57	.51	.25	.42	.23	.26	.30
13	.18	.18	.36	.43	.49	.57	.51	.24	.42	.23	.29	.32
14	.21	.19	.36	.41	.47	.57	.49	.21	.43	.22	.30	.32
15	.20	.19	.39	.39	.48	.57	.49	.21	.47	.22	.30	.35
16	.16	.21	.41	.42	.48	.57	.47	.20	.41	.24	.29	.36
17	.18	.23	.41	.44	.48	.56	.46	.21	.38	.24	.29	.35
18	.18	.24	.41	.45	.46	.53	.46	.21	.31	.24	.30	.35
19	.20	.24	.44	.44	.40	.53	.46	.22	.29	.25	.29	.36
20	.21	.22	.47	.46	.40	.54	.45	.21	.30	.23	.29	.38
21	.20	.20	.42	.46	.40	.54	.46	.18	.30	.23	...	.35
22	.20	.19	.45	.46	.39	.53	.45	.19	.29	.23	...	.34
23	.21	.23	.46	.49	.41	.52	.45	.20	.28	.21	.29	.35

6 Lot 4, block 8--Continued.

Highest daily water level, from recorder charts

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
24	.18	.23	.46	.50	.41	.51	.42	.17	.28	.21	.30	.37
25	.18	.23	.48	.51	.43	.52	.42	.19	.25	.22	.31	.37
26	.20	...	.46	.52	.44	.51	.43	.19	.24	.23	.31	.35
27	.20	...	.50	.53	.49	.51	.40	.19	.24	.23	.31	.34
28	.19	...	.50	.55	.51	.53	.39	.17	.24	.24	.31	.34
29	.16		.48	.56	.52	.53	...	.19	.25	.26	.32	.36
30	.18		.42	.56	.53	.54	...	.19	.26	.27	.33	.38
31	.18		.42		.55		...	.19		.28		.36

6a Lot 4, block 8. C. E. James.

Highest daily water level, from recorder charts

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	2.03	....	1.92	1.88	1.76	1.78	....	2.08	1.95	2.01	1.93
2	....	2.03	....	1.93	1.88	1.75	1.80	1.94	2.08	1.96	2.00	1.93
3	....	2.03	....	1.95	1.89	1.75	1.79	1.94	2.09	1.97	2.00	1.93
4	2.08	2.03	1.96	1.95	1.91	1.74	1.80	1.95	+.80	1.98	2.00	1.93
5	2.09	2.03	1.95	1.96	1.92	1.75	1.81	1.96	+.80	1.99	2.00	1.93
6	2.09	2.03	1.95	1.97	1.93	1.75	1.81	1.97	.09	2.00	1.99	1.93
7	2.07	2.03	1.95	1.97	1.93	1.76	1.81	1.99	+1.20	2.00	1.99	1.92
8	2.06	2.03	1.95	1.97	1.90	1.75	1.80	2.00	+1.73	2.01	1.98	1.91
9	2.05	2.03	1.95	1.99	1.89	1.74	1.83	2.00	+1.89	2.02	1.98	1.91
10	2.05	2.05	1.95	2.00	1.87	1.74	1.80	2.01	+1.95	2.03	1.97	1.90
11	2.04	2.05	1.94	2.02	1.86	1.74	1.80	2.02	+1.18	2.04	1.97	1.90
12	2.04	2.04	1.93	2.02	1.87	1.75	1.80	2.02	+1.17	2.04	1.97	1.91
13	2.03	2.03	1.93	2.01	1.86	1.75	1.79	2.03	+1.16	2.04	1.99	1.93
14	1.99	2.02	1.93	2.00	1.86	1.75	1.79	2.04	+1.20	2.04	1.98	1.93
15	1.99	2.01	1.92	1.99	1.87	1.76	1.79	2.05	+1.21	2.04	1.97	1.93
16	2.00	2.01	1.91	1.99	1.86	1.77	1.80	2.06	+1.16	2.03	1.98	1.93
17	2.01	2.00	1.90	1.98	1.85	1.79	1.81	2.07	+.97	2.03	1.98	1.92
18	2.01	....	1.90	1.97	1.85	1.79	1.82	2.07	+.55	2.03	1.98	1.92
19	2.00	....	1.89	1.97	1.86	1.79	1.83	2.06	.43	2.03	1.98	1.93
20	1.99	....	1.88	1.96	1.87	1.79	1.84	2.06	1.11	2.03	1.97	1.92
21	1.98	....	1.88	1.95	1.88	1.79	1.84	2.07	1.42	2.04	....	1.91
22	1.98	....	1.88	1.94	1.89	1.78	1.84	2.08	1.60	2.04	....	1.91
23	1.99	....	1.87	1.93	1.88	1.78	1.84	2.08	1.32	2.05	2.01	1.91
24	1.99	....	1.87	1.93	1.87	1.79	1.85	2.09	1.77	2.05	1.99	1.91
25	2.00	....	1.86	1.92	1.86	1.80	1.85	2.09	1.83	2.05	1.98	1.91
26	2.00	....	1.86	1.91	1.85	1.80	1.86	2.09	1.87	2.05	1.98	1.91
27	2.00	....	1.87	1.89	1.83	1.80	1.87	2.08	1.90	2.04	1.96	1.91
28	2.00	....	1.86	1.87	1.82	1.80	1.87	2.09	1.91	2.03	1.95	1.91
29	2.01		1.86	1.86	1.79	1.79	1.87	2.09	1.93	2.02	1.93	1.91
30	2.03		1.88	1.86	1.78	1.79	....	2.09	1.93	2.02	1.93	1.91
31	2.03		1.91		1.77		....	2.09		2.02		1.90

25 Lot 4, block 93. Jim Knox.

Highest daily water level, from recorder charts

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	8.16	8.17	....	7.91	7.91	7.84	7.85	8.05	8.20	8.17	8.11	8.04
2	....	8.15	....	7.92	7.89	7.84	7.85	8.05	8.20	8.18	8.12	8.06
3	....	8.17	....	7.94	7.89	7.83	7.87	8.05	8.21	8.18	8.14	8.05
4	8.24	8.17	7.99	7.94	7.90	7.83	7.86	8.08	8.06	8.18	8.13	8.08
5	8.23	8.16	7.99	7.96	7.91	7.86	7.87	8.09	8.09	8.17	8.13	8.06
6	8.24	8.17	8.02	7.94	7.91	7.86	7.87	8.10	8.17	8.17	8.13	8.05
7	8.19	8.14	8.00	7.95	7.93	7.85	7.86	8.13	8.22	8.16	8.10	8.05
8	8.17	8.14	7.99	8.02	7.93	7.83	7.85	8.11	8.21	8.17	8.09	8.04
9	8.18	8.17	8.00	8.00	7.93	7.83	7.89	8.11	8.20	8.18	8.11	8.00
10	8.20	8.19	7.98	8.04	7.92	7.82	7.89	8.13	8.20	8.20	8.09	....
11	8.21	8.16	7.97	8.03	7.93	7.82	7.89	8.15	7.97	8.19	8.09	....
12	8.18	8.13	7.96	8.01	7.95	7.84	7.88	8.14	7.93	8.17	8.13	8.10

Part 2. Water levels in January 1949 and highest and lowest recorded levels, 1/ above and below land-surface datum, and change from January 1948 to January 1949, in feet

Field no.	Location lot	Location block	Owner	See also part	Water levels: Jan. 1949 Level	Jan. 1949 Day	Change 1948-49	Highest Level	Highest Year	Lowest Level	Lowest Year	Record: Began	Record: Years missing
					Hot Springs -- thermal wells								
2	17	1	H. L. Lockhart	3	-0.35	4	-0.62	+1.20	42	-0.35	49	41	46
3	17	1	H. L. Lockhart	3	-.30	4	-.60	+1.23	42	-.30	49	41	46
4	21	2	C. E. James (Measurements discontinued, no flow)					+1.28	42	+.28	48	39	49
5	12	9	J. E. Malone	3	-1.29	4	-.53	+.13	42	-1.29	49	39	
6	4	8	Harry Dakos	4	+.01	4	-.53	f+1.57	42	f+.11	49	41	
6a	4	8	Harry Dakos	4	i-2.08	4	-.26	f-1.24	42	f-2.09	49	42	
12	8	40	Mr. Mathis	3	+3.10	4	-.55	+4.53	42	+3.10	49	39	
18	7	105	W. R. Whitehead	3	-2.29	4	-.44	-1.19	42	-2.29	49	39	
19	12	105	Bill Green	3	-1.54	4	-.53	-.20	42	-1.54	49	39	
25	4	93	Jim Knox	4	-8.32	4	-.50	f-6.95	42	f-8.24	49	39	
27	4	42	Ben Graham	3	.....	.	....	+2.97	42	+2.12	48	39	49
30	1	102	G. L. Mills	3	-2.07	4	-.58	-.63	42	-2.07	49	39	
33	2	106	C. E. James	3	-.94	4	-.41	+.28	42	-.94	49	41	
Location number					Hot Springs -- non-thermal wells								
14.4.5.310			Cauthen Packing House	.	-9.17	k9	+.52	-8.26	47	-9.69	48	47	
6.110a			Dave Gray	3	-100.66	k9	-2.51	-98.15	48	-100.66	49	47	
6.441			Roy Howe	.	m +43.02	k9	-14.88	+58.30	47	+57.90	48	47	
6.442			Mrs. Arnold	.	m +45.52	k9	-10.05	+55.57	48	+54.94	47	47	

f From recorder chart.
i Possible discrepancy of a few tenths of a foot between present and previous land-surface data.
j Mar. 1939, Feb. 1940-41, Mar. 1942, Apr. 1943, Jan. 1944-48.
k February.
m Well had been flowing.

25 Lot 4, block 93--Continued.

Highest daily water level, from recorder charts

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
13	8.18	8.16	7.98	7.99	7.95	7.83	7.88	8.15	7.94	8.17	8.10	8.07
14	8.15	8.14	7.97	8.01	7.95	7.83	7.90	....	8.00	8.18	8.09	8.07
15	8.16	8.17	7.95	8.03	7.95	7.83	7.91	....	7.97	8.18	8.09	8.04
16	8.19	8.16	7.92	8.00	7.93	7.83	7.92	....	8.03	8.16	8.11	8.02
17	8.18	8.15	7.93	7.98	7.92	7.83	7.93	....	8.05	8.16	8.10	8.04
18	8.18	8.12	7.93	7.97	7.93	7.86	7.93	....	8.11	8.16	8.09	8.05
19	8.16	8.12	7.91	7.98	7.99	7.86	7.94	....	8.12	8.15	8.10	8.03
20	8.14	8.14	7.89	7.97	7.98	7.86	7.94	....	8.12	8.17	8.10	8.01
21	8.15	8.16	7.92	7.97	7.99	7.85	7.93	8.20	8.12	8.17	8.12	8.04
22	8.15	8.15	7.91	7.95	7.99	7.86	7.94	8.19	8.13	8.17	8.10	8.04
23	8.16	8.12	7.88	7.94	7.98	7.87	7.97	8.19	8.14	8.19	8.10	8.03
24	8.17	8.12	7.89	7.93	7.98	7.87	7.99	8.21	8.14	8.20	8.09	8.02
25	8.17	8.12	7.87	7.92	7.96	7.86	7.99	8.20	8.16	8.18	8.07	8.03
26	8.14	8.11	7.88	7.91	7.95	7.88	7.98	8.19	8.17	8.18	8.07	8.03
27	8.14	....	7.86	7.89	7.91	7.88	8.01	8.19	8.16	8.17	8.08	8.03
28	8.16	....	7.85	7.87	7.89	7.86	8.01	8.21	8.16	8.16	8.08	8.04
29	8.19		7.88	7.87	7.88	7.86	8.01	8.20	8.16	8.14	8.07	8.03
30	8.17		7.91	7.87	7.86	7.85	8.02	8.20	8.15	8.13	8.05	8.01
31	8.17		7.91		7.85		8.05	8.20		8.12		8.03

TORRANCE COUNTY (ESTANCIA VALLEY)

Part 1. General Discussion

Water levels were measured in 113 wells in February, 41 wells in May, 40 wells in August, and 42 wells in November. A total of 242 measurements was made during the year including 7 measurements made on well 7.8.27.221, which is equipped with a recording gage.

Precipitation and Pumpage

Precipitation within the area of the closed basin of Estancia Valley is the ultimate source of ground water, whether by direct penetration to the water-bearing formation or from runoff from the surrounding higher lands. The discharge of ground water, both natural and artificial, is dependent in part upon the amount of precipitation. Precipitation reduces the amount of pumping required for irrigation of crops and also reduces the transpiration of ground water by plants in areas of shallow ground wster by directly supplying at that time part of the water requirements of the plants.

Recharge to the ground-water body in 1949 was more than normal as indicated by the above-normal precipitation. The precipitation at McIntosh was 16.88 inches, 4.46 inches above normal; at Estancia 13.27 inches, 0.05 inch above normal; at Tajique 21.39 inches, 1.11 inches above normal; and at Mountainair about 14.2 inches including an estimate of 0.3 inch for November and December. The precipitation at Otto, for which records for May were missing, was estimated at 13 to 14 inches. Precipitation was more

than in 1948 and generally well above normal during January and most of the growing season of April to September, but below normal for the rest of the year.

There was an increase in ground-water development in Estancia Valley in 1949. It is estimated that about 10,000 acres were watered from wells in 1949 and that about 8,000 acre-feet of water was pumped as compared with about 6,000 acres watered in 1948 with about 5,400 acre-feet of water pumped. Above-normal precipitation, especially during the growing season decreased the amount of ground water required for crops during the year. Most of the new development has been throughout the Torrance County part of the irrigated area.

Changes of Water Levels

The areas in Estancia Valley in which water levels showed net declines from February 1949 to February 1950 are shown on the accompanying map. (See fig. 24.) The ground-water levels declined more than 1 foot under an area of about 80 square miles. In the area of heavy pumping about 7 miles southwest of Estancia the declines in the water levels were not as great in 1949 as in the preceding year as a result of favorable precipitation which supplied a larger part of the water requirements for crops. In this area the maximum decline recorded was 1.70 feet as compared to a decline of 2.15 feet in the preceding year. In this area the ground-water levels showed a net decline of more than 1 foot under about 19 square miles in 1949 as compared to about 24 square miles in the preceding year. Between Estancia and Moriarty the area in which water levels showed a net decline of more than 1 foot was about the same in 1949 as 1948, about 41 square miles, but it was in a somewhat different location.

In the southern part of Santa Fe County the water level apparently declined more than 1 foot under an area of about 20 square miles as compared with about 6 square miles in the preceding year. Irrigation in this area, which began in 1948, increased in 1949. The maximum net decline observed was 1.34 feet in well 10.8.36.111 compared to a decline of 1.26 feet in the same well in the preceding year.

The abnormal decline in well 7.8.16.142 during 1948 continued and from February 1949 to February 1950 the water level declined 13.4 feet. In March 1948 this well was deepened from 200 to 232 feet and encountered a limestone

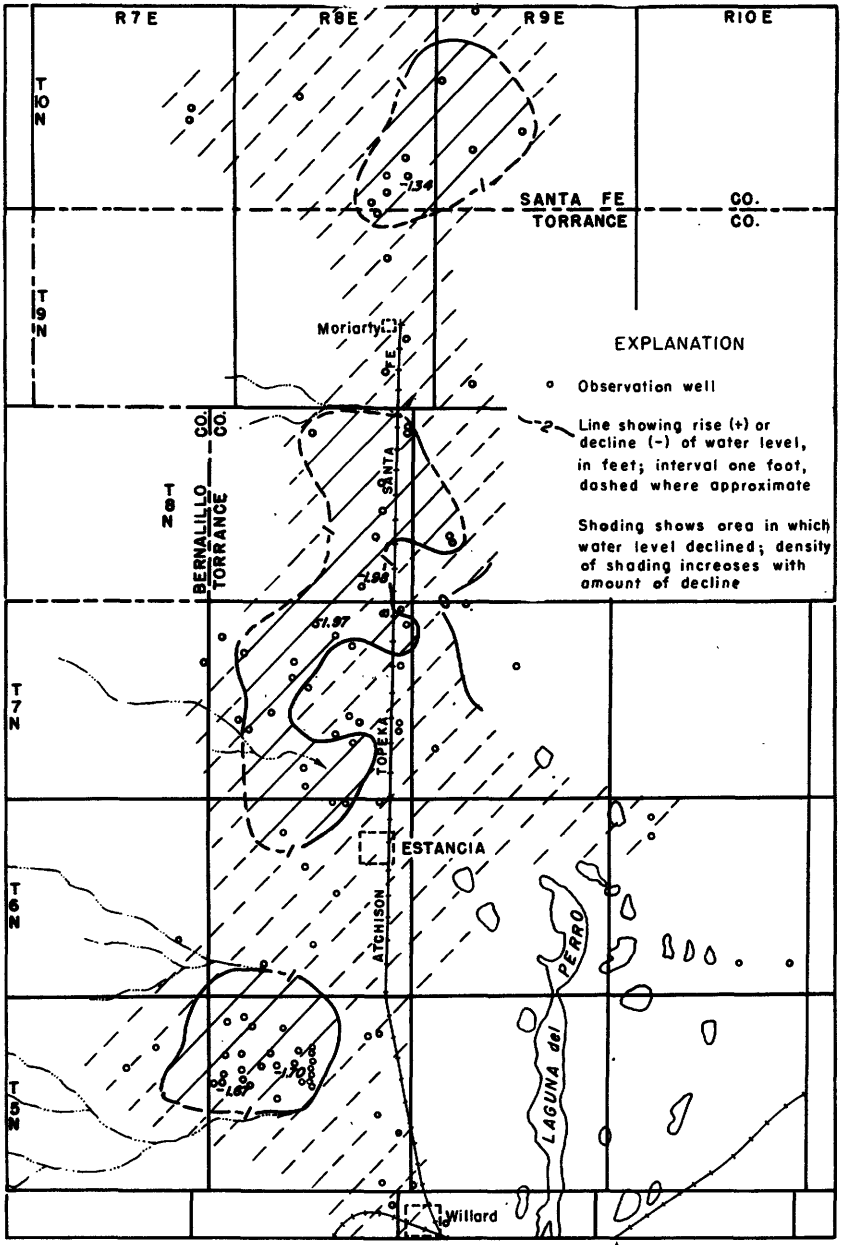

Figure 24.--Map of Estancia Valley, Torrance County, showing decline of water levels from February 1949 to February 1950.

cavity. The artesian pressure in the cavity caused the water level to rise about 53 feet to within 11 feet of the ground surface. However, continued heavy pumping of this well during 1949 and possible leakage into the upper aquifers probably caused most of the continued large decline in the water level. The well was worked on in May 1949 to stop possible leakage into the upper aquifers and may have resulted in the smaller decline in 1949. Some of the decline of the water level may be due to other wells having been drilled into this formation. A nearby well, 7.8.9.431, showed a net decline from February 1949 to February 1950 of 8 feet. However, there are no comparable records on this well for the preceding year.

The water level declined 5.7 feet in well 5.8.12.111 from February 1949 to February 1950 as a result of the casing being pulled and allowing the water in the lower aquifers to flow into the upper aquifers. The only other well in the valley which showed a decline of the water level in excess of 2 feet was well 9.8.24.330. A rise of the water level was observed in this well in the preceding year.

Six wells in various spots over the valley showed small rises in water levels. These wells were either unused or used very little during the year. It is expected that the increase in pumpage that will result from a return to normal precipitation and an increase in irrigated acreage will cause greater declines than have occurred to date.

Part 2. Water levels in February 1949 and highest and lowest recorded levels in January or February, below land-surface datum, and change from March 1948 to February 1949, in feet

Location number	Owner	See also part	Water levels							Record	
			Feb. 1949 Level	Day	Change 1948-49	Highest Level	Year	Lowest Level	Year	Began	Years missing
4.8.1.144	J. M. Harper	.	53.82	15	-0.34	52.91	46	54.70	44	42	
24.222	M. E. Ottoson	.	(a)	15	.....	55.87	48	57.23	41	41	49
4.9.5.344	Morris Ottoson	.	30.16	15	+.17	30.14	47	30.33	48	47	
7.441	Unknown	.	.....	..	.....	52.68	J43	53.39	44	42	49
10.133	Homer Arnn	3	a36.17	15	-18.94	17.15	47	18.22	41	41	
5.7.11.411	O. H. Brown	3	87.67	14	-.86	86.81	48	87.67	49	48	
15.212	Ewing School	.	116.73	14	-.49	115.33	46	117.88	41	41	
5.8.4.343	Carter Bowden	.	34.54	14	.....	30.24	42	34.54	49	42	48
5.311	Glenn Gustin	5	64.98	14	.....	.....	..	.....	..	49	
5.344	O. R. Ethridge	3	54.76	14	-2.06	51.14	47	54.76	49	47	
6.431	W. M. Hibner	5	85.10	14	.....	.....	..	.....	..	49	
7.431	John Ingle	.	73.97	14	-2.01	70.21	47	73.97	49	47	
8.231	E. F. Richards	(Measurements discontinued)				55.81	47	57.40	48	47	49
8.331	Madison Davis	.	58.09	14	-2.15	54.24	47	58.09	49	47	
8.424	Arlington Austin	3	64.09	14	-2.06	62.03	48	64.09	49	48	
9.423	Carter Bowden	.	.....	..	.....	52.52	47	53.65	48	47	49
10.331	Charles Rattan	.	120.67	15	-1.39	18.25	47	20.67	49	47	
10.331a	Charles Rattan	3	21.59	15	-1.80	19.79	48	21.59	49	48	
10.333	Charles Rattan	.	120.55	15	-2.18	17.32	47	120.55	49	47	
11.221a	J. V. Chamberlin	.	11.61	15	-1.34	9.78	45	11.61	49	45	
12.111	J. V. Chamberlin	3	15.21	15	-.74	12.04	43	17.10	41	41	
15.113	D. S. Bailey	.	20.92	15	-1.88	17.91	47	20.92	49	47	
15.131	Joe Begley	.	17.12	15	-1.73	14.45	47	17.12	49	46	
15.131a	Joe Begley	3	19.33	15	-1.85	16.29	47	19.33	49	47	
15.311	Charles Rattan	.	121.78	15	-1.17	19.44	47	21.78	49	47	
15.313	Charles Rattan	.	23.27	15	-1.76	20.33	47	23.27	49	46	
16.111	Arlington Austin	.	56.29	14	-2.12	54.17	48	56.29	49	48	
16.211	Ben Mullen	3	48.07	14	-2.11	45.96	48	48.07	49	48	
16.421	Joe Begley	5	28.78	15	.....	.....	..	.....	..	49	
17.113	Madison Davis	3	48.94	14	-2.13	45.01	46	48.94	49	46	
17.212	R. O. Brown	.	54.11	14	-2.12	51.99	48	54.11	49	48	
17.311	R. O. Brown	(Measurements discontinued, well filled)				26.92	42	30.43	41	41	49
17.311a	R. O. Brown	3	31.60	14	-2.10	29.50	48	31.60	49	48	
17.323	R. O. Brown	.	130.93	14	-1.79	26.05	42	30.93	49	41	
17.334	R. O. Brown	(Measurements discontinued, well dry)				9.80	42	13.61	41	41	49
18.233	S. W. Hodgson	3	42.31	14	-2.01	38.69	47	42.31	49	47	
18.312	Willard Hodgson	.	41.87	14	-1.85	38.57	47	41.87	49	47	

* See footnotes at end of table.

Part 2 --Continued

Location number	Owner	See also part	Water levels: Feb. 1949 Level	Day	Change 1948-49	Highest Level	Year	Lowest Level	Year	Record: Began	Years missing
5.8.18.313	Willard Hodgson	(Measurements discontinued)				32.23	47	33.66	48	47	49
18.421	F. H. Ayres	.	30.73	14	-2.03	26.89	47	30.73	49	47	
21.111	R. B. Ford	3	30.62	15	-2.04	27.23	47	30.62	49	46	
24.311	E. B. Wallace	3	23.25	15	-.52	21.93	46	23.25	49	46	
25.212	Homer Arnn	3	25.71	18	-.39	22.45	42	25.71	49	42	
30.121	Unknown (Measurements discontinued, well dry)					22.68	42	29.66	41	41	48,49
36.341	Mrs. Iva Moe	.	45.25	15	-.10	45.11	47	46.69	41	41	
5.9.31.331	Homer Arnn	3	32.74	15	-.09	32.56	47	34.10	41	41	
5.10.27.444	Unknown	.	40.32	15	+.02	40.32	49	40.78	41	41	
6.7.25.113	C. E. Clark	.	74.14	14	-.91	73.23	48	74.14	49	48	
6.8.1.111	Pat Homan	3,5	22.22	15	.....	.....	..	.....	..	49	
1.244	J. H. Wiggins	.	a25.63	16	-4.82	20.78	47	21.62	45	42	
2.111	Ellison Timmons	.	17.10	15	-1.04	16.06	48	17.10	49	48	
3.221	Ellison Timmons	3	27.67	15	-.99	26.18	42	27.67	49	41	
9.112	F. P. Johnson	5	93.62	15	.....	.....	..	.....	..	49	
15.444	Estancia Cemetery	3	30.86	14	-.39	29.99	43	31.04	41	41	
16.222	McGee Estate	.	59.35	14	-.42	58.66	44	59.47	41	41	
24.111	Aurileo Brito	.	a14.54	15	-4.93	6.22	42	10.78	46	41	
27.134	R. M. Spruill	3	21.39	14	-.60	19.59	43	21.39	49	42	45
30.434	J. W. Langley	.	39.61	14	.....	25.63	42	40.69	41	41	48
32.212	O. R. Ethridge	3	25.12	14	-1.10	23.22	47	25.12	49	47	
34.311	John Chamberlin	.	17.68	14	-.68	16.11	47	17.68	49	47	
6.10.5.312	Berkshire Bros.	5	11.04	16	.....	.....	..	.....	..	49	
7.112	Unknown	3,5	5.74	16	.....	.....	..	.....	..	49	
25.344	C. A. Blackwell	.	41.74	15	+.01	41.74	49	42.38	42	42	
27.444	Major Dean	.	20.27	15	-.07	20.20	48	20.77	41	41	
7.7.12.444	C. B. Roland	3	44.47	16	-1.73	41.37	47	46.45	41	41	
7.8.1.231	Myrtle Homan Estate	3	26.75	17	-.76	c25.10	47	26.75	49	42	
1.423	Floyd Stump	.	25.11	17	-.56	23.93	47	25.11	49	41	
3.140	Wayne Laws	(Measurements discontinued)				.....	..	.....	..	48	49
3.300	Neal Jenson	.	4.83	16	-1.56	3.27	48	4.83	49	48	
3.300a	Neal Jenson	5	9.95	16	.....	.....	..	.....	..	49	
7.121	C. T. Norman	.	77.27	16	-1.87	75.40	48	77.27	49	48	
8.311	C. T. Norman	3,5	111.00	16	.....	.....	..	.....	..	49	
9.431	Knox & Barron	5	46.37	16	.....	.....	..	.....	..	49	
9.444	Knox & Barron (Measurements discontinued, well filled)					57.72	47	62.45	41	41	49

* See footnotes at end of table

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Part 2 --Continued

Location number	Owner	See also part	Water levels							Record	
			Feb. 1949 Level	Day	Change 1948-49	Highest Level	Year	Lowest Level	Year	Began	Years missing
7.8.10.221	Neal Jenson	3	16.72	16	-1.06	15.66	48	17.52	42	42	
10.244	Ted Maxfield	.	a18.90	16	.....	17.13	47	a22.37	45	42	48
11.132	Neal Jenson	.	9.07	16	-1.59	7.48	48	9.07	49	48	
12.433	Arthur Schmidt	.	21.98	16	-.25	21.65	47	23.53	41	41	
12.433a	Arthur Schmidt	3	21.96	16	-.37	21.59	48	21.96	49	48	
16.142	J. J. Thomas	.	32.49	16	21.57	10.92	48	63.53	47	47	
16.422	Jim Ergood	.	44.86	16	-.73	43.88	46	45.61	41	41	45
19.422	Bruce Grimes	3,5	131.07	16	.....	.....	..	.....	..	49	
20.240	C. A. Burns	3	87.56	16	-.86	86.70	48	87.56	49	48	
20.334	Marion Gates	.	111.17	16	-.97	110.20	48	111.17	49	48	
23.311	C. L. Austin	.	18.94	16	-.94	17.80	47	18.94	49	41	
23.324	C. L. Austin	3	2.41	16	-.67	1.74	48	2.45	41	41	
24.431	R. T. Floyd	3	22.60	16	-.26	22.34	48	22.60	49	48	
24.433	R. T. Floyd	.	24.36	16	-.02	23.68	42	25.20	46	41	
25.411	H. P. Brunnell (Measurements discontinued, well filled)					21.26	42	22.13	41	41	49
26.141	Mr. Richter	3	9.39	16	-3.89	4.10	47	9.39	49	46	
27.221	F. C. Pace	4	20.37	16	-.83	f19.21	47	f20.69	49	41	
33.123	B. A. Kincheloe (Measurements discontinued, well filled)					29.24	42	32.35	41	41	49
33.424	E. C. Hayes Estate	.	53.04	16	-.60	52.44	48	53.34	42	41	
34.222	Lilburn Homan	5	.....	..	.....	.....	..	.....	..	48	49
35.111	W. W. Dunn (Measurements discontinued, well filled)					17.95	42	19.22	41	41	49
7.9.5.211	Unknown	.	19.36	17	-.56	18.80	48	19.36	49	42	
10.333	Mr. Price	.	14.87	17	-.05	14.81	47	15.40	45	42	43,44
30.412	Unknown	.	11.54	16	-.20	11.34	48	11.54	49	48	
8.8.1.434	Bennie Moore	3,5	30.13	17	-1.01	29.12	48	30.13	49	48	
10.111	W. H. Woodman	.	109.59	17	-1.54	108.05	48	109.59	49	48	
10.244	W. H. Woodman (Measurements discontinued)					65.21	43	67.22	48	43	45,47,49
12.212	Lawrence Groff	5	30.21	17	.....	.....	..	.....	..	49	
13.311	B. M. Maxwell	.	23.34	17	-1.47	21.87	48	23.34	49	48	
13.324	B. M. Maxwell (Measurements discontinued)					.....	..	.....	..	48	49
24.131	Buck & Cunningham	.	12.42	17	-1.87	10.55	48	12.42	49	48	
26.222	Unknown	3	7.95	17	.....	6.64	47	7.95	49	42	48
35.322	A. C. Hibner	3	52.95	17	-1.87	51.08	48	52.95	49	48	
8.9.8.111	Unknown	.	25.44	17	-.46	23.77	42	25.44	49	42	
29.111	Mrs. Harry Bigger	.	21.73	17	-.33	20.89	42	b22.06	47	42	
29.111a	Mrs. Harry Bigger	.	21.97	17	-.28	20.93	46	21.97	49	44	

* See footnotes at end of table.

Part 2 --Continued

Location number	Owner	See also part	Water levels: Feb.1949 Level	Feb.1949 Day	Change 1948-49	Highest Level	Highest Year	Lowest Level	Lowest Year	Record: Began	Years missing
8.9.30.111	G. I. King	.	20.40	17	-0.27	20.13	48	20.40	49	48	
9.8.2.112	Valley Irrigation Co.	5	b59.12	17	.....	.....	..	.....	..	49	
2.242	Valley Irrigation Co. (Measurements discontinued. Casing pulled.)						..	.....	..	48	49
11.233	Mr. Luhon	3,5	57.26	17	.....	.....	..	.....	..	49	
24.330	Valley Irrigation Co.	5	40.10	17	+.40	40.10	49	40.50	48	48	
24.400	(Incorrect designation used previously for well 9.8.24.330, which see)										
26.121	Unknown		(Measurements discontinued)			19.60	43	21.00	46	42	48,49
26.433	Everett Shockey	3,5	45.10	17	.....	.....	..	.....	..	49	
9.9.32.131	G. L. Dean	3	6.50	17	-.18	5.64	47	6.88	41	41	44
32.131a	G. L. Dean	3	6.59	17	+.05	5.70	47	6.68	44	44	
10.7.23.212	Mr. Mosley	3,5	137.18	17	.....	.....	..	.....	..	49	
23.234	Ray Bassett	3,5	143.00	17	.....	.....	..	.....	..	49	
10.8.17.424	Kenneth Martin	3,5	135.49	17	.....	.....	..	.....	..	49	
25.311	Floyd Irvin	3,5	72.85	17	.....	.....	..	.....	..	49	
34.413	Lloyd Smith	5	72.92	17	.....	.....	..	.....	..	49	
35.211	Valley Irrigation Co.	5	47.50	17	.....	.....	..	.....	..	49	
35.331	Valley Irrigation Co.	3,5	c64.04	17	.....	.....	..	.....	..	49	
35.411	Valley Irrigation Co.	3,5	c62.00	17	.....	.....	..	.....	..	49	
36.111	Valley Irrigation Co.	5	36.17	17	-1.26	34.91	48	36.17	49	48	
10.9.5.111	Bill King	5	72.89	18	.....	.....	..	.....	..	49	
18.131	W. E. Dollahon	5	69.45	17	.....	.....	..	.....	..	49	
21.431	Everett Shockey	3	25.93	18	-.88	24.63	47	25.93	49	47	
29.130	Mr. Terry	3,5	55.13	18	.....	.....	..	.....	..	49	

a Pumping.
b Pumping recently.
c Nearby well pumping.
f From recorder chart.
i Possible discrepancy of a few tenths of a foot between present and previous land-surface data.
j Also 1942.

Part 3

Water levels, below land-surface datum, during 1949

Location number Owner	4.9. 10.133 Arnn	5.7. 11.411 Brown	5.8. 5.344 Eth-ridge	5.8. 8.424 Austin	5.8 10.331a Ratten	5.8 12.111 Cham-berlin	5.8 15.131a Begley	5.8 16.211 Mullen
Feb. 14,15	a36.17	87.67	54.76	64.09	21.59	15.21	19.33	48.07
May 2, 4	17.15	87.79	a82.28	65.13	23.15	16.08	22.66	a65.80
Aug. 15,18	18.14	88.09	a83.78	c71.84	c36.11	15.58	c34.76	.....
Nov. 1, 2	17.42	87.45	a88.24	68.05	25.50	15.34	23.21	.....

Location number Owner	5.8. 17.113 Davis	5.8. 17.311a Brown	5.8. 18.233 Hodgson	5.8. 21.111 Ford	5.8. 24.311 Wallace	5.8. 25.212 Arnn	5.9. 31.331 Arnn	6.8. 1.111 Homan
Feb. 14,15.18	48.94	31.60	42.31	30.62	23.25	25.71	32.74	22.22
May 2	(a)	a53.59	44.02	30.39	23.58	25.74	a32.82	22.33
Aug. 15,16	(a)	35.51	.....	32.84	(a)	25.92	32.79	(a)
Nov. 1, 2	51.52	34.56	.....	33.40	(ac)	26.00	32.76	23.83

Location number Owner	6.8. 3.221 Timmins	6.8. 15.444 Ceme-tery	6.8. 27.134 Spruill	6.8. 32.212 Eth-ridge	6.10. 7.112 Unknown	7.7. 12.444 Roland	7.8. 1.231 Homan Estate	7.8. 8.311 Norman
Feb. 14-17	27.67	30.86	21.39	25.12	5.74	44.47	26.75	111.00
May 2-4	27.65	30.65	.....	26.90	6.00	44.56	26.91	110.64
Aug. 15,16	(a)	a31.53	a23.59	a39.86	7.18	44.69	27.30	112.41
Nov. 1-3	c30.25	31.41	b22.10	26.09	6.87	44.27	27.39	112.80

Location number Owner	7.8. 10.221 Jenson	7.8. 12.433a Schmidt	7.8. 19.422 Grimes	7.8. 20.240 Burns	7.8. 23.324 Austin	7.8. 24.431 Floyd	7.8. 26.141 Richter	8.8. 1.434 Moore
Feb. 16,17	16.72	21.96	131.07	87.56	2.41	22.60	9.39	30.13
May 2,3	16.68	22.06	130.93	87.60	1.82	21.84	....	30.24
Aug. 16	18.51	22.44	131.98	88.43	e4.60	23.65	c9.14	c38.54
Nov. 2,3	18.45	22.84	132.21	88.69	3.30	23.71	.....	32.10

Location number Owner	8.8. 26.222 Unknown	8.8. 35.322 Hibner	9.8. 11.233 Luhon	9.8. 26.433 Shockey	9.9. 32.131 Dean	9.9. 32.131a Dean	10.7. 23.212 Mosley	10.7. 23.234 Bassett
Feb. 17	7.95	52.95	57.26	45.10	6.50	6.59	137.18	143.00
May 3	8.04	53.24	aj83.0	45.13	6.19	6.40	137.24	.....
Aug. 16,18	8.40	55.05	58.30	.....	6.50	6.72	138.41	144.32
Nov. 3,4	8.82	55.00	b60.00	46.24	6.78	6.86	137.60	.....

Location number Owner	10.8 17.424 Martin	10.8 25.311 Irvin	10.8 35.331 Irriga-tion Co.	10.8 35.411 Irriga-tion Co.	10.8 36.111 Irri-gation Co.	10.9 21.431 Shockey	10.9 29.130 Terry
Feb, 17, 18	135.49	72.85	c64.04	c62.00	36.17	25.93	55.13
May 3	135.44	75.75	(ac)	(ac)	39.23	b26.29	a58.64
Aug. 16, 18	135.58	77.38	a86.60	a70.93	40.85	26.55	56.80
	135.83	75.63	acj80.08	c64.95	39.09	c26.88	57.09

a Pumping.
b Pumping recently.
c Nearby well pumping.
e Dry at depth given.
j Measurement uncertsin.

Part 4

7.8.27.221. F. C. Pace.

Highest daily water level, from recorder charts

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	20.68	20.45	20.29	20.17	20.10	22.21	.....	22.20	.....	.....	.....	21.99
2	20.66	20.40	20.30	20.16	20.01	22.27	21.88	22.24	.....	.....	.....	21.99
3	20.69	20.39	20.29	20.18	20.00	22.33	21.86	.....	23.26	.....	22.30	21.97
4	.....	20.40	20.28	20.19	20.00	22.38	21.84	.....	23.29	.....	22.29	21.97
5	.....	20.38	20.27	20.18	20.01	22.42	21.81	.....	23.34	.....	22.27	21.95
6	.....	20.38	20.27	20.17	20.03	22.45	21.79	.....	23.37	22.83	22.26	21.94
7	.....	20.36	20.25	20.16	20.03	22.50	21.77	.....	23.41	22.80	22.25	21.93
8	.....	20.36	20.25	20.16	20.03	22.55	21.77	22.50	23.44	22.78	22.19	21.92
9	.....	20.38	20.27	20.17	20.06	22.59	21.77	22.54	23.49	22.75	22.19	21.89
10	.....	20.37	20.25	20.19	20.09	22.61	21.81	22.58	23.52	22.73	22.18	21.87
11	.....	20.34	20.23	20.17	20.11	22.58	21.92	22.61	23.59	22.71	22.17	21.88
12	.....	20.33	20.25	20.15	20.17	22.55	22.04	22.65	23.59	22.69	22.17	21.89
13	20.49	20.34	20.25	20.15	20.19	22.51	22.12	22.68	g23.58	22.67	22.15	21.85
14	20.48	20.34	20.25	20.15	20.23	22.48	22.16	22.74	23.55	22.65	.....	21.85
15	20.48	20.34	20.23	20.18	20.31	g22.46	22.14	22.76	23.53	22.61	.....	21.81
16	20.48	20.36	20.23	20.07	20.41	g22.42	22.11	22.78	23.49	22.59	.....	21.81
17	20.48	20.34	20.23	20.08	20.52	g22.37	22.08	22.77	.....	.....	.....	21.81
18	20.48	20.33	20.24	20.09	20.66	22.33	22.05	22.75	.....	.....	.....	21.79
19	20.48	20.33	20.23	20.09	20.79	22.29	22.01	22.75	.....	.....	.....	21.75
20	20.46	20.33	20.22	20.09	20.88	22.26	21.99	22.77	.....	.....	22.07	21.73
21	20.46	20.33	20.23	20.10	21.02	.....	21.96	22.84	.....	.....	22.07	21.73
22	20.46	20.32	20.24	20.10	21.08	.....	21.94	22.88	.....	.....	22.05	21.74
23	20.46	20.30	20.18	20.11	21.20	.....	21.89	22.91	.....	.....	22.04	21.72
24	20.46	20.31	20.17	20.10	21.33	.....	21.86	22.95	.....	.....	22.03	21.69
25	20.46	20.30	20.17	20.09	21.45	.....	21.84	22.99	.....	.....	22.01	21.68
26	20.44	20.30	20.22	20.10	21.58	.....	21.81	23.01	.....	.....	22.00	21.68
27	20.44	20.31	20.23	20.10	21.70	.....	21.81	23.05	.....	.....	22.00	21.69
28	20.44	20.29	20.21	20.09	21.81	.....	21.86	.....	.....	.....	21.99	21.68
29	20.46		20.14	20.05	21.89	.....	21.98	.....	.....	.....	21.99	21.66
30	20.46		20.18	20.05	21.99	.....	22.11	.....	.....	.....	21.98	21.64
31	20.44		20.17		22.15		22.18	.....		.....		21.62

Part 5

Miscellaneous Data Concerning Observation Wells

5.8.5.311. Gustin. Drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 256 feet. May 18, 1948, 64.02.

5.8.6.431. Hibner. Drilled irrigation well, equipped with turbine pump, diameter 18 inches, depth 212 feet. May 18, 1948, 84.27.

5.8.16.421. Begley. Drilled irrigation well, equipped with turbine pump, diameter 18 inches, depth 150 feet. Reference point, top of casing, 0.50 foot above land-surface datum. May 19, 1948, 28.43.

6.8.1.111. Homan. Drilled irrigation test well, equipped with turbine pump after Feb. 15, 1949, diameter 18± inches, depth 450± feet. Reference point, top of casing, west side of well, 0.5 foot above land-surface datum. May 19, 1948, 22.25; Aug. 10, 1948, 27.68; Oct. 26, 1948, 22.22.

6.8.9.112. Johnson. Drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 268 feet. Reference point, top of casing, north side of well, 0.5 foot above land-surface datum. May 19, 1948, 91.52; Aug. 10, 1948, 93.19; Oct. 26, 1948, 94.92.

6.10.5.312. Berkshire Bros. Drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 186 feet. Reference point, top of 2- by 2-foot concrete collar on well, 0.08 foot above land-surface datum.

6.10.7.112. Owner unknown. Stock well, equipped with windmill, diameter 6 inches, Reference point, top of casing, 1.20 feet above land-surface datum.

7.8.3.300a. Jenson. In arroyo south of irrigation well 7.8.3.300. Drilled irrigation well, equipped with turbine pump, diameter 20 inches, depth 130 feet. Reference point, top of casing, south side of well, 1 foot above land-surface datum. Oct. 26, 1948, 11.11.

7.8.311. Norman. Drilled unused irrigation test well, diameter 16 inches, depth 348 feet. Reference point, top of casing, 1.25 feet above land-surface datum. May 19, 1948, 109.20; Aug. 10, 1948; Oct. 26, 1948, 110.16.

7.8.9.431. Knox and Barron. Drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 297 feet. Reference point, top of casing, east side of well, 0.30 foot above land-surface datum. Aug. 10, 1948, 44.66.

7.8.19.422. Grimes. Near top of hill. Drilled irrigation well, diameter 12 inches, depth 400 feet. Reference point, top of casing, 1 foot above land-surface datum.

7.8.34.222. Homan. Nov. 2, 25.03.

8.8.1.434. Moore. Reference point, established Feb. 17, 1949, top of casing, 0.06 foot above land-surface datum.

8.8.12.212. Groff. Drilled irrigation well, equipped with turbine pump, diameter 20 inches; depth 180 feet. Reference point, top of casing, 0.2 foot below land-surface datum. May 20, 1948, 29.74.

9.8.2.112. Valley Irrigation Co. Drilled irrigation well, equipped with turbine pump. May 20, 1948, 59.94.

9.8.11.233. Luhon. Drilled irrigation well, equipped with turbine pump. Reference point, top of casing, at land-surface datum. May 20, 1948, 56.80; Aug. 11, 1948, 57.23; Oct. 27, 1948, 57.14.

9.8.24.330. Valley Irrigation Co. Previously designated incorrectly as 9.8.24.400.

9.8.26.433. Sheckey. Drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 198 feet. Reference point, top of casing, 0.30 foot above land-surface datum. Aug. 11, 1948, 45.97.

10.7.23.212. Mosley. Northeast of arroyo, east of house, and south of barn. Drilled irrigation well, equipped with turbine pump, diameter 12 inches, depth 200 feet. Aug. 25, 1948, 138.33; Oct. 25, 1948, 137.20.

10.7.23.234. Bassett. Southwest of arroyo at north end of elevated earthen ditch. Drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 206 feet. Reference point, top of casing, 1.42 feet above land-surface datum. Aug. 25, 1948, 143.14; Oct. 25, 1948, 143.03.

10.8.17.424. Martin. Stock well, equipped with windmill, diameter 6 inches, depth 150± feet.

10.8.25.311. Irvin. Drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 238 feet. Reference point, top of casing, at land-surface datum. May 20, 1948, 73.64; Aug. 11, 1948, 77.05; Oct. 27, 1948, 74.70.

10.8.34.413. Smith. Drilled irrigation well, equipped with turbine pump. Reference point, top of casing, 0.50 foot above land-surface datum. Aug. 11, 1948, 78.59.

10.8.35.211. Valley Irrigation Co. Drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 165 feet. Reference point, top of casing, 0.15 foot above land-surface datum. Aug. 11, 1948, 52.04.

10.8.35.331. Valley Irrigation Co. Drilled irrigation well, equipped with turbine pump. Reference point, top of casing, at land-surface datum. May 20, 1948, 65.13; Aug. 19, 1948, 68.00; Oct. 27, 1948, 65.87, nearby well pumping.

10.8.35.411. Valley Irrigation Co. Drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 270 feet. Reference point, top of casing, at land-surface datum. May 20, 1948, 62.89; Oct. 27, 1948, 70.60, pumping.

10.9.5.111. King. Drilled oil-test well, equipped with irrigation pump, diameter 16 inches, depth 325 feet. Reference point, top of casing, 1.91 feet above land-surface datum. Aug. 11, 1948, 120.48, pumping.

10.9.18.131. Dollahon. Drilled irrigation well, equipped with turbine pump, diameter 18 inches, depth 192 feet. Reference point, top of casing, 0.50 foot above land-surface datum.

10.9.29.130. Terry. About 50 feet east of highway fence. Drilled irrigation well, equipped with turbine pump, diameter 14 inches. Reference point, top of casing, at land-surface datum.

VALENCIA COUNTY (GRANTS-BLUEWATER AREA)

Part 1. General Discussion

The Grants-Bluewater area, in Valencia County, is near the towns of Grants and Bluewater on U. S. Highway 66, about 80 miles west of Albuquerque. The area of irrigated lands is under the Bluewater-Toltec Irrigation District for distribution of surface-water supplies from Bluewater Lake, on Bluewater Creek. A succession of dry years, in which only a partial surface-water supply was available, aroused interest in obtaining a supply of ground water from individually owned wells. The first successful irrigation well was drilled in August 1944.

Water levels were measured in 41 wells in February 1949, after the water levels had recovered in large part from the effects of the previous season's pumping. These winter measurements are used to determine the net change in water levels for the year and give a measure of the status of the ground-water reservoir. (See part 2.) In order to determine more closely the effects of recharge and discharge upon the ground-water body, water levels were measured in 32 wells at bimonthly intervals during the year. (See part 3.) A more detailed record of the fluctuations was obtained by a recording gage that was installed in 1946 on well 12.11.9.222. (See part 4.) A total of 196 measurements of water level was made during the year, including 6 made in the recorder well.

Precipitation and Pumpage

Precipitation is the ultimate source of the ground water in the aquifer, whether it seeps directly to the aquifer through the extensive lava beds exposed in the valley, by penetration through the alluvium in the valley, by being absorbed on the outcrop of the aquifer in the Zuni Mountains to the south, or by leakage from Bluewater Reservoir and Bluewater Canyon. Recharge to the aquifer also occurs from the various canals and from return of irrigation water applied upon the lands.

Indirectly precipitation also causes changes in the water levels by reducing the amount of pumpage of ground water necessary for crops. However, as most of the irrigated land is given to raising truck crops, precipitation generally causes only a minor change in the amount of pumping necessary.

The precipitation at Bluewater in 1949 was 11.05 inches, slightly greater than in 1948, and about 0.7 inch above normal. Precipitation at Grants was 9.6 inches. The above-normal precipitation occurred in April through August, the main part of the growing season, and in July amounted to 4.1 inches, 2.1 inches above normal.

On the basis of measured power input and water output ratios and electric power records on 14 of the 19 used irrigation wells in 1949, and estimates of the pumpage from the other five wells, the pumpage of ground water for irrigation in 1949 is believed to have been 6,900 acre-feet, a decrease from the 9,300 acre-feet and 10,300 acre-feet estimated as having been pumped in 1948 and 1947 respectively. In addition to the ground water, 6,550 acre-feet of surface water, 370 acre-feet more than in 1948, was released from the Bluewater Reservoir for irrigation, according to records furnished by Mr. Clifford Young of the Bluewater-Toltec Irrigation District. Of the surface water, 5,800 acre-feet, 71 percent, was delivered to farms and laterals and 29 percent lost by seepage. Forty percent of the seepage loss, 750 acre-feet, reportedly occurred upstream from the canal division point in NE¼SE¼ sec. 9, T. 12 N., R. 11 W. Much of the surface water was used on lands in the upper part of the district. Because of the use of surface water, ground-water pumpage in the upper part of the district was reduced from about 1,100 acre-feet in 1947 and 230 acre-feet in 1948 to about 150 acre-feet in 1949. The acreage irrigated in 1949 by surface and ground waters is believed to have been about 5,700 acres, about 1,200 acres more than was irrigated in 1947 by ground water alone. Revised estimates indicate about 5,500 acres irrigated by ground and surface waters in 1948.

Changes of Water Levels

Water levels in the area of ground-water pumping in the lower part of the district reached their highest stages in March. Pumping began in late March and the water levels declined steadily, with only minor rises during cessations of pumping, and reached their lowest stages generally in August, the end of the pumping season. A minor amount of water was pumped in the remainder of the year during which time the water levels steadily rose.

As a result of the smaller amount of pumpage in 1949 the low levels reached in August were higher than in August 1948 and as the recovery of water levels after the end of the pumping season in the area of heavy pumping was greater than the drawdown during the pumping season, a net rise of

generally more than 1 foot in the stage of the water levels was shown at the end of the year. The net rise in water level in this area in 1949 compares with net declines of about 1 and 3 feet in 1948 and 1947, respectively.

The fluctuation of water level in 1949 in the lightly pumped area in the upper part of the district was similar to that in the preceding year when surface water was also available. The water level in the recorder well, 12.11.9.222, which is about a quarter of a mile northeast of the main canal, fell gradually from the high level reached in November 1948 until mid-March when a slight rise began. The rise was accelerated somewhat after release of water from Bluewater Reservoir April 22 and, with the exception of two short periods, continued to rise to the high level in early October when releases from Bluewater Reservoir were stopped. The total rise was about 9 feet. A decline of about 3 feet occurred during the remainder of the year. The water level in this well showed a net rise of 5 feet in 1949 as compared with a net rise of 7.4 feet in 1948 and net declines of 11.9 feet in 1946 and 8.3 feet in 1947.

The average net change in water levels from February 1949 to February 1950 in 14 wells, which were also measured in February 1946, 1947, and 1948, was a rise of 1.41 feet, as compared with a rise in the same wells in 1948 of 0.17 foot and declines of 3.91 and 5.88 feet in 1947 and 1946, respectively. In spite of the net annual rise in water level in the last 2 years, the water levels at the end of 1949 were on an average 8.2 feet lower than in February 1946 when records began. With the exception of one windmill well, the water levels in the observation wells in the irrigated area all showed net rises. The maximum recorded rise for the year was 5.19 feet in a well near the mouth of Bluewater Canyon where the effects of pumping are small and recharge high.

The large decline of water level in the lightly pumped area in the upper part of the district that occurred during 1946 and 1947 when water was not released from the reservoir, as contrasted with the large rises in 1948 and 1949 when water was released from the reservoir seem to confirm the opinion that a part of the recharge to the aquifer, at least in the upper area of the district, is derived from losses that occur in the lower part of the canyon and in the canal in that area. The rise in 1949 in the heavily pumped area in the lower part of the district is due in

part to a reduction in pumping in 1949 as well as in 1948, in part to a naturally decreasing rate of decline which results from pumping from ground-water storage, and probably in part to an increased amount of ground-water recharge, which, in this area, may be due largely to increased precipitation on the outcrop of the aquifer in the Zuni Mountains to the southwest.

As pumping of ground water is a new discharge imposed upon a previously more or less stable ground-water system, over-all declines in water level in this area are expected to continue, as long as pumping continues, until the effect of the pumping reaches the area of and diverts, if possible, an equal amount of the ground-water that discharges from the swampy area south of Grants near San Rafael. In years when adequate water is available in Blue-water Reservoir to furnish a supply of surface water to the area, the ground water will be replenished to some extent. Also, with an adequate supply of surface water the amount of pumping will be reduced if additional lands are not irrigated. In view of these factors and as the decline of water level is greater in the initial period of pumping than later, it seems probable that the net decline of water levels in succeeding years will be somewhat less than occurred during 1946 and 1947, unless an increased pumpage of ground water occurs.

Part 2. Water levels in February 1949 and highest and lowest recorded levels in February, below land-surface datum, and change from February 1948 to February 1949, in feet

Location number	Owner	See also part	Water levels							Record	
			Feb. 1949 Level	Day	Change 1948-49	Highest Level	Year	Lowest Level	Year	Began	Years missing
9.10.10.432	Fred Mirabal	.	j84.42	10	-0.38	84.04	48	j84.42	49	48	
10.9.26.224	Robert Gottlieb	3	8.96	10	-.21	ak 8.75	48	8.96	49	47	
10.10.10.200	Joe Padilla	3	10.28	10	+.60	9.83	47	10.88	48	47	
11.10.4.111	M. C. Read	3	73.62	10	-1.23	69.25	47	73.62	49	47	
4.211	J. C. Church	3	67.88	10	-2.13	57.97	46	67.88	49	46	
4.222	E. E. Harden	3	65.17	10	-2.14	60.85	47	65.17	49	47	
5.214	V. M. Vidal	3	73.70	10	-1.28	68.99	47	73.70	49	47	
8.111	Salvador Milan	3	78.46	10	-1.34	73.75	47	78.46	49	47	
8.122	Salvador Milan	5	63.78	10	.....	.....	..	.....	..	49	
8.222	Salvador Milan	3	67.60	10	-1.28	57.85	46	67.60	49	46	
8.344	Salvador Milan	.	57.56	11	-1.35	53.02	47	57.56	49	47	
9.222	A. R. Card	3	63.72	10	-1.30	54.49	46	63.72	49	46	
9.242	A. R. Card	3	61.66	10	-1.22	52.24	46	61.66	49	46	
10.111	Milton Harding	(Measurements discontinued, well dry)				51.92	46	55.26	47	46	48,49
16.121	Frank Wilson	3	55.88	10	-1.43	46.47	46	55.88	49	46	
16.142	Frank Wilson	3	54.25	11	-1.48	45.50	46	54.25	49	46	
16.431	Frank Wilson	(Incorrect designation used previously for well 11.10.212.12, which see)									
17.222	Salvado Milan	.	51.97	11	.....	47.84	47	51.97	49	47	48
21.212	Salvado Milan	(Measurements discontinued)								48	49
26.411	City of Grants well 3	3	d9.77	10	+1.40	7.95	47	d9.77	49	47	48
27.410	Cecil Moore	3	37.50	10	-.66	35.59	47	37.50	49	47	
34.400	Unknown	3	14.82	10	-.41	14.41	48	14.82	49	48	
12.10.23.233	G. T. Henderson	3	124.41	10	-1.39	115.59	46	124.41	49	46	
29.434	A. R. Card	3	77.55	10	-.91	69.23	46	77.55	49	46	
30.111	E. E. Harden	.	112.66	10	-1.06	107.98	47	112.66	49	47	
30.242	E. E. Harden	3	95.86	10	-1.29	b90.93	47	95.86	49	47	
30.332	J. C. Church	.	111.29	10	.....	106.54	47	111.29	49	47	48
30.412	Fred Freae	3	100.27	10	-1.24	90.04	46	100.27	49	46	
30.421	Milton Harding	3	98.61	10	-1.23	88.38	46	98.61	49	46	
32.111	J. C. Church	3	91.93	10	-1.23	82.09	46	91.93	49	46	
12.11.5.413	J. C. Church	3,5	191.99	11	.....	.....	..	.....	..	49	
9.114	J. C. Church	(Measurements discontinued)				.....	..	.....	..	48	49
9.114a	J. C. Church	3,5	136.14	11	.....	.....	..	.....	..	49	
9.222	J. C. Church	4	128.52	..	+7.40	115.70	46	f136.51	48	46	
9.424	George Rowley	3	101.97	11	+3.03	99.23	47	105.00	48	47	
11.343	Tietzen and Hassell	3	123.46	11	+.18	123.46	49	123.64	48	48	

* See footnotes at end of table.

Part 2 --Continued

Location number	Owner	See also part	Water levels							Record	
			Feb. 1949 Level	Day	Change 1948-49	Highest Level	Year	Lowest Level	Year	Began	Years missing
12.11.15.341	Edward Freas	3	107.29	11	+6.50	106.07	47	113.79	48	47	
16.223	E. E. Harden	3	124.84	11	+6.65	123.68	47	131.49	48	47	
20.424	J. F. Nielson	3	243.83	11	+6.75	243.83	49	250.58	48	47	
22.414	Mr. Hassell	3	122.95	11	+6.12	110.59	46	129.07	48	46	
23.233	Harmon and Read	3	68.98	10	+1.77	68.98	49	70.75	48	47	
25.223	J. C. Church	3	110.57	10	-1.12	100.18	46	110.57	49	46	
25.223a	J. C. Church	3	111.64	10	-1.12	106.82	47	111.64	49	47	
25.311	Harmon and Read	.	128.52	10	-1.04	124.50	47	128.52	49	47	
27.222	Harold Prewitt	.	154.76	11	+1.36	154.76	49	156.12	48	48	

a Pumping.
b Pumping recently.
d Nearby well pumping recently.
f From recorder charts.
j Measurement uncertain.
k Also 1947.

Part 3

Water levels, below land-surface datum, during 1949

Location number Owner	10.9. 26.224 Gottlieb	10.10. 10.200 Padilla	11.10. 4.111 Read	11.10. 4.211 Church	11.10. 4.222 Harden	11.10. 5.214 Vidal	11.10. 8.111 Milan	11.10. 8.222 Milan
Feb. 10	8.96	10.28	73.62	67.88	65.17	73.70	78.46	67.60
Apr. 11,12	b8.92	11.07	73.92	68.03	65.22	75.10	79.91	a72.26
June 8,9,11	a8.86	12.05	74.05	(a)	(a)	79.68	85.10	a78.20
Aug. 18	j7.95	b12.58	a75.35	a83.14	(a)	78.73	a94.73	72.73
Oct. 11,12	b8.61	11.92	d78.43	(a)	66.66	75.52	80.24	69.30
Dec. 14,15	a8.92	10.95	73.39	68.41	66.08	a73.43	78.36	67.47

Location number Owner	11.10. 9.222 Card	11.10. 9.242 Card	11.10. 16.121 Wilson	11.10. 16.142 Wilson	11.10. 26.411 City of Grants	11.10. 27.410 Moore	11.10. 34.400 Unknown	12.10. 23.233 Henderson
Feb. 10,11	63.72	61.66	55.88	54.25	d9.77	37.50	14.82	124.41
Apr. 11,12	65.42	62.52	56.51	54.29	9.08	37.64	15.10	a149.04
June 8,9,11	70.16	67.05	a80.41	54.92	11.79	39.03	16.13	a150.30
Aug. 18	a93.57	c67.99	a79.07	.....	c14.98	39.06	16.18	a155.47
Oct. 11	65.23	63.24	57.39	55.19	11.69	38.37	15.50	125.87
Dec. 14	63.65	61.72	55.88	.....	c13.52	37.59	14.87	124.31

Location number Owner	12.10. 29.434 Card	12.10. 30.242 Harden	12.10. 30.412 Freas	12.10. 30.421 Harding	12.10. 32.111 Church	12.11. 5.413 Church	12.11. 9.114a Church	12.11. 9.424 Rowley
Feb. 10,11	77.55	95.86	100.27	98.61	91.93	191.99	136.14	101.97
Apr. 11,12	77.44	.....	102.17	100.48	a95.67	190.03	ak155.	101.35
June 9,10	a100.72	98.41	106.95	105.24	a100.7	186.75	131.05	99.94
Aug. 18,19	a101.19	98.23	a107.45	c104.19	97.40	184.00	123.30	98.46
Oct. 11,12	77.42	96.46	101.89	100.21	93.61	183.46	128.46	97.57
Dec. 14,15	77.33	97.17	100.09	a101.30	91.83	186.00	133.51	98.53

Location number Owner	12.11. 11.343 Berryhill	12.11. 15.341 Freas	12.11 16.223 Harden	12.11. 20.424 Nielson	12.11. 22.414 Hassell	12.11. 23.233 Harmon & Read	12.11. 25.223 Church	12.11. 25.22[illegible]a Church
Feb. 10,11	123.46	107.29	124.84	243.83	122.95	68.98	110.57	111.64
Apr. 11,12	123.64	107.79	125.10	243.46	123.28	69.38	c113.63	a116.81
June 10,11	123.83	103.65	121.11	241.16	121.36	67.34	(a)	118.75
Aug. 18,19	123.61	101.90	119.99	239.02	120.11	a67.70	c116.08	a120.4[illegible]
Oct. 12	123.38	99.78	117.25	236.29	117.94	b67.20	112.00	113.12
Dec. 15	.....	101.15	118.74	.....	118.53	68.10	110.17	111.29

a Pumping.
b Pumping recently.
c Nearby well pumping.
d Nearby well pumping recently.
j Flood water ran into well.
k Air gage reading.

Part 4

12.11.9.222. J. C. Church.

Highest daily water level, from recorder charts

Day	Jan.	Feb.	Mar.	Apr.	May	June
1	128.12	.....	128.59	128.31	126.84	126.84
2	128.05	.....	128.68	128.28	126.80	124.47
3	128.08	.....	128.79	128.28	126.73	124.38
4	.....	.....	128.75	128.34	126.65	124.40
5	.....	.....	128.74	128.37	126.62	124.38
6	.....	.....	128.79	128.28	126.56	124.28
7	.....	.....	128.69	128.17	126.49	124.22
8	.....	.....	128.67	128.06	126.39	124.20
9	.....	.....	128.73	128.00	126.29	124.20
10	.....	.....	128.71	128.02	126.23	124.21
11	.....	128.49	128.64	128.06	126.05	124.18
12	.....	128.39	128.65	128.20	125.98	124.05
13	.....	128.47	128.72	128.07	125.96	124.07
14	.....	128.50	128.78	127.88	125.94	124.11
15	.....	128.60	128.71	127.84	125.84	124.09
16	.....	128.75	128.67	127.92	125.75	124.00
17	.....	128.69	128.72	127.79	125.69	124.02
18	.....	128.66	128.75	127.69	125.67	124.11
19	.....	128.66	128.67	127.62	125.55	123.98
20	.....	128.67	128.54	127.57	125.42	123.85
21	.....	128.75	128.57	127.57	125.37	123.81
22	.....	128.73	128.56	127.57	125.36	123.68
23	.....	128.63	128.48	127.52	125.27	123.56
24	.....	128.59	128.51	127.41	125.22	123.41
25	.....	128.51	128.47	127.31	125.10	123.41
26	.....	128.51	128.50	127.24	124.99	123.39
27	.....	128.55	128.52	127.21	124.88	123.39
28	.....	128.53	128.34	127.05	124.75	123.35
29	.....		128.33	126.87	124.68	123.40
30	.....		128.41	126.83	124.67	123.80
31	.....		128.29		124.60	

Highest daily water level, from recorder charts

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	124.07	123.04	120.88	.....	120.97	.....
2	124.32	122.99	120.83	.....	121.03	.....
3	124.39	122.94	120.48	.....	121.07	.....
4	124.17	122.89	120.35	.....	121.04	.....
5	124.08	122.79	120.27	.....	120.99	.....
6	124.04	122.70	120.21	.....	120.95	.....
7	123.98	122.60	120.16	.....	120.99	.....
8	123.93	122.45	120.14	.....	121.01	.....
9	123.91	122.41	120.09	120.11	121.04	.....
10	123.84	122.11	120.03	120.20	121.05	.....
11	123.73	122.38	120.02	120.30	121.04	.....
12	123.68	122.27	120.06	120.42	121.31	.....
13	123.60	122.18	120.04	120.42	121.46	.....
14	123.58	122.08	120.01	120.47	121.43	122.47
15	123.56	122.00	120.00	120.50	121.41	122.42
16	123.50	121.91	119.99	120.47	121.52	122.32
17	123.42	121.94	119.99	120.44	121.63	122.36
18	123.42	122.09	120.04	120.38	121.65	122.53
19	123.41	122.37	120.09	120.33	121.61	122.44
20	123.38	122.26	120.04	120.43	121.62	122.41
21	123.28	122.18	120.05	120.52	121.70	122.45
22	123.24	122.09	120.10	120.64	121.71	122.65
23	123.22	122.07	120.12	120.66	121.75	122.74

12.11.9.222--Continued.

Highest daily water level, from recorder charts

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.
24	123.20	121.75	120.04	120.74	121.78	122.61
25	123.17	121.48	119.99	120.74	.....	122.63
26	123.06	121.26	120.04	120.75	.....	122.80
27	123.03	121.19	120.04	120.75	.....	122.88
28	123.03	121.00	119.99	120.80	.....	122.94
29	123.02	120.94	120.04	120.77	.....	122.92
30	123.02	120.92	.....	120.79	.....	122.92
31	123.05	120.89		120.96		123.00

Part 5

Miscellaneous Data Concerning Observation Wells

11.10.8.122. Milan. Drilled irrigation well, equipped with turbine pump, diameter 14 inches, depth 150 feet. Reference point, top of 4- by 4-foot concrete pump base, 2.97 feet above land-surface datum. Dec. 10, 1947, 67.84; Aug. 5, 1948, 86.0, pumping.

11.10.21.212. Milan. Published incorrectly as 11.10.16.431.

12.11.5.413. Church. Drilled well, no equipment, diameter 8 inches, depth 357 feet. Oct. 6, 1948, 191.60; Dec. 10, 1948, 192.03.

12.11.9.114a. Church. On north side of irrigation district canal, northwest of house, about 15 feet east of test well 12.11.9.114. Drilled irrigation well, diameter 16 inches, depth 523 feet. Reference point, surface of 4- by 4-foot concrete pump base, 0.70 foot above land-surface datum. Apr. 6, 1948, 144.14; June 11, 137.83; Aug. 5, 1948, 135.80; Oct. 6, 135.14; Dec. 10, 136.38.

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